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Autumn 2004

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Quarterly Bulletin—Autumn 2004

Markets and operations
(pages 265–81)

This article reviews developments since the Summer 2004 *Quarterly Bulletin* in sterling and global financial markets, in UK market structure and in the Bank's official operations.

Research and analysis
(pages 282–320)

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.

How should we think about consumer confidence? (by Stuart Berry of the Bank's Sterling Markets Division and Melissa Davey of the Bank's Conjunctural Assessment and Projections Division). In the United Kingdom, movements in confidence have been closely related to annual real consumption growth over the past 30 years. But both these series have common determinants. This article shows that the standard economic determinants of consumption such as income, wealth and interest rates can 'explain' a large part of the movements in consumer confidence. However, confidence is also affected by non-economic events, or may react in a complex manner to unusual economic events. We find that such 'unexplained' movements in consumer confidence do not appear to be closely related to households' spending decisions on average. So although consumer confidence indices are published well ahead of official data on consumer spending it is important to consider why confidence has changed before assessing its likely implications for consumption.

Household secured debt (by Matthew Hancock of the Bank's Monetary Assessment and Strategy Division and Rob Wood of the Bank's Structural Economic Analysis Division). Deteriorating household sector balance sheets were widely thought to have exacerbated the recession in the early 1990s. In recent years households have once more significantly increased their indebtedness; this has been matched in aggregate by an accumulation of financial assets. This article analyses homeowners' financial positions since the late 1980s using disaggregated data, to assess the extent to which debt may exert an important influence on the macroeconomy in the current conjuncture.

Housing equity and consumption: insights from the Survey of English Housing (by Andrew Benito of the Bank's Structural Economic Analysis Division and John Power of the Bank's Inflation Report and Bulletin Division). This article examines data from the 2003 Survey of English Housing (SEH) in order to shed light on the link between gross equity withdrawal and spending. Our analysis suggests that the bulk of gross withdrawals is not consumed in the near term. Those who sell a property without purchasing another one and those who trade down are more likely to pay off debt or save withdrawn equity than spend the proceeds. Remortgagors and those who obtain further secured advances are likely to spend the equity, but we estimate that their equity constitutes only about a quarter of total gross withdrawals. Of those who spend equity, financing home improvements rather than purchasing consumer goods appears to be the most important use of funds. That is consistent with the relatively weak relationship between consumption and mortgage equity withdrawal recently observed in aggregate data.

Why has world trade grown faster than world output? (by Mark Dean of the Bank's International Economic Analysis Division and Maria Sebastia-Barriel of the Bank's Structural Economic Analysis Division). Between 1980 and 2002, world trade has more than tripled while world output has 'only' doubled. The rise in trade relative to output is common across countries and regions, although the relative growth in trade and output varies greatly. This article attempts to explain why the ratio of world trade to output has increased over recent decades. It provides a brief review of the key determinants of trade growth and identifies proxies that will enable us to quantify the relative importance of the different channels. We estimate this across a panel of ten developed countries. This will allow us to understand better the path of world trade and thus the demand for UK exports. Furthermore this approach will help us to distinguish between long-run trends in trade growth and cyclical movements around it.

Markets and operations

This article reviews developments since the Summer Quarterly Bulletin *in sterling and global financial markets, in market structure and in the Bank's official operations.*(1)

- *International short-term nominal forward interest rates fell, as market participants appeared to revise downwards their views on the likely future path of monetary policy. Nominal forward rates at longer maturities also fell.*
- *Equity markets were little changed and, except in Japan, remained close to the levels prevailing at the start of 2004. Credit spreads narrowed, particularly on high-yield and emerging market bonds.*
- *Measures of implied and realised volatility have generally been low across financial markets.*
- *The Bank announced on 22 July the main results of its review of its operations in the sterling money markets.*

As had been widely anticipated, official interest rates in both the United Kingdom and the United States were raised over the period, each by 50 basis points in two 25 basis point moves. But market participants' views on the likely *future* path of monetary policy were revised downwards, with international short-term nominal forward rates falling by between 9 and 24 basis points (Table A).

This revision to market expectations about future interest rates followed higher oil prices and mixed US data releases (particularly weak labour market statistics for June and July), prompting some commentators to question the strength of the US recovery. Economists' forecasts for US GDP growth in 2004 were revised downwards in July and August, having ticked up slightly in June (Chart 1). Conversely, forecasts for 2004 GDP growth for the euro area and the United Kingdom rose

Table A
Summary of changes in market prices

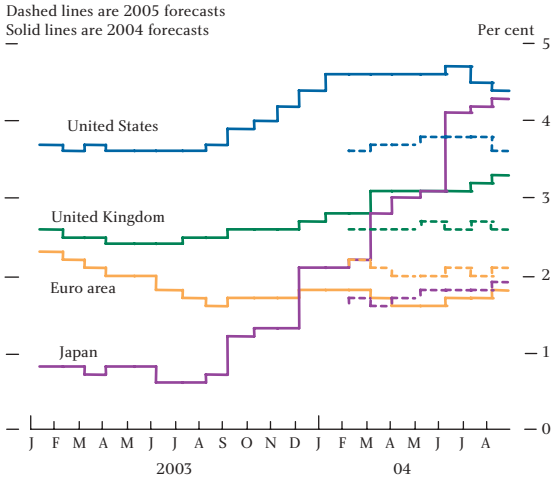
	28 May	3 Sept.	*Change*
December 2004 three-month interbank interest rate (per cent)			
United Kingdom	5.34	5.10	*-24 bp*
Euro area	2.37	2.28	*-9 bp*
United States	2.42	2.32	*-10 bp*
Ten-year nominal forward rate (per cent) (a)			
United Kingdom	4.95	4.84	*-10 bp*
Euro area	5.47	5.18	*-28 bp*
United States	6.72	6.37	*-35 bp*
Equity indices (domestic currency)			
FTSE 100 index	4431	4551	*2.7%*
Euro Stoxx 50 index	2737	2739	*0.1%*
S&P 500 index	1121	1114	*-0.6%*
Exchange rates			
Sterling effective exchange rate	105.8	103.4	*-2.3%*
$/€ exchange rate	1.22	1.21	*-0.8%*

Columns may not correspond exactly due to rounding.

Sources: Bank of England and Bloomberg.

(a) Three-month forward rates, derived from the Bank's government liability curves. Estimates of the UK curve are published daily on the Bank of England's web site at www.bankofengland.co.uk/statistics/yieldcurve/main.htm.

Chart 1
Expected real GDP growth



Source: Consensus Economics.

(1) The period under review is 28 May (the data cut-off for the previous *Quarterly Bulletin*) to 3 September.

slightly, and there was a more significant upward revision to the 2004 GDP growth forecast for Japan.

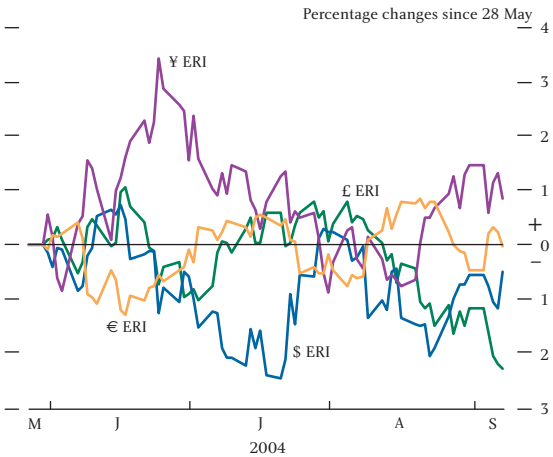
While the mixed news about the outlook for the global recovery had an impact on near-term interest rate expectations, there was no apparent increase in market measures of uncertainty over the future course of monetary policy. In fact, implied volatility derived from options prices generally fell across interest rate, foreign exchange and equity markets.

Low levels of volatility may have made it more difficult for speculative accounts, such as hedge funds, to generate high returns. There has also been a further narrowing of credit spreads as well as a flattening of the US yield curve, with the latter reducing the pay-off to investors of the so-called 'carry trade' (funding short to invest long). At the same time, there have been some early signs that rises in official rates may be relieving the pressure on institutions to find absolute returns.

Foreign exchange and short-term interest rates

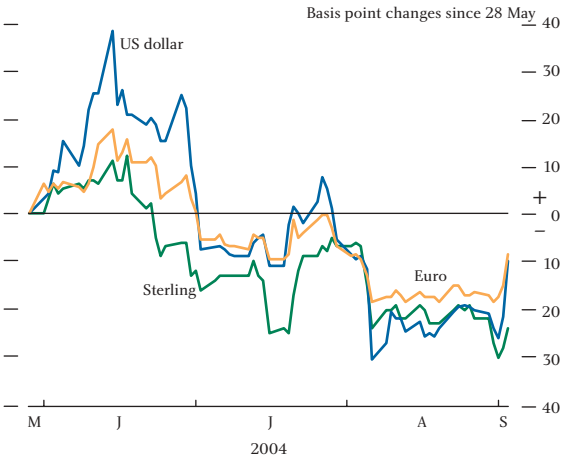
Movements in the foreign exchange market largely reflected the mixed pattern of economic news (Chart 2). Consistent with increased optimism about the outlook for the Japanese economy, there was a marked appreciation of the yen exchange rate index (ERI) during June, although much of this subsequently reversed, in part following higher oil prices, as Japan has a relatively high dependence on oil imports. The dollar ERI, meanwhile, fell during late June and early July, but subsequently rose to end the period little changed. Over the period as a whole, the largest change was for the sterling ERI, which fell during August, having moved within a narrow range during June and July.

Chart 2
Cumulative changes in exchange rate indices



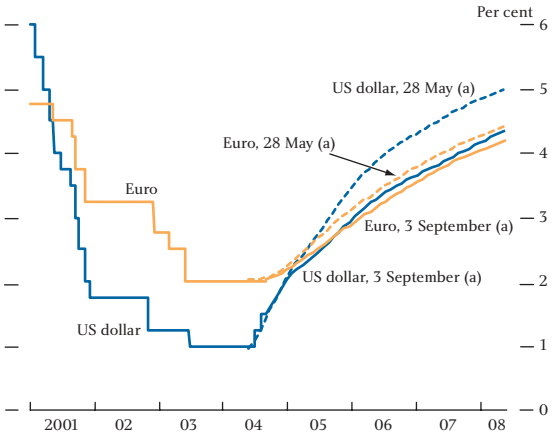
Short-term nominal forward interest rates fell across all currencies, as market participants appeared to scale back their expectations of near-term rises in official rates (Charts 3 and 4). This downward revision was particularly marked for short-term US dollar forward rates following the weak US data releases. Having risen by nearly 40 basis points in early June, dollar forward rates implied at the end of 2004 ended the period around 10 basis points lower. Euro rates fell by a similar amount and, by 3 September, market prices suggested that neither US dollar nor euro rates were expected to rise above 4% until around end-2007 (Chart 4).

Chart 3
Cumulative changes in three-month interest rates implied by December 2004 futures contracts



Sources: Bloomberg and LIFFE.

Chart 4
International official and forward market interest rates



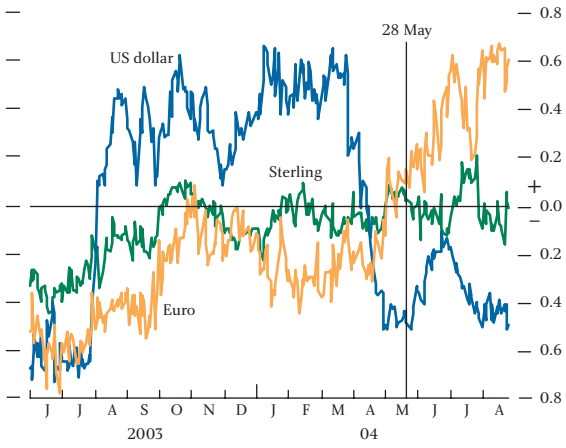
(a) Two-week nominal forward rates implied by repo rates and prices of government securities.

For sterling rates, at least part of the fall in short-term nominal forward rates appeared to be led by UK-specific developments; for example, the market's interpretation of the statement accompanying the Monetary Policy Committee's (MPC's) decision to raise official interest

rates in August. But the comovement between international interest rates, highlighted in the Summer *Quarterly Bulletin*, remained high over the period, with euro and sterling markets also reacting to key US data releases, such as the employment reports.

In contrast, the perceived balance of near-term risks around the level of short-term interest rates varied across currencies, according to a measure of skew derived from short-term interest rate options (Chart 5). For dollar rates, risks to the market's central expectation remained skewed to the downside, despite the fall in the level of nominal forward rates. Conversely, for euro rates, the skew became more positive over the period, suggesting that, as market participants shifted down their central expectation, they perceived a risk that rates could rise sooner than expected. The perceived risks around the level of sterling interest rates, meanwhile, remained broadly balanced.

Chart 5
Six-month implied skew from interest rate options

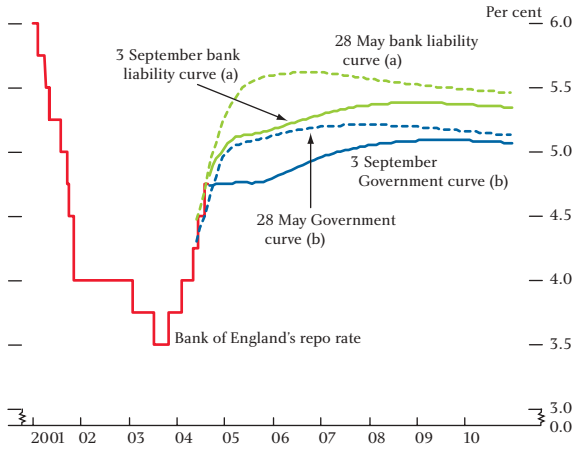


Sources: Bank of England, CME and LIFFE.

In the United Kingdom, the MPC raised its repo rate by 25 basis points at two of its three meetings held during the period, on 10 June and 5 August. Given differences in the stance of monetary policy across the various currency areas, the sterling forward curve was flatter than both the dollar and euro curves on 3 September, but at a lower level than at the beginning of the review period, reflecting the general downward revision of policy expectations (Chart 6).

On 3 September, the profile of short-term forward sterling rates out to 2010 implied by gilt prices and

Chart 6
Sterling official and forward market interest rates

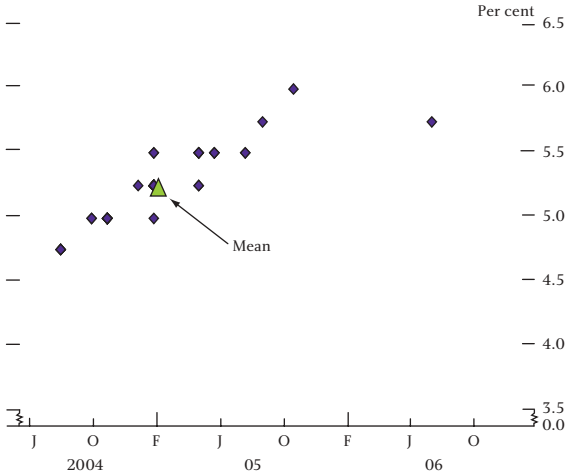


(a) Two-week nominal forward rates implied by a curve fitted to a combination of instruments that settle on Libor.
(b) Two-week nominal forward rates implied by GC repo/gilt curve.

GC gilt repo rates lay in a range of around 35 basis points. By way of comparison, the profile of forward rates implied by instruments that settle on Libor rates lay in a wider range of around 55 basis points. While neither of these measures is perfect as an indicator of market expectations of future official rates,(1) taken together they suggest that the market anticipated only moderate further increases in sterling rates—two further 25 basis point interest rate rises at most—and that the central expectation was for fairly stable rates beyond mid-2005.

A similar view was reflected in survey-based measures of interest rate expectations. The latest Reuters poll of

Chart 7
Reuters poll of timing and level of next peak in UK official interest rates(a)



Sources: Bank calculations and Reuters.

(a) Survey conducted 31 August to 2 September.

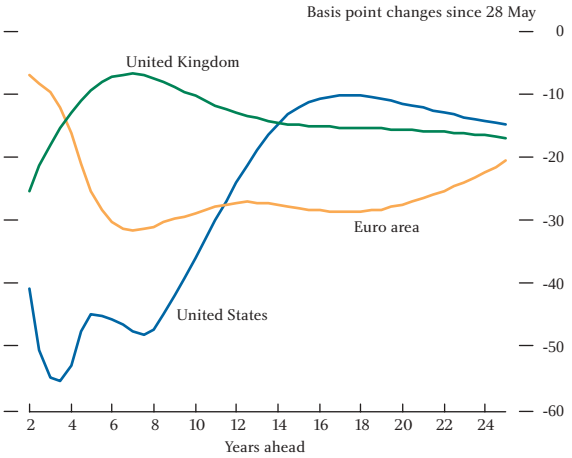
(1) Forward rates implied by both sets of instruments will differ from expected future official interest rates because of risk premia. Of the two, the gilt curve will be closer, as the other curve is fitted to instruments that settle on Libor, which embodies a credit premium for banking sector risk. On the other hand, short sterling futures are less likely to be affected by technical factors that may distort the gilt curve from time to time.

economists for their views on the timing and level of the next peak in UK official interest rates was conducted from 31 August to 2 September (Chart 7). The mean result put the peak at 5.24% (nearly 50 basis points above the repo rate prevailing on 3 September) in February 2005.

Longer-term interest rates

Looking further along the curve, longer-term forward rates also fell across all three currencies (Chart 8).

Chart 8
Changes in implied nominal forward rates(a)

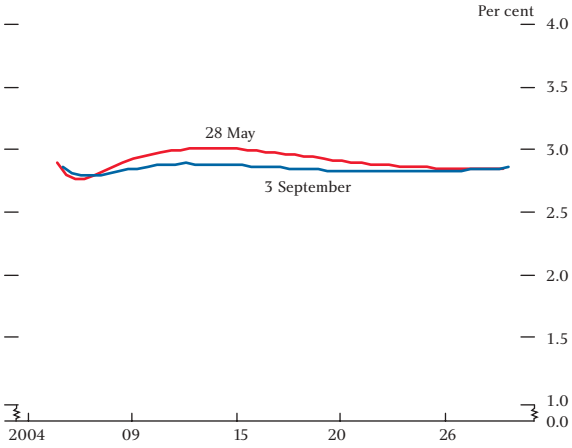


(a) Instantaneous forward rates derived from the Bank's government liability curves.

Sterling forward rates fell by around 7 to 15 basis points at medium to long horizons. According to a forward-looking measure of RPI inflation, derived from the difference between yields on nominal and index-linked gilts, much of the fall can be attributed to a downward revision to market expectations about future inflation and/or inflation risk premia. Over the period, the forward inflation curve flattened, with the entire curve now within a 10 basis point range (Chart 9).

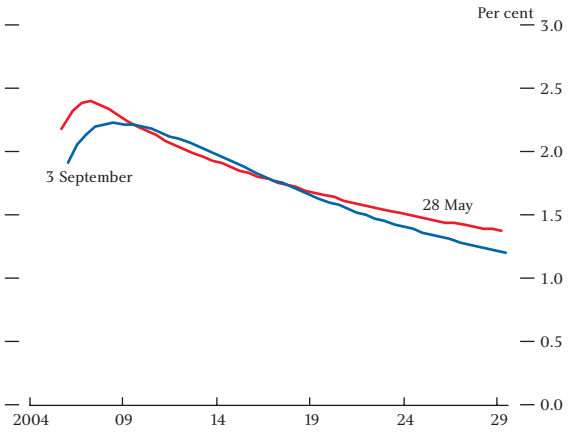
At shorter horizons, and at the very long end of the curve, falls in sterling nominal forward rates were accompanied by falls in sterling real rates (as implied by index-linked gilts) (Chart 10). The level of sterling real forward rates at very long maturities fell further below the range that most economic commentators would regard as plausible in terms of economic fundamentals alone. As mentioned in previous *Quarterly Bulletins*, these low levels are likely to reflect high demand for

Chart 9
Sterling forward break-even RPI inflation curve



Source: Bank of England.

Chart 10
Sterling real forward rates



Source: Bank of England.

index-linked gilts by institutional investors, in particular pension funds. By their nature, pension funds have long-duration liabilities and these often offer protection against inflation. These liabilities need to be matched by long-duration, inflation-protected assets, such as index-linked gilts. Given the relatively low yields on these gilts, contacts report that funds may increasingly turn to other instruments to protect the value of their assets against inflation, such as inflation swaps, particularly those indexed to the limited price index (LPI).(1)(2)

Using information from the growing inflation swaps market, a similar decomposition into their real and inflation components can be obtained for euro nominal forward rates. Chart 11 shows that euro inflation

(1) The LPI is a price index used by pension funds. It rises with the retail prices index, but with a floor of 0% and currently a cap of 5%.
(2) For further details on inflation swaps, see the box entitled 'Inflation-protected bonds and swaps' (2004), *Bank of England Quarterly Bulletin*, Summer, pages 124–25.

forward rates were changed little over the period as a whole, whereas euro real forward rates fell. This may conceivably reflect the concerns over the strength of the recovery, or simply rising demand for inflation protection in the euro area.

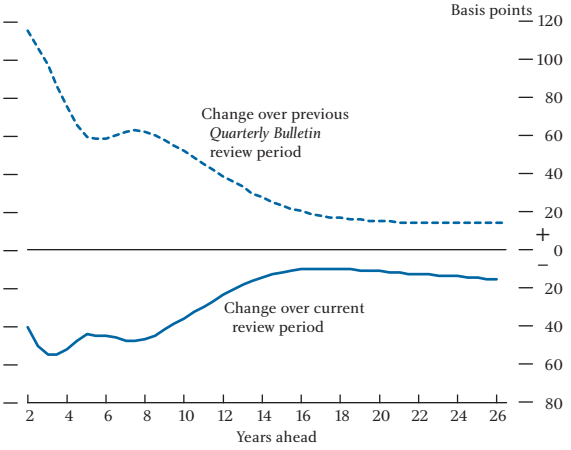
Chart 11
Implied euro real and inflation forward rates(a)

Sources: Bank of England and Bloomberg.

(a) Euro real rates subtract inflation swap rates from nominal government yields, which are not directly comparable due to credit risk.

In the US dollar market, the fall in longer-term nominal forward rates over the period reversed much of the rise reported in the Summer *Quarterly Bulletin* (Chart 12). As noted then, such marked movements in response to individual data releases, particularly at the longer end of the curve, are relatively unusual. Nevertheless, mixed news about the US economy and its impact on market perceptions about the global recovery do appear to have been the main drivers behind these movements.

Chart 12
Changes in US dollar forward rates(a)

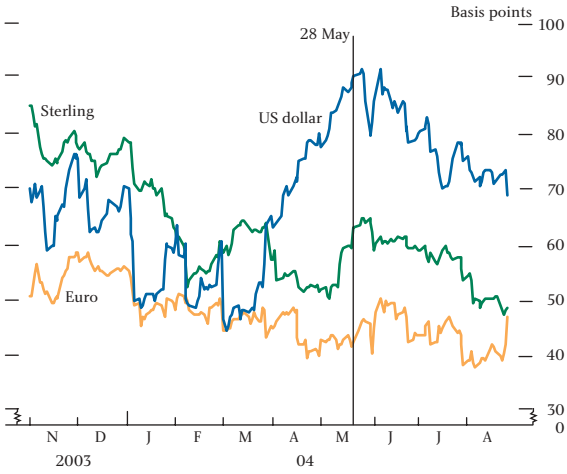


(a) Instantaneous forward rates derived from the Bank's government liability curve.

Developments in market volatility

Other things being equal, mixed news about the strength of the global recovery might have been expected to lead to higher levels of near-term uncertainty around the future path of monetary policy. But measures of short-term interest rate uncertainty, derived from options prices, fell or were little changed (Chart 13). One likely explanation is that the rises in official interest rates that occurred over the period, particularly in the United States, had the effect of resolving some of the uncertainty evident earlier in the year over the upward path of US official rates from the low starting level. Indeed, dollar interest rate uncertainty fell most.

Chart 13
Six-month implied volatility from interest rate options



Source: Bank of England.

More difficult to explain are measures of uncertainty at longer maturities derived from swaptions prices. Given the marked fluctuations in longer-term dollar forward interest rates observed over the past six months, short-term uncertainty over, say, five-year rates, might have been expected to increase. Similarly, given that official dollar interest rates have remained relatively low over the period, and the expected pace of tightening has been revised downwards, uncertainty over dollar interest rates at longer horizons (ie for longer-expiry options) might have been expected to pick up. According to swaptions data, however, uncertainty over five-year swap rates viewed over both the near term and longer horizons actually fell over the period (Chart 14). Moreover, both measures were at low levels in early September compared with recent experience.

One explanation for this is that the swaptions market may be affected by flows related to the hedging of

mortgage-backed securities (MBS).[1] Contacts report that MBS-related hedging has remained relatively light, despite the recent falls in longer-term dollar yields, which may account for the generally low level of swaption volatility, at least relative to the same period last year. Nevertheless, such distortions aside, it is somewhat puzzling that interest rate volatility around medium-term maturity rates has not increased significantly in light of the marked reaction of long-horizon forward rates to US data releases.

Chart 14
Implied volatility from US dollar swaptions

Source: JPMorgan Chase and Co.

The generally low level of implied volatility across asset classes has prompted some commentators to suggest that it has been unusually low, given both geopolitical risks and the mixed signals on the global economic outlook. Other commentators have maintained that the low levels of implied volatility are consistent with recent experience: realised volatility has also been low and, with the exception of the sterling and dollar short-term interest rate markets, the relationship between the two has not appeared unusual in an historical context (Table B).

Table B
Implied and realised volatility

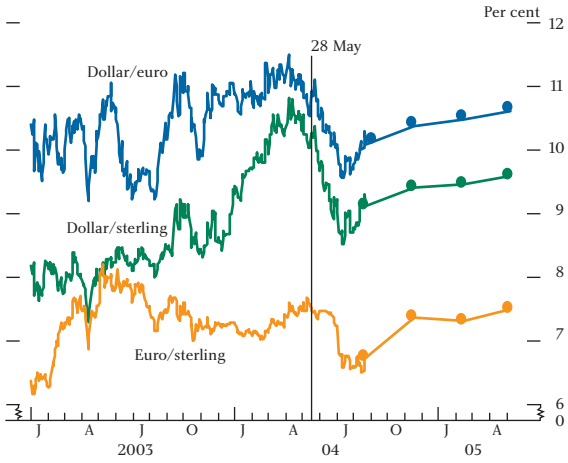
	Three-month volatility on 3 September		Longer-term averages of three-month volatility (a)	
	Implied	Realised	Implied	Realised
Short-term interest rates (basis points)				
United Kingdom	36.1	42.8	59.8	63.2
Euro area	33.5	25.9	49.8	46.4
United States	45.6	61.7	55.5	58.6
Equities (per cent)				
FTSE 100	11.6	10.5	22.1	19.2
Euro Stoxx 50	15.5	13.2	25.9	24.5
S&P 500	13.7	10.9	21.3	19.2
Foreign exchange (per cent)				
$/£	9.4	8.1	8.6	7.5
€/£	7.0	6.4	8.1	7.4
$/€	10.4	9.3	11.0	10.0

Sources: Bank calculations, Bloomberg and UBS.

(a) Average values since 1998, except euro exchange rates, which are average values since 1999.

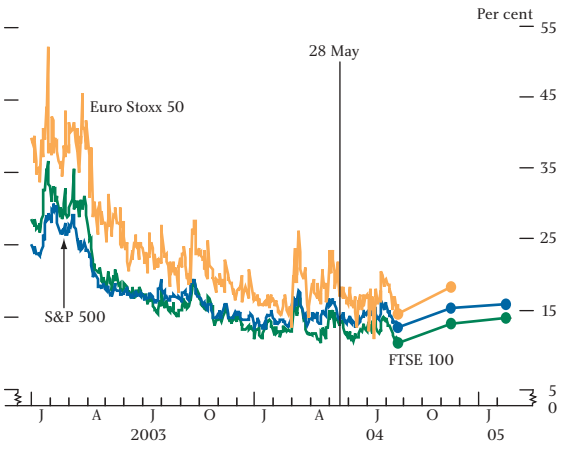
In foreign exchange markets, implied volatility has fallen over the period for all the major cross rates (Chart 15), whereas in equity markets implied volatility changed little, but remained at historically low levels (Chart 16).

Chart 15
Three-month implied foreign exchange volatilities(a)



(a) The solid lines show three-month implied volatility in per cent. The dots indicate the three-month implied volatility three, six, nine and twelve months ahead respectively.

Chart 16
Three-month implied volatilities of selected equity indices(a)



(a) The solid lines show three-month implied volatility in per cent. The dots indicate the three-month implied volatility three, six and (where possible) nine months ahead respectively.

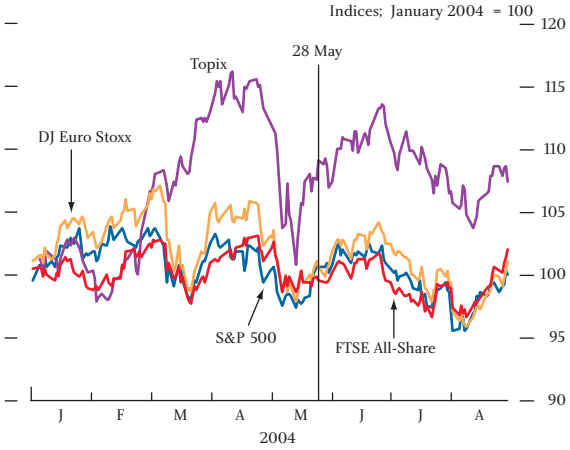
Equity and credit markets

With short-term measures of uncertainty in equity markets largely unchanged, equity price movements over the period may have been influenced more by changes in earnings growth expectations and/or real interest rates. Consistent with a fall in sterling real interest rates, which would tend to lead to higher equity prices via lower discount rates, the FTSE All-Share increased over

(1) See 'Markets and operations' (2003), *Bank of England Quarterly Bulletin*, Autumn, pages 258–59.

the period. But despite some falls in international real interest rates, other major equity indices were little changed or slightly lower over the period (Chart 17). With the exception of the Topix, the major equity indices have changed little over the course of 2004, perhaps suggesting that investors will increasingly focus on strategies that do not rely on equity strength to generate returns. This so-called 'search for alpha' is described in the box on pages 272–73.

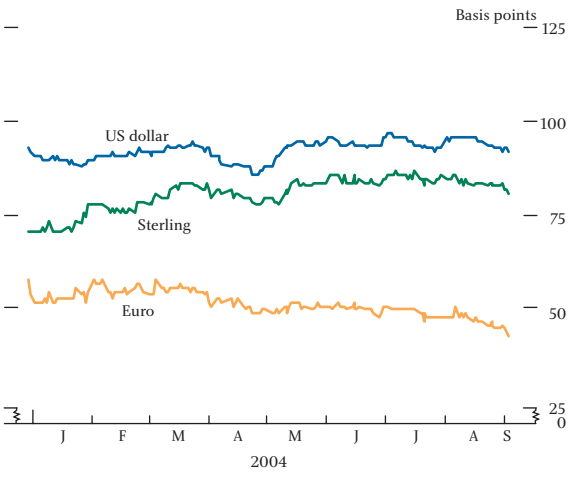
Chart 17
Selected equity indices (local currency)



Source: Thomson Financial Datastream.

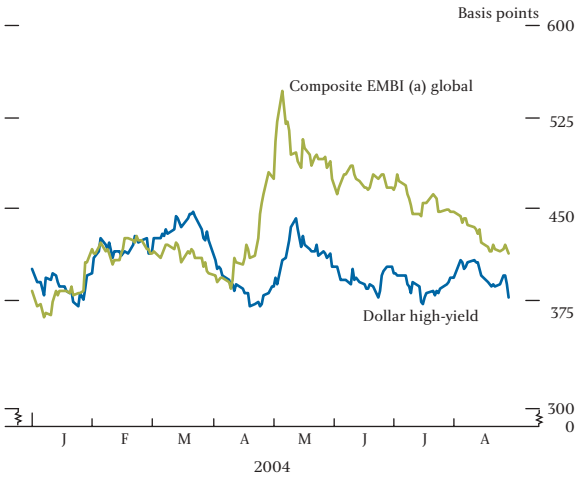
Credit spreads on investment-grade bonds narrowed very slightly (Chart 18). And there was a more significant narrowing in credit spreads on high-yield and emerging market bonds, reversing some of the sharp widening observed earlier in the year (Chart 19). This suggests that, while there may have been some slowing in the expected pace of recovery, the market perceived little sign of a more significant prospective downturn that might be accompanied by corporate credit losses.

Chart 18
International investment-grade option-adjusted bond spreads



Source: Merrill Lynch.

Chart 19
Emerging market and high-yield bond spreads

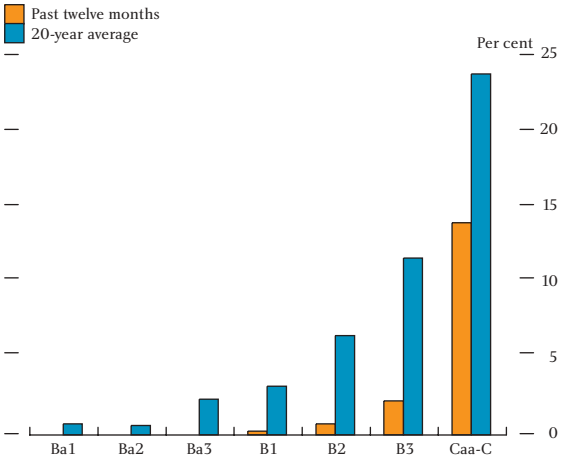


Sources: JPMorgan Chase and Co. and Merrill Lynch.

(a) Emerging Markets Bond Index.

Narrower spreads might have reflected a combination of continuing high levels of investor demand for high-yield bonds, and a benign outlook for credit markets. Evidence for the latter is provided by ratings agencies' forecasts for default rates, which remained low, consistent with recent outturns; globally, Moody's annual default rate on high-yield bonds fell to 2.9% in July. And while a substantial proportion of the very lowest-rated bonds have defaulted, default rates for most high-yield bonds were well below past averages (Chart 20).

Chart 20
Annual default rates by credit rating (all currencies)



Source: Moody's.

Given an apparently favourable outlook and high investor demand, high-yield issuance appears to have picked up again, following a decline in 2004 Q2. But risks to investors remained. Through 2004, the level of issuance rated B- or below, in both the United States and the euro area, has been high relative to its historical average and some ratings agencies have noted

Search for alpha

Innovations in portfolio management and asset allocation are increasingly being referred to by the asset management industry in terms of a 'search for alpha' or 'portable-alpha strategies'. Broadly, 'alpha' describes returns on an asset that are predictable but do not rely on any exposure (or 'beta') to the market portfolio, usually defined in terms of a major equity index. Unsurprisingly, the recent focus on alpha follows a period of weak equity market returns (since 2000), with many asset managers expecting future returns to be somewhat lower than the high levels experienced in the late 1980s and 1990s.(1)

In formal terms, alpha is best explained in terms of the capital asset pricing model (CAPM).(2) Letting $E(.)$ denote expectations of the return on the security, r_i, and on the market portfolio, r_m, and r_f the relevant risk-free interest rate:

$$E(r_i) - r_f = \alpha + \beta\left[E(r_m) - r_f\right]$$

In this model, beta (β) determines the size of the market risk premium—the expected excess return (over the risk-free rate of interest) on a security that compensates the investor for the asset's non-diversifiable exposure to the market portfolio. Alpha (α) can then be identified as the expected excess return on the asset over and above the market risk premium.

If securities are efficiently priced by the market in the CAPM model, $\alpha = 0$; investors are compensated only for an asset's non-diversifiable exposure to the market portfolio. In this context, therefore, a non-zero value for alpha is a pricing error and can be identified only with respect to the expectations of an individual or set of individuals, rather than to the expectations of the market as a whole.

Practitioners in the fund management industry translate these concepts to refer to two types of return: that generated from market exposure, beta, and that from security selection, alpha. They also refer, in turn, to two sources of beta: 'passive' beta returns from exposure to the market; and 'active' beta returns from skill in market timing—increasing market exposure in rising markets, and decreasing it in falling markets. Alpha returns derive from (skill in) security selection within an asset class, and do not depend on the direction of the overall market.(3)

The so-called 'portable alpha' strategies advocated by a number of fund managers and investment consultants entail seeking to enhance returns from one asset class by adding alpha return from another asset class. For example, the market in smaller-capitalisation equities is sometimes suggested as one potential source of excess return, on the grounds that it might be less efficient than the market for large-capitalisation stocks.

As an example, suppose that a pension fund has allocated 40% of its portfolio to S&P 500 equities, and wishes to outperform the index without significantly changing its underlying exposure. It might seek to achieve this by selling a portion of its S&P 500 portfolio, and investing the proceeds in a combination of a long position in S&P 500 index futures (to maintain its beta exposure relative to the S&P 500), and an investment in a small-cap stocks fund to generate alpha. It might offset its small-cap beta exposure by selling Russell 2000 index futures. By this means, it would hope to enhance its return on S&P 500 equities by substituting for the alpha on that portion of S&P 500 stocks sold with what it believes will be a potentially higher alpha on the small-cap equities it has bought with the proceeds. Alternatives for obtaining such small-cap alpha exposure might include investing in a long/short small-cap equity hedge fund.

Beyond this, some asset managers and consultants are advising more fundamental changes in underlying portfolios—also typically described as portable alpha strategies but involving a more eclectic asset mix. This might involve a number of long-duration fixed income investments (such as conventional bonds, asset-backed bonds etc) intended to provide a hedge for part of a pension fund's quasi fixed-income liabilities, together with suggested potential sources

(1) A part may also have been played by many corporate defined benefit pension funds aiming to improve their asset/liability management, for example, by seeking returns that are less volatile, and less correlated with the market portfolio.
(2) See, for example, Copeland, T E and Weston, J F (1992), *Financial theory and corporate policy*.
(3) An active manager following a pure alpha strategy would maintain a beta of 1.0 relative to the benchmark, and all of the active management return would derive from skill in individual security selection.

of alpha such as small and mid-cap equities, international equities, emerging market economy assets, private equity, and investments in absolute-return funds (essentially hedge funds).

There are, inevitably, questions as to the sustainability of the expected investment outperformance—that is, of the so-called alpha. First, to the extent that it has been possible consistently to generate alpha, that may partly reflect the relative inefficiency of a variety of markets that are small and illiquid in comparison with, say, the capitalisation of US S&P 500 stocks. Large-scale asset allocations to these sectors might increase efficiency and, over time, erode any alpha available.

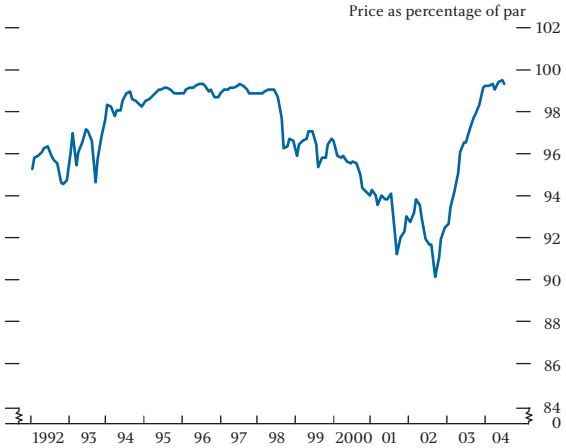
Second, some such investment strategies may not inherently deliver supernormal returns; rather, a more diversified approach may generate returns that are less correlated with US large-capitalisation equities. Greater diversification may, in other words, improve correlation with a wider definition of the 'market' that approximates more closely to an investor's true benchmark.

Third, it cannot be ruled out that these proposed and actual asset reallocations embody a degree of exuberance, with part of the motivation deriving from particular asset classes having generated high total returns in the period leading up to the reallocation. If so, it is possible that this, in turn, has perhaps reflected relatively large amounts of money already having been committed to what are relatively small asset classes in a 'search for yield'. If so, there may be scope for these asset prices to adjust, or for their growth rates to moderate from those seen over the past year or so. In that case, investment funds engaged in a search for alpha may find themselves disappointed. The Bank will continue to monitor these developments as part of efforts to understand the investment management industry.

that, in the past, such a high concentration of sub investment-grade issuance at very low ratings has been followed by increased default rates in subsequent years.

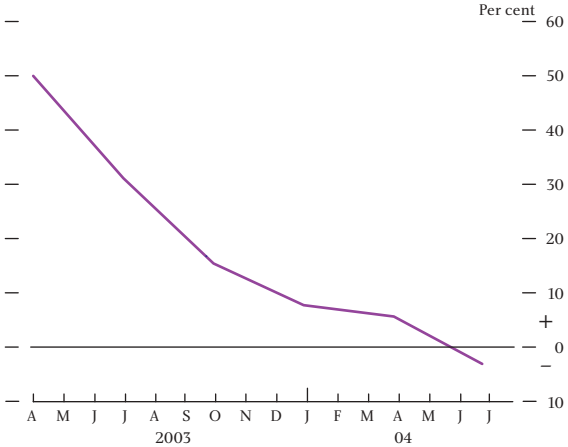
Continuing strong demand for high-yield assets has also been reflected in a further tightening of US leveraged loan spreads; on average, loans are now almost trading at par (Chart 21). And competition to lend among banks has reportedly been high, allowing some borrowers to loosen, or even to remove, covenants. Respondents to the ECB euro-area bank lending survey reported more easing than tightening of covenants during 2004 Q2, the first time a net easing has been reported since the survey began in January 2003 (Chart 22).(1)

Chart 21
US leveraged loans index



Sources: Bloomberg and Credit Suisse.

Chart 22
Net percentage of European banks reporting a tightening of covenants



Source: ECB's bank lending survey.

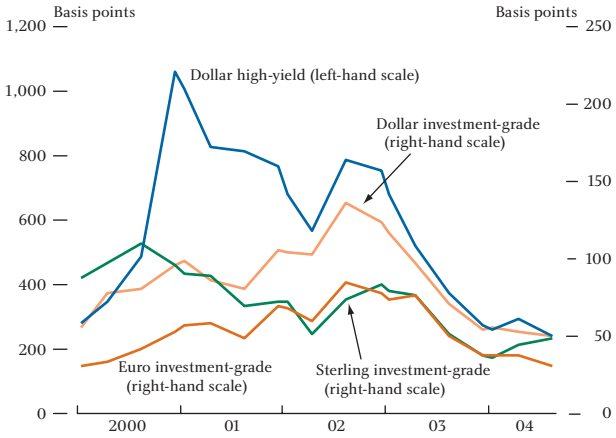
(1) This is consistent with market anecdote reported in the section entitled 'Risks in the international financial system' (2004), *Bank of England Financial Stability Review*, June, pages 50–51.

Search for yield

The narrowing of leveraged loan and high-yield credit spreads, together with developments in interest rate markets, little change in equities and generally low levels of market volatility, may have made the task of generating higher returns more challenging.

For example, the narrowing in high-yield spreads has also been accompanied by a narrowing of the distribution of spreads within each rating group, particularly for high-yield credits (Chart 23). The interquartile range of spreads on a large number of high-yield US dollar corporate bonds fell in 2004 Q2, and remained at a historically low level. This may indicate a lack of investor discrimination, and also suggests less opportunity to increase yield by taking firm-specific credit risk.

Chart 23
Interquartile range of corporate spreads by rating

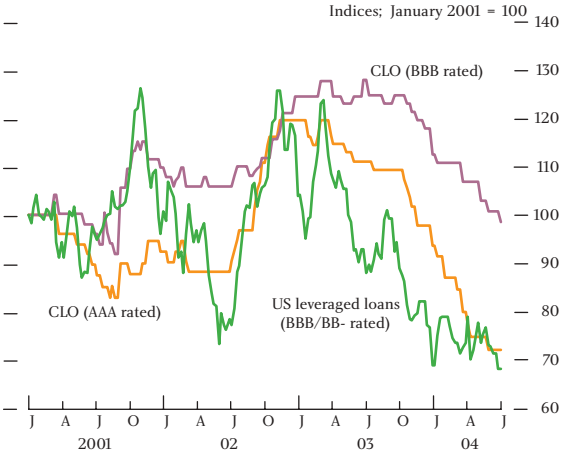


Sources: Merrill Lynch and Bank of England calculations.

Market contacts further reported that, should the downward trend in leveraged loan spreads be sustained, the recent high growth in repackaging these loans as collateralised loan obligations (CLOs) may slow. This is because, as the spreads on the underlying collateral (ie the leveraged loans) tighten, it becomes increasingly difficult to structure a CLO that provides potential investors with a sufficient increase in yield over the underlying collateral. Indeed, spreads on leveraged loan CLOs have tightened notably through 2004, broadly following the tightening in spreads on the leveraged loans themselves, but with a lag (Chart 24).

Perhaps reflecting this fall in spreads on CLOs and other established collateralised debt obligations (CDOs), dealers have increasingly looked to alternative types of collateral to structure CDOs. In particular, market

Chart 24
Collateralised loan obligation (CLO) and US leveraged loan spreads



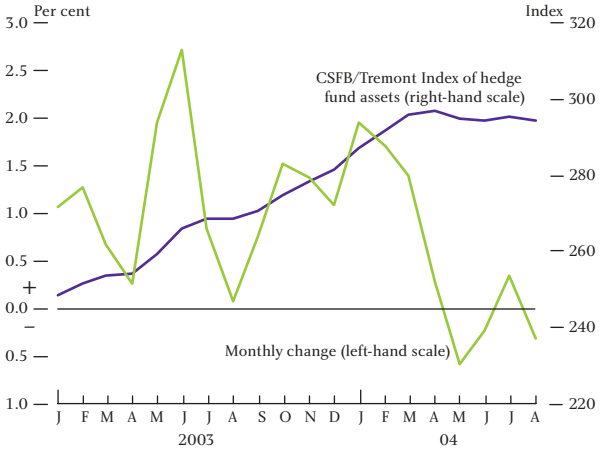
Sources: JP Morgan Chase and Co. and S&P/LCD.

contacts have reported significant growth in issuance of so-called 'CDO-squared' products. The collateral underlying a CDO-squared is typically a selection of mezzanine tranches from a pool of standard CDOs.

An alternative strategy for finding yield that has been widely reported over the past year or so has been to exploit the generally low level of official interest rates using a yield curve 'carry trade' (borrowing at the short end to fund investment at a longer maturity). At least, in principle, yield curve carry trades should benefit from the low level of dollar interest rate volatility noted earlier, since—if it is expected to persist—the likelihood of movements in bond prices leading to capital losses and hence eroding the interest rate 'carry' would be reduced. Nevertheless, data on speculative positions and anecdotal evidence from market contacts suggest that there has been some unwinding of these trades. In part, this is likely to have reflected the flattening of the dollar yield curve over the review period.

On balance, therefore, designing strategies to find yield may have become more challenging. Against this backdrop, some speculative players, such as hedge funds, may have struggled to make positive returns. Although it is difficult to gauge the state of the hedge fund industry, available data suggest that hedge funds have not sustained the strong asset growth experienced in 2003. Indeed, there is some evidence to suggest that asset values have fallen over the period (Chart 25). Contacts also report that some hedge funds may have been enhancing returns by writing more options, ie selling volatility, thereby earning the premium income.

Chart 25
Hedge fund performance



Sources: Bloomberg and CSFB/Tremont.

Looking forward, a rising interest rate environment might be expected to relieve the pressure on institutions to find absolute returns. Indeed, there are some early signs of a change in investor behaviour. For example, issuance of structured notes designed to enhance yield through exposure to interest rate risk fell significantly through 2004 Q2. Any future developments will be reported in future editions of the *Quarterly Bulletin* as well as the *Bank of England's Financial Stability Review*.

Developments in market structure

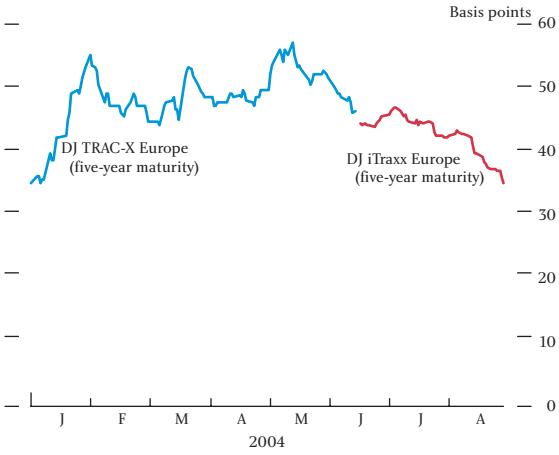
This section provides an update on some structural developments in credit markets, examines the potential market impact of new rules on capital requirements for UK insurance companies, and notes a recent development in the electronic trading of euro-denominated government bonds.

Credit indices

On 21 June, two widely used families of tradable European credit default swap (CDS) indices (DJ TRAC-X and iBoxx) merged into a single product, known as DJ iTraxx Europe. This was followed on 26 July by the launch of a new suite of Asian CDS indices—DJ iTraxx Asia—which were also based on existing indices.(1)

The indices are designed to represent the average credit premia on a pool of liquid CDSs. In terms of composition, there is a considerable degree of overlap between the new and old European benchmark indices, which is reflected in a similar level of premia between the indices (Chart 26). And in line with the old products, the new suite of iTraxx credit indices includes an array of tradable subindices, listed in Table C. In addition to sectoral subindices, there is a European 'HiVol' index, which contains the 30 credits from the benchmark index with the highest CDS spreads, and a 'Crossover' index, which contains 30 lower-rated credits.

Chart 26
European credit default swap index spreads(a)



Source: JPMorgan Chase and Co.

(a) Spreads are for the 'on-the-run' index, ie they refer to the most recently issued basket of underlying credits.

Table C
Overview of DJ iTraxx CDS indices

Index name (number of credits at launch)

Europe
DJ iTraxx Europe (125)
- Senior Financials (25)
- Subordinated Financials (25) (a)
- Non-financials (100)
  - Energy (20)
  - Industrial (20)
  - TMT (20)
  - Consumer cyclical (15)
  - Consumer non-cyclical (15)
  - Autos and auto parts (10)

DJ iTraxx Europe HiVol (30)
DJ iTraxx Europe Crossover (30)
DJ iTraxx Europe Corporate (52) (b)

Asia
DJ iTraxx Asia excluding Japan (30)
- DJ iTraxx Korea (8)
- DJ iTraxx Greater China (9)
- DJ iTraxx Rest of Asia (13)

DJ iTraxx Australia (25)
DJ iTraxx CJ (50)

Source: International Index Company.

(a) Same names as Senior Financial.
(b) Selection of non-financials from DJ iBoxx Corporate Bond Index.

One aim of the merger, which was largely welcomed by market participants, was to consolidate liquidity by creating a single benchmark. Early evidence suggests that there has already been some improvement in the liquidity of the European indices. In July, bid/ask spreads on the DJ iTraxx European benchmark index averaged around half a basis point. Prior to the merger,

(1) These mergers followed similar developments in CDS indices in other markets earlier in the year. More specifically, it was announced in April that the North American and emerging market CDS indices produced by TRAC-X and iBoxx would merge, to form a single suite of indices known as DJ CDX.

the average bid/ask spread on the (discontinued) TRAC-X Europe index was around 1 basis point.

Increased standardisation and liquidity should improve the attractiveness of credit indices for potential investors. For investment purposes, CDS indices are a convenient tool for taking 'directional' views on general credit conditions, since they provide easy access to a diversified credit portfolio at a lower cost than would be incurred by constructing a basket of single-name CDSs.

It is also possible to trade standardised 'tranches' of the benchmark DJ iTraxx Europe index. Analogous to the tranches of a collateralised debt obligation (CDO), these tranches realise losses depending on their level of subordination and the co-dependence of default in the underlying credits. Investors can speculate on this co-dependence by trading in the relevant standardised tranches. They can also be used as a hedging tool. For example, dealers structuring bespoke single-tranche CDOs will be exposed to some risk of changes in co-dependence of default, which they may be able to hedge using the standardised CDS index tranches.(1) The effectiveness of such a hedge, however, would depend on the degree of overlap in the pool of credits underlying the bespoke CDO and the pool underlying the CDS index.

Capital requirements for UK insurance companies

On 2 July, the United Kingdom's Financial Services Authority (FSA) published revised rules on capital requirements for UK life and non-life insurers. Some economic commentators suggested that, as institutions re-optimise portfolios to meet new regulatory requirements, the proposals could have triggered large reallocations across asset classes, perhaps influencing market prices. Anecdotal evidence from Bank contacts, however, suggests that the new rules have not had any significant market impact.

The new rules followed a period of industry consultation, most recently in the form of Consultation Paper (CP) 195 and CP190, which addressed capital requirements and balance sheet provisions for, respectively, life insurers and non-life insurers.(2) The published rules, Policy Statement (PS) 04/16, confirmed that many of the proposals discussed during the consultation period would be adopted, and formalised a regime intended to relate the capital buffer held by insurance companies more closely to the riskiness of their assets and liabilities. The rules are due to be incorporated in the FSA's Integrated Prudential Sourcebook, and will take effect on 31 December 2004.

One important aspect of the new regime is the so-called 'twin peaks' approach to setting capital requirements for with-profits life firms. This requires these firms to calculate capital levels under two sets of assumptions, the so-called 'regulatory peak' and 'realistic peak'. The minimum regulatory capital requirement (or capital resource requirement) is determined by whichever 'peak' is higher. The 'regulatory peak' is designed to represent 'a prudent actuarial assessment' of the reserves required to meet contractual obligations (for example, preannounced bonuses). The 'realistic peak' represents an assessment of the reserves required to cover 'expected' liabilities (including future and terminal bonuses) plus a risk capital margin (RCM).

The RCM is designed to provide a cushion against possible losses arising from unusual market price movements or economic conditions—in effect, a stress test. Broadly, it stipulates a test covering five classes of risk: credit, equity, interest rate, real estate and persistency (to cover policy termination risk). For any given asset, the RCM outlined in the new proposals generally implies a slightly lower capital requirement than under the CP195 proposals.

There have also been some changes to the calibration of the credit test. More specifically, under CP195, the risk weightings assigned to each asset were determined by the asset's credit rating. As a consequence, the CP195 proposals, if implemented, could have created an incentive for insurers to invest in the cheapest (and therefore the riskiest) assets for any given rating, in order to maximise the return to regulatory capital.

In an attempt to eliminate the incentive to hold the riskiest asset for any given credit rating, PS04/16 links the RCM credit stress test to each individual asset's credit spread. A potential implication of this change is that insurers may have the incentive to switch into shorter-maturity and/or higher-rated assets. This is because credit spreads—especially on assets with a relatively low credit rating (BBB-rated assets, for example)—tend to be higher the longer the maturity of

(1) For more details on single-tranche CDOs, see the box entitled 'Developments in portfolio credit risk transfer markets' (2003), *Bank of England Financial Stability Review*, December, pages 27–28.
(2) For more information about CP195, see *Bank of England Financial Stability Review*, December 2003, pages 83–84.

the asset. In practice, however, Bank contacts reported little anecdotal evidence of large sales of long-maturity BBB-rated assets.

In any case, the potential for any such sales (were they to materialise) to have a significant influence on market prices should, in an efficient market, be limited. This is because other investors might be expected to take advantage of any significant sales, meaning the price impact would be transitory. Indeed, many contacts believe that increased demand from pension funds may at least partially offset any fall in insurers' demand for corporate bonds.

Another change from CP195 is that the new rules exempt certain AAA-rated supranational bonds from the RCM tests (in common with highly rated sovereign debt). Also, the new rules require the credit test to be applied to derivatives, which will ensure that credit risks held 'synthetically' through derivatives positions will also be subject to capital requirements.

Bank contacts have reported that, relative to CP195, the revised tests are generally expected to have a lower distortionary impact, in terms of giving insurers incentives to behave in a suboptimal way. That said, several market participants have commented that some aspects of the new regime require further clarification: it is not obvious, for example, exactly how credit tests will be applied to counterparty credit risk on interest rate swaps and other derivatives.

Contacts have further noted that PS04/16 may result in increased use of collateral in interest rate swaps (via a credit support annex (CSA)), should insurers seek to reduce capital charges arising from counterparty credit exposure. Wider use of CSAs, which would reduce counterparty exposure between financial institutions, would be welcome from a financial stability standpoint.

EuroMTS

In recent years, trading via electronic platforms has become increasingly widespread, and is now available across a range of asset classes. For more mature markets, these platforms have enabled dealers to cut the costs of wholesale trading, while often increasing price transparency. In the euro area, the main platform for trading those euro-denominated government bonds with amounts outstanding greater than €5 billion is EuroMTS. This is essentially a group of domestic markets, each separately governed, but trading across a common platform. Trading is anonymous, with participants notified of counterparties only after execution of the trade. A key element of EuroMTS is that participants have market-making obligations, ie they must display tradable prices for a certain number of hours each day.

On 2 August, Citigroup transacted a large deal predominantly via MTS platforms, selling around 200 euro-denominated bonds in less than two minutes, estimated to have been around €11 billion in value. Despite the large volumes, there was no disruption to the system, and dealers obliged to quote a price on the system found themselves holding these bonds, seeking to hedge their positions in bond futures markets. With many other dealers in a similar position, hedging at prevailing bond prices became difficult. As a result, Citigroup was able to buy back bonds at a much reduced price only half an hour later.

Shortly afterwards, a number of dealers withdrew their quotes from the system; and press reports suggested that some dealers would withdraw from the electronic platforms permanently if another such instance arose. This would obviously have implications for the liquidity that the system is able to provide. On 4 August, MTS announced a temporary regulation that imposed an automatic minimum two-month suspension if any participant executed trades within a two-minute period across the main EuroMTS platform and offshoots in Ireland, Austria and Greece, the total volume of which breached some maximum limit. This restriction, however, has since been lifted.

This episode marks a new stage in the evolution of inter-dealer trading among wholesale market participants, and so for the infrastructure underpinning liquidity in some asset markets.

Bank of England official operations

Changes in the Bank of England balance sheet

There was an increase in both the sterling and foreign-currency components of the Bank's balance sheet over the period (Table D). The Bank maintained the value of its three-month and six-month euro-denominated bills outstanding at €3.6 billion by rolling over bills at maturity. Average three-month issuance spreads improved slightly to 8.7 basis points below Euribor, compared with 8.2 basis points in the previous period (March-May); average six-month bills

Table D
Simplified version of Bank of England consolidated(a) balance sheet(b)

£ billions

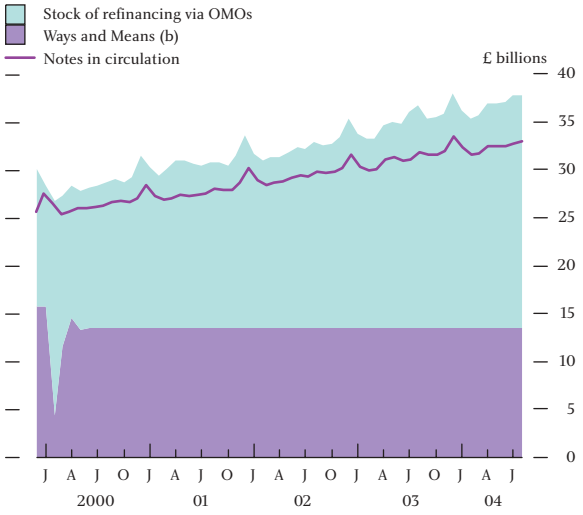
Liabilities	3 Sept.	28 May	Assets	3 Sept.	28 May
Bank note issue	39	38	Stock of refinancing	27	26
Settlement bank balances	<0.1	<0.1	Ways and Means advance	13	13
Other sterling deposits, cash ratio deposits and the Bank of England's capital and reserves	8	7	Other sterling-denominated assets	4	4
Foreign currency denominated liabilities	11	10	Foreign currency denominated assets	14	12
Total (c)	**58**	**55**	**Total** (c)	**58**	**55**

(a) For accounting purposes the Bank of England's balance sheet is divided into two accounting entities: Issue Department and Banking Department. See 'Components of the Bank of England's balance sheet' (2003), *Bank of England Quarterly Bulletin*, Spring, page 18.
(b) Based on published weekly Bank Returns. The Bank also uses currency, foreign exchange and interest rate swaps to hedge and manage currency and non-sterling interest rate exposures—see the Bank's 2003 *Annual Report*, pages 53 and 73–79 for a description.
(c) Figures may not sum to totals due to rounding.

spreads were 10.3 basis points below Euribor, compared with 10.5 basis points previously.

Notes in circulation, by far the largest sterling liability on the Bank's balance sheet, increased over the period, with peaks due to seasonal demand over the late-May and August Bank Holidays and more gradual month-on-month increases due to trend growth in demand for notes (Chart 27).

Chart 27
Bank notes in circulation, the stock of OMO refinancing, and 'Ways and Means'(a)

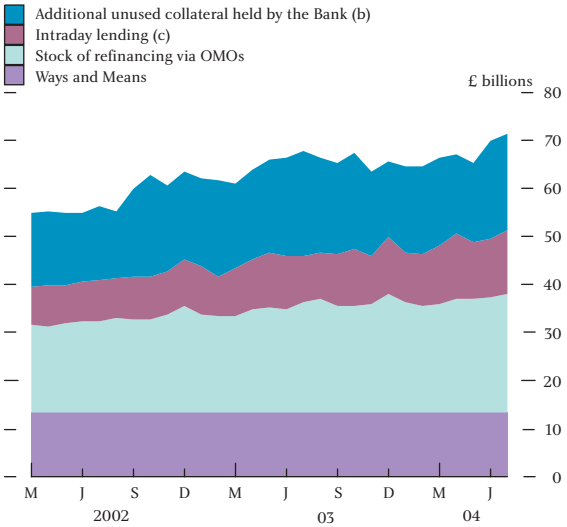


(a) Monthly averages.
(b) An illiquid advance to HM Government. This fluctuated prior to the transfer of responsibility for UK central government cash management to the UK Debt Management Office in April 2000. The Ways and Means is now usually constant, varying only very occasionally.

That part of the stock of refinancing provided by short-term open market operations (OMOs) moved broadly in line with the level of notes in circulation (Chart 27). Other sterling-denominated assets, including the Bank's sterling bond portfolio, were broadly unchanged. The box on page 279 describes recent technical changes to the Bank's management of this portfolio.

During the day, the Bank's balance sheet is considerably larger, reflecting for the most part lending to settlement banks (via reverse repo of high quality securities) to enable them to make payments in the Bank's RTGS payments system (Chart 28). For every bank that borrows from the Bank intraday, another has an intraday deposit—it is a closed system. Partly for this reason, actual borrowing from the Bank during the day is always considerably lower than the total collateral held by the Bank against settlement banks' potential borrowing.

Chart 28
Intraday liquidity and the stock of refinancing(a)



(a) Monthly averages.
(b) Monthly averages of maximum intraday collateral posted in CHAPS sterling less maximum intraday borrowing.
(c) Monthly average of each day's maximum intraday borrowing in CHAPS sterling.

Both intraday and in OMOs, the Bank lends against high quality euro as well as sterling-denominated debt securities. During the latest quarter, the Bank's counterparties made increased use of euro-denominated collateral against the Bank's lending in OMOs (Chart 29). This was despite some apparent increase in

Management of the Bank's sterling bond portfolio

A central bank's balance sheet is unique due to its role as the monopoly supplier of central bank money. Located on the liability side of the central bank's balance sheet, central bank money acts as the final settlement asset for all payments made in the economy and includes banknotes together with banks' settlement or reserve account balances.

On the other side of the balance sheet, central banks vary in their choice of assets. But they are typically of a high quality so that, consistent with a stability-oriented monetary policy regime, the integrity of central bank money is assured. In many cases, a portion of assets is rolled over at short maturities, not only in order to implement monetary policy decisions but also to accommodate fluctuations in demand for central bank money, thereby aiding banking system liquidity management.

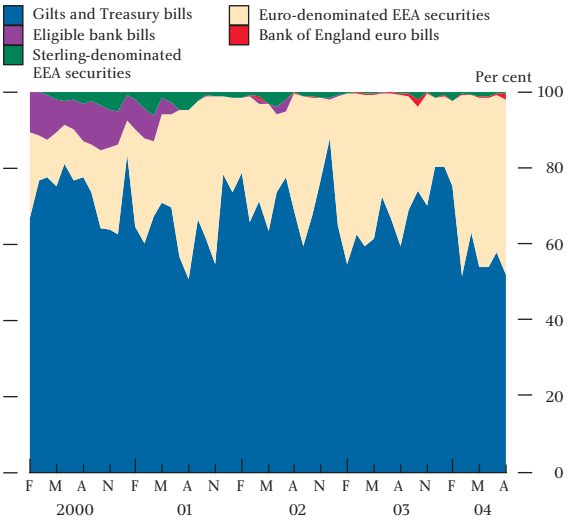
In addition to domestic-currency money market assets held in order to implement monetary policy, central banks also generally hold a portfolio of bonds, usually largely government and other low credit risk bonds.

In normal circumstances, central banks typically hold the portfolio of bonds on a 'buy and hold' basis, so that the liquidity of the central bank balance sheet is primarily managed by allowing money market assets (in the form of short-term reverse repos) to rise or fall as demand for central bank liabilities changes. Occasionally, if changes in demand for central bank money are sufficiently large, the central bank may be forced to sell some of its bond portfolio.

The Bank of England currently holds a portfolio of British government securities (currently around £1.8 billion) and other high quality sterling debt securities (£1.2 billion). On 1 September 2004, the Bank announced some changes to the way in which it executes the management of this portfolio.

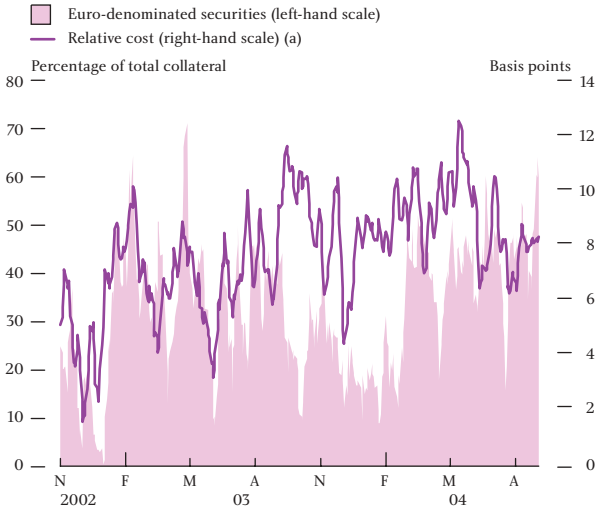
On the first working day of each quarter of the Bank's financial year (September, December, March, June), the Bank will announce details and amounts of the securities it will purchase in the following quarter. The announcement will be made at 3 pm on the Bank's wire service screen pages.

Chart 29
Instruments used as OMO collateral(a)



(a) Monthly averages.

Chart 30
Relative cost and use in OMOs of euro-denominated EEA government securities

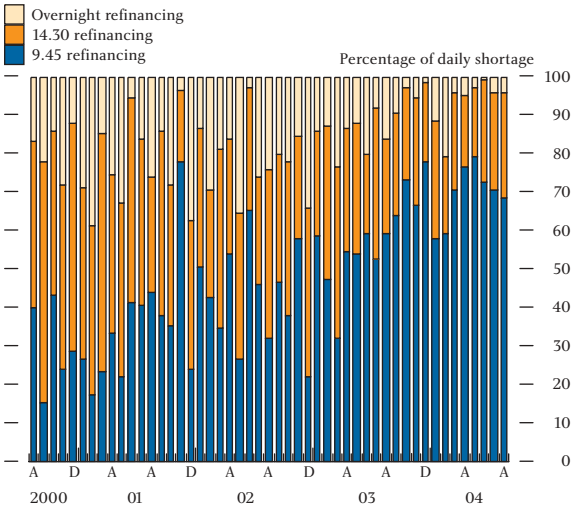


(a) Relative cost calculated as difference between one-month BBA repo and Libor fixing spread and one-month European Banking Federation repo and Euribor spread. A larger spread indicates a lower cost of repoing euro-denominated debt relative to repoing gilts.

its relative cost compared with sterling-denominated collateral over the review period (Chart 30). One likely explanation is that counterparties made less use of the Bank's overnight late lending facilities, with the great majority of refinancing through OMOs provided at two-week maturities in the 9.45 and 14.30 rounds (Chart 31). Due to settlement timetable constraints, euro-denominated government debt securities cannot be delivered as collateral against late lending unless

prepositioned by counterparties with the Bank. Greater use of two-week OMOs is likely to be connected to the more stable overnight market rates observed in recent months.

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

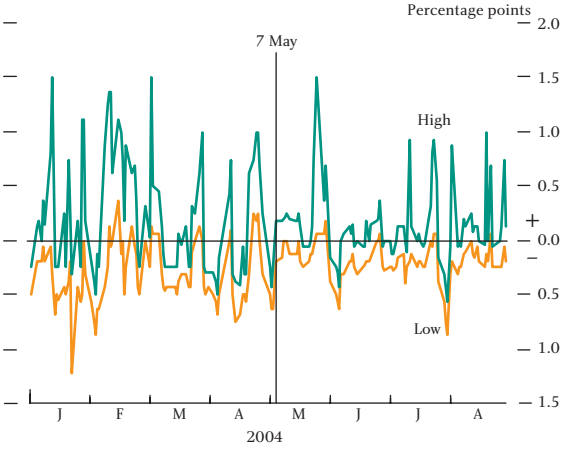


(a) Monthly averages.

Short-dated interest rates

Following the Bank's publication on 7 May 2004 of a paper reviewing its operations in the sterling money market,(1) volatility of sterling overnight interest rates has continued to fall (Chart 32). In that paper, the Bank set out its objectives for reform of its operations, including the need to reduce significantly the volatility of overnight interest rates. Contacts have reported that the reduced levels of volatility observed in recent months have already improved liquidity, encouraging some firms to participate in the overnight interbank market for the first time.

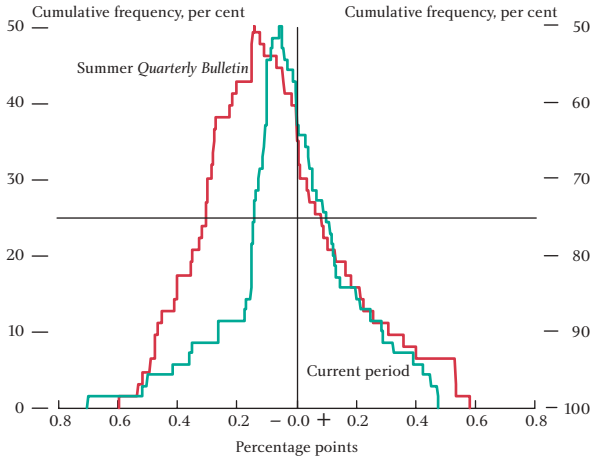
Chart 32
Volatility of sterling overnight interest rate(a)



(a) High and low of the day observed by the Bank's dealing desk as a spread to the policy rate.

Chart 32 shows that there has also been a reduction in the size of the spread between the daily highs and lows of sterling unsecured overnight interest rates. Compared with the period covered by the Summer *Quarterly Bulletin*, the average of this spread has fallen from 38 basis points to 33 basis points over the current review period. The distribution of sterling secured (GC repo) overnight rates has also become closer to that of the MPC's repo rate—the spread between the two rates is now more evenly distributed and narrower overall, as indicated by the interquartile range(2) (Chart 33). This range has been 24 basis points over the current review period, compared with 38 basis points over the period covered by the Summer *Quarterly Bulletin*.

Chart 33
Cumulative folded distribution of sterling secured overnight rates(a)



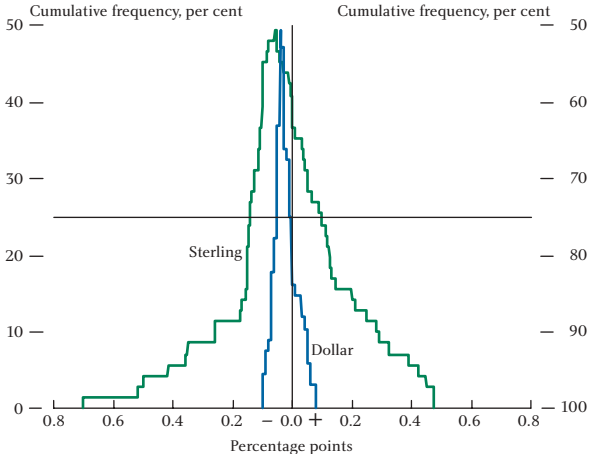
(a) Distribution of the spread between the GC repo rate and the MPC's repo rate. A negative spread indicates that the market rate is less than the official rate; if more than 50% of the spread distribution is below zero, it has a negative skew.

Despite this improvement, there remains a significant difference between the distribution of the GC repo/MPC repo spread and the analogous distribution for dollar rates (Chart 34). This is at least partly due to the additional volatility arising in sterling money market rates near to meetings of the MPC when market participants perceive a high probability of a change in the Bank's repo rate. As discussed in the Summer *Quarterly Bulletin*, this feature, known as 'pivoting', will be

(1) See 'Reform of the Bank of England's operations in the sterling money markets' (2004), *Bank of England Quarterly Bulletin*, Summer, pages 217–27.
(2) The interquartile range covers the region of the distribution between 75% and 25% of all spread values. In effect, it measures the volatility of spreads around Bank repo but excluding extreme spreads. Graphically the interquartile range is given by the difference in spread values when the horizontal line cuts the distributions at the 25% and 75% cumulative frequency.

eliminated as part of the Bank of England's planned reforms. More generally, the residual volatility is not acceptable over the medium term. Pending the introduction of the reforms, it is important that market participants continue to support lower volatility.

Chart 34
Cumulative folded distributions of sterling and dollar secured overnight rates(a)



(a) Distribution of the spread between the sterling and dollar market rates and the relevant official rates. A negative spread indicates that the market rate is less than the official rate; if more than 50% of the spread distribution is below zero, it has a negative skew.

The Bank announced the main results of its review of its operations in the sterling money markets on 22 July; the Bank will adopt a reserve-averaging system, with voluntary reserves remunerated at the MPC's repo rate. At the core of the new framework will be standing lending and deposit facilities, available at 25 basis points either side of the repo rate on the final day of the maintenance period, and at a wider spread on other days. Under the new system, the Bank will conduct weekly open market operations at a one-week maturity. The Bank plans to issue a further paper in the autumn, consulting on detail.

Forecasting the liquidity shortage

There was a significant improvement in the accuracy of the Bank's daily liquidity forecast during the latest period (Table E). In part, this reflected significantly lower seasonal volatility in note demand than during the previous period, which contained both Easter and early-May Bank Holidays.

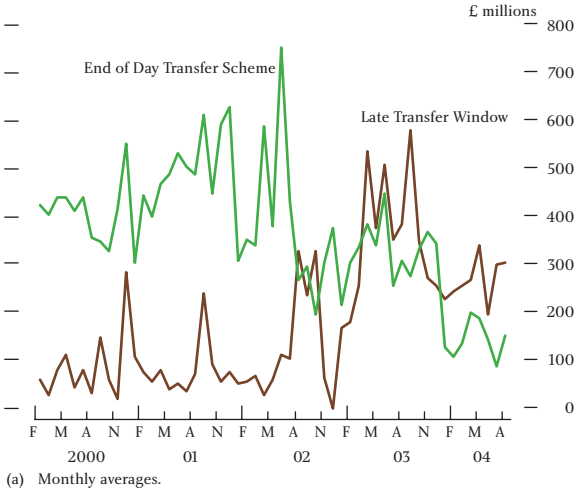
Table E
Intraday forecasts versus actual liquidity shortages

Mean absolute difference (standard deviation), £ millions

	9.45 forecast	14.30 forecast	16.20 forecast
2002	83 (107)	43 (79)	30 (73)
2003	101 (123)	61 (96)	51 (85)
2003 Q1	80 (74)	45 (54)	33 (31)
2003 Q2	119 (131)	54 (76)	38 (43)
2003 Q3	118 (170)	92 (154)	85 (150)
2003 Q4	87 (91)	52 (57)	46 (36)
2004 Q1	120 (108)	79 (77)	55 (43)
2004 Q2	115 (123)	58 (78)	61 (74)
July-Sept. 2004	84 (68)	58 (44)	50 (26)

Perhaps consistent with similar improvements in the forecasting accuracy of the settlement banks, there was a decrease in use of both the End of Day Transfer Scheme (EoDTS) and the Late Transfer Window (LTW) by the settlement banks (Chart 35).(1) Use of both these facilities has been falling since 2003, a development that is welcome to the Bank.

Chart 35
Use of the Late Transfer Window and EoDTS(a)



(a) Monthly averages.

(1) For a description of the EoDTS, see page 163 of the Summer 2003 *Quarterly Bulletin*, or the APACS web site: www.apacs.org.uk/downloads/EoDT.pdf, and of the LTW, see page 40 of the Winter 2003 *Quarterly Bulletin*.

How should we think about consumer confidence?

By Stuart Berry of the Bank's Sterling Markets Division and Melissa Davey of the Bank's Conjunctural Assessment and Projections Division.

In the United Kingdom, movements in confidence have been closely related to annual real consumption growth over the past 30 years. But both these series have common determinants. This article shows that the standard economic determinants of consumption such as income, wealth and interest rates can 'explain' a large part of the movements in consumer confidence. However, confidence is also affected by non-economic events, or may react in a complex manner to unusual economic events. We find that such 'unexplained' movements in consumer confidence do not appear to be closely related to households' spending decisions on average. So although consumer confidence indices are published well ahead of official data on consumer spending it is important to consider why confidence has changed before assessing its likely implications for consumption.

Introduction

Consumer confidence indices, such as that produced by GfK in the United Kingdom, receive considerable coverage in the media. And survey measures of consumer confidence are often used as indicators of household spending intentions. But it is not always clear exactly what information is being captured by these surveys. This article considers some possible interpretations of the consumer confidence data and assesses whether they provide useful incremental information for predicting consumption.

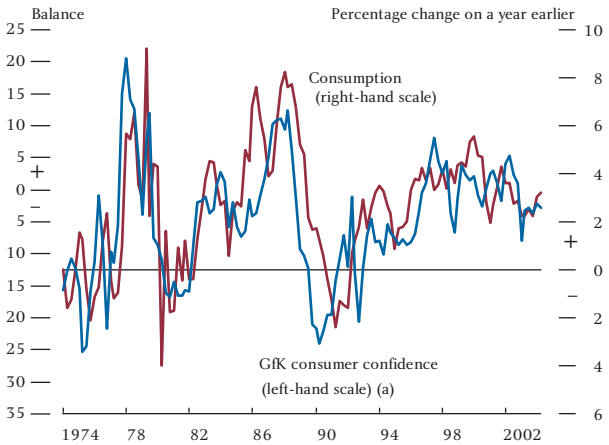
What is consumer confidence?

Consumer confidence is a somewhat nebulous concept. Confidence surveys typically ask a variety of questions that capture household perceptions of different economic factors (see box below). Positive responses to these questions are likely to be associated with households feeling more confident. But even if the survey balances do provide an accurate description of consumer confidence, it is not clear how that helps us to understand developments in the economy. Their usefulness depends on the additional information they provide when assessing developments in the household sector.

Why do we look at measures of consumer confidence?

One reason why confidence measures are followed closely is the observed relationship between confidence and household consumption growth. Chart 1 shows that, in the United Kingdom, movements in confidence have been closely related to annual real consumption growth over the past 30 years.(1) The contemporaneous correlation between confidence and annual real consumption growth since 1974 is 0.6, and the correlation between confidence now and annual real consumption growth in a year's time is 0.5. Care should be taken in interpreting the correlations over the entire sample period, however. The contemporaneous relationship between confidence and consumption is not stable over time. Looking at five or ten-year rolling

Chart 1
Consumer confidence and consumption



Sources: Gallup, Martin Hamblin GfK and ONS.

(a) Seasonally adjusted (see the box below).

(1) It is worth noting that the chart suggests that consumers tend to be pessimistic: the long-run average of the GfK balance is negative at -5, while average annual real consumption growth over this period is 2.6%.

How is consumer confidence measured in practice?

In the United Kingdom there are two main consumer confidence surveys, undertaken by GfK and MORI.

The GfK survey asks a series of questions on household finances, the general economic outlook and so on.(1) Five of these questions are aggregated—by a simple average—to form an overall consumer confidence measure. These are:

- How has the financial situation of your household changed over the last twelve months?
- How do you expect the financial position of your household to change over the next twelve months?
- How do you think the general economic situation in this country has changed over the last twelve months?
- How do you expect the general economic situation in this country to develop over the next twelve months?
- In view of the general economic situation, do you think now is the right time for people to make major purchases such as furniture or electrical goods?

For the first four questions, there are five possible answers. Respondents can answer 'no change' and 'a little' or 'a lot' better or worse. The results are published as a net balance of positive less negative responses, with those who answered 'a lot' in either direction given twice the weight of those who answered 'a little'. For the fifth question, there are only three possible answers: yes, no or evenly balanced.(2)

The survey contains further questions covering a wider range of subjects such as inflation and unemployment expectations, and savings intentions. These questions, though not affecting the aggregate balance, may provide further useful information on consumers' current outlook and willingness to spend.

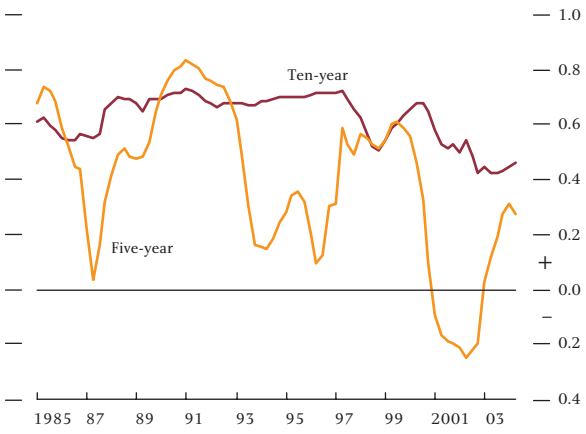
The MORI survey asks only one question on the economic outlook for the next twelve months. It is therefore similar to the fourth question in the GfK survey and represents only a subset of the GfK measure. MORI respondents can only answer whether they think the economy will improve, stay the same or get worse. In this article, we focus on the GfK measure due to the wider range of questions, which help to shed more light on the underlying determinants of consumption.

(1) From 1974 to 1995 this survey was carried out by Gallup. Both surveys were carried out in June and July 1995, and differences in the levels recorded in those months have been used to splice the Gallup data onto the GfK data.
(2) The major purchases balance shows a distinct seasonal pattern, and tends to rise significantly in months of strong price discounting (most notably in January). In this article we use a version of this balance that has been seasonally adjusted, using the US Census Bureau's X-12 programme, and a seasonally adjusted aggregate balance that is a simple average of the published data on questions one to four and the seasonally adjusted major purchases balance.

contemporaneous correlations shows that the relationship between consumption and confidence has varied over time, and has weakened considerably during the past three years (see Chart 2).

Given the reasonably close relationship shown in Chart 1, confidence surveys are often considered as indicators of current and future consumption prospects. The permanent income hypothesis—a standard theoretical framework for analysing consumption(1)—suggests that past values of confidence (or any other variable) should not have a role in forecasting future consumption growth. But distortions in the real economy, such as credit constraints, mean that the permanent income hypothesis is unlikely to hold fully in practice. And moreover, contemporaneous values of confidence indices are published well ahead of direct estimates of household spending. So if confidence

Chart 2
Rolling correlations of confidence and consumption growth



Sources: Gallup, Martin Hamblin GfK and ONS.

(1) See Hall (1978).

measures contain information about people's perceptions or expectations of their lifetime resources, they may therefore give us an early indication of current consumption growth.

Despite the relationship between confidence and consumption, the source of the information in confidence measures is important in determining their usefulness in predicting consumer spending. It may simply be a summary of households' interpretation of other publicly available information, such as income growth and asset prices. But it may also contain private, incremental, information, which is more likely to be useful in improving forecasts of consumption growth. The following section considers which type of information confidence measures may be capturing.

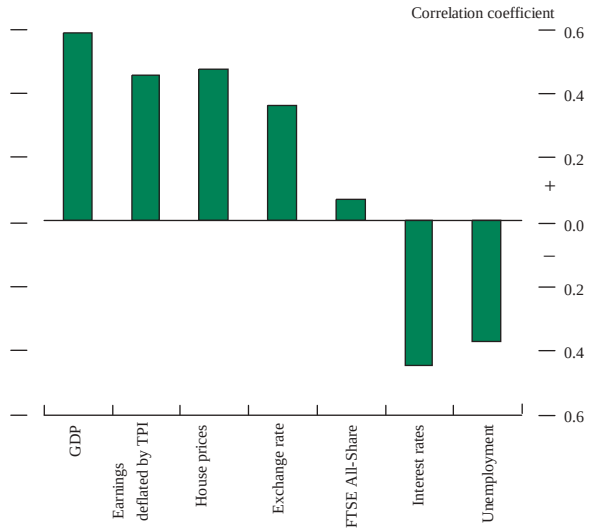
What do consumer confidence measures capture?

In order to be certain of what information respondents are taking into account when answering the confidence surveys, we would need to know how each respondent interpreted the questions. Although this is impossible, we may be able to draw some conclusions by analysing how the observed consumer confidence measures react to developments over time.

Chart 3 shows the correlations between the GfK aggregate balance and a range of other economic indicators in the United Kingdom. To the extent that there are strong relationships between the confidence measures and other macroeconomic variables, it is more likely that the survey balances are simply summarising information available from other sources. The correlations between economic variables and confidence generally have the signs we might expect: positive for income variables, asset prices and GDP growth, and negative for interest rates and changes in unemployment. And most of the correlation coefficients are significant.

These correlations might indicate that the survey balances are simply summarising information available from other sources, and that there is little incremental information in the confidence measure. But all the relationships shown here are bivariate. Ideally, we need to aggregate the other information sources in order to assess how much of the variation in the survey balances is associated with changes in these variables. The next section considers one way of doing this.

Chart 3
Correlations between consumer confidence and macroeconomic variables(a)



Sources: Bank of England, Halifax and ONS.

(a) Quarterly correlations over the period 1984 Q1 to 2004 Q2. All macroeconomic variables are expressed as four-quarter percentage changes, except the unemployment rate which is the four-quarter percentage point change, and interest rates which are in levels (per cent).

Explaining movements in consumer confidence

Although consumer confidence appears to be related to a number of key macroeconomic variables, there may also be other factors affecting the confidence survey balances that provide important incremental information on consumers' views. This could be particularly important in assessing the usefulness of the confidence measures in forecasting consumption. One way to identify the potential incremental information in the survey balances is to filter out the effects of standard economic determinants of consumption. The movements in confidence predicted by these variables would constitute the 'explained' component of confidence, while the residual element would represent the 'unexplained' component. The unexplained component may reflect how consumer confidence reacts to non-economic factors, such as wars and terrorist attacks. Or it may reflect the fact that the interactions between the economic determinants of confidence are more complex than allowed for in a simple econometric equation. For example, confidence may react more strongly than typically expected to unusual or large economic events, such as the exit from the ERM in 1992. Both of these would be captured by the unexplained component, and so that may contain incremental information for spending decisions.

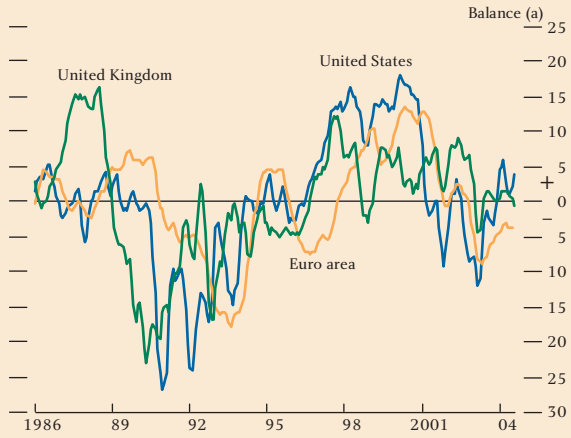
We use a simple equation that filters out the effects of earnings growth, the change in the unemployment rate,

Comparisons with consumer confidence surveys in other countries

The University of Michigan survey in the United States and the European Commission survey in the euro area are based on very similar questions to the GfK survey. Chart A shows the headline measures for the three different economies. All three follow a broadly similar pattern, consistent with the somewhat synchronised developments in the three areas over the past 20 years. But there are substantial differences in shorter-term movements, reflecting economy-specific factors. Confidence in the United Kingdom was unusually high in the late 1980s, and also remained somewhat stronger than in the United States and the euro area in 2002. This is consistent with the relatively strong economic performance in the United Kingdom during those periods.

US and euro-area consumer confidence seem to be related to the same macroeconomic factors as in the United Kingdom. There are strong positive correlations between confidence and real income and GDP growth, and negative correlations with interest rates and changes in unemployment.

Chart A
Consumer confidence



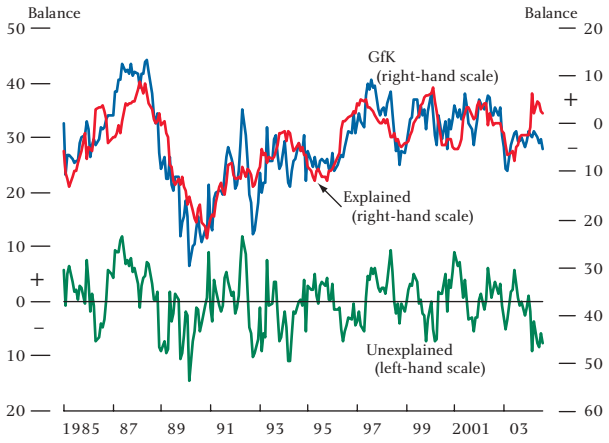
Sources: Martin Hamblin GfK and Thomson Financial Datastream.

(a) Three-month moving averages of deviations from averages since 1986.

interest rates, changes in the cost of living as measured by the tax and prices index (TPI), house price inflation, and equity price and exchange rate changes on the monthly GfK aggregate confidence balance (see equation **(1)** in the appendix).(1) Such an equation can explain two thirds of the movements in UK confidence over the past 20 years. As can be seen in Chart 4, the equation fits reasonably well over the past, with economic fundamentals explaining the broad trends in consumer confidence.

Looking at the unexplained component in a bit more detail, we find that many of the sharp movements in the unexplained component of confidence are concentrated around key events (see Chart 5). For example, it fell sharply in the build-up to the Gulf War in the early 1990s, the UK exit from the ERM (even after accounting for the direct impact of the exchange rate depreciation on confidence), 11 September, and the build-up to the war in Iraq last year. There were also rises in the unexplained component: for example following the general elections in April 1992 and May 1997. There was a sustained period of positive unexplained confidence in the second half of 1997, which may have reflected the perceived boost to households' current and lifetime resources from the building society demutualisations that summer when UK households received windfall payments of around £30 billion.(2)

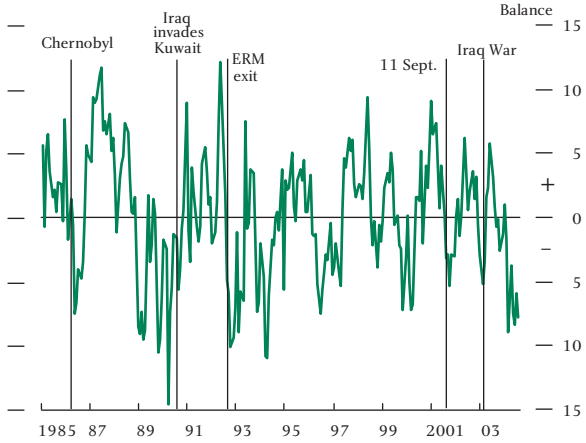
Chart 4
Explained and unexplained confidence



There are also some periods where there are no obvious events which might have led confidence to diverge from its determinants. For example, confidence fell sharply in Spring 1994 when its determinants remained robust.

(1) We use lagged values of these data so this decomposition can be done when the GfK data are published.
(2) In theory, as households who received these windfalls were previously members of the society, they already 'owned' this wealth. The windfall payments simply converted their claim on the assets of the building society into a more liquid form. However, the payments would boost households' view of their available resources if they did not previously realise the value of their building society assets or if they were previously credit constrained (for further details see boxes in the *Inflation Report* in February and November 1997).

Chart 5
Unexplained confidence at key dates



And confidence appeared unusually resilient in late 2000 and early 2001 as its determinants, particularly real earnings growth, weakened. In 2004 confidence has remained subdued whereas continued rises in house prices, a recovery in equity markets and strong growth in earnings suggest that confidence should have risen back to the levels seen in 2002.(1) This weakness could reflect continued worries about the geopolitical situation, or consumers' expectations about economic variables (eg future interest rate rises or a slowing in house price inflation) which we do not directly capture in our simple model.

But the crucial question remains whether consumer confidence, either the explained or unexplained component, provides useful additional information for variables such as consumption. This we explore in the next section.

Similar analysis can be undertaken on the US and euro-area measures of consumer confidence. In the United States, using a similar equation to model confidence, we find that the chosen macroeconomic factors can explain the broad trend in confidence. And again, many of the significant declines in the unexplained component occur around the time of military action and terrorist attacks. In the euro area, data constraints make this type of analysis more difficult. However, the strong (inverse) correlation between confidence and changes in unemployment means that this alone can explain the broad movements in confidence. But there is still evidence that euro-area confidence fell by more than economic factors suggested in the build-up to the recent war in Iraq.

Consumer confidence and consumer spending

In the previous section we showed how confidence could be explained in large part by the determinants of consumption suggested by economic theory. We now consider whether it is the common economic determinants of both confidence and consumption that explain the strong observed correlation between the two, or whether the unexplained component of confidence also plays a role. In order to examine the relationship between monthly changes in confidence and consumer behaviour, retail sales data (which, unlike the broader measure of household consumption, are available at a monthly frequency) are used in the analysis.

Looking at the data, retail sales seem to move more in line with the explained than the unexplained component of confidence (see Charts 6 and 7). And this is borne out by simple correlations which suggest that the unexplained component is not related to annual retail sales volumes growth, whereas the explained component is strongly correlated—indeed, more so than the aggregate balance. Further, looking at regressions of retail sales on consumer confidence, we can better explain retail sales by splitting out the explained and unexplained components of GfK than using the aggregate balance (see equation **(2)** in the appendix). And the unexplained component is insignificant in that equation. This suggests that, on average, the confidence indicator does not contain additional information on how households aggregate news on economic fundamentals. And although other non-economic factors may influence confidence, they do not appear to affect spending decisions, at least systematically. Care should be taken, therefore, when considering the implications for consumption of a given change in confidence, especially for changes that do not appear to be related to economic fundamentals. For example, in 2004, retail sales growth has picked up in line with explained confidence, suggesting that the unexplained factors that have affected overall confidence negatively have not affected consumer spending on goods.

A more sophisticated way to look at the information contained in confidence balances is to take a standard forecasting equation for consumption and look at

(1) Part of this pickup reflects the sharp increase in bonuses included in our earnings measure around the turn of the year. Excluding bonuses the rise would have been less sharp, but we do not have a long-run series excluding bonuses to use in this analysis.

Chart 6
Explained confidence and retail sales

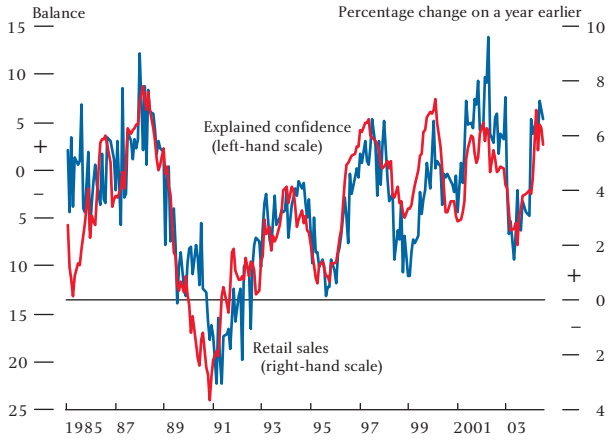
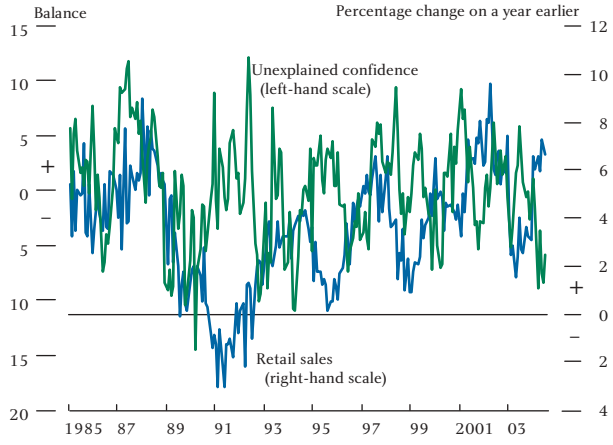


Chart 7
Unexplained confidence and retail sales



whether adding consumer confidence as an explanatory variable can improve its performance. As with the analysis above, this separates out that part of confidence not captured by the other variables in the equation. We find that a standard error-correction model(1) (where consumption is a function of labour income, wealth and interest rates in the long run, and labour income, house prices, equity prices, employment growth, and interest rates in the short run) is only slightly improved by adding the aggregate confidence balance contemporaneously (see equation **(3)** in the appendix).(2) And past values of confidence have a similar impact. This is consistent with the results shown above: once we strip out that part of confidence explained by the other dynamic terms in the equation, it has little explanatory power for consumption. In contrast, Pain and Weale (2001) estimate ECM consumption functions with dynamics in income and net wealth for the United States and the United Kingdom and find a more significant role for confidence in both countries. Their findings have some economic as well as statistical significance—a 10 percentage point fall in the GfK balance in the United Kingdom is estimated to reduce quarterly consumption growth by nearly 0.3 percentage points, around 30% larger than the coefficient found in our analysis. One reason why their results differ from those we have found for the United Kingdom is the choice of dynamic terms in the consumption function. Our equation contains dynamic terms in a greater variety of series so the more significant confidence term found by Pain and Weale may in part reflect the omitted dynamic series.

Our analysis suggests that confidence measures in themselves contain little information on consumption behaviour over and above that available from other sources. But it is important to remember that these methods can only tell us about the average effects of unexplained confidence on spending. By its nature, it is likely that unexplained confidence is picking up a wide variety of economic and non-economic shocks, some of which are more likely to affect spending decisions than others. Many of those who do not think confidence has incremental power in general conclude that it can contain independent information at some times. For example, Garner (2002) looked at 'unusual' events and concluded that confidence did have explanatory power for US consumption growth at times (the first Gulf war) but not at others (11 September 2001). Looking at our data series, the fall in unexplained confidence in 1998 does seem to be related to the slowdown in retail sales growth. But at other times, consumers seem to have carried on spending despite their relative pessimism. Such event analysis is not very helpful for economic forecasting, therefore, as it is not possible to know at the time of an event that affects confidence whether or not it will also affect consumption.

In contrast to the UK results, there does appear to be some information in both the explained and unexplained components of confidence in the United States. Using a simple equation to explain monthly consumption data, both the explained and unexplained components are significant at the 10% level. Other authors have found similar results using a variety of different variables to proxy confidence. Some, such as

(1) See for example equation 6.2.8 in Bank of England (2000), *Economic models at the Bank of England, September 2000 update*, available at www.bankofengland.co.uk/modcoupdate.htm. The equation is estimated between 1975 Q2 and 2002 Q4.
(2) The $\bar{R}^2$ increases by less than 0.1 percentage points when confidence is added to the equation.

Carroll, Fuhrer and Wilcox (1994) find a role for confidence once they have controlled for income growth, and Fuhrer (1993) concludes that the incremental information in confidence indices is statistically significant, but the economic significance is small, with contemporaneous forecasts of consumption improved only modestly. However, Garner (1991) concludes that confidence does not in general have incremental power, and in ordinary times forecasts of consumption using the determinants of confidence produce better forecasts than using confidence itself.

Conclusion

Consumer confidence is closely related to consumption in the United Kingdom, and has predictive power for future consumption. But this appears to reflect the fact that the two series have common determinants. The standard economic determinants of consumption, such as income, wealth, and interest rates, can explain a large part of the movements in consumer confidence. This economically explained element of confidence does not add any incremental information on UK consumption as it is already captured in readily available official data. The unexplained component represents the potential incremental information for consumption in the consumer confidence measure. But that does not appear to be closely related to consumer spending on average. And, as a result, adding consumer confidence to a standard forecasting equation for UK consumption only improves its ability to explain the past a little. Confidence measures may still be useful as a more timely indicator of consumption, but they can be misleading. Other influences on confidence, such as non-economic events, do not appear to influence UK households' spending decisions in a predictable manner. It is important therefore to assess why consumer confidence has changed before determining its likely implications for consumption.

Appendix

Estimated by OLS January 1985 to August 2004:

$$GfK = -0.017 - 1.006*RS(-1) - 0.990*\Delta_{12}U(-1) + 155*\Delta_{12}earn(-2) - 232*\Delta_{12}tpi(-1) + 9.47*\Delta_{12}eqp(-1)$$
$$(0.928)\ (0.311)\qquad (0.386)\qquad (41.5)\qquad (24.2)\qquad (2.33)$$
$$+ 21.3*\Delta_{12}eri(-1) + 24.6*\Delta_{12}hp(-1) \qquad \textbf{(1)}$$
$$(5.17)\qquad (5.143)$$

$\bar{R}^2 = 0.65$

Estimated by two-stage least squares January 1985 to July 2004:

$$\Delta_{12}sales = 0.0451 + 0.00264*\hat{GfK} + 0.000312*(GfK - \hat{GfK}) \qquad \textbf{(2)}$$
$$(0.00110)\ (0.000139)\qquad (0.000261)$$

$\bar{R}^2 = 0.61$

Estimated by OLS 1975 Q2 to 2002 Q4:

$$\Delta c = -0.042 + 0.215*\Delta ly + 0.477*\Delta emp(-1) + 0.024*\Delta nfw + 0.110*\Delta ghw - 0.001*\Delta RS - 0.001*\Delta RS(-1)$$
$$(0.0138)\ (0.0451)\quad (0.182)\qquad (0.00930)\quad (0.0350)\quad (0.000577)\ (0.000571)$$
$$- 0.165*(c(-1)-ly(-1)) - 0.022*(c(-1)-(nfw(-1)+ghw(-1))) - 0.0003*(RS(-2)-INFE(-2)) + 0.000181*GFK + dummies$$
$$(0.0349)\qquad (0.00559)\qquad (0.000192)\qquad (0.0000912) \qquad \textbf{(3)}$$

$\bar{R}^2 = 0.73$

GfK = GfK consumer confidence aggregate balance (seasonally adjusted).
RS = Base rate of interest.
U = Unemployment rate.
EARN = Average earnings index.
TPI = Tax and prices index.
EQP = FTSE All-Share.
ERI = Sterling ERI.
HP = Halifax house price index.
$\hat{GfK}$ = Fitted values from equation **(1)**.
Sales = Retail sales volumes.
C = Household final consumption expenditure.
LY = Households' real labour income.
Emp = Employment rate.
NFW = Households' real net financial wealth.
GHW = Households' real gross housing wealth.
INFE = Expectations of annual RPIX inflation.

Lower-case letters indicate natural logarithms.
Standard errors in brackets.

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Household secured debt

By Matthew Hancock of the Bank's Monetary Assessment and Strategy Division and Rob Wood of the Bank's Structural Economic Analysis Division.

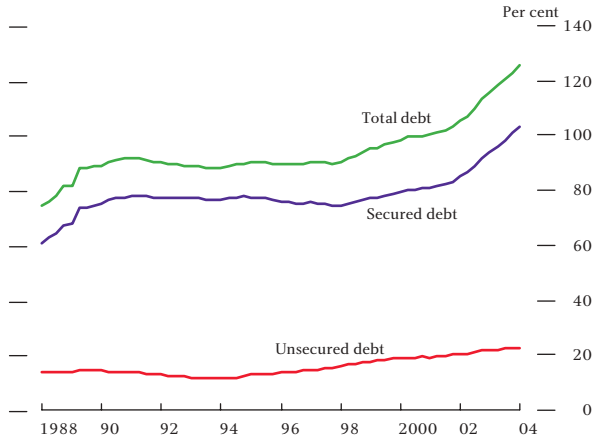
Deteriorating household sector balance sheets were widely thought to have exacerbated the recession in the early 1990s. In recent years households have once more significantly increased their indebtedness; this has been matched in aggregate by an accumulation of financial assets. This article analyses homeowners' financial positions since the late 1980s using disaggregated data, to assess the extent to which debt may exert an important influence on the macroeconomy in the current conjuncture.

Introduction

The level of UK household debt has risen substantially over the past five years, from 95% to 125% of households' post-tax income (see Chart 1). Often a higher level of debt relative to income signals an improvement in household welfare. It suggests more consumers have had the opportunity to smooth through short-term falls in income, or to raise consumption to match expectations of higher or more certain future income. But a higher level of debt can cause significant difficulties for some households, such as those that have borrowed more than they can pay off. The level of debt may also influence the way in which shocks are transmitted through the economy by affecting households' responses to them, and so have implications for the future path of consumption and inflation.(1)

This article analyses the implications of the recent rise in the level of debt, and compares households' current debt positions with the late 1980s. High indebtedness may have contributed to the recession in the early 1990s by exacerbating the reduction in borrowers' consumption following the increases in interest rates and unemployment.(2) So it is useful to consider how households' current balance sheets—in particular their collateral and cash-flow positions—compare with that period. We examine data on debt, collateral and debt-servicing costs, and focus on disaggregated data because the implications of the level of debt depend on its distribution across households.

Chart 1
Debt to income ratio(a)



Sources: Bank of England and ONS.

(a) Secured and unsecured lending to individuals and housing associations as a proportion of total available households' resources.

We examine the secured debt position of new mortgagors using the Survey of Mortgage Lenders (SML), which records information on the flow of new mortgages each month. These data are timely, run from 1974, and cover lending by almost all mortgage lenders.(3) The position of new borrowers is important because households tend to be most vulnerable immediately after taking out a new mortgage, before house price inflation and principal repayments have increased their net

(1) Debt levels may have implications for financial stability, which are discussed in the *Financial Stability Review* (see June 2004, pages 17–22) and previous *Quarterly Bulletin* articles (see Cox *et al* (2002) and Tudela and Young (2003)).
(2) For instance, King (1994) presents a number of stylised facts, some from disaggregated data, which give a '*prima facie* case for thinking that high debt burdens, especially the increase during the 1980s, led to a deeper and longer recession than might otherwise have occurred' (page 426). Also see Smith, Sterne and Devereux (1994).
(3) The data set is compiled from a 5% sample of new mortgages advanced each month by some members of the Council of Mortgage Lenders (CML), who collectively undertake around 95% of UK residential mortgage lending.

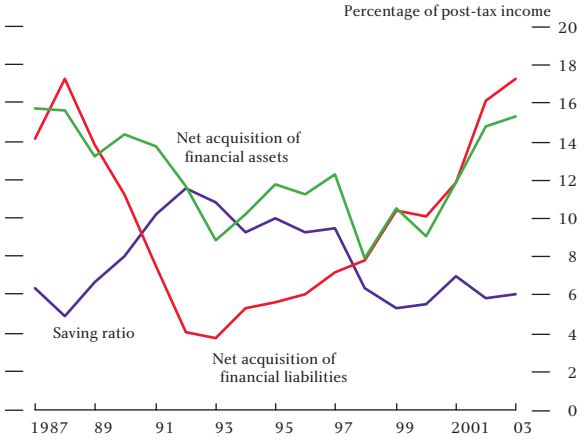
wealth, and nominal income growth has reduced their debt-servicing burden. But these data do not cover all mortgagors, so we also use the British Household Panel Survey (BHPS),(1) an annual survey representative of the population, to provide information on the stock of loans. That survey is only available for 1991–2002, so is not as useful as the SML for assessing recent changes, and cannot be used for making comparisons with the late 1980s.

Why might debt have implications for the macroeconomy?

Debt and consumption growth

The saving ratio has been broadly stable since 1998, as consumption has grown roughly in line with income. So rather than funding consumption, the rise in debt has, in aggregate, been matched by a rise in financial assets (see Chart 2). But those accumulating debt and those accumulating assets have not necessarily been the same people. For example, some households may have taken out new mortgages to buy houses from those trading down. The net proceeds of those sales may then have been used to purchase financial assets, so debt and assets both rise.

Chart 2
Aggregate household financial positions



Source: ONS.

The evidence in Chart 2 undermines the argument that rising debt levels have fuelled a consumption boom. In any event, movements in aggregate debt are the result rather than the cause of households' consumption decisions, which are based on their past consumption decisions, their expected lifetime income and the financial constraints they face.(2) However, the rise in the level of debt in recent years may have implications for consumption and inflation because collateral and cash-flow effects, discussed below, may amplify the impact of shocks to the economy—although it is difficult to quantify the size of those effects precisely.

Collateral effects

Households with a stronger collateral position—with a large value of assets available to pledge against borrowing—tend to be able to borrow more and at lower interest rates. Net housing assets will form the majority of available collateral because financial assets cannot generally be used by individuals as collateral for borrowing. For most homeowners, this housing collateral is also likely to form a substantial proportion of their net wealth and the majority of their precautionary savings balances(3)—assets that provide households with insurance against future falls in income—because in practice most homeowners do not have access to significant, or any, financial assets.(4)

A change in asset prices will affect homeowners' available collateral and their saving behaviour. For example, a fall is likely to lead to lower consumption by homeowners as they save more to rebuild their savings balances. Also, homeowners' consumption will become less responsive to changes in expectations about future income because the fall in collateral means that they are less able to borrow, or have to borrow at a higher interest rate, to react to changes (King (1990) and Pagano (1990)).(5) But their consumption may become more sensitive to other temporary shocks because they are less able to use borrowing to smooth through their impact.

(1) The BHPS data used in this article were made available through the UK Data Archive. The data were originally collected by the ESRC Research Centre on Micro-social Change at the University of Essex, now incorporated within the Institute for Social and Economic Research. Neither the original collectors of the data nor the Archive bear any responsibility for the analyses or interpretations presented here.
(2) If households' expected lifetime income increases they may borrow to consume more now and *vice versa*. In both cases expected income and consumption would drive debt.
(3) Carroll *et al* (1999) finds evidence that consumers hold precautionary wealth in housing, even though it is often less liquid than some financial assets. This may be sensible if their chief concern is a high cost but low probability event, such as job loss, or if they want to force themselves to save. More recently, flexible mortgage products may have made it easier to access housing wealth.
(4) Excluding households' private pension funds, life insurance and housing, around one third of the population had no interest-bearing financial assets in the United Kingdom in 1997–98, and the median homeowner with pension entitlements had £2,100 (Banks and Tanner (1999)).
(5) Also see Bayoumi (1993) who finds that financial liberalisation, by improving consumers' access to credit, increases their responsiveness to changes in future income.

The opposite effects are likely to follow a rise in asset prices.

These effects will increase with the absolute size of the balance sheet—the level of debt and assets—and as the level of net wealth falls (assets minus debt). That is because bigger balance sheets or lower net wealth will increase the chance of households experiencing a significant change to their level of net assets relative to their income. They also increase the number of households likely to face negative equity (and its extent), which may have effects on consumption for four reasons. First, the precautionary savings motive will be much stronger at low or negative collateral levels (Kimball (1990), Disney *et al* (2002)). Second, the supply of credit is likely to be tighter, so borrowing to smooth through an income shock would be more difficult. Third, household mobility is likely to be significantly impaired if households have negative equity, because lenders may not allow them to transfer it from one house to another (Gentle *et al* (1994), Henley (1998)). This makes it harder for people to move to find a new job, and so may increase unemployment. And fourth, some durable goods purchases are made when moving home, so a decrease in housing market transactions implies lower consumption of those goods.

Cash-flow effects

A change in interest rates will have an effect on current consumption that does not depend on the level of debt, because it alters the return to saving. A rise in interest rates encourages a reduction in current spending by increasing the amount of future consumption that can be achieved by sacrificing a given amount of current consumption, and *vice versa*. But a change in interest rates may have an effect that does depend on the level of debt. Debtor households are committed to making regular payments of the interest on, and repayments of, debt. Changes in these payments affect the level of income available for consumption. Those households that cannot borrow further and lack sufficient liquid savings, or did not expect the change, will respond by altering their consumption or falling into arrears and in the extreme perhaps having to sell their house.(1) In contrast, savers—whose interest income rises with interest rates—tend to change their consumption less in response to a change in interest rates because they do not need to borrow to smooth through the shock.(2)

Throughout this article we measure borrowers' obligatory payments by the proportion of post-tax income required to pay interest and meet regular repayments on debt, which we term income gearing. Income gearing becomes more sensitive to changes in interest rates and income when debt rises and the proportion of borrowers with variable-rate loans is higher. So the likely impact of debt on the response of consumption to a change in interest rates or unemployment will increase with the level of debt.

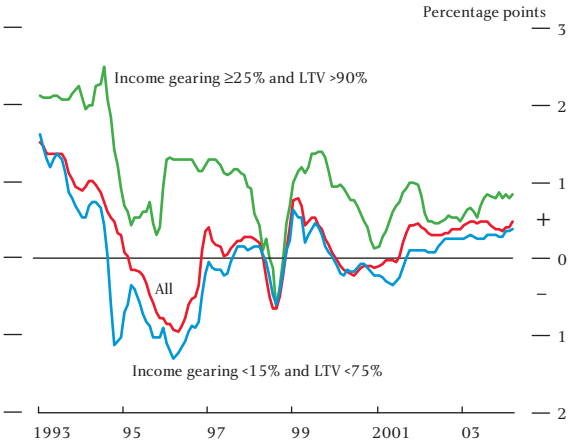
Higher indebtedness may have further effects to the extent that the amount and terms at which households are able to borrow are determined by their income gearing;(3) for instance, if households find it more difficult or expensive to increase their borrowing when they are unemployed. In this case, a worsening of a household's cash-flow position would worsen that household's ability to borrow to smooth through the impact of the shock, making its consumption behaviour more sensitive to it.

Coincidence of collateral and cash-flow effects

Some households may have enough available collateral and savings to allow them to smooth through a temporary cash-flow shock. Similarly, for those households that do not need to borrow more, a decline in the value of available collateral may have only precautionary savings effects. But if the value of available collateral declines at the same time as a household's cash-flow position deteriorates then there may be a more significant impact on consumption, particularly if both changes are unexpected and lead to a rise in the interest rate at which they can borrow on further loans. Chart 3 suggests that the rate paid by mortgagors with both a weak collateral and cash-flow position tends to be higher. These effects could be reinforced by a change in lenders' behaviour, if a combination of lower collateral values and weaker cash-flow positions reduced lenders' appetite for risk.

(1) Miles (2004) presents evidence that a large proportion of households expect the variable rate of interest to remain constant over the whole life of their mortgages, so any change in interest rates would be unexpected. In contrast, 69% of respondents and more than 80% of mortgagors in the February 2004 Bank of England/NOP survey of inflation attitudes expected interest rates to rise over the next twelve months (Janssen (2004)). The impact of an unexpected change may be smaller if borrowers could borrow or had liquid savings because the reduction in lifetime income could be spread over all future consumption.
(2) In addition, savers may consume less of any additional income because they tend to be wealthier than borrowers (Carroll (1997, 2001)).
(3) There is evidence from the Bank's conversations with lenders that they are increasingly basing their lending decisions on measures of affordability such as gearing rather than loan to income ratios.

Chart 3
Spread of median mortgage over official interest rate(a)(b)



Sources: Bank of England and SML.

(a) Three-month moving average.
(b) New mortgages for house purchase and remortgage.

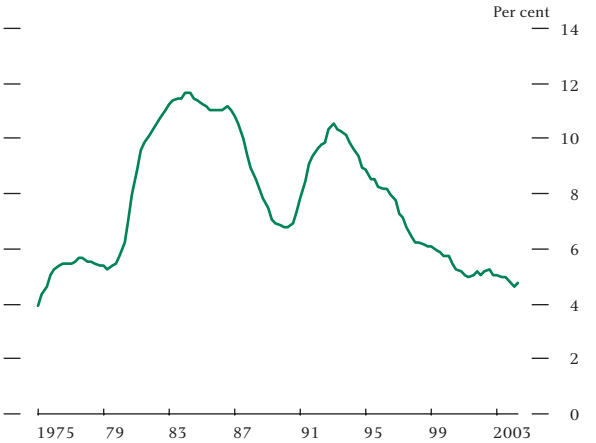
There may be additional feedback effects because households could be forced to sell their houses if their income gearing were to rise to a temporarily unmanageable level while a fall in the value of collateral prevented them from borrowing further.(1) House prices would be depressed by more if there were many forced sales, which would lead to further deterioration in the value of collateral and perhaps cash-flow positions via the effect of house prices on consumption, GDP and employment (Breedon and Joyce (1992)).

Comparison with the late 1980s

Macroeconomic background

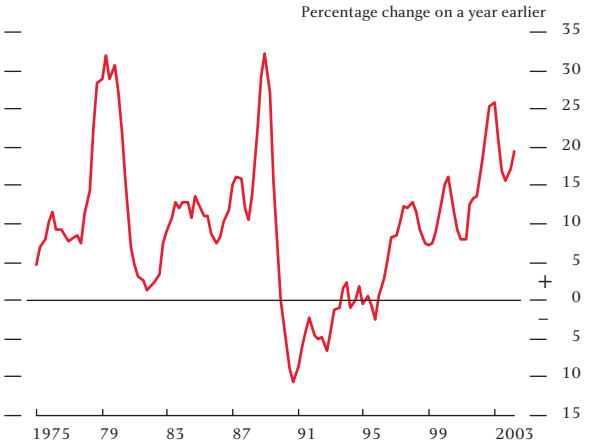
Charts 4–7 show that, in the late 1980s and early 1990s, when debt was high relative to income and nominal house prices, real GDP and consumption fell, there were

Chart 4
Unemployment rate



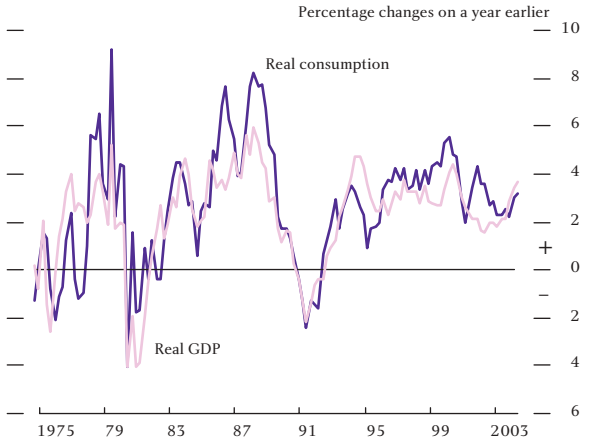
Source: LFS (data before May 1992 are currently published on an experimental basis).

Chart 5
House price inflation



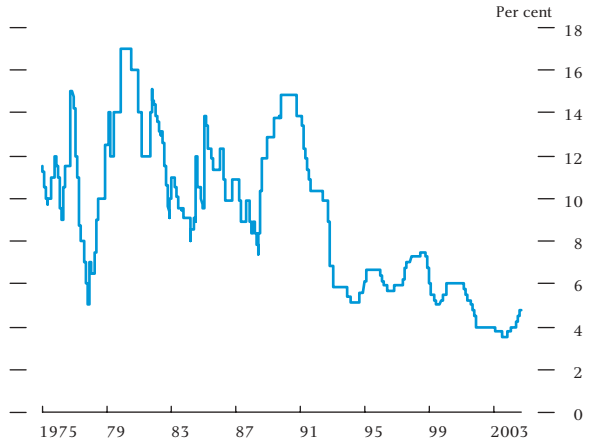
Source: Nationwide.

Chart 6
Real consumption and GDP at market prices



Source: ONS.

Chart 7
Official interest rates



Source: Bank of England official interest rates at the end of the month.

(1) Households might find it difficult to decide whether a rise in their gearing was temporary and whether or not they should sell the house, and so might fall into arrears. This might slow the transmission of the shock.

also large increases in unemployment and official interest rates rose to a peak of 15%. The collateral and cash-flow effects would be expected to be particularly strong in those circumstances. At the same time the increases in unemployment and interest rates and the slowing of GDP growth may also have contributed to the fall in consumption by causing borrowers to revise their expectations of future income, and therefore their desired level of debt.

Although some characteristics of the macroeconomy look similar to the late 1980s—house price inflation has been rapid and household debt has been rising strongly—others look rather different. The unemployment rate is lower than in the late 1980s, and interest rates are low relative to the levels of the past 30 years and are expected to remain so by market participants.

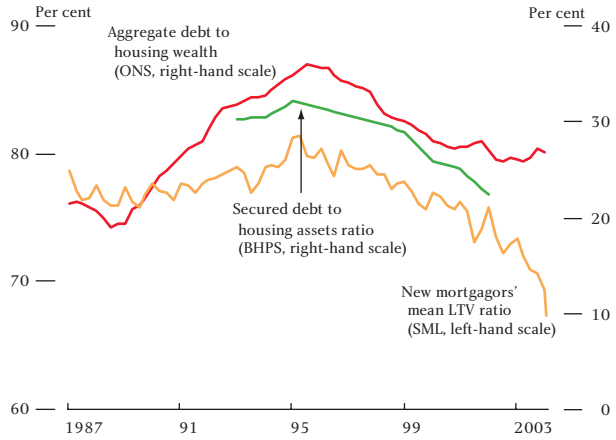
Collateral position

The aggregate debt to housing wealth ratio and the BHPS series for all mortgagors in Chart 8, and the net housing equity series in Chart 9 suggest that households' current collateral position in aggregate is similar to that in the 1980s. But the SML series indicates that new mortgagors now have significantly more collateral. Nevertheless, the implications of these summary measures are difficult to interpret because the collateral may not be evenly distributed. So we must examine the disaggregated picture.

Significantly fewer new loans now have an initial loan to value (LTV) ratio greater than 100% (where the loan is greater than the value of the collateral), and the proportion of loans at greater than 90% or 80% has also fallen sharply (see the solid lines in Chart 10). The BHPS confirms the same pattern for the stock of loans as of 2002 (dashed lines in Chart 10), although the absolute percentages of homeowners within each group are much smaller, and the rates of decline in their LTV ratios much higher, because the households have experienced significant rises in house prices since taking out their loan.

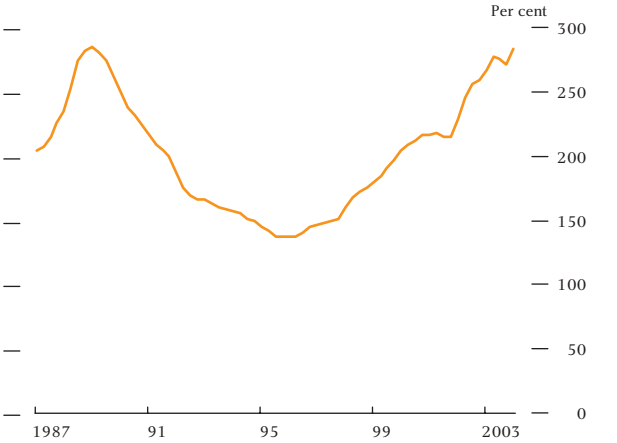
The distribution of debt across new borrowers suggests that, if there were a given fall in house prices, fewer households than in the 1980s would be likely to face problems borrowing, and the number of households experiencing negative equity would be lower. Because LTV ratios tend to be highest at the start of a mortgage, lower LTV ratios for new borrowers mean that fewer

Chart 8
Debt to housing wealth



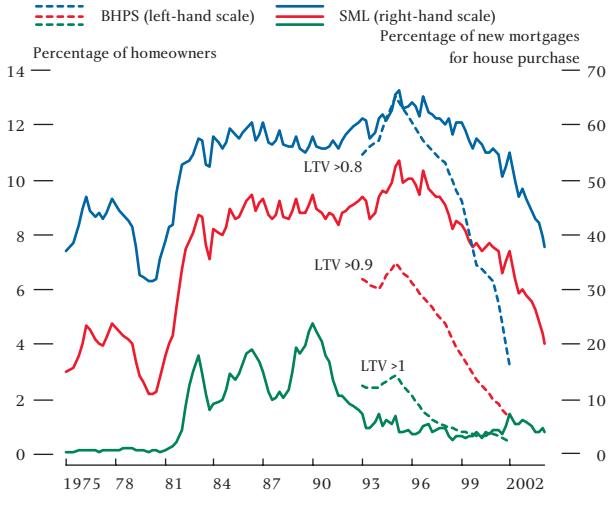
Sources: BHPS, ONS and SML.

Chart 9
Net housing equity as a proportion of annual post-tax income



Source: ONS.

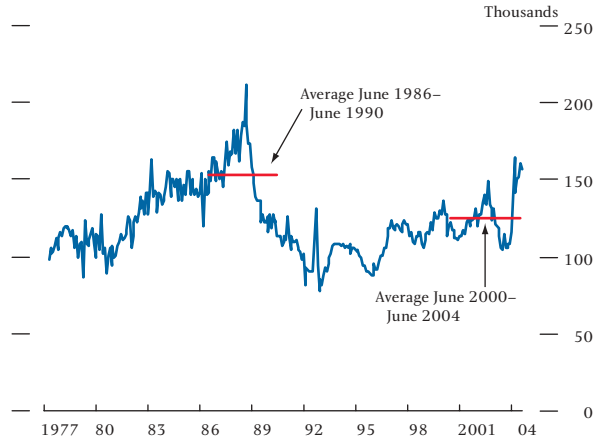
Chart 10
New and all mortgagors' LTV ratios



Sources: BHPS and SML.

borrowers would be at risk of falling into negative equity following a given house price fall. Similarly, because there have been fewer transactions in recent years compared with the late 1980s, there are likely to be fewer borrowers than there were in 1990 who could be at risk of falling into negative equity following a given house price fall (see Chart 11).(1)

Chart 11
Housing market transactions(a)



Source: Inland Revenue.

(a) From December 2003 the data were collected from Land Transaction Returns (LTRs), rather than Particulars Delivered forms. LTRs cover more transactions and are processed quicker. This may have contributed to a sharp rise in transactions in early 2004, and may mean the level of transactions in 2004 is not comparable with the pre-December 2003 data.

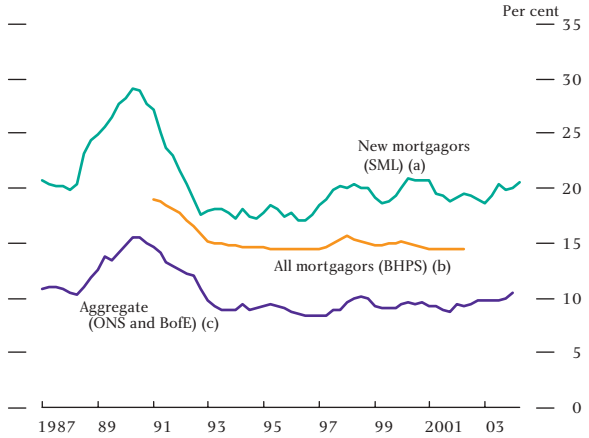
Although higher levels of debt than in the past mean that both sides of households' balance sheets relative to income are large compared with historical averages, these data suggest that the risks from collateral effects are smaller than in the early 1990s.

Cash-flow position

The three summary measures of income gearing in Chart 12 show that constraints on households' cash flow due to debt-servicing payments are close to their lowest levels since 1990. The position of new mortgagors in particular has improved substantially since the 1990 peak. The distribution of gearing within each cohort of new mortgages is also narrower than in 1990 (see Charts 13 and 14), although the distribution would necessarily widen if interest rates rose.

Mortgage contracts typically require (for given interest rates) constant nominal payments over the life of the loan. So the burden of repayment relative to income is 'front-end loaded'. When inflation and hence nominal

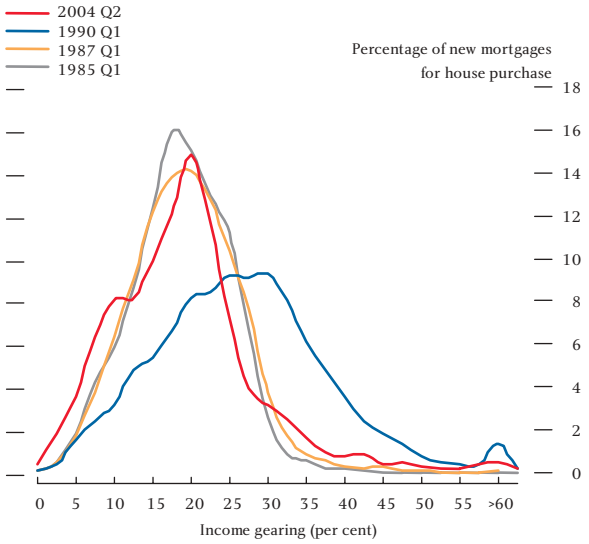
Chart 12
Income gearing



Sources: Bank of England, BHPS, ONS and SML.

(a) Mortgage instalments as a percentage of borrowers' pre-tax household income. The mortgage instalment includes interest and principal repayments or endowment premia. It is estimated from the reported level of secured debt, the interest rate and the term of the mortgage and is adjusted for Mortgage Interest Relief at Source (MIRAS) (all borrowers are assumed to have received relief at the basic rate of income tax).
(b) Households' latest total monthly mortgage instalment as a percentage of total pre-tax household income. Monthly instalments include interest, principal repayments/endowment premia, and insurance payments that are bundled with regular mortgage payments eg Mortgage Payment Protection Insurance. They are net of MIRAS subsidies.
(c) Total interest payments plus regular mortgage principal repayments as a percentage of annual post-tax household income. This measure is not adjusted for the effect of MIRAS or endowment mortgages.

Chart 13
Distribution of income gearing for new mortgagors

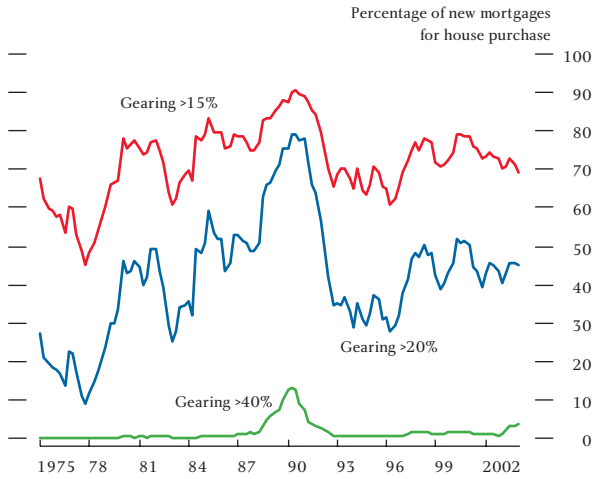


Source: SML.

interest rates and income growth are high, new borrowers' gearing is much higher than existing borrowers' gearing, and is eroded more quickly over time. This effect is shown by the red line in Chart 15. A fall in inflation and nominal interest rates lowers the gearing of new borrowers relative to borrowers with more mature loans (red to green line).(2) Chart 16 shows mean

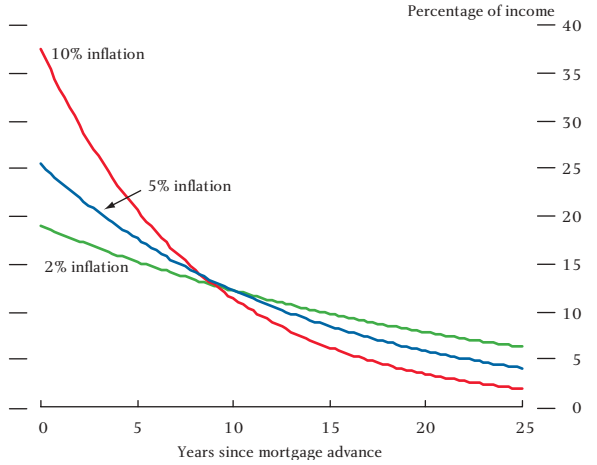
(1) Vass and Pannell (2004) explain how new borrowers' LTV ratios can be used to estimate the incidence of negative equity.
(2) Standard mortgages specify constant nominal payments over time, so real payments fall over time if inflation is positive. The real cost of a mortgage, however, is determined by real interest rates and the maturity of the mortgage, not inflation. See Kearl (1979), Nickell (2002) and the August 2002 *Inflation Report* (pages 8–9) for further explanation of front-end loading.

Chart 14
New mortgagors' income gearing



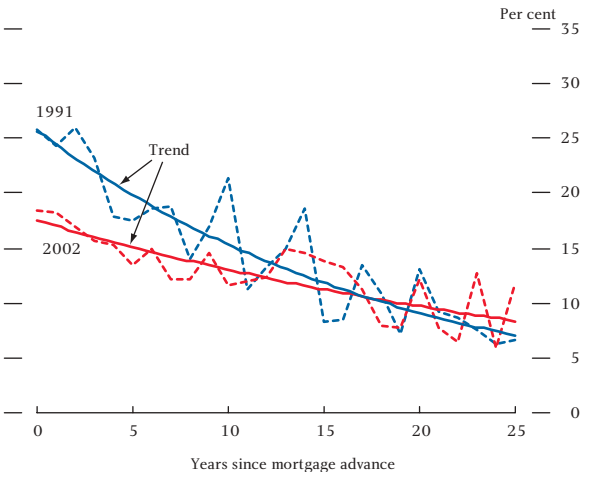
Source: SML.

Chart 15
Income gearing under different inflation rates(a)



(a) Real income growth is equal to 2.5% in each case.

Chart 16
BHPS income gearing



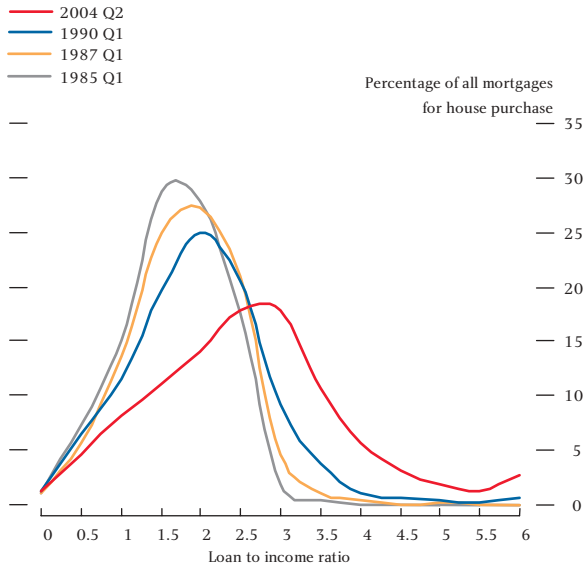
Source: BHPS.

household income gearing by the number of years since the mortgage was taken out from the 1991 and 2002 BHPS surveys, which confirms that the distribution of income gearing across mortgages of different maturities was flatter in 2002 than it was when inflation was higher. So the SML series in Chart 12 is higher, and has fallen by more, than the BHPS series because of the changes in inflation and the front-end loading effect.

This discussion also illustrates why historical comparisons of average gearing may not be useful for assessing the impact of changes in gearing on consumption. New mortgagors are one of the groups most vulnerable to changes in their cash-flow position, as first-time buyers (who have typically accounted for between a third and half of new mortgagors) are unlikely to have significant financial assets, and income gearing is highest at the start of a mortgage. But the higher gearing of new borrowers is concealed in the aggregate measure. High inflation in the early 1990s meant that new borrowers' income gearing was particularly high relative to the average, whereas low inflation over the past twelve years means that new borrowers' income gearing is now much lower relative to the average.

Nevertheless, loan to income (LTI) ratios have risen, particularly for new borrowers (see Charts 17 and 18); it appears that lower initial payments due to reduced front-end loading have led to an offsetting increase in the level of borrowing.(1) Income gearing is therefore more sensitive to changes in interest rates now than in the past, and more so for new borrowers. In fact, the distribution of income gearing within recent cohorts of new borrowers would be wider, and the mean would be

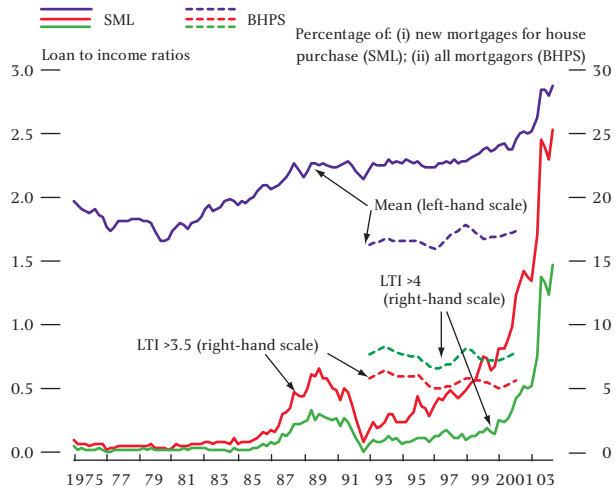
Chart 17
Distribution of LTI ratios for new mortgagors



Source: SML.

(1) Vigdor (2004) shows that easier access to borrowing tends to increase asset prices.

Chart 18
New (SML) and all (BHPS) mortgagors' LTI ratios



Sources: BHPS and SML.

higher, than in 1990 if nominal interest rates rose to the same level as then because the distribution of LTI ratios has widened and the mean has risen. But market expectations at the time of the August *Inflation Report* were for official interest rates to rise to a peak of around 5.2% in 2007 compared with the peak level of 15% reached in late 1989, which would leave average income gearing of new borrowers, and the proportion of new borrowers with very high gearing levels, well below that in 1990.

Collateral and cash-flow position

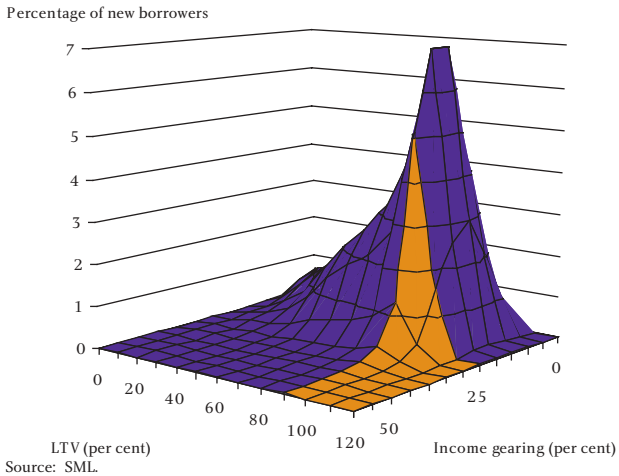
A smaller proportion of new borrowers than prior to the sharp rises in interest rates in the late 1980s now have both high income gearing and high LTV ratios (indicated by the orange shaded areas in Charts 19 and 20). In 1987 (the local trough in official interest rates), 22% of new borrowers had both income gearing higher than 25% and an LTV ratio greater than 90%, compared with 14% in 2004 Q2 (the volume under the orange area is smaller in 2004 Q2). This implies that, for a given fall in house prices or unexpected rise in interest rates or unemployment, new mortgagors are a little less vulnerable now than they were in the late 1980s.

Data considerations

There are a number of caveats to the data used in this analysis. The SML and BHPS include self-certified and fast-track mortgages, where declared income is not verified, which may introduce some errors into the income data (Fitch Ratings (2004) and CML (2004)). The impact of that is difficult to estimate. Moreover, it is not possible to take account of further advances secured on property in the analysis of the SML data. But the BHPS and aggregate ONS National Accounts data suggest similar trends in gearing so this does not appear to have serious implications for our analysis.

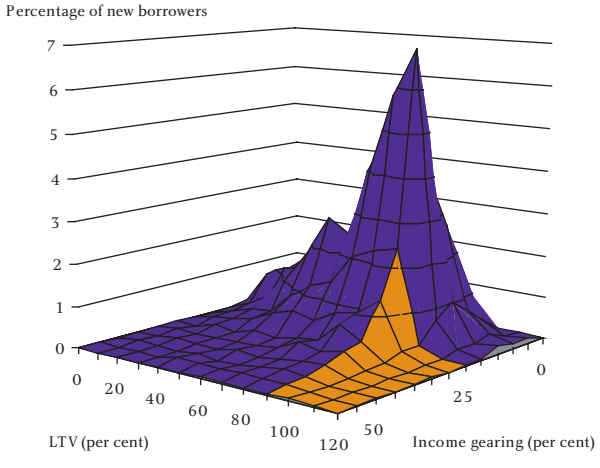
Finally, unsecured debt cannot be taken into account in the analysis of new mortgage borrowers using the SML data set. But unsecured debt seems unlikely to have a significant impact on our conclusions for three reasons. First, the proportion of total debt that is unsecured is similar to that prevailing at the previous peak in debt (see Chart 1), so unless the distribution of unsecured debt across households has changed substantially, the impact on households' total income gearing is also likely to be similar. Second, payments on unsecured debt are

Chart 19
Distribution of LTV ratios and income gearing for new mortgagors: 1987[(a)]



Source: SML.

Chart 20
Distribution of LTV ratios and income gearing for new mortgagors: 2004 Q2[(a)]



(a) The squares in the charts depict the percentage of new borrowers in each quarter who have income gearing within a particular 5 percentage point range and an LTV ratio within a particular 10 percentage point range. For instance, the right corner square shows the percentage of borrowers with income gearing between 0% and 5%, and an LTV ratio of between 110% and 120%. The squares for those borrowers who have income gearing greater than 25% and an LTV ratio greater than 90% are shaded orange.

less responsive to the official interest rate than are payments on secured debt. Third, Tudela and Young (2003) find that 77% of those people who find unsecured debt to be a significant burden do not have a mortgage, so while unsecured debt may have implications for consumption, it may not for this analysis of mortgagors.

Conclusion

Evidence from the Survey of Mortgage Lenders and the British Household Panel Survey shows that households currently tend to borrow a lower proportion of the value of their property than in the past. So households' consumption would probably be less affected by a given fall in house prices. The decline in inflation and nominal interest rates since 1990 means that income gearing has remained at a low level despite the rise in debt relative to income. But higher loan to income ratios, particularly for new borrowers, mean that income gearing is more sensitive than in the past to changes in interest rates.

Finally, fewer households than prior to the increase in interest rates in the late 1980s now combine low levels of collateral with high debt repayment commitments. So unless households face an unexpected large negative shock—for example should unemployment or interest rates rise substantially more than they expect—the risks from a coincidence of collateral and cash-flow effects are lower than in the past.

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Housing equity and consumption: insights from the Survey of English Housing[1]

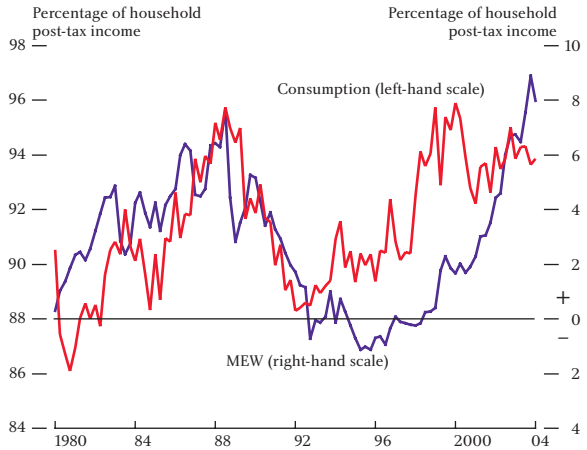
By Andrew Benito of the Bank's Structural Economic Analysis Division and John Power of the Bank's Inflation Report and Bulletin Division.

This article examines data from the 2003 Survey of English Housing (SEH) in order to shed light on the link between gross equity withdrawal and spending. Our analysis suggests that the bulk of gross withdrawals is not consumed in the near term. Those who sell a property without purchasing another one and those who trade down are more likely to pay off debt or save withdrawn equity than spend the proceeds. Remortgagors and those who obtain further secured advances are likely to spend the equity, but we estimate that their equity constitutes only about a quarter of total gross withdrawals. Of those who spend equity, financing home improvements rather than purchasing consumer goods appears to be the most important use of funds. That is consistent with the relatively weak relationship between consumption and mortgage equity withdrawal recently observed in aggregate data.

Introduction

Housing equity withdrawal plays a potentially important role in linking developments in the housing market with consumer spending.[2] But the relationship between equity withdrawal and consumption is not clear-cut. In recent years, the Bank of England's measure of mortgage equity withdrawal (MEW) has risen sharply without being accompanied by a sharp rise in consumption (see Chart 1). That is consistent with the view in the latest issues of the *Inflation Report* that the relationship between house prices and consumption has been weaker recently than it had been in the more distant past.[3]

Chart 1
MEW and consumption



It is difficult to interpret the relationship between these aggregate quantities as equity withdrawal reflects the behaviour and actions of different types of households. The stereotypical withdrawer is someone who remortgages or takes out an additional secured loan to finance consumer spending. But there are instances of equity withdrawal that do not increase the indebtedness of the individual withdrawer, most notably the equity withdrawn by those who exit the owner-occupied housing market and those who trade down. Such withdrawers might have a different motivation for withdrawing equity and hence a different propensity to consume out of those funds compared with those who borrow.

Information on the nature and motivation behind equity withdrawal is scant. The Bank's estimate of MEW, which in broad terms is measured as secured borrowing that has not been invested in the housing stock, is a top-down measure of equity withdrawal.[4] It cannot shed light on the different channels of withdrawal. In

(1) The authors would like to thank the Office of the Deputy Prime Minister and the Council of Mortgage Lenders for helpful discussions on using the Survey of English Housing.
(2) See for example Catte *et al* (2004) and Aoki *et al* (2002) on the link between housing and consumption. See also Davey (2001), pages 10–11 of the August 2004 *Inflation Report*, and the article on pages 291–301 of this issue of the *Quarterly Bulletin*.
(3) See for example page 44 of the May 2004 *Inflation Report*.
(4) The Bank's estimate of MEW is calculated as net secured lending and capital grants for housing paid to the household sector less housing investment, net transfers of land to the household sector and the costs of transferring dwellings to the household sector. See www.bankofengland.co.uk/mfsd/mew/mew.htm for details of the Bank's estimate of MEW.

this article we use microdata from the Survey of English Housing (SEH) to find out the relative importance of different types of equity withdrawal and how likely it is that those funds are spent. In the box on page 304 we use the survey data to examine the incomes of those who withdraw housing equity. The survey examines gross equity withdrawal. This differs from the Bank's estimate of MEW which is measured net of injections of equity, such as repayments of loan principal and spending on home improvements.

The Survey of English Housing

The SEH is an annual household survey in England conducted for the Office of the Deputy Prime Minister by the National Centre for Social Research. Its core purpose is to provide descriptive information about housing in England. In the 2003 survey, a module was added about gross equity withdrawal. The survey covered almost 15,000 households in England. As this was the first occasion that a set of questions on equity withdrawal had been included in the SEH, respondents were asked about all gross withdrawals they made during the preceding five years.

Incidence of gross withdrawal

Table A outlines the ways in which individuals can withdraw equity.

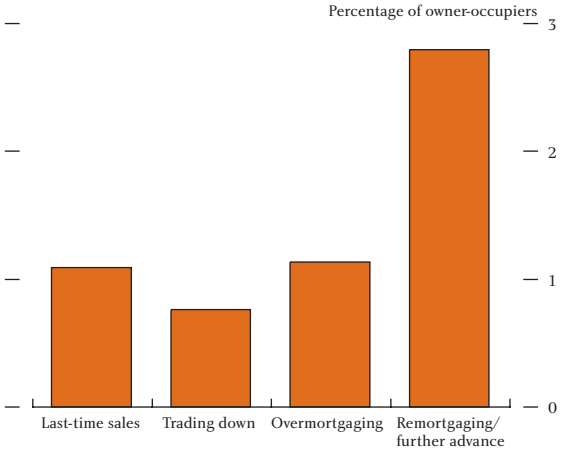
Table A
The components of gross withdrawals

Component	Description
Last-time sales	A seller does not buy a new property. 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.
Overmortgaging	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 or second mortgages	A borrower raises a further advance on an existing mortgage or takes a second mortgage without moving properties or improving the property to the same extent.

Generally, the SEH microdata allowed us to identify the incidence of gross equity withdrawal as outlined in Table A. But information on last-time sales is incomplete. It is restricted to those who exit the owner-occupied sector by selling a property and who are currently renting. According to Holmans' (2001) component flows analysis of equity withdrawal, those cases account for about 20% of total last-time sales (the bulk being the equity withdrawn from the sale of inherited properties).(1) So, in order to create a more accurate estimate of relative incidence we scaled up the recorded data on last-time sales by a factor of five. Within the data, it is also difficult to separate the incidence of equity withdrawal that occurs through remortgaging and through further advances. So we merged those channels of withdrawal.(2)

Chart 2 shows the incidence of equity withdrawal in 2002 (the most recent full calendar year for which we have data). 4.1% of households (5.8% of owner-occupiers) withdrew equity in 2002. Withdrawing equity by remortgaging or by obtaining a further advance was the most common form of withdrawal, accounting for just under half of all cases. Last-time sales and overmortgaging each accounted for just under one fifth of total incidence (the last-time sales data have been scaled up). Trading down accounted for about 13% of total incidence.(3)

Chart 2
Incidence of gross withdrawal in 2002



Note: Number of observations: 516.

But information on incidence does not tell us the actual amounts withdrawn through each channel. Table B shows the mean and median amounts withdrawn. Typically, last-time sales and trading down involve the

Table B
Gross withdrawals in 2002

£ thousands

	Last-time sales	Trading down	Overmortgage	Remortgage/ further advance
Mean	77.7	75.7	23.8	22.8
Median	60.0	55.0	16.0	13.8

(1) See Davey and Earley (2001, page 8).
(2) It is likely that both groups have similar characteristics (at least with respect to their propensity to consume out of withdrawn equity). Both groups borrow to withdraw equity and neither require a house move.
(3) In 2002, sales of houses were equivalent to 7% of the number of households.

How does equity withdrawal vary by household income?

What are the incomes of those withdrawing equity? This may be important for assessing the potential vulnerability, particularly of borrowers, to asset price or income shocks.

It is useful to consider two categories of withdrawers:

- Borrowers—those who borrow to withdraw equity (overmortgagors, remortgagors and those who take out a second mortgage).
- Other withdrawers—those who withdraw equity from the proceeds of the sale of their property (those who trade down and last-time sellers).

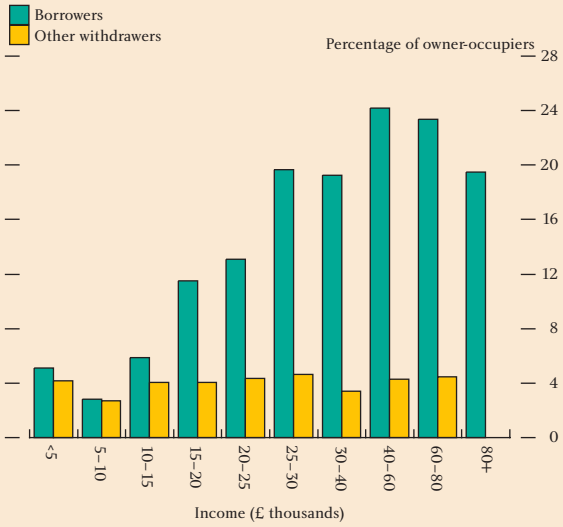
We consider these two groups separately for two reasons.

- The characteristics of both groups are likely to differ. We know that borrowers are more likely to withdraw smaller amounts of equity and more likely to spend it than the other group.
- Borrowers are more important from a financial stability perspective; so it is useful to consider their financial and demographic characteristics in isolation.

Chart A shows the percentage of owner-occupiers who withdrew equity during the past five years broken down by income. Other withdrawals, that is trading down and elements of last-time sales, are evenly distributed across income groups; those withdrawals are as likely to occur in high and low income groups. However, information on last-time sales of those moving into the rental sector, on which our information is based, may not be representative of all last-time sales.

Borrowing is concentrated primarily among high income households. The median income of borrowers is £33,600, higher than the median income of owner-occupying households. We estimate that nearly one quarter of all owner-occupying households earning £40,000 or more have borrowed to withdraw equity during the past five years. That is a much higher proportion than the 3.5% of households earning less than £10,000 who have borrowed (households earning less than £10,000 make up 18% of owner-occupying households).

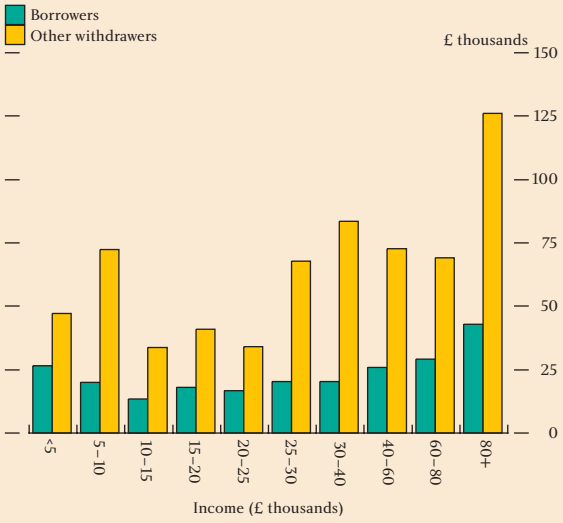
Chart A
Incidence of gross withdrawals in past five years by income



Note: Number of households: 346.

When low income households do extract equity, the survey suggests that they tend to withdraw relatively large amounts (see Chart B). Sums withdrawn by those households are comparable to withdrawals by medium-income groups regardless of whether they are borrowers or other withdrawers. Caution is required when interpreting this particular statistic; few low income households withdraw equity (see Chart A), so the data are subject to the influence of outliers. Beyond those on the lowest incomes, the average amount withdrawn tends to increase with the income of the household.

Chart B
Average amount withdrawn in past five years by income

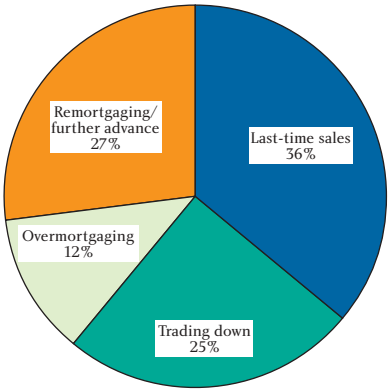


Note: Number of households: 346.

extraction of much larger amounts of equity than remortgaging and overmortgaging (the mean amount is over three times greater). That is intuitive, as in both cases the house is being sold and the withdrawers are not taking on additional debt.

Chart 3 indicates the share of the total value of funds extracted by the various means in 2002.(1) Last-time sales was the largest component of gross withdrawals, accounting for 36% of the total sum extracted in 2002. Remortgaging and trading down each accounted for around one quarter of total gross equity withdrawal. Overmortgaging accounted for 12%. So these data imply that only about 40% of total gross withdrawals represented funds that had been actively borrowed by the individual withdrawer.

Chart 3
Value of gross withdrawals in 2002



These data can be compared with those in Holmans' (2001) component flow analysis of equity withdrawal. For 2000 (the most recent year for his data), last-time sales accounted for 45% of gross withdrawal, while remortgaging and further advances accounted for 27%. This is broadly in line with our results. However, he found a much lower figure for trading down (3.4%) and a higher figure for overmortgaging (24%) than we did. At face value, his results therefore suggest that about 50% of funds were borrowed by the withdrawer—higher than our derived results. That is puzzling. It could be that house price inflation has mechanically boosted the non-borrowed elements of equity withdrawal in recent years. But this comparison of our results with Holmans' highlights that estimates of component flows are subject to uncertainty. Results produced in this analysis should therefore be treated with some caution.

Uses of funds raised

Respondents to the SEH stated what they used the withdrawn equity for, or their motivation for withdrawal. Assessing the information on uses of withdrawn equity is complicated by the design of the survey questions, which differed across each category of withdrawal. We consider information given on all withdrawals during the past five years. Our key findings are:

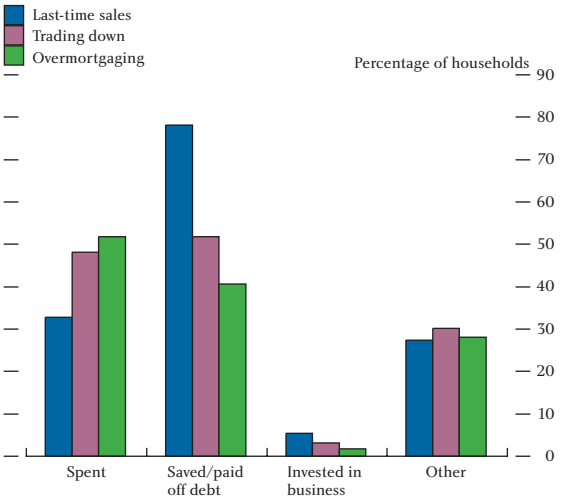
- Last-time sellers and those who trade down, which we estimate account for about 60% of the value of gross withdrawals, are more likely to pay off debt or save than spend the equity.
- Those who borrow to withdraw equity are more likely to spend the funds. Nevertheless, a substantial proportion of overmortgagors (ie those who move house and increase their mortgage) also use the funds for purposes other than spending.
- Withdrawers often mention unidentified uses for their withdrawn equity. It is possible that this could reflect gifts or transfers to other members of their family/household.
- Regardless of the channel employed, home improvements are the most important individual item of spending for those who spend the equity.

Last-time sales, trading down and overmortgaging

We estimate that these channels together covered over 70% of the value of total withdrawals in 2002 (or about 50% of the total number of withdrawers). Respondents were asked whether they spent, saved, paid off debt, invested in a business or did something else with the equity. Respondents were allowed to mention more than one use but the relative amounts allocated to each category were not given. Chart 4 illustrates the various responses. Last-time sellers were the least likely to spend withdrawn equity. Less than a third of them indicated that they spent some of their equity, while nearly 80% said they saved some or paid off debt. However, it is worth reiterating that the last-time sellers considered here are those who moved into the rental sector, which constitutes only a subset of total last-time sales. Their motivation to move into the rental sector may reflect a forced move due to a change in household circumstance or structure. So their propensity to consume out of those funds

(1) Smith *et al* (2004) have also produced estimates of the size of the components of gross withdrawal using SEH data. Their analysis considers the period 1998–2003. Their results are similar to ours.

Chart 4
How the proceeds were used(a)



Note: Number of households: 507.

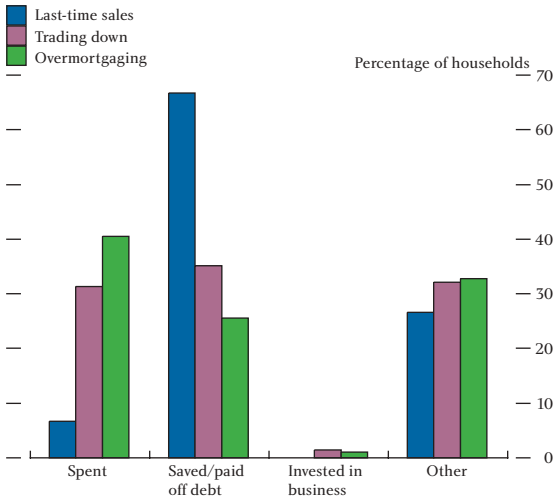
(a) Households can give more than one response.

might differ from that of the recipients of inherited funds.

Similarly, a greater proportion of those who traded down said that they either saved or paid off debt rather than spent some of the equity. In contrast, overmortgagors were more likely to spend the equity than save or pay off debt. The survey suggests that withdrawers rarely used their funds to invest in a business (less than 6% mentioned investing in a business). Surprisingly, 25%–30% of the withdrawers mentioned other unidentified uses of the withdrawn equity. It is possible that those funds were used as gifts or transfers to other members of their family (eg as a deposit for a child's new home). The age profile of those who mentioned they had used the equity for 'other purposes' is older than the typical withdrawer, possibly suggesting some intergenerational transfer.

Respondents were allowed to mention more than one use. In order to gauge better the relative importance of each item, we can analyse the distribution of responses for those who only mentioned one use (see Chart 5). This covers about 70% of the original sample, so we can still consider this group to be informative. The results are similar to those in Chart 4 but more striking. Less than 10% of last-time sellers who only mentioned one use said they spent the proceeds. Overmortgagors were still more likely to spend the proceeds than the other two groups. Nonetheless, about 60% of them mentioned uses other than spending. And for each channel of withdrawal 25%–35% of households still mentioned unidentified uses of the funds.

Chart 5
How the proceeds were used by those only citing one use

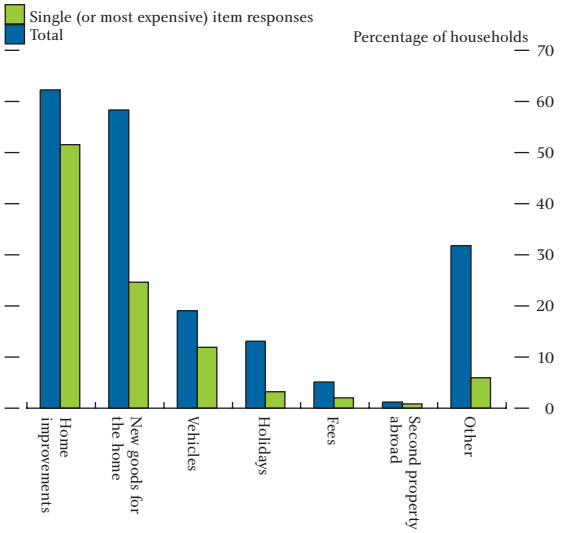


Note: Number of households: 359.

Of those who spent the proceeds, the survey identified how they spent their equity. As sample sizes were small we combined the responses of last-time sellers, overmortgagors and those who traded down. Response options included home improvements; new goods for the home; vehicles; holidays; fees (school, university, nursing home); a second property abroad; other goods (which we assume to be other expensive durable goods); general expenditure; and other. For simplicity we combined the last three responses. Households were allowed to give multiple responses, but if they did so they were asked to identify the most important item of spending.

Chart 6 shows the various items on which the proceeds were spent. The blue bars show the raw responses. The

Chart 6
How the proceeds of last-time sales, trading down and overmortgaging were spent



Note: Number of households: 252.

green bars reaggregate the responses by including those who identified just one item, or the most expensive item if more than one response was given. That should give a better indication of the relative importance of each item. About 50% of respondents said they either spent all the proceeds on home improvements or mentioned that these formed the most expensive item. The remaining 50% mentioned other items of expenditure, the most important being new goods for the home. The survey suggests that buying properties abroad was not an important use of withdrawn funds.

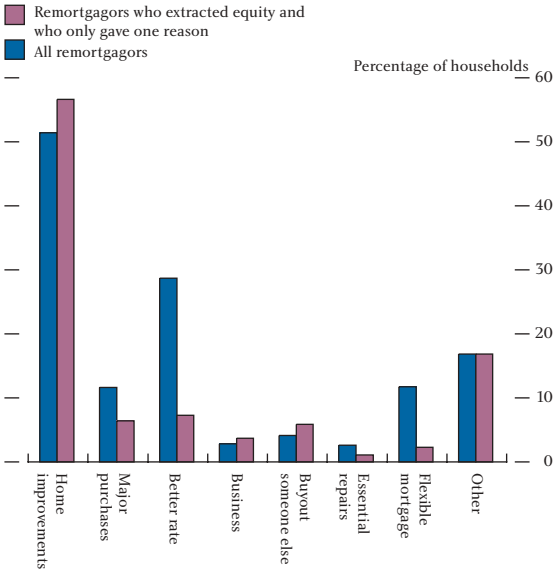
Remortgaging, further advances and second mortgages

Remortgagors were asked their motivation for remortgaging. Options included to make home improvements; to help to purchase a major item (car, boat, caravan, second home); to secure a better or fixed rate of interest; in connection with a business;(1) to buy out another person's share in the property; for essential repairs to the property; to move to a more flexible mortgage; or some other purpose. Once again households were allowed to give more than one response. Their responses are shown in Chart 7. But some of those who remortgaged did not extract equity. It is likely that their motivation for remortgaging was different from those who also withdrew equity. So to get a better handle on the motivation behind those who withdrew, Chart 7 also shows the responses of those who remortgaged, withdrew equity and gave only one motivation.

Remortgaging in order to finance home improvements appears to be the most important individual motivation, mentioned by over half of the respondents. Securing a better rate was the next most popular motivation for the full set of remortgagors. But unsurprisingly, as this is not related to equity withdrawal, it was not as popular among the restricted sample, being mentioned by only 7% of respondents. Among the restricted sample the other named motivations were individually small. But 17% of the respondents in both samples gave some other unidentified motivation for remortgaging. That may reflect either paying down debt, gifts to others, or other general expenditure. Some of these results chime with those from a study on mortgage refinancing in the United States (Canner *et al*, 2002). That work found that over 40% of refinancers used equity to make home improvements, in line with SEH estimates for the United Kingdom. That study also found that paying off other debts was an important motivation behind refinancing.

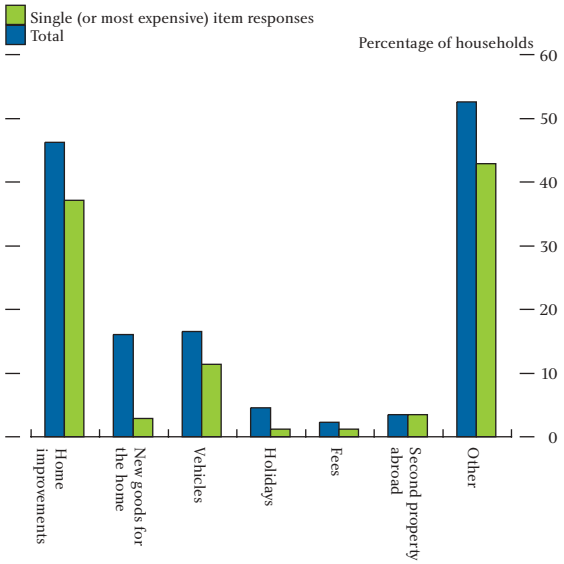
The SEH also identified those who had taken out a second mortgage. Similar to overmortgagors, last-time sellers and those who trade down, respondents were asked how they spent the proceeds. If they gave more than one reason they were asked what the most important item of spending was. But unlike the overmortgaging, last-time sales and trading down groups, they were not initially asked whether they saved, spent or paid off debt with the equity. Chart 8 shows the raw

Chart 7
Motivation for remortgaging and further advances



Note: Number of households: 1,291 (full sample), 659 (restricted sample).

Chart 8
How the proceeds of second mortgages were spent



Note: Number of households: 175.

(1) It is not clear what exactly 'in connection with a business' means. It probably refers to equity withdrawn in order to invest in a business.

responses and, like Chart 6, a set of reaggregated responses that considers only the most important items.

Almost 40% of respondents said home improvements were the only, or the most important, named item of spending. About 20% mentioned other items of expenditure, with vehicles being the largest category. The remaining 40% mentioned other items. As respondents were not initially given the opportunity to state whether they had actually saved, spent, or paid off debt with the funds, it is possible that this 'other' category reflects funds that were not actually spent. It is also possible that gifts and transfers show up in this category.

Some conclusions

Equity withdrawal does not only occur when individual households borrow against the value of their home to finance consumption. In this article we have shown that equity withdrawal occurs through several channels, some of which do not necessarily involve borrowing by the individual withdrawer, and that the use of withdrawals varies (spending, saving, paying off debt, and possibly transfers to others). Funds that are released through borrowing are the most likely to be spent; but such advances only account for about 40% of total gross withdrawals. Last-time sales and trading down together account for more than half of gross withdrawals; those funds are more likely to be saved or used to pay off debt than spent. And, for all categories of withdrawal, respondents mentioned other uses for the funds. We conclude therefore that the bulk of gross withdrawals is unlikely to be spent in the near term.

Where funds are spent, the survey data suggest that home improvements are the most important item of spending. Home improvements do not form part of consumption. In the National Accounts they are treated as housing investment, although, in practice, certain home improvements (such as a self-installed new kitchen) may be picked up in consumption.(1) But there are difficulties in measuring this accurately.

As noted previously, the information on gross withdrawals analysed in this article is not the same as the Bank's estimate of MEW, which is net of injections of equity. However, the broad conclusion that equity withdrawal is not synonymous with secured lending for consumption holds for the Bank's estimate of MEW. Withdrawal of housing equity is largely generated by mechanisms (exiting and trading down) that give rise to a tendency for it to vary with movements in house prices. But we have shown that these types of withdrawal have lower consumption propensities. It is possible therefore that some of the increase in measured MEW funds in recent years has in aggregate flowed into financial assets if those funds have been saved: the households' financial balance has been roughly stable during the past six years despite the increase in household debt.(2)

In the past, when a strong correlation between equity withdrawal and consumption was observed, this is likely to have reflected house prices and consumption responding to a common shock such as changing income expectations.(3) The lower correlation observed now suggests that such a common shock may have been a less important factor behind the recent upturn in the housing market.

(1) The Bank's regularly published estimate of MEW should be unaffected by spending on home improvements as they simultaneously represent both a withdrawal and an injection of equity.
(2) See Section 1 of the August 2004 *Inflation Report*.
(3) See for example Attanasio and Weber (1994).

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Why has world trade grown faster than world output?

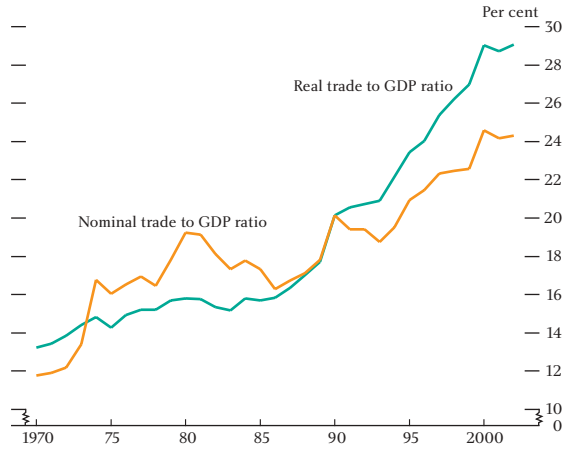
By Mark Dean of the Bank's International Economic Analysis Division and Maria Sebastia-Barriel of the Bank's Structural Economic Analysis Division.

Between 1980 and 2002, world trade has more than tripled while world output has 'only' doubled. The rise in trade relative to output is common across countries and regions, although the relative growth in trade and output varies greatly. This article attempts to explain why the ratio of world trade to output has increased over recent decades. It provides a brief review of the key determinants of trade growth and identifies proxies that will enable us to quantify the relative importance of the different channels. We estimate this across a panel of ten developed countries. This will allow us to understand better the path of world trade and thus the demand for UK exports. Furthermore this approach will help us to distinguish between long-run trends in trade growth and cyclical movements around it.

Introduction

In the past few decades there has been an increasing integration of the world economy through the increase of international trade. The volume of world trade(1) has increased significantly relative to world output between 1980 and 2002 (see Chart 1). Some of this increase can be accounted for by the fact that traded goods have become cheaper over time relative to those goods that are not traded. However, even in nominal terms the trade to GDP ratio has increased over this period. This means other factors may also be contributing to the phenomenon.

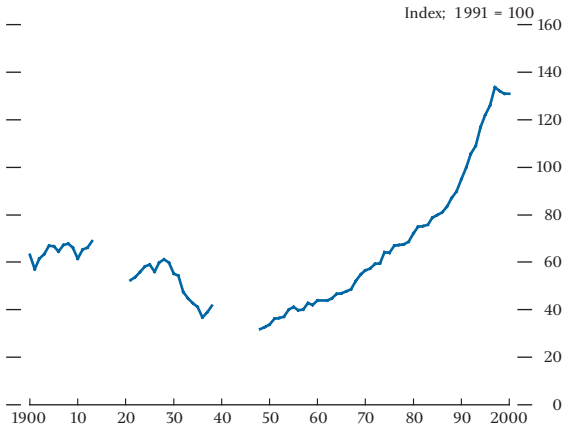
Chart 1
World imports as a ratio of world GDP: nominal and real



Source: UN statistics.

The upward trend in the trade to output ratio is evident since the end of the Second World War, and seems to have accelerated in the past 20 years. Prior to that, trade fell as a proportion of output following the end of the gold standard (see Chart 2).

Chart 2
Volume of world manufacturing trade as a ratio of world manufacturing output

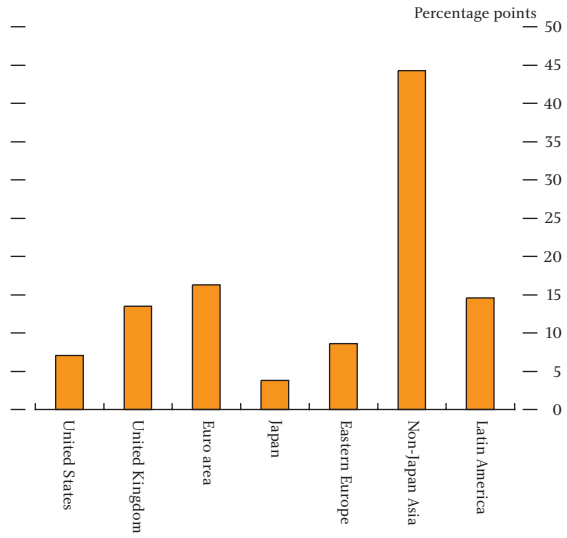


Source: UN Monthly Bulletin of statistics.

The trade to GDP ratio has increased in all major economies in the past 20 years, but as Chart 3 points out the scale of the increase has varied from region to region. It has risen by around 50 percentage points in non-Japan Asia, around 15 percentage points in the euro area, Latin-American countries and the United Kingdom, but by less than 10 percentage points in

(1) Defined in this article as world imports.

Chart 3
Increase in the real import share of GDP (1985–2003)(a)



Source: IMF *World Economic Outlook* (April 2004).

(a) Eastern Europe: Albania, Bulgaria, Croatia, Estonia, Moldova, Poland, Russia, Slovak Republic and Slovenia. Non-Japan Asia: China, India, Malaysia, Maldives, Myanmar, Pakistan, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Sri Lanka, Taiwan and Thailand. Latin America: Argentina, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Paraguay and Peru.

Eastern-European countries, the United States and Japan.

Explanations for the increase in trade tend to fall into three categories:

- **Falling costs of trade.** Transportation, communication and search, currency exchange and tariffs are all examples of costs incurred when trading goods internationally. To the extent that these costs have fallen over the past 20 years, we would expect trade to increase.

- **Productivity growth in the tradable goods sector.** Many studies have noted that productivity growth tends to be higher in the tradable goods sector than in the non-tradable goods sector. Such a trend should have the effect of increasing the ratio of trade to output.

- **Increasing income per head.** As a country's income rises consumers tend to shift their spending away from basic food and clothing products and into manufacturing goods, which may offer more scope for product differentiation, diversification and international trade.

The next section describes these and other possible reasons for the increase in trade in more detail.

Despite the popularity of this topic in the recent trade literature, there are few empirical estimates on the impact of these channels, with two notable exceptions, Rose (1991) and Baier and Bergstrand (2001). Our aim in this article is therefore twofold: first, to provide a brief review of the key determinants of trade growth and developments in these variables over the past 20 years; and second, to draw some conclusions on the empirical importance of these factors through a model-based approach using panel data estimation techniques. This will allow us to understand better the path of world trade and thus the demand for UK exports. Furthermore this approach will help us to distinguish between long-run trends in the trade to output ratio and cyclical movements around it.

The structure of the article is as follows. The second section describes the main determinants of world trade, drawing on the existing trade literature, and identifies within the data available possible proxies for these. The third section explains how this information can be used to derive a model for trade growth and discusses the results. The last section presents conclusions.

What determines how much a country trades with the rest of the world?

This section differentiates between inter and intra-industry trade, and explains what factors might be determining the level of trade in the economy as suggested by economic theory. It reviews developments in these variables over the past 20 years for a panel of countries. We have selected (*ex post* and given the available data) a sample of ten developed countries: seven from the European Union (Belgium, France, Germany, Italy, the Netherlands, Sweden and the United Kingdom), Canada, Japan and the United States.

Two different types of trade

Models of international transactions tend to differentiate between two different types of trade, that driven by inter-industry specialisation and that driven by intra-industry specialisation.

Inter-industry specialisation

Early models of trade focused on the form of specialisation that occurs when countries specialise in the production of different types of goods—for example country 'A' produces cars and country 'B' produces wheat. Countries will specialise in the production of goods that are relatively cheap for them to produce,

either because they have a technological advantage in the production of that good, or because they have an abundant supply of the factors that are used to produce it. Either reason would give the country a comparative advantage in the production of that good. Trade should *ceteris paribus* be greatest between countries that have the largest differences in technology or factor endowments.

One way to see how much an economy has specialised in the output of certain industries is to observe how employment is allocated across different industries at different points in time.(1) The OECD STAN database provides annual employment data disaggregated by industry. We calculate an annual measure of the dispersion of employment across 18 industries,(2) the coefficient of variation (standard deviation divided by the mean), for every country in our sample. Table A shows how these coefficients of variation have changed

Table A
'Coefficient of variation' for employment across industries

	Coefficient of variation		
	1971 (a)	2001	Percentage change
Belgium	0.97	1.57	62
Canada	1.28	1.53	20
France	1.02	1.49	46
Germany	0.89	1.40	58
Italy	1.06	1.27	20
Japan	1.19	1.42	20
Netherlands	1.14	1.58	39
Sweden	1.28	1.70	33
United Kingdom	1.21	1.57	30
United States	1.54	1.72	12

Source: OECD STAN.

(a) 1979 for the United Kingdom.

between 1971 and 2001. Dispersion across sectors has increased for all countries. The largest increases in the coefficient of variation have been in Belgium, Germany, France and the Netherlands. Such an increase would be consistent with an increase in inter-industry specialisation,(3) which should be positively related to the trade to output ratio; the higher the dispersion of employment across sectors, the more specialised an economy and the higher the level of trade relative to output.

Intra-industry specialisation

Empirical evidence offers little support for models of trade based solely on comparative advantage.(4) The main problem is that there are two stylised facts that run contrary to the predictions of such models. First, most trade takes place between structurally similar industrial economies rather than between developed and developing countries: for example, 80% of OECD trade takes place with other OECD economies. Classical trade models would predict that most trade would take place between countries most different in their factor endowments and technology levels.

Second, a large and growing fraction of trade is made up of the exchange of goods produced within the same industry, which indicates the presence of intra-industry specialisation. This form of specialisation occurs when countries specialise in the production of different varieties of the same basic good. For example, both Japan and the United States produce passenger cars. Table B shows that the intra-industry trade share of manufacturing trade has increased gradually since the late 1980s across most of the countries in our sample.(5)

Table B
Share of intra-industry trade in total manufacturing trade(a)(b)

	1988–91	1992–95	1996–2000
Belgium/ Luxembourg	77.6	77.7	71.4
Canada	73.5	74.7	76.2
France	75.9	77.6	77.5
Germany	67.1	72.0	72.0
Italy	61.6	64.0	64.7
Japan	37.6	40.8	47.6
Netherlands	69.2	70.4	68.9
Sweden	64.2	64.6	66.6
United Kingdom	70.1	73.1	73.7
United States	63.5	65.3	68.5
Average	*66.0*	*68.0*	*68.7*

Source: 'Intra-industry and intra-firm trade and the internationalisation of production', *OECD Economic Outlook, No. 71.*

(a) Intra-industry trade (*IIT*) is measured using Grubel-Lloyd indices based on commodity group transactions. For any particular product *i*, an index of the extent of intra-industry trade between A and B is given by the following ratio:

$$IIT_{i,AB} = \frac{(X_i + M_i) - |X_i - M_i|}{(X_i + M_i)} * 100$$

This index takes the minimum value of 0 when there are no products in the same class that are both imported and exported, and the maximum value of 100 when all trade is intra-industry. Bilateral indices for all goods and trading partners are obtained as a weighted average of the bilateral indices using as weights the share of total trade of A accounted for by B. These are then reweighted for all product classes *i*, with weights given by *i*'s share in total manufacturing trade.

(b) The absolute level of summary statistics of intra-industry trade is in itself not very meaningful because it depends on the level of disaggregation chosen for the analysis. The focus here is on changes in intra-industry trade through time, which should be less affected by aggregation structures.

(1) A technique used by Imbs and Wacziarg (2001).
(2) We use ISIC Rev.3 1-digit disaggregation, except for the manufacturing sector, which is further disaggregated to the 2-digit level. This allows an employment split into 18 different categories. To get over the problem of reunification in Germany, we use data for Western Germany before 1993.
(3) Although employment shares have been widely used as a measure of sector size in the literature concerned with sectoral specialisation, it is worth noting that for example increases in the contracting out of certain tasks within a firm or industry could mean changes in the coefficient of variation that would not reflect changes in the outputs of a given country.
(4) See Helpman (1999) and Davis and Weinstein (2001).
(5) With the exception of Belgium/Luxembourg and the Netherlands.

These two empirical problems with trade theory based solely on comparative advantage encouraged new motivations for trade that could explain intra-industry specialisation. These new trade theories were based on firms that are able to differentiate their products within a given industry so that their outputs become imperfect substitutes in consumption (Dixit and Stiglitz (1977) and Helpman and Krugman (1985)). If consumers like variety, then differentiation gives firms monopoly power, so firms will seek product differentiation even within the same industry and thus create trade between apparently similar economies.

The differentiation of trade between intra and inter-measures is, in practice, somewhat subjective as the grouping of industries into different categories is arbitrary. As an example, people working in the 'Food, beverages and tobacco' industry might range from marketing consultants to industrial chemists. If one country chooses to specialise in marketing and another in industrial chemistry as a result of comparative advantage then our data would categorise this as intra rather than inter-industry specialisation. The breakdown of the production process of a specific product across countries—so-called vertical specialisation (see Feenstra (1998) and Hummels *et al* (2001))—could have made this problem more acute in recent years.

Determinants of specialisation and trade

This section describes four specific determinants of the level of inter and intra-industry specialisation and trade. It also describes the data available in order to measure the size of these effects.

Country size

The relationship between country size and the level of trade comes from the assumption that larger countries produce a wider range of goods than smaller countries. Say the world has only two countries, one of which produces two thirds of all the different types of goods, and the other that produces one third. If preferences are the same across both countries, and people desire all good types equally, then the residents of the larger country will spend one third of their income on imported goods, while those in the smaller country will spend two thirds of their income on imports. The larger country can provide a wider range of goods from domestic production than the smaller one. Though the above example is clearly stylised, the result persists in quite a wide class of theoretical frameworks. On a global level, the above result supports the argument that world trade should increase as country size becomes more equal for a fixed number of countries.(1) As a proxy for country size this analysis uses the IMF *World Economic Outlook* measure of a country's world output share.(2) These tend to be slow-moving; the largest change between 1970 and 2000 has been a 1.8 percentage point fall in the German share of world output.

Income per head

Levels of income per head might have a role in explaining trade, as suggested by Linder (1961). He observed that consumers with similar levels of income per head tend to consume similar bundles of goods.(3) Even if consumers' preference for variety is the same at different levels of income, budget constraints have an effect on consumption bundles. When income levels are low, consumers concentrate their spending on necessities, such as staple foods and basic clothing. In these sectors it is not possible for firms to create differentiated products, so there is little scope for intra-industry trade. As income levels rise, spending patterns shift towards manufacturing products. These tend to have more sophisticated production processes that allow for product differentiation and may prompt intra-industry trade. Higher incomes, however, also lead to higher expenditure on services, for example eating out in restaurants, which tend to be less traded. This shift could have an offsetting effect as income rises. To compare across countries we use a GDP per head(4) measure in dollars.(5) Development in this measure since 1980 varies greatly across countries, from a 200% rise in Japan to a 40% fall in Italy.

Costs of trade

There are many different ways in which international trade might incur costs over and above those incurred by domestic trade. Such costs include: transport costs and communication costs, imposed tariffs and non-tariff barriers, search costs, the cost of building and maintaining a network of customers, currency exchanges and exchange rate risk.

(1) This argument is developed more thoroughly in Helpman (1984).
(2) These series are calculated using a 'purchasing power parity' exchange rate measure that equalises prices of goods across countries to convert output figures to a common currency.
(3) Markusen (1986) formulated a model incorporating income-dependent consumer preferences, such that the share of income spent on manufactured products increases as income increases.
(4) Data source: IMF *World Economic Outlook*.
(5) As in Rose (1991) and Hunter and Markusen (1988).

Some of these frictional costs may have fallen over the past 20 years. Transport costs and communication costs may have fallen as technology improves. Tariffs and non-tariff barriers to trade have fallen through successive multilateral and bilateral trade agreements and might continue to do so as part of trade agreements such as the 'Uruguay Round'. Capital market liberalisation may also have reduced the cost of foreign currency transactions and have created the ability to hedge against exchange rate risk.

As the costs of trade fall, specialisation becomes more profitable and both inter and intra-industry trade should increase.(1) Furthermore, reductions in trade costs due to improvements in communication technology have also led to increases in trade in services such as consultancy advice or financial services often delivered through the internet. Many of these factors are, however, hard to quantify. This article therefore examines the effects of freight costs, tariffs, and exchange rate volatility.

Transport costs, insurance and freight

One of the most obvious costs to international trade is the cost of transporting goods from one country to another. Transport technologies are continually improving and transport services are also becoming cheaper through increased competition. The goods transported are also changing; some goods are now transported electronically, such as newspapers and magazines, due to improvements in communication technology and others are becoming lighter, for example mobile phones. All this should be reflected in lower transport costs.(2)

One way to measure transport costs is by comparing the cost of imports when delivered to the point of departure of the exporting country(3) with the cost of imports at the point of arrival in the destination country. The difference between the two prices should therefore be the cost of transport and insurance for the exported items. Many studies use this ratio as a measure of transportation costs (for example Baier and Bergstrand (2001)) as the data are readily available for a large number of countries and over many years.(4)

Chart 4 shows the sample average for transport costs between 1970 and 2002. The available data suggest that transport costs have fallen gradually over the period in our study, from an average of 8% of total import costs in 1970 to about 3% in 2002.

Chart 4
Transport, insurance and freight costs as a share of total import costs

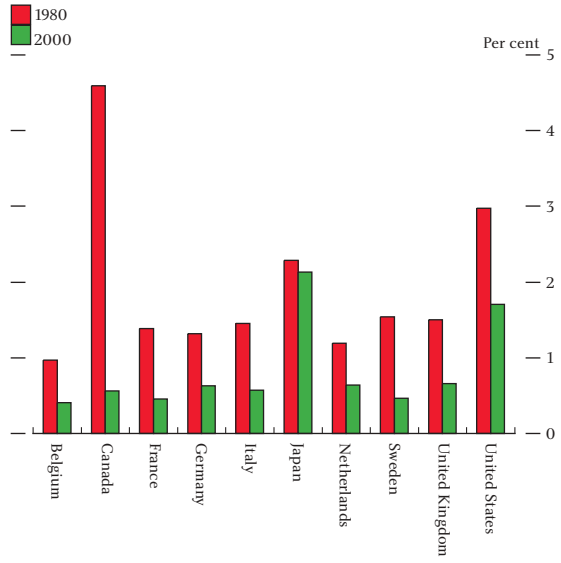
Sources: Bank of England estimates and IMF *International Financial Statistics* (1995).

Tariffs

A second obvious frictional cost to trade arises from tariffs and non-tariff barriers such as quotas or import standards. Although all of these have been falling as part of multilateral and bilateral trade agreements, this section only quantifies tariff rates. The World Bank's 'World Development Indicators' provide tariff revenue as a share of import costs for the panel of ten countries in this article from 1975 to 1997. To complement these data up to 2001 we use average import tariff rates from the United Nations Conference on Trade and Development (UNCTAD).(5) Chart 5 shows how rates

(1) Falling frictional costs have been highlighted by many authors as a key driver in the growth of world trade. See for example Obstfeld and Rogoff (2000).
(2) Transport costs are also affected by the distance travelled, thus increases in intra-European or intra-Asian trade could also contribute to the fall in transport costs.
(3) Imports measured 'Free on Board (FOB)' relative to the cost as measured including 'Cost, Insurance, Freight (CIF)'.
(4) The IMF *International Financial Statistics* (1995) reports CIF/FOB ratios for over 100 countries for the period 1965–94. For France, Germany and the United States we can obtain annual transport costs up to 2002; we use the annual average growth rate of these to extend the sample period for the other nine countries and avoid it finishing in the mid-1990s. A statistical test for the equality of mean growth across countries cannot reject the hypothesis of the mean growth in transport costs for our set of countries being equal.
(5) Unfortunately, the World Bank measure only records tariff revenue collected by central government. This means that the data are not accurate for countries within the European Union, for whom tariff revenue from extra-European trade accrues to the EU itself. To circumvent this problem, we use tariff revenue for the euro area from the EU Commission (2000); the ratio of total tariff revenue to total trade is used to calculate a tariff rate of extra-EU trade. To turn this into a tariff rate for each country, we then multiply the EU tariff by the share of that country's imports that comes from outside the EU.

Chart 5
Tariff rates as a percentage of total import costs



Sources: Bank of England estimates, EU Commission, United Nations, and World Bank.

have fallen in every country over the past 20 years; only in Japan has the tariff rate remained broadly unchanged.

Exchange rate volatility

Exchange rate volatility can increase uncertainty about prices for foreign transactions, and so acts as a cost to international trade. Thus, lower exchange rate volatility should lead to an increase in the level of cross-border trade.(1)

As a summary statistic of exchange rate volatility, Table C shows the average variance of the daily level of the nominal effective exchange rate in each country over the course of a year over the 1980s, the 1990s and 2000–03.

Table C
Average annual variance of daily nominal effective exchange rate

	1980s	1990s	2000–03 (a)
Belgium	1.79	1.39	0.40
Canada	2.02	3.20	4.92
France	3.57	1.47	0.58
Germany	2.02	2.03	0.80
Italy	3.91	4.60	0.29
Japan	12.47	42.54	11.24
Netherlands	1.60	1.30	0.51
Sweden	9.71	4.98	2.64
United Kingdom	17.44	8.19	2.34
United States	24.90	7.30	13.63

Source: Bank of England.

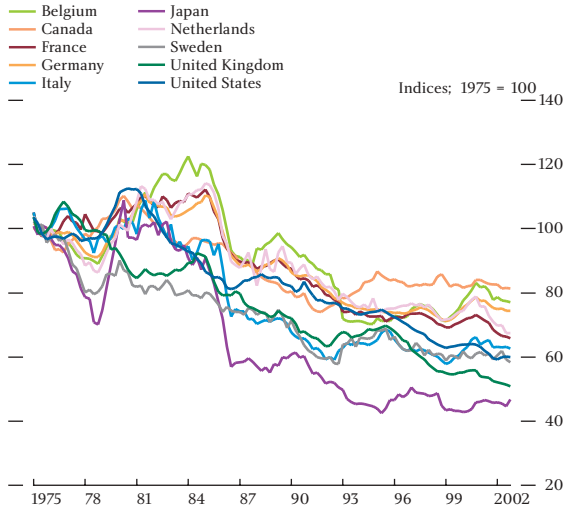
(a) For the euro-area countries' exchange rate the last year available is 2002.

In most countries volatility was lower in the 1990s than in the previous decade. Exceptions are Canada, Italy and Japan. In the euro-area countries we can observe a substantial fall in volatility in 2000–02, after the introduction of the euro in 1999.(2) Thus, less uncertainty around the level of the nominal exchange rate could have encouraged more trade.

Productivity gains in the tradable sector

Another long-run determinant of a country's import to output ratio is the productivity of the tradable goods sector relative to that of the non-tradable goods sector. Balassa (1964) argued that productivity growth tends to be higher in the manufacturing than in the services sector; to the extent that manufactures are more highly traded than services, this translates to faster productivity growth in the tradable goods sector than in the economy as a whole. If prices are set as a trendless mark-up over the costs incurred in production, this would lead to falling tradable prices relative to non-tradable prices. Such relative price changes should lead to substitution of tradable for non-tradable goods in consumption, and so increase the share of trade in expenditure. The price of goods in the tradable sector(3) has fallen relative to the price level of the economy as a whole by around 30% between 1975 and 2002 (on average in our sample) as shown in Chart 6. However, the direction of causality is not necessarily clear. It is possible that the price of these goods has fallen due to the increased competition brought about by increased trade.

Chart 6
Price of tradable goods relative to whole-economy prices



Source: Thomson Financial Datastream.

(1) One can think of examples in which exchange rate volatility acts in the opposite direction. For example (although unlikely due to the implied search costs), in times of high exchange rate movements exporters might choose to hedge their risk by importing raw materials from the destination country, thus increasing trade.
(2) These data are available for the ten countries in our sample from 1979–2002/2003.
(3) We are approximating the price in the tradable sector as the domestic-currency import price plus the domestic-currency export price, giving export and import prices the same weight.

Quantifying the relative importance of these factors

Having discussed some possible proxies for the determinants of international trade, we can attempt to quantify their relative importance through a panel regression across our ten developed countries. To the extent that the increase in trade is a global phenomenon, we would like to assess whether the drivers are also global in nature; to do this we are assuming that the determinants observed have an equal effect on all countries in the long run.(1) This should help us to get more precise parameter estimates.

The variable that we want to explain is the trade to total final expenditure ratio. A country's total final expenditure consists of household and government consumption, investment expenditure, exports and stockbuilding.(2)

The six potential variables we have identified as proxies for the determinants are listed below.(3) The signs in parentheses show the expected effect of each of the variables on import shares. For example an increase in tariffs would suggest a fall (-) in the trade to final expenditure ratio.

- share of world output (-);
- GDP per head (+);
- transport costs (-);
- tariff rates (-);
- exchange rate volatility (-); and
- price of tradable relative to non-tradable goods (-).

The equations are estimated as error correction mechanisms, which map short-run changes in the import to final expenditure ratio to changes in lagged imports, final expenditure and relative tradable prices and deviations from the long-run equilibrium, where the long-run determinants are the levels of all the variables above. The annex contains a full description of the specification.

Chart 7 plots the percentage change in the import to expenditure ratio implied by a 1% change in each of the determinants; statistically significant coefficients are shown in green while white bars indicate insignificant coefficients. The coefficients on exchange rate volatility, GDP per head, relative price of tradable goods, tariffs and share of world GDP are all correctly signed, and significant. The coefficients on transport costs are of the right sign but not significant.(4)

Chart 7
Coefficient estimates of long-run determinants

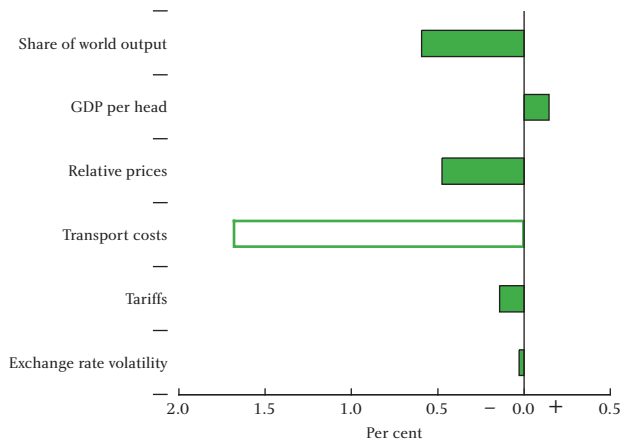


Chart 8 plots the contributions to the change in the world import to expenditure ratio(5) from 1980 to 2000, once we have excluded from the estimation the insignificant explanatory variables. The fall in the relative price of tradable goods relative to non-tradables and the fall in tariffs appear to be the largest contributors to the increase in the import to expenditure ratio (65%). Convergence in world output shares, increasing GDP per head and lower exchange rate volatility have all positively contributed to the rise in imports over that in final expenditure. Our estimation also suggests that around 14% of the rise in the import to expenditure ratio is not accounted for by our model.(6)

We can also see how the estimated trend in the world import to expenditure ratio based on our determinants

(1) As in Pesaran, Shin and Smith (1999). We test the restriction that the long-run coefficients are equal across countries using the Hausman test (Im, Pesaran and Smith (1996)); all coefficients are accepted to be equal except in the case of transport costs, so according to this test there is parameter homogeneity across most determinants in the ten countries.
(2) GDP equals total final expenditure minus imports. As import growth does directly depend on changes in these expenditure components, an increase in the ratio would reflect an increasing use of imports for consumption, investment or export production.
(3) We constructed a data set containing all these variables for the ten countries in our sample from 1979–2001.
(4) The insignificance of this coefficient may be due to the degree of measurement error in our proxy for transport costs. Hummels (1999) describes some of the problems associated with the CIF/FOB ratio.
(5) In our estimation the world is defined as the ten countries in our sample weighted by their share in world imports.
(6) If we exclude exchange rate volatility from our specification in order to bring the sample back to the beginning of the 1970s, then GDP per head becomes insignificant over that larger sample period but the rest of the results remain unchanged.

Chart 8
Contributions to the total change in the world import to expenditure ratio (1980–2000)

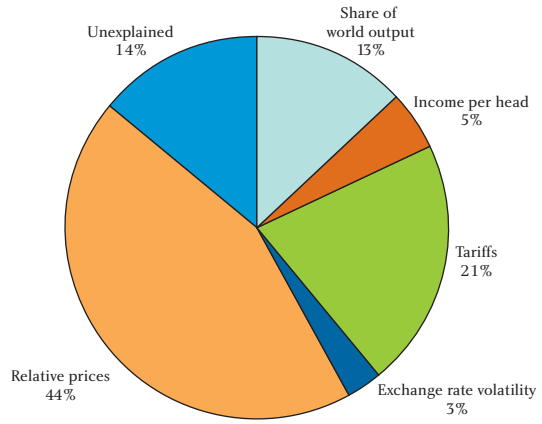
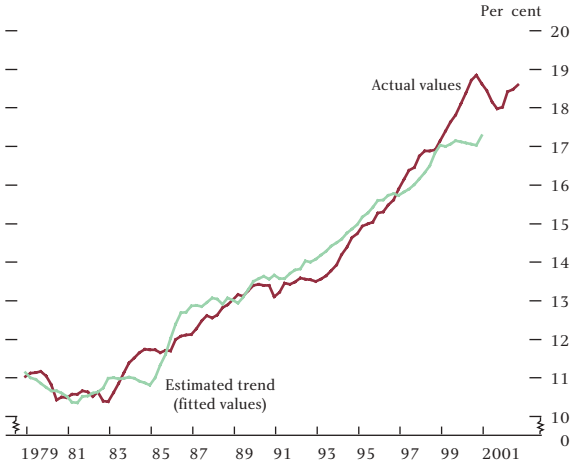


Chart 9
Estimated (fitted) trend in the world import to expenditure ratio



has moved over time relative to the actual values. Chart 9 shows that, since the beginning of the 1980s, our estimated trend has moved closely in line with the actual import to expenditure share, with a large gap in historical terms between 1999 and 2000, although the actual ratio appears to have fallen back in recent years. Herzberg *et al* (2002) suggest that the composition of total final expenditure over those years could partly explain this diversion. The higher import content of business investment, in particular information, communications and technology (ICT) investment, together with the strong growth in this investment category over 1999 and 2000 might partly explain the stronger growth in the actual import to expenditure ratio.

Conclusion

The empirical analysis above has helped us to identify two main causes for the increase in trade witnessed over the past 20 years. First, productivity growth in the tradable goods sector has caused a fall in the relative price of such goods, and so increased trade. Second, tariff rates have fallen in most major economies, reducing the cost of international trade and increasing the returns to specialisation. Between them, these two effects account for about 65% of the increase in the trade to total final expenditure ratio in the past 20 years. There is also a lesser, but still significant role for falling exchange rate volatility, the convergence of country shares in world output and increasing GDP per head. We do not find a significant role for falling transport costs, but this may be due to the poor measurement of this variable.

Our results generally confirm those of previous empirical studies into the causes of trade growth. Rose (1991) finds a large, significant effect from tariff rates and a large but insignificant coefficient on transport costs. Baier and Bergstrand (2001) also find a large and significant role for tariff rates, and a smaller, but still significant role for transport costs.

Our determinants appear to be able to explain a large part of the increase in the import to expenditure ratio in developed economies over the past 20 years. The increase in the ratio between 1998 and 2001 not predicted by our equation may be due to cyclical increases in expenditure on investment and, in particular, ICT goods, as suggested by previous work (Herzberg *et al* (2002)). But since then, the import to total final expenditure ratio seems to have returned towards the more persistent trend implied by falling tariff rates and relative prices of tradable goods.

Annex

We start the empirical estimation with the reduced-form combination of supply and demand determinants as in Rose (1991):

$$\Delta m/tfe_t = \alpha_t + \beta_1 \Delta m_{t-1} + \beta_2 \Delta m_{t-2} + \beta_3 \Delta tfe_{t-1} + \beta_4 \Delta tfe_{t-2} + \beta_5 \Delta rt_t + \beta_6 \Delta rt_{t-1} + \gamma(ECM)_{t-1}$$
$$ECM = m/tfe - \delta_1 evol - \delta_2 gdpph - \delta_3 rt - \delta_4 tc - \delta_6 ta - \delta_6 sh$$

where *m/tfe* denotes the import to total final expenditure ratio; *m* is total imports; *tfe* denotes real total final expenditure;(1) *rt* denotes the relative price of tradables to non-tradables; *evol* denotes exchange rate volatility; *gdpph* denotes GDP per head; *tc* denotes transport costs; *ta* denotes tariff rates; and *sh* the share of world output. All variables are in logs. Dynamic terms are included for all variables for which we have quarterly data.

Statistical analysis

Unit root tests

For the above equation to be valid, if the data are I(1), the ECM must form a cointegrating vector. To test for this we use the panel unit root tests suggested by Im, Pesaran and Shin (1997). The tests suggest that most of the variables are not I(0) in levels.(2) Given that we can more clearly accept stationarity when we difference our data, we assume that the data for the overall panel are I(1).

Cointegration analysis

Pedroni (1999) constructs seven tests for cointegration in heterogeneous panels with multiple regressors—four are based on pooling within dimensions ('panel tests') and three based on pooling between dimensions ('group statistics'). In our full panel the test statistics allow us to reject the null of no cointegration in four out of seven tests.

Estimation results

We estimate a system by using restrictions across the cross-sectional dimension in the long run as in Pesaran and Smith (1995) and Pesaran, Shin and Smith (1999). They propose estimation by either averaging the individual country estimates, or by pooling the long-run parameters and estimating the model as a system (pooled mean group estimator—PMG—consistent with the characteristics and size of our panel).

Long-run coefficients are shown in the table below. Using the SUR method, the error correction approach seems appropriate with negative and significant coefficients (at the 5% level) for all the countries in our sample except the United States. All the equation residuals are well behaved according to the LM-test for autocorrelation.

	Loading coefficients									
	Belgium	Canada	France	Germany	Italy	Japan	Netherlands	Sweden	United Kingdom	United States
ECM	-0.03	-0.23	-0.06	-0.05	-0.17	-0.20	-0.04	-0.09	-0.12	-0.01
p-value	0.05	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.03	0.46

Pooled coefficients	Coefficient	*p*-value
Exchange rate volatility	0.03	0.04
GDP per head	-0.14	0.00
Relative prices	0.48	0.00
Tariffs	0.14	0.00
Share of world output	0.59	0.00
Transport costs	1.68	0.07

P-values above 0.05 indicate insignificant coefficients at the 5% level.

(1) Import volumes and total final expenditure data are from the OECD.
(2) Variables that are stationary in levels over the sample period are 'exchange rate volatility' for Belgium, Canada, Germany, Japan, Sweden and the United States and the 'share of world output' for Belgium.

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Health, disability insurance and labour force participation

Working Paper no. 218

Brian Bell and James Smith

The 1990s witnessed a rapid expansion of employment in the United Kingdom and an associated decline in unemployment to levels last seen in the 1970s. Yet over the same period, the aggregate participation rate was flat. This aggregate picture masks diverging trends in the activity rates of the sexes: female participation continued to increase, but over half a million men of working age left the labour market. Moreover, the decline in labour force participation was most pronounced among prime-age men (aged between 25 and 54), with early-retirement trends explaining very little of the change.

In this paper we focus on two important features in the data on rising male inactivity. First, the overall rise for men was accompanied by a rise in the numbers saying that they were too ill to work. The participation rate of prime-age males fell by a mere 0.7 percentage points between 1971 and 1989, but fell by 2.9 percentage points over the course of the 1990s. A feature of this fall was an increase in the number of those who cited health reasons for their inactivity. Many of these men also claimed disability benefits. This suggests that any explanation for declining male participation needs to address the rise in the inactivity among the long-term ill and the higher incidence of those claiming disability benefits. Second, the decline in male labour force participation was more pronounced among those with little or no formal qualifications. For those males who left school with no qualifications, the participation rate dropped almost 13 percentage points over the course of the 1990s.

One explanation that has been suggested for these trends is that a deterioration in the labour market opportunities for the low skilled coincided with increasing generosity of disability benefits, producing incentives for these workers to drop out of the labour market. However, testing such a hypothesis is not straightforward. The incentive for workers to drop out of the labour market and claim disability benefits depends upon the relative pay-off from looking for work. This makes it difficult to estimate the effect of benefits on individuals' labour supply decisions, as variation in benefits is driven primarily by differences in earnings. Since workers' earnings are likely to be highly correlated with taste for work, it is difficult to isolate the behavioural effects of disability benefits from these taste differences.

One way to get around this problem is to use a 'natural experiment', exploiting variation in benefit levels that is unrelated to tastes for work. Such variation in benefits occurred in 1995, when the UK disability benefits program was reformed. Prior to 1995, those claiming disability benefits received an Additional Pension (AP) based on earnings history: people becoming sick were entitled to higher amounts of AP depending upon earnings. After 1995, new cohorts lost entitlement to AP. This reduced the value of the disability program to new cohorts of older men, but left younger men—with only a short earnings history—largely unaffected. We exploit the resultant variation in benefit levels to estimate labour supply elasticities.

Using this approach we obtain significant positive effects from benefits on labour supply. The elasticities are particularly large for the least educated males. These results support the hypothesis that relatively generous disability benefits encouraged the early accommodation of health problems for those males who were most at risk of job loss.

The participation rate is a key determinant of sustainable supply capacity. Therefore future inflation will depend on whether or not the trends seen over the 1990s continue. So what does our analysis suggest? As entry into the disability benefits system tends to be a decision that results in permanent exit from the labour market, it seems unlikely that future demand shocks will generate similar-size flows out of the labour market. There are two reasons for this. First, future shocks may not have the same skill characteristics as those observed over the previous two decades. Second, the generosity of disability benefits has fallen significantly since the recession of the early 1990s. Hence the pull-factor of disability benefits has been reduced and workers are more likely to remain within the labour market following job loss.

Female labour force participation in the United Kingdom: evolving characteristics or changing behaviour?

Working Paper no. 221

Maria Gutiérrez-Domènech and Brian Bell

The period 1984–2002 was characterised by a substantial increase in female participation rates in the United Kingdom, whereas the opposite trend was observed for males. Understanding participation trends in the United Kingdom is important for monetary policy, since participation affects the supply capacity of the economy. The balance between that capacity and aggregate demand in turn affects inflationary outturns.

Because males and females have experienced such different participation trends, it is necessary to analyse them separately. This paper focuses mainly on females and uses an accounting framework to quantify how much of the rise in female participation was related to changes in the characteristics of the female population, and how much was linked to changes in behaviour and other uncontrolled factors. This exercise suggests that two thirds of the growth in female participation over 1984–2002 was associated with changes in the socio-demographics of the female population, especially education and fertility. As these two variables may be endogenous to participation, we cannot say anything about causality. The remaining one third of the rise in female participation was linked to changes in behaviour, such as women with the same observable characteristics responding differently over the period, and/or driven by changes in other variables not accounted for in the model.

Most of the increase in female participation between 1984 and 2002 took place in 1984–92, when both characteristics and 'behaviour' contributed positively to participation growth. In the 1980s, changes in behaviour contributed significantly to participation growth. The majority of the increase over the 1990s was driven by changes in the characteristics of the female population, whereas the slowdown in participation growth was mainly accounted for by a reversal of the behavioural effects.

The paper uses the same method to analyse briefly the evolution of male participation. The data reveal that the decline in male participation was mainly driven by changes in behaviour, especially after 1993.

The roles of expected profitability, Tobin's Q and cash flow in econometric models of company investment

Working Paper no. 222

Stephen Bond, Alexander Klemm, Rain Newton-Smith, Murtaza Syed and Gertjan Vlieghe

Econometric models of company investment face the problem that current investment decisions depend on expectations of future conditions, but these expectations are generally not observed. This makes it difficult to know whether significant coefficients on financial variables, such as cash flow, in empirical investment equations indicate the importance of financing constraints, or whether these variables simply provide additional relevant information about current expectations of future profitability. In this paper we construct explicit measures of expectations of future profitability for UK firms to address this question.

The *Q* model of investment relates investment to the firm's stock market valuation, which is meant to reflect the present discounted value of expected future profits. Under certain assumptions about the firm's technology and competitive environment, the ratio of the stock market value of the firm to its replacement cost (Tobin's *Q*) should be a sufficient statistic for investment. Significant coefficients on cash-flow variables after controlling for Tobin's *Q* can then not be attributed to additional information about current expectations. However, if the above conditions are not satisfied, or if stock market valuations are influenced by 'bubbles' or any factors other than the present discounted value of expected future profits, then Tobin's *Q* would not capture all relevant information about the expected future profitability of current investment. In this case additional explanatory variables, like current or lagged sales or cash-flow terms, could proxy for the missing information about expected future conditions.

This problem is particularly important in the literature that tests for an impact of financing constraints or capital market imperfections on corporate investment. Many empirical studies have added cash-flow variables to empirical models that relate investment rates to Tobin's *Q*, and interpreted significant coefficients on these cash-flow terms as evidence of 'excess sensitivity' of investment to the availability of internal funds. Although these findings are consistent with the presence of a cost premium for external sources of investment finance, they may also be explained, in the absence of financing constraints, by observed cash-flow or profits variables containing additional relevant information about expected future profitability not captured by Tobin's *Q*.

Recent findings for US data suggest that much, if not all, of the significance of cash-flow variables in conventional estimates of Tobin's *Q* investment equations can be attributed to the failure of Tobin's *Q* to capture all relevant information about the expected profitability of current investment. Previous studies using UK company data have reported significant coefficients on cash-flow variables, both in the context of models that relate investment to Tobin's *Q*, and in the context of reduced-form empirical models without explicitly forward-looking controls for expected profitability. The aim of the present study is to consider the robustness of these findings to alternative controls for expected future profitability. We obtain data on earnings forecasts from IBES International for around 700 publicly traded UK companies between 1987 and 2000. We match this information with stock market valuations and company accounts data on investment, cash flow and other financial variables obtained from Datastream International. Our main finding is that, whereas lagged cash flow is highly significant conditional on a standard measure of Tobin's *Q*, the coefficient on this cash-flow variable becomes insignificantly different from zero when we include our direct measures of expected future profitability. This parallels the results found for US data by other researchers. We also examine subsamples of firms, and find that the results are robust across subsamples of smaller firms and low-dividend firms.

Although cash-flow variables become insignificant when we control for expected profitability in this way, we find positive coefficients on both sales growth and cash-stock variables that remain statistically significant after conditioning on our measures of expected profits. These additional variables could be capturing expectations of profitability in the longer term that are not captured by our explicit measure of expectations. These longer-term expectations would be relevant for explaining investment rates under the maintained structure of the *Q* model. Alternatively, our findings could reflect misspecifications of the basic *Q* model, such as market power, decreasing returns to scale, or non-convex components of adjustment costs. In principle, the significance of these additional variables could also be due to the presence of financing constraints, although our results for subsamples do not suggest that this is a likely explanation. The coefficients on the additional sales growth and cash-stock terms appear to be broadly similar between subsamples of firms that have been considered elsewhere to be more or less likely to be subject to significant financing constraints. So the additional information these variables provide appears more likely to be explained by more general features of the investment behaviour of UK firms.

Real exchange rates and the relative prices of non-traded and traded goods: an empirical analysis

Working Paper no. 223

Jan J J Groen and Clare Lombardelli

Empirical real exchange rate studies mainly reflect one of two views of real exchange rate behaviour. Purchasing power parity (PPP) assumes that any measure of the real exchange rate is mean-reverting in nature and therefore constant in the long run. An alternative hypothesis makes a distinction between the empirical behaviour of the tradable and non-tradable components of the real exchange rate. This approach assumes that cross-country differences in the prices of tradable goods expressed in the same currency should eventually be eliminated, that is the Law of One Price (LOOP) across tradable goods between countries holds. In this case, the long-run movements in real exchange rates are related to movements in the ratio of the relative price of non-tradable and tradable goods between countries.

Based on evidence in the literature it seems sensible to assume that the real exchange rate contains a unit root. We carry out unit root tests on the data, which show this assumption is appropriate. Although this phenomenon is not consistent with PPP, it can be reconciled with the second approach; that national price indices have non-tradable components, which in turn affects real exchange rate behaviour. In this context, short to medium-run deviations between the real exchange rate and the ratio of the relative price of non-tradable and tradable components are possible. These occur as a consequence of temporary deviations from the LOOP. Hence LOOP deviations can only dominate the variability of the real exchange rate in the short to medium run.

In this paper we test this hypothesis for movements in UK real exchange rates relative to a sample of six main OECD partners. The identification of a long-run relationship between the real exchange rate and the ratio of the relative price of the non-tradable and tradable components requires us to choose a method for constructing these components. Determining precise indices that accurately capture the price of traded and non-traded goods is virtually impossible. Given these inevitable constraints we use two different methods to construct indices to capture movements in the prices of traded and non-traded goods in each country in our sample. One method decomposes the consumer prices index into its tradable and non-tradable components; the other uses the producer prices index as a proxy for tradable goods prices.

The analysis presented examines the existence of a long-run relationship between bilateral UK real exchange rates and the corresponding relative prices of non-traded to traded goods. Consistent with the findings elsewhere in the literature, using cointegrated vector autoregressive (VAR) models for these series, otherwise known as vector error correction (VEC) models, we find little support for the LOOP; there is only limited evidence for a cointegrating relationship in the dollar and euro bilateral rates. Using an autoregressive model for the relative price of tradable goods, we quantify the severity of the deviations from the law of one price. This provides evidence that such deviations are persistent relative to the time span of our data set. This finding motivates the use of a multi-country panel cointegration-testing framework. It provides evidence for a cointegrating relationship between the real exchange rate and the relative price of non-tradable goods for the United Kingdom, using both the CPI and the PPI-based decompositions.

Out-of-sample evaluation shows that the estimated time series based cointegrating VAR models are inferior to a naive random-walk model. But we find evidence that a novel panel VEC approach can, for most bilaterals, provide a significantly more accurate prediction of movements in the real exchange rate than a random-walk model. Our results show that by using a panel-data framework we are able to identify a long-run relationship between bilateral UK real exchange rates and the corresponding relative prices of non-traded to traded goods.

The informational content of empirical measures of real interest rate and output gaps for the United Kingdom

Working Paper no. 224

Jens D J Larsen and Jack McKeown

Comparing short-term nominal interest rates with some benchmark level can provide a measure of policy stance and hence may provide an indication of whether inflation will rise or fall in the future. One such benchmark is the natural rate of interest. In this paper, the unobservable natural real rate is estimated and the leading indicator properties of the real rate gap—the difference between the estimated actual real rate and the estimated natural rate—for inflation over the past 40 years are assessed. The estimates of the natural rate of interest in this paper can be interpreted as being like an intercept in a policy rule: so a real rate gap of zero—that is setting actual real rates equal to the natural rate—is consistent with an output gap of zero and with stable inflation in the medium term, while a negative (positive) real rate gap is consistent with a positive (negative) output gap and with rising (falling) inflation.

Because the natural rate of interest is unobservable there are a variety of possible approaches to obtain estimates of it. At one end of the spectrum, one could use a fully specified dynamic general equilibrium model. The main advantage of this approach is that the estimates of the natural rate—and other elements in the model—could be given full structural interpretation. However, where such models have been log-linearised around a non-stochastic steady state they cannot be used to make inferences about low-frequency movements in the natural rate of interest, because the long-run natural rate, by construction, is constant. At the opposite end of the spectrum of possible approaches one could use long-maturity index-linked bond yields or simple filtering. This approach has the advantage that it does not require any estimation or modelling. However, such an approach would not allow a structural interpretation of the estimates, and they could not be construed as a direct guide to monetary policy. The approach taken in this paper lies somewhere in between these two extremes.

Here, the natural rate of interest is estimated using Kalman filtering techniques in a small semi-structural model of the UK economy. Because these estimates are obtained using a semi-structural approach, they can be interpreted as economically meaningful, so they are preferable to estimates obtained from bond yields or simple filtering. On the other hand, the combination of a relatively sparse theoretical structure with a data-driven filtering approach allows for low-frequency movements in the natural rate of interest and means that the estimated levels of the natural rate are not tied to some calibrated long-run value.

The paper provides estimates of expected inflation along with estimates of real rate gaps, output gaps and unemployment gaps, which all appear broadly plausible. The estimates of the real rate gap are found to have had leading indicator properties for both the estimated output gap and inflation over the sample as a whole. However, the paper also finds evidence of substantial variation in the indicator properties over time. Breaking the sample into four subsamples it appears that the leading indicator properties for both the output and real rate gap were substantially stronger for the subsample that covers most of the 1980s. After the introduction of the inflation target, post 1992, the relationship between the real interest rate gap and the output gap strengthens, but the leading indicator properties of the estimated gaps for inflation diminish, as might be expected under an inflation-targeting regime.

Exploring the relationship between credit spreads and default probabilities

Working Paper no. 225

Mark J Manning

Theoretically, changes in the yield spread between risky and risk-free bonds should reflect changing expectations about the likelihood of loss from default, which will itself be determined by variability in the probability of default and expected recovery. Our principal interest in this paper is to explore the extent to which variability in sterling corporate credit spreads corresponds to the theory, drawing, in particular, upon the predictions of a structural (Merton-style) model of corporate failure. Although credit spreads are often cited as indicators of such expectations, the empirical literature has found little evidence that idiosyncratic default risk is the principal driver of variability in credit spreads.

The recent empirical literature has generally adopted one of two approaches to examine the validity of structural models of default. Researchers have either compared actual credit spreads with those implied by a fully calibrated structural model or else they have regressed changes in spreads upon a reduced form of the model. In this study we take a different approach. First, we adopt an error-correction method in order to capture both the long-run relationship between spreads and default probabilities, and short-run deviations from trend. Second, while analysis of a reduced form of the structural model allows the key relationships to be identified, the non-linear interactions between the model inputs are not exploited. Hence, some of the power of the model is lost. In this paper, therefore, we apply the structural approach more directly, employing a Merton-style model, developed at the Bank of England, to generate a panel of implied default probabilities. Finally, much of the previous work in this area has drawn upon data from the US non-government bond market. Our work, by contrast, employs a sample of 78 sterling bond issues by 42 UK industrial companies. For each, we have up to 83 monthly observations for both asset swap credit spreads and Merton-generated implied probabilities of default, thereby creating a diverse data set, covering a segment of the market that, to our knowledge, has not previously been studied in this way.

The application of this approach is revealing. In a pooled regression, we find that variability in the implied probability of default can explain just 8% of the probability of default in the highest quality credit spreads (AAA/AA), and 11% of that in A-rated credits. With the probability of default for these issuers generally low, and often lacking variability, the relative importance of systematic factors tends to increase. Indeed, we find that the addition of time dummies to the specification increases explanatory power considerably, perhaps reflecting the influence of common factors such as liquidity conditions not explicitly included in the specification. Our results for lower investment-grade issues, those rated BBB, are more supportive of the structural model. Here we find that the probability of default explains around a third of the variation in credit spreads in a pooled regression, which is higher than previous empirical studies have found.

Comparison with a broadly equivalent specification to that employed elsewhere suggests that this is a reflection of the more direct application of the Merton approach; in particular, capturing the non-linearity inherent in the structural model, which is most important for companies that are closer to the default point.

In a further round of tests, we allow for heterogeneity in responses across individual issues in the ratings subgroups. Heterogeneity does indeed appear to be an important feature of the data set, with explanatory power increasing to 28% for high-quality issues, and almost 50% for BBB issues. This argues in favour of not only applying the Merton model directly, but also allowing for potential idiosyncrasies in factors such as liquidity and recovery rates.

Finally, we consider whether we are losing valuable information in the annualisation process for our implied default probabilities. If investors have short horizons, they may place greater weight on near-term default probabilities, and this will perhaps be more important for lower-grade bond issues. This hypothesis is supported by the data. Returning to a pooled specification with common coefficients, but retaining differences across ratings, we find once again that almost half of the variability in BBB credit spreads is explained by the regression specification. Explanatory power remains at just 12% for high-quality issues.

Many of these results would appear to have an intuitive interpretation. Previous research has established that the theoretical relationship between credit spreads and default expectations does not hold fully in practice, and this paper concurs with that finding. Spreads would appear to be influenced by market factors, such as liquidity premia, and these are likely to be time varying. Thus, it is intuitive that, for high-quality issuers, where both the level and variability of the probability of default is likely to be lower, the relative contribution of default expectations is likely to be much smaller.

Corporate capital structure in the United Kingdom: determinants and adjustment

Working Paper no. 226

Philip Bunn and Garry Young

The balance sheet position of non-financial companies goes through phases of strength and weakness. At the end of 2003 the amount of debt on corporate balance sheets was at a historically high level in relation to the market value of the capital that ultimately provides the means by which the debt is serviced. Past patterns would suggest that such high gearing situations do not persist and that companies act to bring down their indebtedness. This paper addresses the factors that determine the level of gearing that companies appear to aim for over time and what actions companies take to adjust when their debt gets out of line with their desired level.

Our analysis provides an empirical test of the 'trade-off' theory of corporate capital structure, which suggests that firms have an equilibrium level of capital gearing that is determined by trading off the advantages of holding debt against the expected costs of financial distress, which becomes more likely at high debt levels. We consider only the tax benefits of holding debt, since the other factors that make debt an attractive form of business finance are difficult to quantify. The tax advantage of debt arises from the deductibility of interest payments against corporation tax payments, but the magnitude of the benefit depends in a complex way on the personal tax rates faced by shareholders. This paper uses a theoretical model of corporate behaviour to derive an expression for the tax gains to corporate gearing, which we construct for the United Kingdom from 1970 onwards and use as a basis for the empirical part of the paper. The tax gains to gearing were high in the second half of the 1970s and the early 1980s when corporation tax rates were high, but they have fallen since and are currently at a historically low level.

We find evidence that firms in the United Kingdom have target levels of capital gearing at the aggregate level, which in the long run depend on the tax advantages of debt and on the probability of bankruptcy (which will be related to the expected costs of financial distress). This finding provides empirical support for the 'trade-off' theory of corporate capital structure, and it reinforces the results of previous firm-level work at the Bank which also found that firms have target levels of gearing. The current level of long-run equilibrium capital gearing at market value for the UK PNFC sector implied by our model is approximately 16%.

The paper then goes on to test how firms adjust their balance sheets to eliminate deviations in actual gearing from the implied equilibrium level. We find that most of the adjustment in response to above-equilibrium gearing takes place through reduced dividend payments and increased equity issuance. There is only weak evidence that firms adjust through more restrained capital investment. This is consistent with the 'new view' of corporate behaviour which suggests that real adjustment will only take place once dividends cannot be reduced any further. These findings are also consistent with firm-level work for the United Kingdom which has found evidence of adjustment in dividends and new equity issuance, with the proviso that investment appears to be more responsive to a flow measure of financial pressure than a stock measure of balance sheet disequilibrium.

Illustrative simulations show how firms may adjust their balance sheets in response to shocks that move gearing further away from its implied equilibrium. Although firms appear to respond quickly and make relatively large adjustments to the flows, the actual adjustment process is likely to be protracted because the flows of dividends, equity issuance and investment are all small in relation to the stock of debt.

The Phillips curve under state-dependent pricing

Working Paper no. 227

Hasan Bakhshi, Hashmat Khan and Barbara Rudolf

The Phillips curve has long served as a useful description of monetary policy effects on inflation. In modern New Keynesian models, it is explicitly derived from the pricing decisions of firms. One advantage of this new approach is that, because the relationship has a structural interpretation, we can, for example, infer implications for the transmission of inflation following a shock; the Phillips curve is no longer a 'black box'. But if there are structural changes in the economy, such as the move to a low-inflation environment witnessed since the 1990s in the United Kingdom and several other countries, the price-setting behaviour of firms may change and affect inflation dynamics. From a policy perspective, therefore, two important issues arise. First, how sensitive are short-term inflation dynamics to such shifts in the economic environment? Second, how well does a Phillips curve based on the assumption of unchanged price-setting behaviour of firms describe inflation dynamics of an economy where this assumption does not hold?

One approach to modelling firms' price-setting behaviour is to assume that firms choose their prices optimally, while the timing of their price changes is exogenous (time-dependent pricing). This approach underlies the New Keynesian Phillips curve (NKPC), which suggests that current inflation is determined by the expectation of next period's inflation and a measure of current economic activity. The time-dependent pricing assumption implies that firms may not adjust the time pattern of their price adjustments in response to changes in macroeconomic conditions. This is hardly plausible if we think of an environment with shifts in trend inflation, for example, and therefore it may limit the value of these models for monetary policy analysis. In response to this problem, approaches with an endogenous timing of price changes have been developed. These approaches allow the firms' time pattern of price changes to respond to the state of the economy (state-dependent pricing).

This paper derives a closed-form solution for short-term inflation using a state-dependent pricing model. The resulting equation is more general than the NKPC and it nests the latter as a special case. It relates inflation to lagged inflation, expected future inflation, and current and expected future real marginal costs. The number of leads and the coefficients are endogenous and depend on the level of steady-state inflation and on firms' beliefs about future adjustment costs associated with price changes. This structural equation is referred to in this paper as the state-dependent Phillips curve (SDPC).

In contrast to the NKPC, the SDPC allows lagged inflation terms to affect current inflation. This is an interesting feature since recent empirical evidence suggests that the NKPC extended by a lagged inflation term provides a better description of inflation dynamics than the purely forward-looking NKPC for several countries. In fact, specifications with lagged inflation terms have been derived before by several authors. But all these studies were based on the assumption of an exogenous timing of price changes. The SDPC, therefore, has the advantage that it explicitly captures the aggregate effects of state-dependent pricing behaviour on current inflation.

The paper uses the SDPC framework to examine whether a hybrid NKPC (NKPC extended by a lagged inflation term) can adequately describe inflation dynamics of a realistically calibrated state-dependent pricing economy. To explore this issue, artificial data sets for a state-dependent pricing economy are generated based on various calibrations of price adjustment costs under both low and high trend inflation environments. We use these data to estimate the hybrid NKPC and to assess the specification by examining both the estimated coefficients and the correlations between the simulated inflation and the inflation predicted by the hybrid NKPC. The findings suggest that the hybrid NKPC provides a good reduced-form description of inflation dynamics for a wide range of state-dependent pricing behaviours, particularly in the low-inflation environment. The fit of the hybrid NKPC is similar to that reported in the literature for estimations using real-world data. An interpretation of this finding is that the hybrid NKPC may be a good proxy for inflation dynamics implied by more realistic models of price-setting. Consequently, structural interpretation of its parameters may not be straightforward.

The UK labour force participation rate: business cycle and trend influences

Working Paper no. 228

Mark Schweitzer and David Tinsley

Policymakers will frequently be interested in how 'tight' the labour market is currently and how tight it can be expected to be in the future. This assessment will in turn depend upon a view of how the demand for labour compares with its availability. Looking at the unemployment rate alone might not be a sufficient statistic for gauging labour availability, since the inactive population represents a large potential source of labour supply. And the distinctions between some forms of inactivity and unemployment can be fairly weak, so that certain types of inactive people are as likely to fill jobs as the unemployed.

The decision whether to participate in the labour market is subject to numerous long-term 'trend' influences. In the United Kingdom, these long-term influences have included an increase in the number of students, as well as in the number of individuals who report themselves as long-term sick. But alongside these trend influences some aggregate business cycle effects are also likely to operate.

This paper investigates the extent to which the participation rate is influenced by structural trends and by the business cycle. We propose a modelling strategy that pools the available micro and macro-level data to produce a mutually consistent model of the trend and cyclical components of participation.

We find a significant procyclical pattern to participation in the available time-series data. However, we also identify some distinct trend influences on the participation rate, using longitudinal microdata. Together, these factors help to explain some of the movements seen in overall participation over the 1990s.

Our approach also allows us to construct forecasts for the participation rate, which would be a useful input into the sort of macroeconometric models used by policymakers. We assess our approach by conducting out-of-sample forecasts and find that it outperforms some conventional macroeconometric forecasts.

On the resolution of banking crises: theory and evidence

Working Paper no. 229

Glenn Hoggarth, Jack Reidhill and Peter Sinclair

Over the past quarter of a century, unlike in the preceding 25 years, there have been many large bank failures around the world. Moreover, cross-country estimates suggest that output losses during banking crises have been, on average, large—over 10% of annual GDP.

This paper reviews the merits of the various techniques used by authorities when resolving individual or widespread bank failures in developed and emerging market economies. In particular, the various banking crisis resolution techniques available to the authorities are classified and then compared with the techniques that have been used in practice, drawing on both the available evidence and our own analysis.

There is a range of options for dealing with insolvent banks. At one extreme, a bank can be kept open through an injection of capital. At the other extreme, a bank can be closed with its assets sold and depositors and possibly other creditors paid off. Between these extremes, a bank's licence may be removed but the bank may be sold off to another bank, in full or part, to preserve its activities. The extent of involvement of the authorities may also vary. It may be limited to encouraging or organising private sector support, or extended to official financial support, in the limit through government takeover.

Faced with a banking crisis the authorities often face a trade-off between maintaining financial stability today through intervention and jeopardising future financial stability through increasing moral hazard later on. To the extent that the public sector becomes involved in crisis resolution, moral hazard and the resolution costs can be limited by ensuring that bank 'stakeholders'—shareholders, managers, depositors and other creditors—share at least some of the losses. Clarity and transparency over restructuring programmes may also speed up the resolution process and reduce both present costs and future risks.

In practice, faced with individual bank failures the authorities have usually first sought a private sector solution. Any losses have been passed on to existing shareholders, managers and sometimes uninsured creditors, and not to taxpayers. Most recent systemic crises have typically been caused by an adverse macroeconomic shock weakening the whole financial system, rather than resulting from the impact of contagion following the failure of just one individual bank. In these cases policy options have often been limited. Finding a domestic private sector solution has often been difficult, so there has been more reliance on foreign takeovers and government intervention. Also, the authorities have been faced with the dilemma that imposing losses on to the banks' stakeholders could exacerbate rather than ameliorate the liquidity crisis.

In practice, in most recent systemic crises:

- early on central banks have provided liquidity to failing banks and governments have given blanket guarantees to depositors. In nearly all cases investor panics have been quelled but at a cost to the budget and increasing the risk of future moral hazard;
- open-ended central bank liquidity support seems to have prolonged crises, thus increasing rather than reducing the output costs to the economy;
- bank restructuring has usually occurred through mergers, often government assisted, and some government capital injection or increase in control. Bank liquidations have been used only occasionally, and typically for smaller institutions. Shareholders have usually lost their capital and senior managers their jobs, but creditors, including uninsured ones, have rarely made losses; and
- resolution measures have been more successful in improving banks' balance sheet positions than in restoring their profits or credit to the private sector. In many cases, bank lending and profitability have remained subdued for years after a banking crisis. However banking crises are handled, the adverse effects on the economy are likely to be large. This suggests that ensuring that the financial system is robust in the face of even substantial shocks should be a key objective of financial stability policy.

Financial interlinkages in the United Kingdom's interbank market and the risk of contagion

Working Paper no. 230

Simon Wells

A well functioning interbank market is essential for efficient financial intermediation. But interbank credit exposures imply the possibility of direct contagion: the sudden insolvency of a single institution may trigger multiple bank failures due to direct credit exposures. This paper aims to examine the potential for direct contagion in the UK interbank market.

Economic theory suggests that the potential for direct contagion depends, to some extent, on the exact structure of the interbank market. The problem is that the precise network of interbank exposures is unobservable. So this paper uses available data to estimate bilateral exposures between UK-resident banks. The estimates are used to assess the potential for direct contagion by tracing the path of assumed insolvency shocks through the banking system. We simulate the failure of each individual bank in the model and estimate the losses suffered by other banks as a result of the initial shock. We assume that contagion occurs (ie a bank fails outright) if a bank suffers a loss that exceeds its Tier 1 capital holdings.

Analysis is performed on three alternative estimates of the UK interbank structure. In each case, data on the total borrowing and lending positions of each UK-resident bank with the entire UK system are used to estimate the complete map of bilateral exposures. The first model (the benchmark case) assumes interbank borrowing and lending is as widely dispersed as possible, given each bank's observed total interbank assets and liabilities. This estimate is not conditional on market structure and so may be a poor representation of reality. The second estimate incorporates information from a database of bilateral exposures reported by banks. These data do not provide a complete map of interbank exposures: they include only exposures exceeding a certain threshold for a sample of banks. Nevertheless, incorporating information from this database into the model may mean that it better reflects concentrations in the UK interbank market. The final model is a restricted version of the benchmark case, where smaller banks and foreign banks are assumed to transact only with large UK-owned banks. In this case, the large banks can be thought of as a money centre for all banks in the UK system.

Data constraints mean that it is difficult to draw reliable conclusions about the potential for contagion. First, only banks that are resident in the United Kingdom are modelled. This means that the estimates capture only the exposure of UK-owned banks to the UK branches and subsidiaries of foreign banks and not to entire foreign banking groups. Given London's position as an international financial centre, failing to capture the full extent of exposures to foreign banks rules out a potentially important channel of contagion. Second, suitable data are only available for interbank money market loans and deposits. Although these capture a large part of unsecured interbank activity, exposures arising from other instruments (such as interbank holdings of Certificates of Deposit and financial derivatives) are not included. Third, each model of the interbank market is derived from partial information and we show that the results depend on the assumed distribution of lending across banks.

Despite these caveats, our results give some useful information on the general potential for contagion in the UK interbank market. We explore the effect of one type of extreme event—the sudden and unexpected insolvency of a single bank. Our results show that an insolvency shock, idiosyncratic to a given bank, can lead to a substantial weakening in the capital holdings of other banks, but in most cases does not result in additional (or knock-on) bank failures. But assuming complete loss given default, our stylised model suggests that, in extreme cases, a single bank insolvency could trigger knock-on effects leading in the worst case to the failure of up to one quarter of the UK banking system. At the same time, a further quarter of the banking system would suffer losses amounting to more than 10% of their Tier 1 capital. For loss given default levels of less than 50%, contagion affects, at worst, less than 1% of total banking system assets. However, even with low loss given default, a narrow shock can considerably reduce the capital reserves of many banks. And, if the initial shocks hit during a period where the banking system is already weakened (say during a period of large macroeconomic fluctuations), the effect of contagion can be larger.

The institutions of monetary policy[1]

I argue that it is useful to think about the optimal design of monetary institutions using the insights from the theory of incomplete contracts. The core of the monetary policy problem is the uncertainty about future social decisions resulting from the impossibility *and the* undesirability *of committing our successors to any given monetary policy strategy. The impossibility stems from the observation that collective decisions cannot be enforced so that it is impossible to commit to future collective decisions. The undesirability reflects the fact that we cannot articulate all possible future states of the world. Monetary institutions expand the possibility frontier of the technology of collective decisions by raising the costs of making inefficient deviations from pre-announced paths. I illustrate the importance of institutional design for the operation of monetary policy by reference to three case studies: the collapse of exchange rate regimes in Brazil and the United Kingdom; currency arrangements in Iraq and their reform after the 2003 war; and the relationship between central banks and governments when the zero constraint on nominal interest rates is binding.*

President, Ladies and Gentlemen,

To have one central bank governor address you today may be regarded as a misfortune, but to invite two looks like carelessness!

It is a great honour to be invited by this year's President-elect, Marty Feldstein, to deliver the Ely Lecture. Marty has been my teacher, mentor, colleague, and friend for over 30 years, and I never cease to be amazed by the energy and imagination which he devotes to the study of economic problems.

I got to know Marty during my time as a Kennedy Scholar at Harvard in 1971. The Kennedy Scholarships form one part of Britain's national memorial to President John F Kennedy. The other part is an acre of land, now American territory, at Runnymede. At the ceremony to open the Runnymede memorial in 1965, Prime Minister Harold Wilson remarked about President Kennedy that 'his eyes were on the horizon, but his feet were on the ground'. Almost 30 years earlier Richard T Ely published his autobiography entitled 'Ground under our feet'. Whereas I found the experience of coming from Europe to the United States intellectually liberating and exhilarating, a hundred years earlier Ely found academic freedom by making the reverse journey. As he wrote in his autobiography, 'When I first went to Germany I seemed to breathe a new and exhilarating atmosphere of freedom … [which] did not exist in [American universities]' (Ely (1938)). Two journeys, separated by a hundred years, reveal much about what occurred in Europe and America between them. Upon his return, Ely 'undertook to draw up a project for the formation of a society to be called 'The American Economic Association', which should be broad enough to appeal to all the younger economists who, irrespective of their personal views, felt the stirring of the new life in economics'. His actions helped the AEA to develop into the great institution it is today.

I have the privilege to work for another great institution, the Bank of England. As we celebrate the 150th anniversary of Ely's birth, I thought it would be appropriate to choose as the theme of my lecture today the role that institutions play in the conduct of monetary policy. In brief, I want to argue that the core of the monetary policy problem is uncertainty about future social decisions resulting from the impossibility and the undesirability of committing our successors to

(1) Speech given by the Governor at the American Economic Association Annual Meeting in San Diego on 4 January 2004. I am deeply grateful to James Proudman, Jan Vlieghe and Tony Yates for their research collaboration and for many of the ideas in this lecture. They are truly co-authors. I am also grateful to Peter Andrews, Andrew Bailey, John Campbell, Forrest Capie, Philip Evans, Niall Ferguson, Charles Goodhart, Simon Gray, Oliver Hart, John Moore, Tom Sargent, Lars Svensson, Greg Thwaites, and Geoffrey Wood for their helpful comments. Kath Begley and Ed Bolingbroke provided valuable research assistance. All errors and omissions are my responsibility. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech208.pdf.

any given monetary policy strategy. The impossibility stems from the observation that collective decisions cannot be enforced, so that it is impossible to commit to future collective decisions; the undesirability reflects the fact that we cannot articulate all possible future states of the world. It is not possible collectively to commit to enforce a monetary policy contract with an institution such as a central bank. Even if we could, we would not want to, because that would prevent us from exploiting new knowledge about the world. In essence, I want to argue that the relevant theoretical framework could be described as 'public goods meet incomplete contracts'. Institutional design is at the heart of collective decisions in a world of incomplete contracts, and interestingly, discussion of monetary issues in recent years has focused on institutional arrangements.

I shall illustrate the importance of institutional design for the operation of monetary policy by reference to three case studies: the collapse of exchange rate regimes in Brazil and the United Kingdom; currency arrangements in Iraq and their reform after the war last year; and the relationship between central banks and governments when the zero constraint on nominal interest rates is binding.

Money and monetary policy can be traced back to the dawn of civilisation itself. In contrast, central banks are a recent development. The first central bank was the Riksbank in Sweden, set up in 1668.(1) To celebrate its tercentenary it endowed the Nobel Prize in Economics. The Bank of England, the oldest continuing central bank, opened for business in 1694. Our tercentenary was a more low-key event: we published a book of conference proceedings. By 1900 there were still only 18 countries with a central bank. Today the number is 174. The Federal Reserve has yet to reach its centenary. As institutions go, most central banks are youthful. Indeed, the reputation of central banks as wise and disciplined institutions, in contrast with the wild excesses of finance ministries, belies their respective ages. So the history of monetary policy cannot be equated with the history of central banks. But it is a story about institutions.

I Externalities in the theory of money

In the history of money, the two key events are the emergence of a medium of exchange and the rise of institutions governing its management. Those events raise two basic questions which are central to understanding the nature of monetary institutions. First, why did money evolve as a social or public rather than a private institution? Second, how can societies reduce the costs of being unable to make commitments about future collective decisions? The answers to these two questions determine the nature of modern central banks.

The two questions relate to two different externalities. The first is a network externality. Money overcomes the constraint of the double coincidence of wants implied by barter exchange, a view set out in detail by Carl Menger (1892) and which is modelled explicitly in Nobuhiro Kiyotaki and Randall Wright (1989). More recently, the existence of money has been linked to the information structure of the economy. Agents have imperfect information about their potential trading partner's credit history, which explains the emergence of a private sector medium of exchange as an alternative to an extension of credit (Narayana Kocherlakota (1998)). Our willingness to use and hold money is greater the more that money is used by other people. There is, therefore, a network effect.

One can imagine, and indeed Friedrich Hayek (1976) advocated, a system in which anyone is allowed to issue money. The private sector may well co-ordinate on using the money of the 'best' issuer, and that issuer's behaviour may be kept in check by the threat of entry. But competitive monies have arisen only rarely and in situations where government money is either absent (as, for example, in Robert Radford's (1945) study of cigarette money in POW camps) or very badly managed (as in periods of hyperinflation). Despite the abolition of foreign exchange controls, as recommended by Hayek, competition among national currencies has not lessened the dominance, within each economy, of a single public money. Network externalities make it difficult for competing currencies to emerge.

The existence of public money generates a second type of externality to do with intertemporal choices. The willingness to hold money as either a store of value or a means of payment, or to use money as a unit in which contracts are denominated, depends upon expectations of the stability of the value of that money. If money takes the form of competing private currencies, then there is no inherent problem for private issuers to

(1) Strictly speaking, it is not clear that the Riksbank was what we would today recognise to be a central bank until considerably later.

maintain the value of their liabilities by backing them appropriately, a commitment that can be enforced by the legal system. Alternatively, where a private commodity standard is the solution to the exchange problem, then there is no ability (and therefore no temptation) to devalue. But a public monopoly means that the demand for money today depends upon expectations of our collective decisions about the supply of money tomorrow. The key question for a public currency is how do we prevent the government (ourselves) from abusing its issuing power in the future? Collective decisions today cannot bind future collective decisions. And when monetary policy is set period-by-period, inefficient outcomes result. The key insight of Finn Kydland and Edward Prescott (1977) was that the inability to make commitments leads to a failure to internalise the impact of public policies on the expectations of the private sector.

Dynamic inconsistency was used by Kydland and Prescott (1977) and Robert Barro and David Gordon (1983a) to demonstrate that rational expectations could lead to an equilibrium in which inflation was higher than desired. *Ex post* it would always seem attractive to create surprise inflation. More recently, research by Lars Svensson (1997), Michael Woodford (2003), and others has shown that even when there is no inflation bias there can be a 'stabilisation bias' from the exercise of discretionary monetary policy: one that would lead to a suboptimal combination of output and inflation variability. Those results have prompted a large volume of research exploring different ways in which the commitment to price stability could be made credible. And central banks themselves have devoted no less energy to establishing the importance of their credibility.

Two very different approaches to the time-consistency problem have been discussed in the literature. One examines contractual relationships between the public and monetary decision-makers that reduce or eliminate the degree of inflation and stabilisation biases resulting from discretionary policy. Examples include formal adoption of monetary policy rules, a contract between government and central bank instructing the latter to target price stability, the delegation of monetary policy to a conservative central banker, and investment in a reputation by current decision-makers. But those answers from the literature on rules versus discretion are not really solutions. They only move the time-consistency issue one step back—the policy rule may be abandoned, the central banker fired, the contract reinterpreted or rewritten.(1)

The other approach says that real central bankers do not and need not worry about time-inconsistency; they 'just do it' (Bennett McCallum (1995)). Central bankers should simply resist the temptation to deviate from the time-inconsistent policy, and private agents will eventually come to accept that resolve. Attractive as such a solution may appear to central bankers, it fails to answer the challenge posed by the game-theoretic result of Kydland and Prescott. And it fails to explain why it is that some countries in some periods just do it and others do not. Central bankers who have the determination and strength of purpose to 'take the punch bowl away just when the party is getting going', in McChesney Martin's memorable phrase, clearly have the 'right stuff'—so why don't they 'just do it'?(2) A deeper explanation of how this problem can be overcome requires an analysis of what might be called the 'technology of collective decisions'.

Individual agents can make contracts because they believe that the legal system is external to both parties to the contract. But it is difficult to write contracts that commit future collective behaviour. Collectively, we can either meet our previous commitments or we can ignore them. To take just one example: only a few weeks ago ECOFIN, the council of economic and finance ministers of the European Union, decided to suspend the excessive deficit procedure (a key feature of the Stability and Growth Pact) that had been initiated against France and Germany. Ernst Welteke, the President of the Bundesbank, has since raised serious doubts about whether politicians in Europe are willing to embrace the collective fiscal discipline, backed up by real sanctions, that is necessary to prevent fiscal free-riding inside a monetary union.(3)

(1) Torsten Persson and Guido Tabellini (1999) argue that if it takes sufficient time for a government to tear up contracts designed to eliminate the inflation bias (longer than the duration of nominal contracts) promises not to inflate can be credible.

(2) Svensson (2002, page 57) takes the same view of McCallum (1995) in his comments on Nancy Stokey (2002): '…to my knowledge neither McCallum nor anyone else has presented a model where 'just do it' is an equilibrium outcome'.

(3) 'The institutional structure of monetary union forms the basis for public trust in the euro and rests on two pillars: the stability-oriented monetary constitution enshrined in the Maastricht treaty, and the stability and growth pact. Both pillars are being undermined, leaving European monetary union in a very grave predicament.' (Ernst Welteke, *The Times*, 4 December 2003, page 23).

II The role of institutions

The technology of collective decisions describes the feasible set of institutional arrangements that can be constructed to reduce the costs of the commitment problem. That problem may lead to inefficient outcomes—the Coase theorem does not apply to collective decisions.(1) It is useful to think about the optimal design of monetary institutions using the insights from the theory of incomplete contracts. That theory discusses what contracts would look like if certain aspects of the world could not be verified by an outside enforcer of the contract. In terms of monetary policy, there are two related though distinct aspects of the commitment problem. First, the inability to enforce commitment, because monetary arrangements can always be changed in the absence of an outside enforcer, means that no such arrangement is sacrosanct for all time. Thomas Jefferson believed that the US Constitution should be rewritten every 20 years or so at a new constitutional convention.(2) Second, we cannot fully describe an optimal monetary arrangement because we do not know all possible states of the world and hence the policy rule to which we would like to commit. Those two aspects of the technology of collective decisions create a role for institutions.

But they differ in important ways. If there were only a commitment problem, then we could describe an optimal state-contingent monetary policy reaction function. Mechanisms could then be devised to make it less likely that policy would deviate from this optimal plan—perhaps by writing the optimal rule in the form of a constitutional provision which could be overturned only by a substantial majority, or financing deficits by issuing index-linked debt. Such mechanisms would make it incentive compatible collectively to stick to the optimal plan. None of this would have come as a surprise to the authors of the American Constitution. In *Federalist Paper* No. 10 James Madison points out that 'our governments are too unstable' (*Federalist Papers*, 1961, page 173), and in No. 37 he writes: 'the people of this country, enlightened as they are with regard to the nature ... of good government, will never be satisfied till some remedy be applied to the vicissitudes and uncertainties which characterize the State administrations' (page 243). Outside observers agreed. In 1835, Alexis de Tocqueville wrote that 'the authority which public men possess in America is so brief and they are so soon commingled with the ever changing population of the country that the acts of the community frequently leave fewer traces than events in a private family. .... The instability of administration has penetrated into the habits of the people.' (de Tocqueville, 1945 [Vol. 1], pages 211–12).

The stability of institutions is, therefore, one of their greatest assets. Barro and Gordon (1983b) assumed the existence of an ongoing government or central bank which had an interest in preserving a reputation for 'good' behaviour. A substantial literature, reviewed by Stokey (2002), analyses the circumstances in which it is attractive for a 'good' government to distinguish itself from a 'bad' government. Stokey shows that, if it is not easy to do so, then it may be optimal to impose a monetary policy rule on all governments in order to reduce the damage done by the prospect of a bad government in the future. But how can society convince itself that it can eliminate bad government by adopting a policy rule? A really bad government will simply restore discretion to itself. Good and bad governments are not independent actors. They reflect the degree of consensus on how to construct institutions that will pursue consistent objectives.

The experience of high and variable inflation itself can be an important force shaping public attitudes towards the design of institutions to control it. Differences among cohorts may lead to variations over time in the optimal shape of institutions, rather as Jefferson advocated. For example, Robert Shiller (1996) reports that 90% of those born before 1940 in Germany agreed with the statement that 'The control of inflation is one of the most important missions of German economic policy', compared with 51% of those born from 1950 onwards. Memories of hyperinflation can be vivid: Niall Ferguson (2001, page 154) cites the diary of one Frankfurt resident in 1923: '[I]t was more than disorder that smashed over people, it was something like daily explosions… the smallest, the most private, the most personal events always had one and the same cause; the raging plunge of money.' So it is not surprising that the generation of Germans which created the Bundesbank saw it as a crucial component of their new constitution. Countries, or indeed cohorts, which have not experienced hyperinflation may be more willing to adopt

(1) Daron Acemoglu (2003) argues that inefficient policies can occur in a democracy because those in political power cannot commit to maintaining the policies that are required to achieve efficient outcomes. In other words, the Coase theorem does not apply at the level of society as a whole.
(2) As reported by Gore Vidal (2003).

monetary arrangements that are less entrenched in constitutional form than the postwar generation in Germany.

The second aspect of the technology of collective decisions that creates a role for institutions is our ignorance of all possible future states of the world. That means that, even if we were able to commit to a policy rule, we would choose not to do so. The exercise of some discretion is desirable in order that we may learn. The most cogent argument against the adoption of a fixed monetary policy rule is that no rule is likely to remain optimal for long. Nor is this just a question of learning about parameter values. That would yield an optimal state-contingent procedure for updating the monetary policy rule. It is that we are unwilling to commit now never to learn from future experience. So we would not want to embed any rule deeply into our decision-making structure, such as giving it the force of law or making it part of the constitution. Instead, we delegate the power of decision to an institution that will implement policy period-by-period exercising 'constrained discretion'. The status and purpose of such institutions can be embedded into the law or constitution, which may increase the cost of reversing the delegated powers, but the optimal policy path should be open to change in response to learning. Since we cannot hope to describe *ex ante* what it is we expect to learn, and since new ideas are unlikely to be uniformly recognised and instantly accepted, it may be sensible to delegate both the immediate policy decision and the process of learning to the same institution.(1)

An interesting example of seeking flexibility to allow for learning occurred during the writing of the US constitution. One draft clause specified that Congress should be allowed to '…emit bills on the credit of the United States'. There was a debate on a proposition to strike out the clause. Madison's notes describe George Mason's position on the subject: 'Though he had a mortal hatred to paper money, yet, as he could not foresee all emergencies, he was unwilling to tie the hands of the legislature.'(2) Edmund Randolph was of a similar opinion: '… notwithstanding his antipathy to paper money, [he] could not agree to strike out the words, as he could not foresee all the occasions that might arise'.

So the ideal is a framework that will implement what we currently believe to be the optimal monetary policy strategy and will deviate from that only if collectively we change our view about what that strategy should be. Our ignorance is too pervasive to allow the adoption of a rule for how learning should occur. So if it is sensible to delegate both policy decisions and the process of learning to institutions such as central banks, that in turn requires those institutions to have political legitimacy and an acceptance that they will not redistribute income and wealth in favour of some groups rather than others at the expense of the objective given to them.(3) Where such institutions are difficult to create, the 'external effect' (as Stokey (2002) called it) of good monetary policy will not be captured. And if the result is a monetary policy that is sufficiently bad, it may result in a radical switch to a unit of account determined externally, an obvious example of which is dollarisation.

Monetary institutions, therefore, play two different roles. First, they expand the possibility frontier of the technology of collective decisions and can be designed to raise the cost of those decisions deviating from pre-announced contingent paths. Second, they are set up explicitly to exercise a degree of discretion, 'constrained discretion', subject to the broad objective of price stability. Discretion is inevitable because of the need to learn about the economic environment. Institutions thereby become repositories of experience and knowledge which they communicate to society as a whole.

III Case study I: exchange rate regimes in Brazil and the United Kingdom

I want to illustrate the importance of institutions and the credibility of their stability by three case studies. My first example concerns the collapse of exchange rate regimes in Europe and Latin America. It demonstrates that economic institutions require a broad base of political support if financial markets are to believe that those institutions are likely to survive.

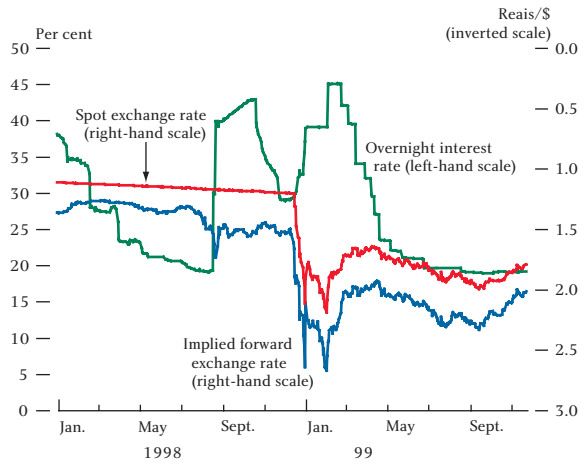
For a while, fixed exchange rate regimes enjoyed a degree of support in both Europe, with the Exchange Rate Mechanism (ERM), and Latin America. But experience shows that, in terms of credibility in financial

(1) Svensson (2003) takes a view that is related to the argument here. In his opinion, commitment to 'targeting rules' (objectives that the central bank must pursue) is workable, while commitment to 'instrument rules' (reaction functions) is not, since it is 'impossible' that 'every conceivable contingency be anticipated' (page 439).
(2) This is cited in David Dewey (1918, page 68).
(3) The costs and benefits of discretion in a world where we cannot describe future possible states of the world are set out in Philippe Aghion and Patrick Bolton (2002).

markets, the design of those policy regimes was less important than the fact of their having broad political support.

Brazil in 1998–99 is a case in point. In 1998 Brazil operated a crawling peg exchange rate regime. As can be seen from Chart 1, throughout that year markets expected the Real to depreciate as evidenced by the fact that the implied forward exchange rate was lower than the spot rate by more than the crawl would imply.(1) In order to defend the crawling peg, the central bank raised interest rates in September 1998 from 20% to 40% per year. The implied forward exchange rate promptly fell. Raising interest rates actually increased the expectation that the peg would be abandoned, since markets knew that high interest rates were likely to prove politically unsustainable. Any government prepared to keep interest rates that high was not likely to win re-election. In January 1999 a second speculative attack on the peg occurred. And this time the peg was abandoned. Although short-term interest rates were raised while the peg was being defended, they were soon lowered to more sustainable levels. The expectations that had been built into forward exchange rates were proved correct.

Chart 1
Exchange rates and monetary policy in Brazil, Jan. 1998–Dec. 1999



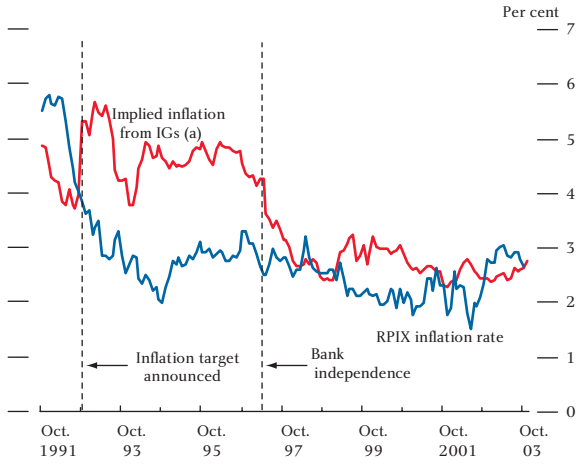
Sources: Banco Central do Brasil and JP Morgan.

In the literature on target zones for exchange rates, it is assumed that raising interest rates is a successful method for supporting the exchange rate because of uncovered interest parity. But this ignores the possibility that raising interest rates to defend a fixed exchange rate regime will simply call into question the durability of the regime itself and raise the probability that the peg or target zone will be abandoned. In such circumstances an increase in interest rates may lead to a fall in the exchange rate.

A second example of the same phenomenon is the pressure on sterling during 1992 and its forced departure from the Exchange Rate Mechanism on 16 September of that year. Massive speculation on that day led to the announcement in the morning of a 2 percentage points rise in interest rates and, when that failed to dampen the pressure on sterling, of a further 3 percentage points rise in rates. That second announcement, far from bolstering the exchange rate, merely convinced financial markets that Britain's membership of the ERM could no longer be sustained politically. The strong political commitment to joining European monetary union, which was the effective support for other currencies in the ERM, was absent in the United Kingdom.

Following its departure from the ERM, the United Kingdom introduced an inflation target regime for monetary policy. It succeeded in bringing inflation down to around 2.5% (see Chart 2).

Chart 2
UK inflation and inflation expectations, Oct. 1991–Oct. 2003



Sources: Bank of England and ONS.

(a) Implied average inflation expectations from five to ten years ahead, derived from index-linked gilts (IGs).

Long-term inflation expectations did not fall as quickly. Only after the announcement in May 1997 by the new Labour government that the Bank of England would be made independent did inflation expectations fall quickly to the target level, as can be seen from Chart 2. That reform created an expectation that it would be in the interests of all political parties not to repeal the

(1) The forward rate was below the spot rate even allowing for the devaluation implied by the crawling peg.

legislation. For the first time since World War II, there was a broad-based and credible commitment in the United Kingdom to stable and low inflation.

The need for any monetary regime to command sufficient support in order to acquire a reasonable life expectancy was given insufficient weight in the discussions that took place at the IMF and elsewhere concerning Brazil and other financial crises of the 1990s. The point is made by Guillermo Calvo and Frederic Mishkin (2003, page 5) when they write: 'the key to macroeconomic success in emerging market countries is not primarily their choice of exchange rate regime, but rather the health of the countries' fundamental macroeconomic institutions, ... less attention should be focused on the general question whether a floating or a fixed exchange rate is preferable, and more on these deeper institutional arrangements'.(1)

IV Case study 2: currency reform in Iraq

The importance of expectations about the future of monetary institutions is illustrated by the recent monetary history of Iraq. This second case study demonstrates that expectations of future collective decisions can have a major impact on the value of a currency quite independently of the policies pursued by the current government. Expectations of monetary decisions within a given policy regime may be less significant than expectations of changes in the regime itself. In Iraq, regime change took on a new meaning. What is particularly interesting about Iraq is the link between expectations of a change in political regime and movements in currency values.

Prior to the Gulf War in 1991 the Iraqi currency was the dinar. Following that war, Iraq was divided into two parts that were politically, militarily, and economically separate from each other: southern Iraq was under the control of Saddam Hussein and the enforcement of the northern no-fly zone meant that northern Iraq became a *de facto* Kurdish protectorate. In the South, Saddam's regime struggled to cope with UN sanctions and resorted to printing money to finance growing fiscal deficits. Unable to import notes printed abroad because of sanctions, the regime printed low-quality notes in Iraq that bore Saddam's image. In May 1993, the Central Bank of Iraq announced that the 25 dinar note, then the highest denomination note in circulation, would be withdrawn and replaced by a new locally printed note. These were known as 'Saddam' or 'print' (because of the offset litho print technology used) dinars. Citizens had three weeks to exchange old for new notes. So many notes were printed that the face value of cash in circulation jumped from 22 billion dinars at the end of 1991 to 584 billion only four years later. Inflation soared to an average of about 250% per year over the same period. As a result, the smaller-denomination notes became worthless in southern Iraq.

In the North, however, matters were rather different. Residents in that part of Iraq had no opportunity to exchange their notes. And it was no accident that, because of expropriation of cash in the banks by the Saddam regime, the holders of the high-denomination notes were disproportionately in the North. Of the seven billion 25 dinar notes in circulation in Iraq at that time, about five billion circulated in Kurdish-controlled Iraq. Thus, the Saddam dinar did not circulate in the North, and the old dinar notes continued to be used. They were known as the 'Swiss' dinar, so-called because, although the notes had been printed by the British company De La Rue, the plates had been manufactured in Switzerland. The Swiss dinar developed a life of its own and in effect became the new currency in the North. No Swiss dinar notes were issued after 1989, and since there was no issuing authority there was at most a fixed, and probably a declining money stock in the North. As a result, the Swiss and Saddam dinars developed into two separate currencies.

For ten years, therefore, Iraq had two currencies: one issued by the official government and the other backed by no government at all. The Swiss dinar continued to circulate in the North, even though backed by no formal government, central bank, or any law of legal tender. For a fiat currency this was an unusual situation. Whatever gave the Swiss dinar its value was not the promise of the official Iraqi government, or indeed any other government.(2)

Although there was little or no trade between North and South Iraq, both the Swiss and Saddam dinars were traded against the dollar. The implied Swiss to Saddam

(1) This quote appears on page 5 of the NBER working paper number 9808 (Cambridge, MA) version of their paper. At the time of writing, the *Journal of Economic Perspectives* version, which appears in the list of references, was still forthcoming.

(2) At no stage did the Kurdish groups lay claim to the Swiss dinar as their currency—they had no control over it, as shown by the interview given to Gulf News on 30 January 2003 by the Kurdistan Regional Government Prime Minister Barzani who said: 'We don't have our own currency.'

dinar cross-exchange rate from 1997 onwards is shown in Chart 3.(1)

Chart 3
Saddam/Swiss dinar exchange rate, July 1997–Oct. 2003

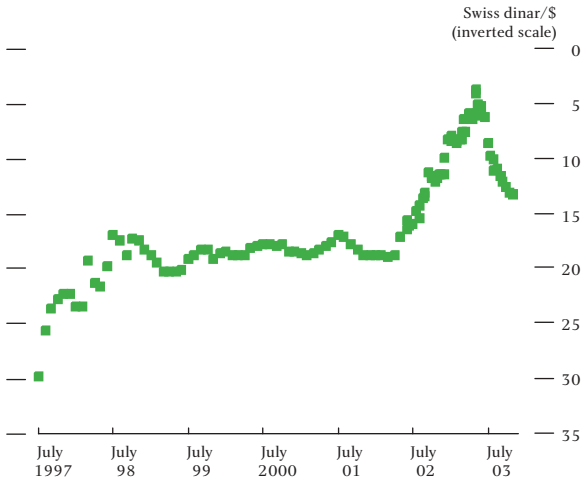
Sources: Central Bank of Iraq and United Nations Oil-for-Food Program.

After 1993, the Swiss dinar deviated from parity and rose to around 300 Saddam dinars to the Swiss dinar by the time Saddam's regime was deposed in 2003. The appreciation of the Swiss dinar is clearly a consequence of the evolution of the actual and expected money supplies in the two territories.

Given the monetary and fiscal policies pursued by the Saddam regime, the rise of the Swiss dinar against the Saddam dinar is, perhaps, understandable. But what is less obvious is the path of the Swiss dinar against the US dollar. Chart 4 shows the Swiss dinar/dollar exchange rate from 1997 onwards.

After fluctuating in the early 1990s, the Swiss dinar rose sharply against the US dollar from the middle of 2002 as the prospect of an end to the Saddam regime increased. It rose from around 18 to the dollar in May 2002 to about 6 to the dollar by the beginning of May 2003 when the war ended. That appreciation reflected expectations about (i) the durability of the political and military separation of Kurdish from Saddam-controlled Iraq and (ii) the likelihood that a new institution would be established governing monetary policy in Iraq as a whole that would retrospectively back the value of the Swiss dinar. The political complexion of northern Iraq led to the assumption that the currency used there would have value once regime change had occurred.

Chart 4
The Swiss dinar/dollar exchange rate, July 1997–Oct. 2003

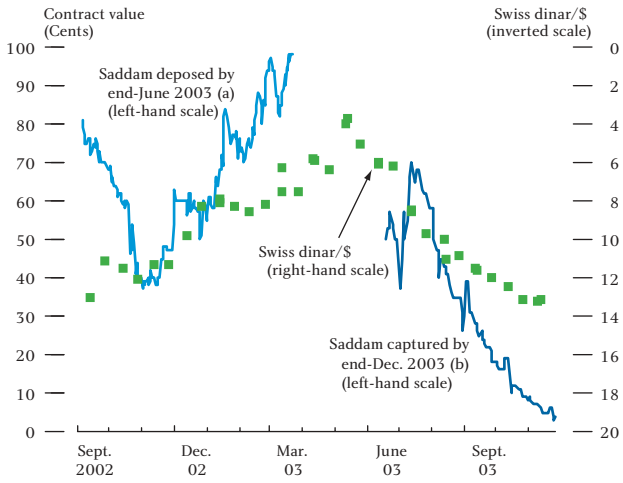


Sources: Central Bank of Iraq and United Nations Oil-for-Food Program.

In other words, the value of the Swiss dinar had everything to do with politics and nothing to do with the economic policies of the government issuing the Swiss dinar, because no such government existed. As someone might have said: 'It's the political economy, stupid!'

Another illustration of this is shown in Chart 5, which plots the Swiss dinar/dollar exchange rate against the values of futures contracts showing how expectations about the political order in Iraq were evolving. One futures contract paid out 100 cents if Saddam was

Chart 5
Exchange rates and regime change in Iraq Sept. 2002–Dec. 2003



Sources: Central Bank of Iraq, Tradesport Exchange Limited and United Nations.

(a) Value in cents of a contract that paid 100 cents if Saddam was deposed by the end of June 2003, and 0 otherwise.
(b) Value in cents of a contract that paid 100 cents if Saddam was captured by the end of December 2003, and 0 otherwise.

(1) Sources for these data include the United Nations (from the Oil-for-Food Program) and the Central Bank of Iraq.

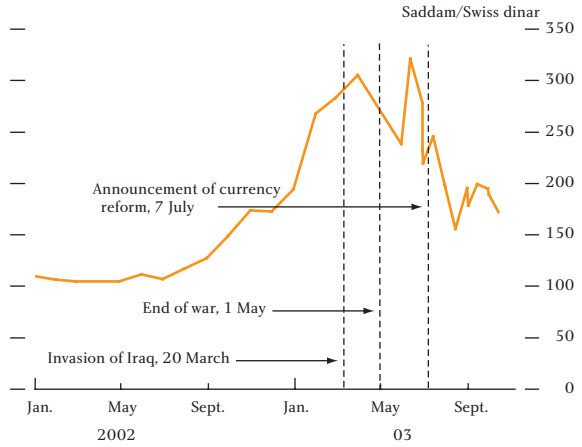
deposed by the end of June 2003 and nothing otherwise. As the chance of Saddam's regime being deposed (and the price of the future) rose, the Swiss dinar appreciated against the dollar. Later there was also a future that paid 100 cents if Saddam was captured by the end of December 2003, and nothing otherwise. As the chance of this happening (and the price of the future) fell last autumn, the Swiss dinar fell against the dollar. It has just risen again. Again, expectations about the future political order in Iraq, which have repercussions for the likely monetary regime in northern Iraq, influence the value of the Swiss dinar today.

Much of this was understood by Kurds in the North where the exchange rate of the Swiss dinar to the dollar was a matter of both concern and interest. The minutes of a meeting of the Kurdish Regional Government on 14 October 2002 state: 'KRG Prime Minister Nechirvan Barzani chaired a meeting to discuss the ongoing problem of the weak US dollar in the local currency markets. Discussion focused on the … unprecedented 45% decrease in the value of the US dollar against the Iraqi Swiss dinar, possible causes of the problem, and effects on the market.' Realising that the effect of a change in the exchange rate cannot be understood without an analysis of the causes of the change, the minutes continue, in a manner that would do justice to the minutes of any G7 central bank: 'It was pointed out that the US dollar is currently stable in foreign markets so there must be other explanations for the sharp slide in value in Iraqi Kurdistan.'(1) In other words, an explanation was needed for a rise in the real value of the Swiss dinar.

Of course, as we now know, the expectation of a future institution guaranteeing the integrity of the Kurdish area, and the value of their currency, turned out to be correct. Coalition forces assumed control of the whole territory, and on 7 July 2003 the head of the Coalition Provisional Authority, Paul Bremer, announced that a new Iraqi dinar would be printed and exchanged for the two existing currencies at a rate that implied that one Swiss dinar was worth 150 Saddam dinars. The exchange was to take place over the period 15 October to 15 January. It is now virtually complete. The new dinars, like the Swiss, were printed by De La Rue in a very short space of time using plants in Britain and several other countries. The fact that the populations of both North and South Iraq have been prepared to exchange their old notes for new dinars reflects the confidence which they have in the future of the institutions backing the new Iraqi dinar.

The 150 parity is barely half the rate the Swiss dinar reached at its peak (see Chart 6). But it is above the average rate that prevailed over the past six years, and above the rate that would equalise the purchasing power of the two currencies. For example, around the time when the new conversion rate was being determined, it was estimated that 128 Saddam dinars to the Swiss would equalise the wages of an engineer in the two parts of Iraq, 100 would equate the price of the shoes he wore to work, and 133 the price of his suit.(2)

Chart 6
The Saddam/Swiss dinar exchange rate
Jan. 2002–Dec. 2003



Sources: Central Bank of Iraq and United Nations.

From Chart 6, it is clear that the exchange rate hovered above 150 after the parity was announced on 7 July. There are two reasons for this. First, the 10,000 Saddam dinar note was heavily counterfeited, easy to do given the primitive local technology used to print them. The exchange rate of this note against the dollar is consistently less than the 250 dinar note which, as a smaller-denomination note, was less heavily counterfeited. The Swiss notes, printed using more sophisticated technology, are virtually free of counterfeits. The Swiss notes traded at above the parity because of the risk that holders of the 10,000 note would find that they had a forgery and could not exchange it at the central bank. Second, before the capture of Saddam Hussein there was inevitably some uncertainty about the prospects of the new regime and the new currency that it issued.

(1) The minutes are archived on the KRG web site www.krg.org/news.
(2) Compiled by the Central Bank of Iraq, based on data collected by the United Nations World Food Program.

The circulation of Swiss dinars in Kurdish-controlled Iraq during the 1990s was a market solution to the problem of devising a medium of exchange in the absence of a government with the power to issue currency. Changes in the relative price of Swiss and Saddam dinars show that the value of money depends on beliefs about the probability of survival of the institutions that define the state itself.

V Case study 3: monetary policy in Japan and the zero bound on interest rates

My third case study shows that institutional arrangements need to be consonant with the underlying economics, or failure will result. Recent experience in Japan has led to the rebirth of interest in monetary policy when official interest rates are constrained by the zero lower bound. Official short-term interest rates in Japan have been approximately zero since the beginning of 1999. Of particular interest in this context is the question of how responsibilities should be divided between the central bank, on the one hand, and the finance ministry, on the other.

Guy Debelle and Stanley Fischer (1994) introduced the distinction between instrument and goal independence of central banks. That distinction has become the standard framework within which to analyse the optimal constitution of central banks. Such a distinction presumes the existence of a policy instrument that is uniquely available to the central bank. That instrument is the level of official short-term interest rates. But when interest rates are constrained at their lower bound of zero, the position is much less clear. Indeed, I shall argue that in such circumstances both instrument and goal independence are impossible. Rather, when interest rates are at their zero lower bound, policy relies on successful co-operation between the central bank and the finance ministry.

I shall assume that, when interest rates are zero, monetary policy takes the form of open market purchases or sales of government securities using central bank money. A well known policy prescription, which has become known as unconventional monetary policy, is that the central bank should buy long-term government bonds rather than the more conventional short-term bills. The Bank of Japan did indeed follow this prescription. The logic of such a proposal is as follows. Long-term bonds are likely to contain a significant premium to compensate investors for their lack of liquidity—the fact that, in practice, investors face significant costs when switching between bonds and goods. When the central bank offers to buy illiquid long-term bonds, it increases the average liquidity of the private sector's portfolio, replacing less liquid with more liquid securities. The private sector will therefore be more willing to hold other illiquid instruments, such as private sector bonds and equities. As a result, liquidity premia fall across a broad category of securities, raising their market value. That will stimulate spending by firms and consumers.(1) Such a policy is preferable to conventional open market purchases of short-term bills or bonds because when interest rates are zero such bills become perfect substitutes for cash. Hence purchases of short bonds have no effect on spending or other real variables.

It is a short step to show that this argument implies an equivalence proposition between unconventional quantitative operations, on the one hand, and a combination of neutral conventional operations and government debt management, on the other. The purchase of a long-term bond by the central bank is equivalent to a combination of two other operations: a purchase of a short-term bill, followed by an operation that swaps the short-term bill for the long-term bond. In either case, the central bank balance sheet ends up with an additional liability in cash, and an additional asset in long-term bonds. The first of these two operations, the purchase of a short-term bill, is neutral in its effect as it replaces one private sector asset, a short-term bill, with another, cash, that is a perfect substitute for it. The second is debt management, which is normally seen as the responsibility of the finance ministry. So when interest rates are zero, unconventional quantitative operations and debt management are indistinguishable.

The interplay between monetary policy and debt management may not matter too much when short-term interest rates are positive because the central bank can control the level of interest rates, even if debt management affects the optimal level of rates. But when rates are at their zero bound, then the central bank no longer has instrument independence. Indeed, because its actions can be offset by appropriate sales or purchases in the government debt market, it loses goal independence too. It becomes crucial that fiscal and

(1) How large these effects are is an open question. The absence of a compelling general equilibrium theory of liquidity makes it difficult to produce reliable empirical estimates. For the purposes of the equivalence proposition the magnitude of the effect is irrelevant.

monetary authorities co-operate. An alternative strategy, equivalent in terms of its monetary effects but avoiding the risk to the Bank of Japan's balance sheet from holding large quantities of government bonds, would have been for the Ministry of Finance to have issued short-term bills to the Bank of Japan, using the proceeds to purchase and retire long-term government bonds. Similar arguments apply to other unconventional monetary policies, such as purchases of foreign currency, which conflict with the responsibilities of the fiscal authorities for the ownership of foreign exchange reserves.

A serious problem for the Japanese authorities was that the Bank of Japan was granted independence not long before it became necessary for policy to be co-ordinated between the Ministry of Finance and the Bank.(1) Inevitably, the desire on both sides to respect the newly won independence of the central bank came into conflict with the growing realisation that monetary policy was operating in a zero interest rate environment. The clarity of communication about the objectives of monetary policy diminishes when it is no longer possible to identify clear and distinct responsibilities for the two institutions. A desirable long-term reform, central bank independence, led to short-term difficulties.

VI Conclusions

I am conscious that I have raised more questions than I have answered—perhaps that is what happens when you become a central banker. I hope I have not copied my room-mate at Harvard whose PhD supervisor wrote: 'he chewed more than he had bitten off'.(2) But the search for institutions that improve our ability to handle the two problems associated with public money, the impossibility and undesirability of committing our successors, is never ending, and our knowledge is limited. At the very first gathering of economists to create the American Economic Association, in Saratoga in September 1885, Richard Ely showed that he had the makings of a good central banker when he said: 'We acknowledge our ignorance, and if we claim superiority to others it is largely on the very humble ground that we know better what we do not know.' Or, in Hayek's words, 'It is high time we took our ignorance more seriously.'

The inability to bind future generations means that institutions do not resemble an optimal time-invariant design chosen from behind the 'veil of ignorance'. They reflect, in Hayek's words, 'how nations in the darkness stumble upon institutions which are in fact the result of human actions, not the implementation of a human plan'.(3)

Suitably designed, though, monetary institutions can help to reduce the inefficiencies resulting from the time-consistency problem and can incorporate new ideas into a discretionary monetary strategy constrained by a mandate that has widespread support in the population as a whole. A central bank needs to explain to the population both what it knows and what it does not know. Such a framework of 'constrained discretion' for central banks is far removed from the world of 1930 when the Deputy Governor of the Bank of England explained to the Macmillan Committee that 'it is a dangerous thing to start to give reasons'.

In 1908 Congress set up the National Monetary Commission to report on 'what changes are necessary or desirable in the monetary system of the United States'. Before recommending the establishment of the Federal Reserve System, a plan which it described as 'essentially an American system, scientific in its methods, and democratic in its control', the Commission produced 22 volumes on the monetary and banking systems elsewhere, especially in Europe. Copies of these volumes sit proudly in the Governor's anteroom in the Bank of England. The authors noted that 'the important place which the Bank of England holds in the financial world is due to the wisdom of the men who have controlled its operations and not to any legislative enactments'. But they did not see the Bank of England as a model, and they recommended the creation of an institution framed by legislation. It would be 90 years before Britain finally learnt the lessons of the National Monetary Commission and passed legislation to buttress whatever wisdom the Bank could command.

Institutions embody accumulated wisdom and experience, and they should not be meddled with lightly. From time to time, however, it is necessary to rethink the role of our institutions. The changes made to the Bank of England in recent years, including an inflation target

(1) The legislation was published in 1997 and took effect in April 1998.
(2) The supervisor (in English literature) was citing a letter from Mrs Henry Adams to her father, December 1881: 'It's not that he bites off more than he can chaw as T G Appleton said of Nathan, but he chaws more than he bites off.' (Nathan was Appleton's son). The remark is also sometimes attributed to Mark Twain as a comment on Henry James's writing.
(3) Hayek (1960), cited by Otmar Issing (2003).

and a high degree of transparency, have, I believe, improved Britain's monetary arrangements. Whether either the men and women or the current institutional arrangements of the Bank of England will have any more success in influencing monetary arrangements in the United States today than in 1908 is a matter I leave to you.

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The Governor's speech[1] to the CBI Scotland dinner

One hundred years ago the three largest employers in Glasgow were the North British Locomotive Company, and the shipbuilders Fairfields and John Brown and Company. Today the largest employers are Glasgow City Council, the National Health Service, and Strathclyde Police.

It is not just Glasgow which has experienced the shift of economic activity away from manufacturing, especially engineering, towards services. One hundred years ago the ten largest British companies, ranked by market capitalisation, were all railway companies. In eleventh position was the Bank of England, then of course in private ownership. Now the ten largest companies include five in financial services and only two in manufacturing.

Such radical changes to our industrial landscape reflected a shift of investment to those economic activities in which the United Kingdom had a comparative advantage. They led to a rise in productivity—and living standards. Productivity growth for the economy as a whole is the result of the continuous efforts, under the pressure of competition, of thousands of businesses to improve their efficiency—perpetual change, indeed perpetual revolution. For much of the post-war period, policymakers have debated how to encourage this entrepreneurial revolution.

What type of economic environment is most conducive to productivity-enhancing change? The story of macroeconomic policy in this country over the past 30 years has been the search for stability. Greater stability is one of the achievements of the reforms to the Bank of England over the past decade, even if some part of the gain was probably due to good fortune. During this period the United Kingdom has experienced a degree of stability of output and inflation never before recorded. But has it come at the cost of weaker pressures to revolutionise products and production processes—the sources of productivity gains? The 'boom and bust' cycles of the early 1980s and early 1990s were associated with rapid increases in productivity which, measured as output per hour worked in the private sector, rose by 2.7% a year in the 1980s and the early 1990s—above its long-term average. So should we conclude that stability, though desirable for its own sake, hinders the changes of industrial structure that are necessary for productivity improvements? Some economists have concluded just that. Indeed, they have gone further and argued that only waves of innovations, and their resulting destruction of existing capacity, can lead to significant increases in our standard of living. It is in rushes of 'creative destruction', as the Austrian economist Joseph Schumpeter described it, that the economy progresses.

My answer will be rather different, and is in three parts. First, creative destruction—the process whereby new firms and sectors expand while others contract—is constantly taking place below the surface. Those changes are indeed the main source of productivity growth. Of course, change is painful for those directly affected, as many of you know only too well. Second, such changes are occasionally so dramatic as to cause fluctuations in the level of output of the economy as a whole. But this is rare. Third, most business cycles over the past 50 years have owed more to the twists and turns of monetary policy, and the failure to control inflation, than to waves of innovations.

Let me take those three points in turn. First, below the surface, the pace of economic change is striking. Turnover in the labour market is high. The labour force in the United Kingdom comprises around 30 million people. About four million move from one job to another each year. Seven million move into or out of work. So each month there are on average almost a million job changes of one sort or another. That dwarfs the net change in unemployment which, over the past year, has averaged around twelve thousand a month.

Structural change also means the rise and fall of particular industries. Scotland illustrates the pace of change. It is exactly 100 years ago since the first British-made two-door saloon car was built on the banks of the Clyde at Alexandria. Unfortunately, the company concerned—Argyll—collapsed in 1907. Over the

(1) Given in Glasgow on 14 June 2004. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech221.pdf.

subsequent century motor cars and the British motor car industry have changed out of all recognition. Shipbuilding is another example. At the beginning of the twentieth century, the Clyde yards built 20% of the world's ships, and the United Kingdom produced more ships than the rest of the world combined. By the 1960s, the United Kingdom's share of world production had fallen to less than 5%. During the 1980s and 1990s, a new specialisation developed in Scotland with the emergence of Silicon Glen. About half of all semi-conductors produced in the United Kingdom are now made in Scotland. More recently, the Scottish IT industry has successfully diversified into other hardware and software products. Such changes below the surface are the essence of productivity growth.

Second, sometimes structural change can cause movements in the economy as a whole big enough to create waves above the surface. Shipbuilding on the Clyde and Silicon Glen are examples of 'clustering', where firms in a similar industry locate close to each other. This enables them to learn from each other, use the same suppliers, use the same infrastructure, and hire from a pool of workers with the requisite skills. But it also means that, when an industry is hit by a shock, the whole community is affected. When the world downturn in IT investment occurred in 2001, the economic impact on Silicon Glen was larger than on the rest of the United Kingdom, though less than on Silicon Valley. IT investment as a share of total investment is about twice as large in the United States as in the United Kingdom. When the excessive optimism about the impact of new technology on profits subsided at the end of the 1990s, the resulting downturn in investment affected the US economy as a whole: the United States experienced a recession in 2001, whereas the United Kingdom did not.

Third, most economic cycles are not driven by waves of innovation and the reactions of investors to them. In particular, the boom and bust cycles of the 1970s and 1980s were, if not driven, then certainly exacerbated by the failure of monetary policy to keep inflation and inflation expectations under control. Only a recession could then bring them both down. As I mentioned at the outset, productivity in those recessions did benefit from the demise of the least efficient firms—the so-called batting average effect—but at the cost of falls in total output. Remember too that the abolition of foreign exchange controls and the opening up of the UK economy to greater competition from abroad provided an environment conducive to the beneficial process of creative destruction taking place below the surface. Those structural changes, together with the batting average effect, were sufficient to offset the disincentive to make long-term investments in both capital and people resulting from high and variable inflation. At the level of the economy as a whole, the evidence suggests that variability in output growth, and the higher uncertainty it generates, is associated with lower growth.

From those three points, I draw two conclusions. First, openness of an economy—to ideas, innovation and competition from abroad—is a spur to productivity growth. And we can draw comfort from the fact that all major political parties in Britain support the principles of openness, competition and free trade. Indeed, whatever criticisms they might otherwise attract, politicians in this country, together with our business and trade union leaders, deserve praise for their clear support for a liberal approach to international trade and integration, something which cannot always be said about their counterparts overseas. It is vital to continue the long and tortuous process of lowering barriers to trade in the Doha round of trade negotiations.

Second, stability is a spring-board for enterprise, not a hindrance. The most useful contribution which the Bank of England can make to encourage investment and innovation is to provide a backdrop of macroeconomic stability.

In order to maintain that stability the Bank of England has now raised interest rates four times since November. Although UK interest rates have been the highest in the G7 for well over three years, alone among the G7 we have not experienced a single quarter of falling output for over a decade. Indeed, it is the relative strength of the UK economy that explains those differences in interest rates. But a synchronised recovery in the rest of the industrialised world is now under way. The US economy has created over one million jobs this year. Even in the euro area and Japan, where domestic demand has been weak, growth in the first quarter was the fastest for several years. As a result, the world interest rate cycle has now turned. Over the past three months expectations of interest rates among all the major industrial countries have risen as recovery has become more firmly established.

But what are the prospects closer to home? A reasonable central view is that growth of the UK economy is likely to be robust over the next year, and

then to ease back towards its long-term average. That continued strength—if left unchecked—is likely to put upward pressure on inflation, taking it over the target in the medium term. The uncertainty over the pace of growth in recent months, especially in manufacturing, complicates the judgments we have to make. The official data are invaluable, but they are complemented by the information we receive through our Agents around the United Kingdom and from visits such as this. As Robert Louis Stevenson remarked:

> Here he comes big with Statistics,
> Troubled and sharp about fac's.
> He has heaps of the Form that is thinkable—
> The stuff that is feeling, he lacks.

My visit to Scotland is a welcome opportunity to ask you and other representatives of local businesses for your views on what is happening on the ground. As far as we can tell, there does not appear to be much spare capacity in the UK economy. The labour market has tightened further as employment has risen at well above the rate implied by growth of the labour force. Cost pressures are increasing, and pay growth has picked up.

There are, of course, many risks around the central view. Some of these come from the behaviour of house prices which have risen by over 20% in the past twelve months and more than doubled over the past five years. This sustained increase has repeatedly confounded expectations and taken the ratio of house prices to earnings to record levels. Demographic factors, a shortage of housing supply and low levels of inflation and interest rates all mean that the sustainable ratio has probably risen somewhat over the past decade. Nevertheless, it is now at levels which are well above what most people would regard as sustainable in the longer term. There are some early signs, from surveys, of a slowdown in the housing market. After the hectic pace of price rises over the past year it is clear that the chances of falls in house prices are greater than they were. So anyone entering or moving within the housing market should consider carefully the possible future paths of both house prices and interest rates.

For the Monetary Policy Committee, the significance of the strength in the housing market is its implication for household spending and hence the outlook for inflation. So it is the strength of our economy, and especially domestic demand, which explains why the MPC has been raising interest rates. How far interest rates will need to rise in order to keep inflation on track to meet our 2% target for CPI inflation in the medium term is impossible to say with any degree of confidence. There is no pre-determined plan. We examine the outlook afresh each month and keep an open mind. And the MPC will remain focused on meeting the inflation target in order to deliver stability.

The changes to both Glasgow and the British economy over the past century have been dramatic. And it is those changes—driven by the decisions of businesses like yours—which are the basis of higher productivity and higher living standards for us all. Stability of the economy as a whole goes hand in hand with perpetual revolution in individual enterprises.

The Governor's speech[1] at the Mansion House

My Lord Mayor, Mr Chancellor, My Lords, Aldermen, Mr Recorder, Sheriffs, Ladies and Gentlemen:

Not since 1881 has a new Governor ceded over six years seniority in office to the Chancellor of the Exchequer—when Gladstone had eleven years advantage over Grenfell. So I approach tonight with due humility, and offer my congratulations to the Chancellor for his longevity in office and successful pursuit of economic stability—not even Gladstone achieved such stability. A major contribution to that was made by my predecessor. I want to express the gratitude of the Bank to Eddie George for his leadership and my thanks for his personal support during his ten years as Governor, which historians will surely describe as a golden period for the Bank.

You will all know that today is the centenary of 'Bloomsday'. Leopold Bloom's walk around Dublin, immortalised in James Joyce's Ulysses, was on 16 June 1904. Joyce himself wrote 'I've put so many enigmas and puzzles [in the book] that it will keep the professors busy for centuries arguing over what I mean.' Some might say that Joyce invented the language of central bankers!

Tonight I want to describe a different walk—the Governor's walk. Initiated by Montagu Norman, from Notting Hill Gate to the Bank of England, it is a walk through the British constitution. Starting in the 'dignified' branch of the constitution, to use Walter Bagehot's word, near Kensington Palace it continues through the Royal Parks towards the 'efficient' part of the constitution: the Executive. Up the Clive Steps, and navigating carefully between the Foreign Office and the Treasury, of which the Bank has long experience, I look up at the Chancellor's window and see those famous golden scales which balance spending, on the one hand, and revenues, on the other. Recently they have tilted more and more towards the spending side, although the projected rise in tax revenues over the next three years will, I am assured, allow the scales to swing back to what is known in the trade as a sustainable fiscal position. That is important because the improvement in the fiscal stance in recent years has been a key element in achieving macroeconomic stability.

I move on towards the third branch of the constitution: the Legislature. Passing through Parliament Square, I recall my four appearances before the Treasury Committee over the past year: a key part of our public accountability. Such hearings are a far cry from the days when a previous Deputy Governor said to a Parliamentary Committee, 'it is a dangerous thing to start to give reasons'. The Bank of England has now raised interest rates four times since November. Although UK interest rates have been the highest in the G7 for well over three years, alone among the G7 we have not experienced a single quarter of falling output for over a decade. Indeed, it is the relative strength of the UK economy that explains those differences in interest rates. But a synchronised recovery in the rest of the industrialised world is now under way. The US economy has created over one million jobs this year. Even in the euro area and Japan, where domestic demand has been weak, growth in the first quarter was the fastest for several years. As a result, the world interest rate cycle has now turned. Over the past three months expectations of interest rates among all the major industrial countries have risen as recovery has become more firmly established.

But what are the prospects closer to home? A reasonable central view is that UK growth is likely to be robust over the next year, and then to ease back towards its long-term average. As far as we can tell, there does not appear to be much spare capacity in the UK economy. The labour market has tightened further as employment has risen at well above the rate implied by growth of the labour force. Cost pressures are increasing, and pay growth has picked up.

There are, of course, many uncertainties and risks around that central view. How far interest rates will need to rise in order to keep inflation on track to meet our 2% target for CPI inflation in the medium term is

(1) Given on 16 June 2004. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech222.pdf.

impossible to say with any degree of confidence. But the MPC will continue to remain focused on meeting the inflation target in order to deliver stability.

Having satisfied, I hope, the requirement to explain our monetary policy decisions, the Governor's walk now crosses Westminster Bridge, continues down the South Bank and over that other monument to stability, the Millennium Bridge. I enter the City after six miles of virtually traffic-free walking, and arrive in the calm atmosphere of the Bank of England. Over the past year, the Bank has been able to reflect on the changes stemming from the Bank of England Act 1998 and the associated Memorandum of Understanding between the Bank, Treasury and FSA on financial stability. That legislation inevitably changed the Bank's relationship with the City and the financial sector more generally. Freed from the responsibilities of day-to-day regulation, the Bank has been able to focus on two principal objectives: maintaining monetary stability and maintaining financial stability. Those objectives are the essence of central banking. But that left hanging in the air the question of the Bank's traditional role in the City. That role has evolved over many years, and the recent changes provide an opportunity to restate how we see it.

Since Big Bang in 1986, the City has changed beyond all recognition. The so-called 'Wimbledonisation' of the City—hosting a successful tournament where most of the winners come from overseas—has proceeded apace. Some have blamed the Bank, among others, for failing to engineer the promotion of more British institutions to the top ranks of global financial institutions. But in fact there are now some home players in the top ten in the world. And there is little evidence that it makes sense for the public sector to try to identify national champions, as opposed to creating an environment which encourages innovation and provides first-rate infrastructure.

The Bank is, and always will be, deeply involved with the City and those who work here. We operate in markets daily; we stand at the centre of—indeed underpin—the payments system; we have a close interest in settlement systems. But our involvement is from the perspective of the public interest, not the defence of particular private interests nor treading on the toes of other public authorities. At present there are three areas in which we are looking actively to work with practitioners to improve both our performance and the efficiency of the financial markets in London.

First, the Bank tries to detect and reduce threats to the stability of the financial system as a whole—work led by Sir Andrew Large, Deputy Governor for Financial Stability. To help us do that we have expanded our market intelligence function, under Paul Tucker, the Executive Director for Markets. The risks to financial stability now come at least as much from lack of liquidity in markets as in individual institutions. So the eyes and ears of the Bank need to be sharper than ever. That is why the Bank remains, to quote Governor Cobbold in 1958, 'a bank and not a study group', and I have encouraged staff in the Bank to learn as much as they can from outside Threadneedle Street and not just from the files or computers inside. With so much information and so many players in the City today, it is no longer sensible to define the relationship between the Bank and the City solely through the person of the Governor. The relationship must be broader and calls for a high degree of personal contact. That is why I appointed Alastair Clark as Adviser to the Governor on financial sector issues last summer, and this expanded line of communication has proved immensely valuable in drawing to our attention the nature of issues about which you in the City are concerned.

Second, as I announced last October, the Bank has decided to reform the way it conducts operations in the sterling money markets. The present system is complex and results in volatile overnight interest rates. At the very short end, market rates are distorted when changes in the official rate are expected at the subsequent MPC meeting. We are considering two alternative ways of conducting operations—one with banks settling their accounts each day and the other based on an averaging scheme for bank reserves. Either approach would represent a significant improvement to the current system. Both would extend to a wider set of banks access to the deposit and lending facilities we offer. We will consider carefully the views expressed to us in response to the consultation paper published in May, and will shortly be announcing the direction in which the system will change. I want the Bank to become a model of how to conduct monetary policy operations.

Third, the technology for payments is constantly evolving. And central bank practices need to evolve with it. So just as widening access to our market operations will improve the functioning of sterling money markets, so widening access to the UK large-value payment system can lead to safer and more efficient payments. The introduction of real-time gross settlement reduced

interbank credit risk for payments made between banks in the CHAPS system by removing the gap between final payment and receipt of funds. Wider membership of CHAPS might permit a further reduction in that risk and make our financial system more resilient in a crisis. Our intention is to understand better what are the barriers to wider membership and how they can be lowered. Separately, in the area of retail payments, it is disappointing that the United Kingdom now takes longer to clear payments—whether cheques or electronic payment—than almost any other member of the G10. Together with other members of the OFT task force, the Bank will actively explore ways in which that performance can be improved.

My Lord Mayor, you did ask me whether I could talk about something more interesting at the Mansion House Dinner, such as the City's commitment to the Arts. If you feel like that, I replied, why don't we go to the Barbican on 16 June to hear Bernard Haitink conduct Brahms's Third and Fourth Symphonies? I was sure we could get back to Mansion House before it was our turn to speak. Dutiful as ever you counselled against this course of action. But your personal commitment to the arts, and to music in particular, has been the centrepiece of your Mayoralty. Your campaign for 'Music and the Arts for Everyone' has happily coincided with the centenary of the London Symphony Orchestra which, so ably led by Clive Gillinson, is a demonstration of what the City and the arts can achieve in partnership which helps to make London such a wonderful city in which to live and work … and indeed walk. And tonight all of us here would like to pay tribute to your work, and to thank both the Lady Mayoress and yourself for the splendid hospitality which you have extended to us all this evening.

So I invite you all to rise and join me in the traditional toast of good health and prosperity to 'The Lord Mayor and the Lady Mayoress'.

Keeping the party under control—anniversary comments on monetary policy

In this speech to the British Hospitality Association,[1] *Rachel Lomax, Deputy Governor responsible for monetary policy, looks back at her first year on the MPC. She argues that the UK economy emerged from the recent world slowdown with less slack than other economies. That is the key reason why the United Kingdom was the first to start raising interest rates when activity picked up last year. While it was right for the MPC to take early action to contain inflationary pressures, uncertainty about how consumers would react to higher rates, and a desire to avoid springing surprises, have been important reasons for tightening policy gradually. Noting that the housing market is a key risk to a benign central forecast, she argues that the MPC cannot ignore the influence of house prices on domestic demand; and while the link has been weaker recently than in the past, it is unsafe to conclude that consumers would shrug off the effects of a sharp downturn in the housing market.*

It is a great pleasure to be here today. Judging by the capacity crowd, the businesses you represent are in pretty good spirits.

What better way to start than by thanking you for your excellent hospitality. And what better place to celebrate an important double anniversary. Because that's what today is, for me.

It is exactly a year since I joined the Bank of England as Deputy Governor for Monetary Policy. And it is forty years, almost to the day, since I started my first job. I was a waitress: in a famous seaside town—the one that's noted for fresh air and fun.

It wasn't much of a job. But then I wasn't much of an employee, having no marketable skills, but plenty of attitude. I learnt how to carry several plates at the same time and a lot of interesting new words; and the job paid for a memorable holiday in Greece. Looking back on it, I'm sorry I left without giving notice: though I'm not sure my boss was.

My work habits have improved immeasurably since those far off days. And so I think has British hospitality.

The 'eating out experience' has certainly been transformed. At the very top end of the market, there are now over a hundred Michelin starred restaurants compared with less than thirty in my youth. The past decade has seen a huge investment in both hotels and visitor attractions. Three of the top five fee paying visitor attractions in the UK are less than five years old, with the wonderful London Eye now comfortably outstripping that doughty old trouper, the Tower of London. London doesn't have it all its own way of course—the ground breaking Eden Project now comes in at a well deserved number three.

Tourism has become more than good business. From the Welsh Valleys to the East end of London, it is increasingly seen as a catalyst for economic regeneration. With the success of the Manchester Commonwealth games, and Liverpool's ambitious plans for 2008 as European City of Culture, not to mention London's Olympic bid, there's no shortage of high profile events and projects to provide inspiration for the future.

Your industry is still a major employer, of course. You must provide more jobs than the NHS and the Armed Forces put together. I'd be the last person to underrate the importance of entry level and seasonal jobs; but you need highly skilled people too. So it's good news that thousands of people are already on tourism and hospitality related FE and work based courses. Your new Sector Skills Council will provide an even sharper focus on defining and meeting your industry's training needs.

Nowadays, your industry makes a major contribution to our national income, and to our exports. And it's not surprising that your fortunes are heavily influenced by the economic climate at home and abroad.

(1) Delivered at the Annual Luncheon of the British Hospitality Association, London Hilton, 1 July 2004.

The decade of strong growth which you have enjoyed has been underpinned, at the national level, by an unprecedented period of low and stable inflation, and steadily growing output and employment. Unemployment has been falling for over a decade and has now reached a thirty year low. And household spending has been growing strongly year in year out since the mid 1990s.

What this means is that for many years your customers have been enjoying a very healthy growth in their spending power, in a labour market where jobs have by and large been plentiful.

Of course, averages never tell the whole story. And hindsight is a wonderful thing. At the time, it didn't always seem like plain sailing.

The Stock Market crash, the slump in transatlantic traffic after September 11 and, last year, Iraq war related fears have represented setbacks, especially for London based businesses. Over the past few years, overseas tourism has been affected by the economic slowdown in North America and much of Europe and, maybe also, by the strength of the exchange rate. On the other hand, though foot and mouth hit the industry very hard in some parts of the country in 2001, domestic tourism seems to have held up well.

And that's probably because the UK economy has weathered the squalls of the past few years rather better than both the US and the euro area. Since 2000, we have grown more strongly than the euro area, and more steadily than the US; indeed we are alone among major industrial countries in not having experienced a single quarter of falling output for more than a decade.

As a result the UK emerged from the slowdown in the world economy with less slack than other economies. That is the key reason why we were the first to start raising interest rates last November, when world activity started to pick up and demand at home accelerated. Since then, a number of other countries, including the US, have begun to raise their rates to more normal levels.

When I joined the Monetary Policy Committee a year ago, both the Fed and the ECB had just cut their interest rates to exceptionally low levels, reflecting real concerns about the strength of the world recovery. Activity picked up sharply in the US last autumn, but the mood only changed decisively early this year, when a million new jobs were created in just three months. It is now clear that a broad based world recovery is well under way, led by the US and Asia, especially China, but spreading to other regions.

The news from Japan is more encouraging than it has been for over a decade. The UK's major markets in Europe are benefiting from strong demand for their exports; and the latest news suggests that domestic demand in most of these countries is finally picking up, though consumers probably still remain a little wary.

As the news from abroad has steadily improved, we have also seen a marked strengthening in demand at home. After a fairly weak first half, retail sales bounced back, the housing market took on a new lease of life and investment began to recover. It now looks as if the UK economy has been growing around or above trend since the middle of last year.

It was against that background that the Monetary Policy Committee raised interest rates in three further stages to 4.5%. Meanwhile inflation remains low, well below the Chancellor's target of 2%.

This might seem to bear out the old taunt, that central bankers are the sort of people who want to close the bar as soon as the party starts to go with a swing. It would be fairer to say that we want to be sure that the party remains under control. We don't want to encourage binge behaviour any more than you do, and for much the same reason; it makes life unpleasant for other people, and it leaves a nasty mess behind.

That points to taking action at the first sign of trouble, and preferably before. In current circumstances, strengthening demand is beginning to put upward pressure on costs. Evidence from our Agents round the country, as well as official statistics, suggests that the labour market is tightening, and firms are having difficulty in filling some vacancies, despite the inflow of workers from the rest of the EU.

These are straws in the wind, but if we delay taking action until inflation has taken off, it will be more difficult to bring it down again without causing the economy to slow sharply. That's why our interest rate decisions need to reflect a view of likely inflationary pressures that looks a couple of years ahead.

Our central forecast is that the economy will continue to grow strongly over the next year before easing back

towards its longer term average, as both household and public spending slow down a bit. But any central forecast is subject to a wide margin of uncertainty, and there are a number of key risks.

The housing market is one. Obviously, there are many aspects of housing which have nothing to do with monetary policy. It is striking that fewer houses were built in 2001 than in any year since the Second World War; and over 12% fewer houses were built in the ten years to 2002 than in the previous decade.

It is not the MPC's job to control house prices, any more than it is our job to control share prices or the exchange rate; but just as we would not ignore the wider economic effects of a high exchange rate or a boom in the stock market, so we cannot, and do not, ignore the influence of soaring house prices on consumer spending and hence on the overall pressure of demand.

Much attention has been paid to the historically high level of house prices relative to earnings, and what this might mean for the future path of house prices. A less discussed question—of more interest to you—is how much influence the current strength of the housing market is having on household spending; and what impact a weakening in the housing market might have on consumers.

Healthy as household spending has been in the last few years, there has not been a consumer boom on anything like the scale of the late 80s, when house prices last took off. Since early 1998, house prices have risen sharply relative to incomes; but household spending has only grown broadly in line with incomes. A buoyant housing market may still have had some influence on spending; and spending and house prices may have been influenced by some of the same factors. But spending and house prices do not seem to have moved together as closely as they have done in the past.

Does that imply that consumers would shrug off a downturn in the housing market? Not necessarily. The rise in house prices has meant that households have taken on a lot of debt, and higher interest rates will mean they have less money to spend on other things. While there are few signs of obvious financial stress at current interest rates, given the strength of the current jobs market and the current housing market, this could change, especially if several of these factors weakened at the same time and the economic climate deteriorated sharply.

That's a long way from our central forecast, but uncertainty about how consumers might react to higher interest rates has been an important reason for tightening policy gradually since last November.

We have also avoided springing surprises. I think that's important: people are more likely to believe what we say, if our behaviour is reasonably predictable. But we wouldn't be doing our job if we didn't constantly revise our views in the light of new information and new research. That is why every month has to be a fresh decision. And why I can honestly say that I don't know, any more than anyone else, where rates will be in a year's time.

Compared with a year ago, interest rates have risen from 3.5% to 4.5%. But the international outlook is clearly stronger now, the domestic economy is buoyant, and inflation remains low. That's how we like it: and the lesson you should draw from our readiness to tighten policy over the past seven months is that we are on the case.

I hope that will give you the confidence to focus on your main business; creating wealth and, in the words of a famous mission statement, 'making people happy'.

Some current issues in UK monetary policy

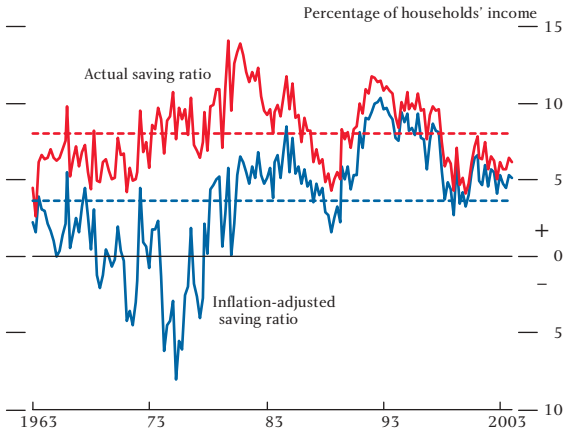
In this speech,(1) *Charles Bean, Chief Economist and member of the Monetary Policy Committee, notes that the increase in gross household debt has been primarily associated with asset accumulation rather than borrowing in order to finance consumption, and is largely a by-product of developments in the housing market. Any impact of debt on the macroeconomic outlook thus depends on differences in the behaviour of lenders and borrowers. He goes on to discuss the* Inflation Report *projections for inflation and growth which the MPC uses to make and explain its decisions. He argues that, if interest rates are a long way from 'normal', forecasts for inflation and growth assuming that rates follow a path implied by the financial markets provide a more useful picture of economic prospects than assuming interest rates remain constant.*

Good afternoon. The world economy now appears to be experiencing a broad recovery from the synchronised downturn that started in 2000. The UK economy weathered that storm better than most, though how much of that was down to luck and how much to judgment others should decide! In any case the immediate economic outlook appears brighter than it has done for a while. But the job of a central banker is to be on the lookout for rain even on a cloudless day, and today I want to touch on some of the issues that have recently been occupying us on the MPC.

One issue that has attracted considerable public attention recently is the potential threat posed by high levels of consumer debt, with headlines about the stock of household debt approaching £1 trillion and talk of a debt 'time bomb'. Caricaturing this view just slightly, the economy has been kept afloat during the past few years only because households, encouraged by the inflated value of their property, low interest rates and an easy supply of credit, have borrowed in order to finance a consumption binge. But that debt will eventually have to be repaid, at which point consumer spending will slow sharply and the economy will slip into recession.

The reality is somewhat different. While gross household debt has risen from about 90% of annual personal disposable income in 1998 to about 120% today, the household saving rate has not been *unusually* low—in fact it is less than 2 percentage points below its post-1963 average. And a measure of the saving ratio that corrects for the loss in real wealth induced by inflation(2) is actually $1\frac{1}{2}$ percentage points above its post-1963 average (see Chart 1).(3)

Chart 1
Household saving ratio



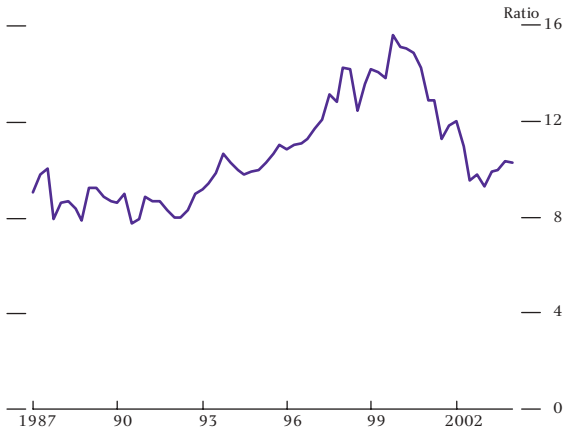
Sources: Bank of England and Office for National Statistics.

So how does this all fit together? At the aggregate level, the answer is that the household debt build-up has been primarily associated with asset accumulation rather than borrowing in order to finance current consumption. In particular, the acquisition of household financial assets (as a share of household income) has broadly risen in line with the acquisition of liabilities over the past five

(1) Delivered to the Institute of Economic Affairs on 28 July 2004.
(2) Income as measured in the National Accounts includes nominal net interest receipts, but from an economic perspective one should include only *real* net interest receipts, ie allowing for the fact that the real value of assets and liabilities that are fixed in cash terms falls as prices rise.
(3) Even if the periods of unexpectedly high inflation in 1974–76 and 1979–81 are excluded, it is still 1 percentage point above the post-1963 average.

years, so that the ratio of financial assets net of liabilities to income is about the same today as it was in the mid-1990s (see Chart 2).[1] That is largely a by-product of developments in the housing market. Faced with higher house prices, a lower initial debt-servicing burden as a result of lower interest rates, and an increased availability of mortgage finance, first-time buyers and those trading up the housing chain have been both willing and able to take out larger mortgages, thus adding to the upward pressure on house prices. But on the other side of the market, last-time sellers and those trading down the housing chain have been investing the housing equity thereby released into financial assets rather than spending it immediately. In essence, higher house prices have induced a transfer of lifetime wealth from younger generations to their parents. Moreover, even if house prices were to stop rising tomorrow, the debt to income ratio would continue growing for many years until all of the housing stock had turned over.[2]

Chart 2
Ratio of household net financial assets to quarterly household income



Source: Office for National Statistics.

How does that affect the macroeconomic outlook? Since, in the aggregate, the higher debt has been broadly matched by higher financial assets, it is not obvious that it has any impact. But if highly indebted individuals respond more strongly to, say, falls in income than do individuals with less debt, then the debt build-up could increase the responsiveness of aggregate demand to adverse shocks. And if indebted individuals respond more strongly to a rise in their interest payments than do savers to a corresponding rise in their interest receipts, the impact of monetary policy on demand may also be affected. Differences in the behaviour of households are therefore key to generating a scenario in which the high levels of household debt have an impact on the economy. But this is a much more subtle mechanism than is usually envisaged in popular discussion of the debt 'time bomb'.

None of this is to deny that *some* households may have been borrowing primarily in order to consume and that *some* households may have overextended themselves. For example, with regard to unsecured debt, we know from a recent Bank survey[3] that a significant fraction of low income households find servicing their debts difficult and could be particularly vulnerable in the event of higher unemployment or a significant increase in interest rates. But these households account for only a small fraction of consumers' expenditure and so do not represent a threat to the overall macroeconomic outlook, though the problems for the individuals affected are, of course, real and acute.

Of possibly greater significance for consumption prospects is the evolution of house prices, which have almost doubled relative to earnings since 1996. The value of housing wealth affects consumption because it allows households to borrow more easily and at lower rates than on unsecured borrowing. And, to the extent that high rates of house price inflation are associated with higher levels of activity in the housing market, more house moves imply more expenditure on housing-related durables, such as furniture and white goods. While there are a variety of reasons why the equilibrium house price to earnings ratio might be higher now than in the past,[4] there is considerable uncertainty about what ratio is sustainable. Moreover, to the extent that house prices are overvalued relative to earnings, it is also uncertain how drawn out any adjustment to a sustainable ratio will be: there could be a sharp correction to house prices, but equally house prices could just stagnate for a while until earnings catch up. Previous sharp corrections to the level of house prices have typically been preceded by a substantial tightening of monetary policy—usually to curb excessive inflation—and coincided with a substantial increase in unemployment. On the other hand, a 'soft landing' is

(1) The increase in the second half of the nineties followed by the sharp fall in the noughties reflects the swings in equity prices.
(2) See Hamilton, R (2003), 'Trends in households' aggregate secured debt', *Bank of England Quarterly Bulletin*, Autumn, pages 271–80.
(3) See Tudela, M and Young, G (2003), 'The distribution of unsecured debt in the United Kingdom: survey evidence', *Bank of England Quarterly Bulletin*, Winter, pages 417–27.
(4) See eg Bank of England (2004), *Inflation Report*, May, pages 43–44.

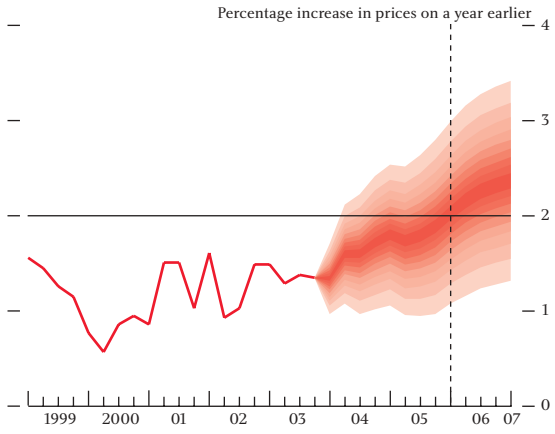
entirely possible if the economic conjuncture remains benign. That, for instance, was exactly how the adjustment occurred during the second half of the 1950s. But we simply do not know how things will unfold—only time will tell.

Of course, the household sector is not the only source of uncertainty the MPC faces. Even though the global economy has been strengthening, doubts remain about the momentum of the recovery in the euro area. Further ahead, there is considerable uncertainty about how the twin US fiscal and current account deficits will correct and the consequent implications for exchange rates, including sterling. And there is the ever-present threat of terrorism and disruptions to the supply of oil. But, overall, prospects still look brighter than for a while.

It is against this improving background that the Committee has, since last November, been gradually reducing the monetary stimulus that had been introduced to offset the impact of the global slowdown. A key vehicle for both making and explaining our decisions is the assessment of economic prospects contained in our quarterly *Inflation Report*. The *Report* contains projections for inflation and growth conditioned on the assumption that official interest rates remain unchanged and on the alternative assumption that rates follow a path implied by the financial markets. Projections conditioned on either assumption can be used to illustrate the Committee's assessment of economic prospects—they are like two photographs of an object taken from slightly different vantage points. But the usefulness of the information contained in those two photographs depends on the starting value of interest rates. If interest rates are significantly different from their 'normal' level—as has been the case recently—the assumption that they will remain unchanged over the forecast period becomes less plausible and the behaviour of inflation and growth towards, and beyond, our normal two-year forecast horizon under the constant interest rate assumption can start to appear peculiar. The constant interest rate photograph is accurate, but not so helpful in portraying economic prospects.

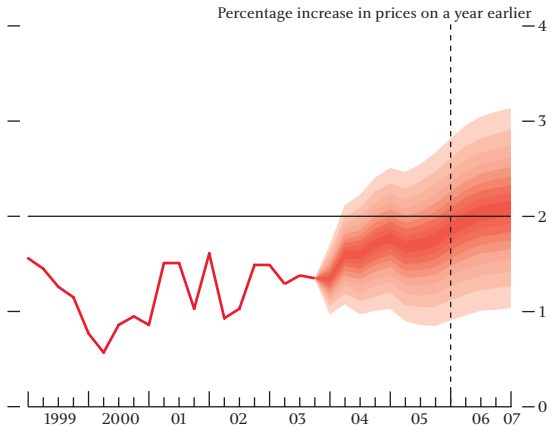
That is evident in the inflation projections from the February *Report* (see Charts 3 and 4), which I have mechanically extended into a third year to make the point clearer.[1] It can be seen that inflation moves sharply above the target by the third year under the constant interest rate assumption (see Chart 3). That is because official interest rates are assumed to be held low despite the building inflationary pressures. In contrast, the market's expectation of official interest rates represents more plausible behaviour on the part of the MPC, leading to a better-behaved projection in which the central projection for inflation settles around the target (see Chart 4).

Chart 3
February 2004 CPI projection under constant (4%) interest rates



Source: Bank of England.

Chart 4
February 2004 CPI projection under market interest rates



Source: Bank of England.

In our own deliberations we have increasingly found ourselves referring to the projection based on market rates. A key issue facing us recently has been how quickly to reduce the monetary stimulus injected earlier, and discussion of the merits of alternative strategies is facilitated by comparison against a benchmark with rising, rather than constant, interest rates. And, for similar reasons, we have found that the explanation of

(1) The MPC did not agree projections for the third year.

our policy decision is more straightforward when reference is made to the projection based on market rates. For, as Chart 3 demonstrates, if official interest rates are unusually low, but likely to rise back to normal as activity and inflation pick up, then the central projection under constant interest rates should be expected to overshoot the target. By contrast, if the profile implied by market interest rates represents a plausible expectation for the future path of official rates it should settle around it, as in Chart 4. Accordingly, in future *Inflation Reports* we will place the primary emphasis on the projection based on market rates, rather than that based on constant interest rates as hitherto.

In deciding how quickly to reduce the policy stimulus implied by very low interest rates, there are a number of factors that need to be weighed against each other. First, and foremost, is the question of how quickly the economy is gathering momentum with the consequent implications for inflationary pressure in the medium term. That judgment is, of course, embodied in our projections and with inflationary pressures building only slowly, a gradual withdrawal of the stimulus is appropriate. Second, uncertainty about the reaction of house prices and of the response of highly indebted households to higher interest rates also suggests a cautious approach.

But against these two factors, two other considerations point to a somewhat sharper withdrawal of the stimulus. First, although our job is to target 2% inflation 'at all times', getting inflation back up to target quickly by engineering a short-lived boom and then slamming on the brakes to prevent inflation overshooting is not very sensible. Rather—as required by the Chancellor's *Remit*—we are also seeking to achieve stability in the trajectories for output growth and employment. Generating a smooth growth profile thus suggests tightening earlier rather than later. And, second, worries that excessively high house price inflation in the present raises the probability of a sharp correction in the future—with the attendant risk of a sharp reduction in demand and a subsequent undershoot of the inflation target—point to a tighter policy in the near term in order to moderate the overvaluation in house prices.(1)

Some commentators have suggested that what is needed is a sharp increase in interest rates in order to 'bring consumers to their senses'. Aside from the fact that there is no empirical evidence to suggest that a single large increase in rates is more effective than two smaller increases, we are in any case not in the business of trying to clobber the consumer. Rather, we are seeking to engineer a modest slowing in consumer spending growth in order to make room for an increase in investment and exports as business conditions improve here and abroad.

Where are interest rates likely to settle? That depends on the level of the 'neutral' real rate of interest, corresponding to the rate of interest that, loosely speaking, obtains when output is at potential and the economy is growing at its trend rate. But the neutral rate of interest is not a constant and instead varies over time, being affected by factors such as domestic and foreign saving rates, fiscal policies and rates of productivity growth. As a result, although the neutral rate provides a conceptual framework for thought, it cannot be pinned down with any confidence and so is not very helpful in deciding the precise level of interest rates. Instead one is forced back to something more akin to trial and error, as if rates are set too low, inflation will tend to pick up and *vice versa*.

Let me conclude by noting that there are many other important issues affecting the outlook for the UK economy that I have not even touched on. The impact of the continuing competitive pressures wrought by the emergence of China and India, and the likelihood of a US-style surge in productivity here are but two of the more obvious. And I have no doubt that the future will bring further unexpected challenges. The past decade has been one of extraordinary macroeconomic stability in the United Kingdom. The MPC cannot guarantee that that stability will continue over the next decade, but you can be sure that we will be doing our best to make it so.

(1) For further discussion, see Bean, C (2003), 'Asset prices, financial imbalances and monetary policy: are inflation targets enough?', in Richards, A and Robinson, T (eds), *Asset prices and monetary policy*, Reserve Bank of Australia, Sydney, pages 48–76.

Managing the central bank's balance sheet: where monetary policy meets financial stability

In this lecture,[1] *Paul Tucker*[2] *sets out the analysis underlying the Bank's announcement on 22 July of major reforms to its operations in the sterling money markets. He outlines the problems with the current framework and goes on to argue that the new system represents a fundamental change in how the Bank thinks about the implementation of monetary policy, the lubrication of the wholesale payments system, and the provision of liquidity insurance to the banking system, all of which are facets of the management of central bank money and the central bank's balance sheet.*

When, ten years ago, Mervyn King delivered a lecture to mark the fifth anniversary of Tim Congdon's Lombard Street Research, he reviewed ideas on the monetary transmission mechanism and, engaging with part of Tim's substantial contribution over many years, the role of money (and credit) within it. These days most such accounts—including that published by the MPC[3]—begin with a simple assertion that the central bank sets the short-term nominal interest rate. And they go on to explain how, given sticky wages and prices, that enables the central bank to shift the short-term *real* interest rate in a way that either restrains or stimulates aggregate demand.[4] Notice no mention of money here. On this view of the world and, in particular, given this way of *implementing* monetary policy, money—both narrow and broad—is largely endogenous. The central bank simply supplies whatever amount of base money is demanded by the economy at the prevailing level of interest rates. Depending on the stability of the demand for money, the monetary aggregates can be useful *indicators* of what is going on in the economy,[5] but they are not necessarily *doing* anything causal. This apparent relegation of money in policy debates often troubles policymakers like me who emphasise that monetary policy's main capability is to deliver a medium-term path for *nominal* variables; and it does not, in fact, logically preclude the existence of an effect working through the quantity of money, via liquidity and other relative risk premia etc.[6] But, in any case, it should not obscure the fact that the very first step of the transmission mechanism—setting a short-term nominal rate—turns precisely on how we manage access to our money. There is a curious lack of interest in how this is done; and occasionally some puzzlement. Indeed, a former Chief Economist of the Bank, Christopher Dow, ended up concluding that it was just some miraculous convention that the banks chose out of politeness to follow.[7]

Well, last week we announced plans for the biggest shake-up in how we implement monetary policy for at least a quarter of a century. I want to use today's occasion to explain the analysis underlying these reforms. This will involve coming clean about how compromises with the first Thatcher government, during the monetary base control debate of the very early 1980s, had the unfortunate effect, albeit with a lag, of clouding the Bank's thinking about the feasible role of open market operations in the framework for setting

(1) Delivered on 28 July 2004 to mark the 15th anniversary of the founding of Lombard Street Research. The views expressed are those of the author and do not necessarily reflect those of either the Bank of England or other members of the Monetary Policy Committee. My thanks to the team that has planned the changes to the Bank's market operations, led by David Rule, Sarah Breeden and Niki Anderson of the Sterling Markets Division. My profound thanks to Roger Clews, who is truly a co-author of this paper and of many of the ideas in it; and my thanks to Kath Begley and her colleagues in the Bank's Information Centre for archival support for Roger's historical research. Special thanks also to Peter Andrews, who was the first amongst us to see that the big issue was whether to remunerate reserves. In addition to them, I am grateful for comments from the Governor, Andrew Bailey, Charles Goodhart and, also for research support, Fergal Shortall. And, finally, as ever, my thanks to Sandra Bannister for secretarial support.

(2) The Bank's Executive Director for Markets and a member of the Monetary Policy Committee.

(3) 'The transmission mechanism of monetary policy', by the Monetary Policy Committee reprinted in *Bank of England Quarterly Bulletin*, May 1999, pages 161–70.

(4) An early account is *Interest and prices*, by Knut Wicksell, London: Macmillan (1898), 1936.

(5) See, for example, 'Money and credit in an inflation-targeting regime', by Andrew Hauser and Andrew Brigden, *Bank of England Quarterly Bulletin*, Autumn 2002, pages 299–307.

(6) As discussed, for example, in *Money and the economy: issues in monetary analysis*, by Karl Brunner and Allan H Meltzer, New York: Cambridge University Press, 1993. It's just that we do not know how to identify or quantify such elements of the transmission mechanism.

(7) See *A critique of monetary policy: theory and British experience*, by J C R Dow and I D Saville, Oxford: Oxford University Press, 1988, page 217.

interest rates. On a more positive note, I shall also outline how, operationally, our monetary and financial stability roles fit together.

Managing central bank money: demand for reserves and the shape of a central bank's balance sheet

Both missions stem from the special nature of our liabilities: central bank money. We are able to implement monetary policy because the economy has a demand for central bank money and, as monopoly suppliers, we can set the terms on which we provide it. The demand for our money is manifested in two ways—holdings of notes, and bankers' balances with us. This reflects structural features of the financial system and, in particular, the way risk is managed in a fractional-reserve banking system.

Although some payments are still made using our notes, most are made in commercial bank money (through transfers of deposits). But deposit money is subject to risk. Commercial banks are in the business of providing liquidity insurance to their customers—via deposits withdrawable on demand and via committed loan facilities—and, as such, are themselves inherently susceptible to liquidity crises. In consequence, customers want to be assured that banks can maintain convertibility into central bank money (notes). And banks therefore have to manage their various credit and other risks, including 'reinsuring' against their liquidity commitments. Second-tier banks can try to acquire such reinsurance by paying for lines of credit from the largest banks.(1) But the largest banks cannot buy liquidity insurance from each other without incurring an unacceptable level of (contingent) counterparty credit risk. They have to self insure, which they do by holding high-quality assets that can be exchanged at the central bank for 'cash'—or, rather, for a credit to their account at the central bank.(2)

That relates to the second source of demand for central bank money: bankers' balances. For commercial bank money to be used as a means of payment, banks have to settle transfers of deposits amongst themselves. The big banks—ie the so-called settlement banks—settle in Bank of England money, and to that end maintain balances with us. Why is that? If they settled in each other's money, the consequent credit exposures would not be controllable—intraday or from day to day. To avoid that, they settle payments in the 'final settlement asset', central bank money. This makes the system as a whole safer. (It isn't some newfangled thing, by the way. Since the 1770s,(3) the banks have had increasingly formal arrangements to settle the clearings in Bank of England money—first in notes and then, from 1854 up to today, via deposits held with us.(4))

These sources of demand for our money rely on two preconditions: the integrity of our balance sheet and, in a fiat money system, a decent monetary policy. Without them, agents might drift to using final-settlement assets which could provide an alternative unit of account for the economy. Neither is currently a worry!

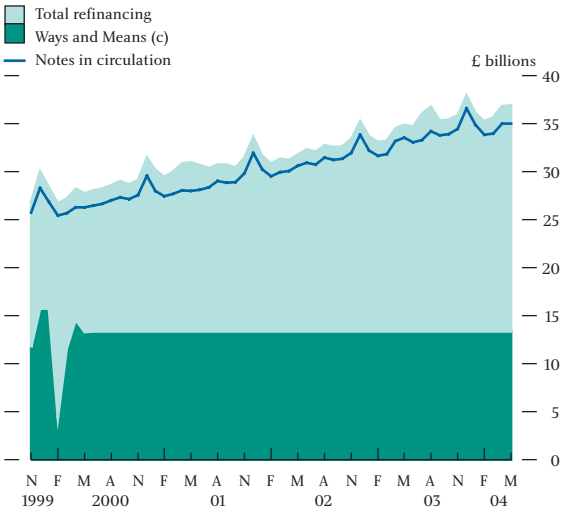
Developments in the demand for the two types of central bank money—notes and bankers' balances—drive the shape of our balance sheet: they comprise the bulk of our liabilities. For careful students of the Bank, I should perhaps make it clear at this point that in what follows—and, more important, in our analysis—Issue Department and Banking Department are treated in a completely joined-up way.(5) The separation was a central feature of the 1844 Bank Charter Act, which posited that convertibility of our notes into gold was a sufficient specification of a central bank's role. It did not have much merit then, amongst other things because it failed to recognise the importance of bankers' balances; is an aberration in today's fiat money system; and has not affected the high-level architecture of the system we are planning.

Broadly, as the economy grows, demand for our notes increases.(6) The banks have to buy the notes from the Bank, and they draw down their balances with us to do so. But that buffer is limited and, in consequence, they

(1) In the United Kingdom, this dates back to the second half of the 18th century when the 'country banks' banked with the 'London banks', and they banked with the Bank. The UK payment system remains tiered in that sense.
(2) This is the basis of the FSA's stock liquidity requirement for the largest UK banks, which was introduced in 1996. See Box 4, 'The sterling stock liquidity requirement', in 'Banking system liquidity: developments and issues', by Graeme Chaplin, Alison Emblow and Ian Michael, *Financial Stability Review*, Bank of England, December 2000, pages 93–112.
(3) And so well before Bank of England notes became legal tender (1833) or we were granted a monopoly on note issue (1844).
(4) *The Banker's Clearing House*, by P W Matthews, London: Pitman, 1921.
(5) This is also reflected in the presentation of a consolidated summary balance sheet for the Bank in the final section of the *Quarterly Bulletin's* regular 'Markets and operations' article, which we have tried over the past couple of years to make more complete and transparent.
(6) One recent study of the demand for notes is 'Assessing the stability of narrow money demand in the United Kingdom', by Kathryn Grant, Gertjan Vlieghe and Andrew Brigden, *Bank of England Quarterly Bulletin*, Summer 2004, pages 131–42.

are 'structurally short', with the Bank having to lend to them (or buy assets from them). At an aggregate level, we do that via open market operations (a term originating from around a century ago).[1] So, in line with double-entry bookkeeping, both sides of our balance sheet expand as the demand for our notes expands (Chart 1). For what are expected to be permanent increases in the value of notes in issue, the central bank can in principle provide the necessary assistance—ie inject reserves—by buying long-maturity assets, which would be done at market rates. Shorter-term assistance rolls over more frequently, and is typically used by central banks to provide reserves at a rate in line with the policy rate.

Chart 1
Bank notes in circulation and the stock of refinancing(a)(b)



(a) The difference between notes and total refinancing is accounted for by liabilities arising from bankers' balances, the Bank's capital, central bank deposits etc.
(b) Monthly averages.
(c) An illiquid advance to HM Government. This fluctuated prior to the transfer of responsibility for UK central government cash management to the UK Debt Management Office in April 2000. The Ways and Means balance is now usually constant, varying only very occasionally.

Meanwhile, the level of end-of-day balances that bankers want to maintain with the Bank is driven by (i) the rate we pay, which in the past has always been zero, and the rate we charge on overdrafts; and (ii) the precision with which they can manage their payment flows over a day as a whole. The greater their control over payment schedules, and the more effective the Bank is in ensuring that the system as a whole is square, the smaller the end-of-day buffer the banks need in the form of balances with the Bank. The fact that such balances are unremunerated has, in practice, provided a powerful impetus to end-of-day payment system efficiency. The whole system now rests on the banking system targeting *aggregate* balances of just £45 million (*m*illion not *b*illion), compared with average daily flows in the CHAPS payment system of over £150 billion (more than three thousand times greater). So although the implementation of monetary policy *does* depend on banks' demand for our money, they don't seem to demand very much of it! In the framework we are moving to, the influences on the demand for notes will be unaffected, but the bankers' balances regime will change materially.

Outline of the current and new systems

Where are we moving from, and to? First the current system. Its essence[2] is that the dozen or so sterling settlement banks have to maintain non-negative balances with us at close of business each day (the £45 million mentioned earlier). They receive no interest on positive balances, but incur a penalty rate if overdrawn. The system needs to borrow from the Bank so that the settlement banks can meet their target balances and, thereby, avoid the penalty charge on overdrafts. To that end, each day we publish a forecast of the system's shortage and undertake to make the system square (ie to achieve the £45 million target). Open market operations (OMOs) with a two-week maturity are conducted each day at the MPC repo rate; the stock of OMO loans outstanding has in recent years typically been around £20–£25 billion. There are two rounds of OMOs (9.45 am and 2.30 pm) to cater for updates during the day to our forecast of the shortage. Towards the end of the day, there are overnight lending and deposit facilities—broadly, for settlement banks/OMO counterparties—to be sure that the system is 'square'; these facilities carry penalty rates in order to induce participation in OMOs. Not all settlement banks are OMO counterparties, and *vice versa*. OMOs can span MPC dates, so we can have OMO loans outstanding which carry a different rate from that most recently decided by the MPC.

The new system will work as follows. A broad range of banks, including all of the settlement banks but going beyond that group, will agree to hold a specified positive balance with the Bank *on average* over a maintenance period lasting from one MPC meeting to the next. The level of balances targeted will be chosen by individual banks: *voluntary reserves*. For the first time in its history,

(1) *The Bank of England 1891–1944 Volume 1*, by R S Sayers, Cambridge: Cambridge University Press, 1976, page 28.
(2) For more detail, see the 'Red Book', www.bankofengland.co.uk/markets/money/stermm3.pdf.

the Bank will pay interest on such reserves: at the MPC's repo rate. The consequent demand for reserves will be met via a weekly OMO with a maturity of one week, and a fine-tuning repo on the final day of the maintenance period. There will be standing lending and deposit facilities available all day to banks generally. On the final day of the maintenance period, these facilities—used if a scheme member would otherwise under or overshoot the target—will carry rates ±25 basis points from the MPC's repo rate. Earlier in the maintenance period, the penalties on the standing facilities will be higher, perhaps ±100 basis points. If short-term OMOs were ever to span an MPC meeting, we envisage that the rate charged would be indexed to the MPC's rate.

All that sounds—and is—rather technical. But, compared with the past couple of decades, the plan reflects a fundamental change in how the Bank *thinks* about the implementation of monetary policy and the management of our balance sheet more generally, including how we support the stability of the system. This will, I hope, begin to become apparent by my explaining why we *need* to move away from where we are now.

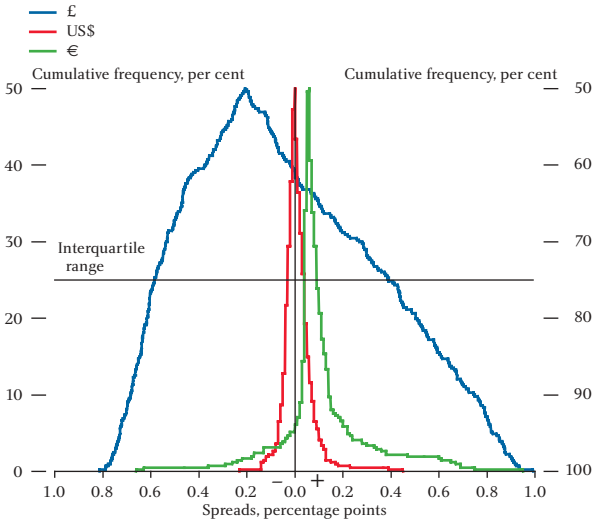
Problems with the current system: the need for reform

There are three types of problem with the current framework. First, it is overly complex: the system provides for four rounds of operations each day and on most days there are at least two. The end-of-day arrangements are especially elaborate. Second, when the MPC is expected to change rates, the ultra-short maturity rate structure 'pivots' in a rather perverse way, because the daily two-week repos span the MPC meeting but are conducted at the existing rate.(1) For all but the initiated, this makes it harder to decipher expectations from ultra short-term money market rates.

And third, the overnight rate is highly volatile by international standards—from day to day, and intraday (Charts 2 and 3). Although it has typically not affected longer-maturity money market rates and so has not impeded the monetary transmission mechanism,(2) this

Chart 2
Overnight interest rates and policy rates—United Kingdom, United States and euro area

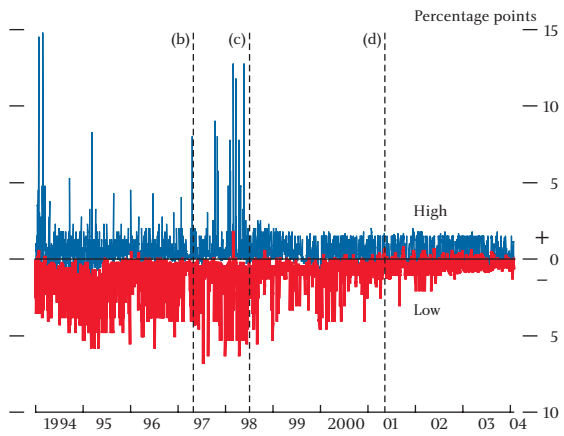
Chart 3
Cumulative folded distributions of overnight/policy rate spreads (2 January 2002 – 8 August 2003)



volatility has troubled the Bank for some years. It was considerably reduced by some major surgery in the mid to late 1990s reforms (Chart 4), which eliminated the capacity of banks to 'corner' the limited amount of eligible collateral then available (see Annex 1). But those reforms did not eliminate the capability of those large sterling banks that are OMO counterparties to move the overnight rate around, typically resulting in periods of persistent *softness* designed to reduce the cost of financing longer-maturity assets. This was a frequent occurrence until mid-2003 when the Bank's concern became evident.

(1) Arbitrage tends to make expected overnight rates over the relevant two-week period equal to the rate at which the Bank lends in its operations. So, if the Bank lends at the MPC's existing repo rate and pins down the market rate at that maturity, overnight rates up to the meeting will fall below this rate if the MPC is expected to raise its rate at its next meeting. Bidding for two-week money in the Bank's regular OMOs also rises. Conversely, if the MPC is expected to reduce the Bank's rate, overnight rates up to the meeting date rise and participation in the two-week operations falls.
(2) See, for example, 'Money market operations and volatility in UK money market rates', by Anne Vila Wetherilt, *Bank of England Quarterly Bulletin*, Winter 2002, pages 420–29.

Chart 4
Volatility of the sterling overnight interest rate(a)



(a) High and low of the day observed by the Bank's dealing desk as a spread to the policy rate.
(b) Daily gilt-repo OMOs introduced.
(c) End of transition for discount houses.
(d) Introduction of the deposit facility.

Also, since the discount houses withered away in the 1980s,(1) there has been less active market-making in overnight money. In consequence, there can be temporary frictions in the distribution of 'reserves' when it is not the large banks/OMO counterparties that are short but rather a range of smaller banks. The result has been occasional *tight* overnight market conditions, with market rates moving towards the Bank's penal 'late lending' rates.

A number of foreign banks, securities houses, corporate treasurers and money managers have told us that these characteristics of the sterling money markets deter their full participation. The volatility may, for example, have impeded the development of the overnight interest rate swap (OIS) (derivative) market relative to, say, the euro OIS market.

Less tangibly, but importantly, the reputation of the sterling money markets is impaired. How come, some ask, that the Bank has what is regarded by many outside commentators as a state-of-the-art monetary policy regime, is amongst the leading official institutions in financial stability analysis and surveillance, but has such a peculiar core money market?

So we *need* reform.

Things *were* worse before the mid to late 1990s reforms. Then the Bank had to stop relying on a moribund market (the bill market) and atrophied institutions (the discount houses); the Bank created the gilt repo market (now with nearly £200 billion outstanding), transitioned out the discount houses, and introduced a (wide) interest rate corridor for the first time. We do not have an equivalent crisis now, and we have therefore been able to step back and consider the framework more fundamentally and in the light of our high-level objectives. We made those objectives clear in the paper we published on 7 May (Annex 2).

Maturity of rates targeted

The primary objective is to stabilise short-term rates at the policy rate. Up to now, there has probably been a fairly widespread perception that, by conducting OMOs at a two-week maturity, the Bank has aimed to steer, or even set, money market rates at a two-week maturity. Prior to 1997, the Bank's daily OMOs routinely included outright purchases of bills out to a maturity of one month, and occasionally three months, encouraging a perception that the Bank wished to steer rates at those maturities. In fact, the maturity of a central bank's OMOs and the maturity of the rate(s) it aims to steer/set need not be bound together in that way. At times, a clear distinction does not seem to have been made between the maturities at which the Bank sought to *set* rates and the maturities at which the market rate would be determined by market *expectations* of the future path of the official policy rate.(2) Under monetary regimes where policy decisions were not taken and announced regularly, such a distinction was harder to make as the horizon to the next decision was uncertain.

But whatever the validity or otherwise of the idea that the Bank was, under past regimes, using its operations to steer rates at two weeks, one month or whatever, it is not what we should be doing now. And, in truth, it has been less appropriate since the early 1990s, when in a series of steps the authorities introduced the system of deciding and announcing the level of the official interest rate on a regular monthly timetable. All we can, and should, do is set the interest rate up to the next MPC meeting—a period of up to a month or so immediately

(1) The houses existed until the late 1990s, but with their presence in the market a shadow of earlier decades. They had been key intermediaries in the money markets since the mid-19th century, when what later became known as the clearing banks effectively outsourced their treasury management operations via holding secured deposits with the houses. Those deposits were run up or down as the clearers had surplus or deficit liquidity. The clearing banks progressively reclaimed their treasury function during the 1980s.
(2) As the archival research reported later in this paper demonstrates, for much of its history the Bank did make the distinction. Blurring seems to have resulted from the peculiarities of the regime introduced in 1981. See below and Annex 3.

after an MPC meeting, but eventually of just one day. Beyond the next MPC meeting, money market rates should be determined by what market participants expect the MPC to decide. Hence our objective is to have a basically flat curve, at the MPC's rate, out to the next MPC meeting. The market in overnight money would then be used by banks for liquidity management but not to speculate on the rate.

Amongst other things, this means eliminating pivoting when an MPC rate change is expected. That should be straightforward. It entails not operating *at a fixed rate* beyond the next MPC meeting, which can be achieved either by simply not operating at all beyond the next MPC meeting, or via any such operations being at a market-determined rate or indexed to the prevailing MPC rate.(1)

I have not yet quite specified which market rate we are targeting. In the sterling markets, central bank money and commercial bank money are exchangeable at par, and so one cannot identify a 'market interest rate on central bank money'. Rather, we are interested in influencing, via arbitrage, the rates on those money market instruments carrying the lowest possible credit risk, with the market determining credit risk premia on other instruments and transactions.

In routine circumstances, the Bank is not trying directly to influence the price of assets taken as collateral in our open market operations, which these days are effected via repo. Although technically a purchase and resale of securities, the securities exchanged in our repos play no role in setting policy. They are nevertheless vital, as they constitute the collateral securing the Bank's credit exposure to its counterparties.(2)

How the central bank sets rates

In terms of the overriding objective of stabilising ultra-short interest rates at the MPC's rate, the key is to ensure that we are both the marginal supplier and taker of 'reserves'. In theory, there are two possible ways of achieving this. One is to use OMOs to adjust the quantity of reserves to bring about the desired short-term interest rate, implicitly or explicitly drawing on an identified demand schedule. Neither in the past nor in the current review have we even briefly entertained the notion that this is realistic.

The alternative way for the central bank to establish itself as *the* rate-setter is to be prepared to supply (or absorb) whatever liquidity the market demands at its chosen rate(s). The most precise way of doing this is through so-called 'standing facilities' in which the central bank lends (secured) whatever is demanded at a fixed rate or takes on deposit whatever is supplied at a fixed rate.(3)

This points to the underlying problems with the Bank's current system. On their own, OMOs are *not* sufficient to make the Bank the rate-setter if, as now, they are used simply to offset the market's *net* liquidity need given a specified maintenance requirement. This is the *first fundamental flaw* of the Bank's current system. Broadly, at present a single OMO counterparty can take our money—so that the system is square *vis-à-vis* the Bank—and seek to influence the market overnight rate by trading at a different rate from the Bank's rate (up to the boundaries formed by the current *wide* corridor). A mistaken emphasis on OMOs as 'setting the rate', rather than on standing facilities, has been one precondition for the volatility in the sterling overnight rate. So a *first basic design principle* is that a well constructed system involves the *possibility* of *gross* intermediation across the central bank's balance sheet.

Divergence of the market rate from the MPC's rate can be caused by a maldistribution of liquidity among institutions (accidentally so or through deliberate hoarding). If the market rate diverges from our rate, the banks that are having to pay/receive the 'wrong' rate should be able to come to the Bank. At present, however, only relatively few banks—the settlement banks and OMO counterparties—have access to the Bank's standing facilities. This is the *second fundamental flaw* of the current system. Furthermore, the penalty on

(1) The Bank provided for indexed repos over Y2K (for a description see 'Sterling market liquidity over the Y2K period', *Bank of England Quarterly Bulletin*, November 1999, pages 325–26).
(2) Eligible collateral has to meet two tests. It should be high-quality, and to that end we recently supplemented our criteria with a public ratings cut-off of Aa3. And there should be plenty of it. Because we take EU government securities, there is some £3 trillion outstanding—somewhat larger than the £20–£25 billion stock of OMO lending in recent years!
(3) It is important to stress that this view of how the central bank's rate can most expeditiously be made effective does not entail a particular set of views about whether money is 'special' and thus about how policy rate changes are transmitted into other asset prices etc. Thus, for example, the fact that Michael Woodford advocates a narrow corridor system does not entail that practitioners who adopt such systems also share a view that nothing would be changed if money gave no special benefits (such as liquidity) to its holders. This is relevant to the range of policy options available at the 'zero bound' (briefly discussed later in this paper). For Woodford's analysis, see Chapter 2 of his *Interest and prices: foundations of a theory of monetary policy*, Princeton: Princeton University Press, 2003.

intermediating via the Bank's balance sheet should not be too great; otherwise 'victim' banks may prefer the costs of rate volatility and/or persistent tightness or softness in rates. The rates on the Bank's current 'facilities' are 200 basis points apart. To have closer control over rates using standing facilities, the Bank's interest rate 'corridor' needs to be narrower. A *second basic design principle*, therefore, is that *access* to intermediation via the Bank's balance sheet needs to be widespread and at an unprohibitive price.

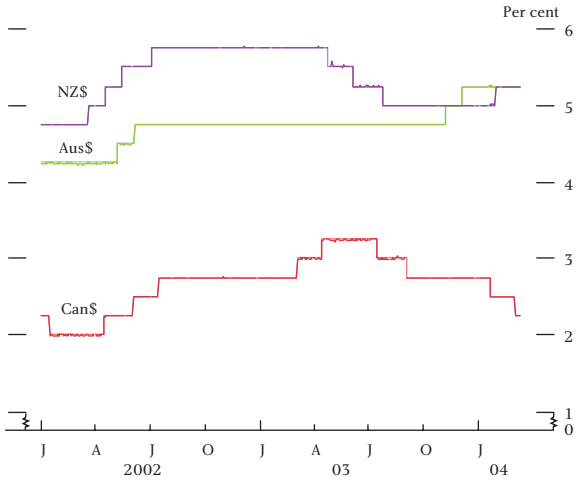
There are lots of ways of satisfying those basic design principles. At a high level of generality, the Bank could be the marginal player/price-setter in a system where banks *actually* intermediate across our balance sheet. But we could also achieve that in a so-called 'corridor system' where the rates on lending and deposit facilities provide a corridor for market rates; most intermediation occurs via the interbank market at prices *within* the corridor; and 'symmetry', which I shall explain later, delivers a market rate equal to the mid-point of the corridor, chosen of course to be the MPC's rate.

Why not have a zero corridor?

The limiting case is for the Bank to give every bank access to borrow (against collateral, o/a credit risk) or deposit in unlimited quantities overnight at the MPC's rate, ie a *zero corridor*. With identical lending and borrowing rates, there would be no (overnight) interbank market as the intermediaries could not even recover the bid/offer spread. This would distort ultra short-term money markets, and possibly collateral markets (because the Bank lends against high quality collateral and so at times would hold large amounts of it); would cause major and unpredictable day-to-day fluctuations in the size of our balance sheet; and apply no premium for the backstop liquidity insurance provided to banks via the standing lending facility.(1) Our preference is to design a framework that can achieve our monetary policy/volatility objectives while leaving open the possibility of a private market in short-term money. To achieve those goals, we do not *need* a system that entails that the Bank is the *only* intermediary in overnight money—as overseas systems demonstrate.

Other central banks have, in fact, achieved their goals for managing central bank money in a variety of ways. One group—the ECB, the Fed—use 'reserve averaging'. Indeed, it has sometimes been suggested that the fundamental flaw in the United Kingdom's current system is that it has a one-day maintenance period. Analytically, that is *not* the fundamental flaw, as I hope is clear from my earlier remarks on OMOs. And *empirically*, a number of central banks—notably Australia, Canada, New Zealand—have achieved rate stability with a same-day system (Chart 5).(2)

Chart 5
Overnight interest rates and policy rates—Australia, Canada and New Zealand



The Bank's new system will involve both. Rates will be set at the MPC's rate using the technology of a same-day narrow-corridor system. But by employing averaging, we should need a narrow corridor to steer rates only once every so often, not every day.

Averaging and smoothing the overnight rate

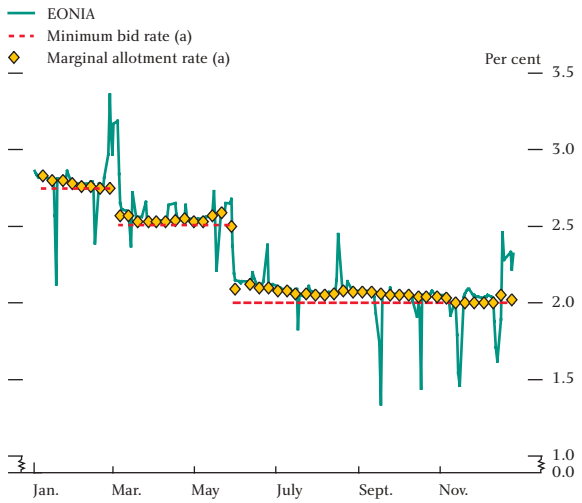
In an averaging system, a member bank has to maintain a required level of reserves on average over the maintenance period. During the maintenance period, banks are free to draw on or build up their balance at the central bank in order to meet the average required

(1) Also, the absence of a private market would potentially create scope for predatory behaviour by the clearing banks, *qua* bankers, towards other firms—securities dealers, corporate treasurers, investment firms—that bank with them, that do not have access to the Bank, and that have to manage a daily liquidity surplus or deficit. It is conceivable that there would be enough such firms for a market to exist but, unless there were active intermediaries, the search costs might be high.

(2) Comparing the US and (*inter alia*) New Zealand systems, Woodford ('Monetary policy in the information economy' in *Economic policy for the information economy*, Kansas City: Federal Reserve Bank of Kansas City, 2001) argues that same-day narrow-corridor systems are superior because they do not rely on the ability of banks to defer meeting their liquidity needs from one day to the next. In the US system, this 'deferral' capability is limited by virtue of reserve requirements being low; improvements in technology have enabled the banks gradually to reduce the level of reserves they are required to hold—a trend Woodford, like others, expects to continue. His paper does not, however, consider the possibility of attracting high levels of bankers' balances via a system of *voluntary* reserves remunerated at the official policy rate, combined with standing facilities that create a *narrow* corridor on just the final day of the maintenance period.

over the period. Such day-to-day fluctuations attract no penalty, so there is in effect no 'turn'. In principle, market rates are smoothed—a martingale is established[1]—by scheme banks varying their balances with the central bank rather than borrowing/lending in the market whenever the market rate diverges from their central expectation of the market rate that will prevail on the final day of the maintenance period; that is, the rate at which they expect to be able to 'square' up to meet their reserves target by lending or borrowing in the market on the final day. In consequence, averaging in principle establishes a flat curve through the maintenance period, with the rate expected on the final day fed back to earlier days via arbitrage. That leaves the central bank with the task of establishing its rate on the final day of the maintenance period, so that the flat curve is at the central bank's rate not some other rate. It is the same task as in a same-day maintenance system.[2] And it is also why most averaging systems exhibit UK-style volatility on their final day (Chart 6). But we believe that should be avoidable, by employing the technology of the best same-day systems.

Chart 6
Overnight interest rates in the euro area during 2003



(a) In the ECB's Main Refinancing Operation.

Setting the interest rate via a narrow corridor

Narrow-corridor systems not only put bounds on market rates, they also influence where rates will be *within* the corridor. Provided the banking system as a whole is square, the excess balances of 'long' banks by definition offset the deficit balances of 'short' banks. The former face a choice between lending in the market or depositing their excess with the central bank at a discount (say 25 basis points) to the official repo rate. The latter, 'short' banks face a choice between borrowing in the market or from the central bank at a premium (say 25 basis points) to the official repo rate. The cost of using the facilities depends on where the market rate is within the corridor. If, for example, the market rate were above the mid-point of the corridor, it would be relatively expensive to use the deposit facility but cheaper to use the borrowing facility, so banks would be more willing to run the risk of being short. They would, therefore, lend more in the market, which would tend to soften the market rate, helping to bring it back towards the middle of the corridor.

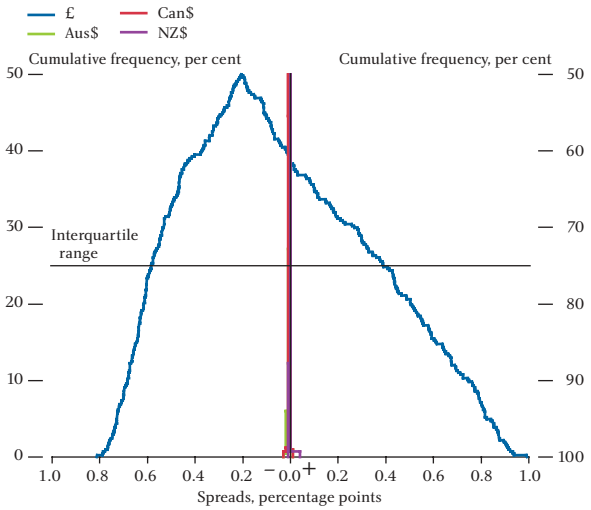
Somewhat more exactly, the pre-conditions for such symmetry are (i) central bank operations being *expected* to offset, with balanced risks, the market's net quantity shortage/surplus relative to the maintenance requirement; (ii) a market that distributes reserves efficiently; and (iii) genuine symmetry in using the two standing facilities, including no 'shame' in using the borrowing facility.[3]

In the Bank's new framework, the first of these conditions will be met via OMOs (made easier, possibly, by expressing the maintenance requirement as a small range). To help meet condition (ii) we plan to have a narrow corridor on the final day of the maintenance period. In theory, symmetry is consistent with a corridor of any width. In practice, nearly all such systems have a narrow corridor (±25 basis points). That is what we plan to employ. A narrow corridor will reduce the returns from any efforts to drive the market rate away from its midpoint. It will also reduce the cost to any potential victim banks of taking defensive action by using the Bank's standing facilities rather than the market to square their books, which would reduce the incentive for other banks to try to influence the market rate in the first place.

(1) In other words, the overnight rate on any day corresponds to the expected overnight rates on the following days of the same maintenance period.
(2) An earlier Bank analysis of averaging focused on rate smoothing and did not address how the central bank should establish *its* rate on the final day of the maintenance period. See 'Averaging in a framework of zero reserve requirements: implications for the operation of monetary policy', by Haydn Davies, *Bank of England Working Paper no. 84*, 1998.
(3) As has traditionally been thought to attach to the use of the Federal Reserve's discount window. Condition (iii) cannot be *completely* satisfied as the central bank requires collateral to cover loans. In a narrow sense, it could be made symmetric if the central bank were to provide collateral against deposits. But that opens up the possibility of such a facility being used as a general collateral stock lending facility (as occasionally happened in the United Kingdom between 2001 and mid-2003).

This kind of system has been used to great effect by New Zealand, Australia and Canada (Chart 7). Like setting policy in terms of interest rates rather than base money ('i' rather than 'm'), and inflation targeting, its basis has since been set out formally by the academic community.(1) As Keynes might perhaps have said, academic economists are often the scrupulous tidiers up after some obscure practitioner in a small country (in this case, Antipodean).

Chart 7
Cumulative folded distributions of overnight/policy rate spreads



Remunerated reserves and the scope for averaging

So the Bank of England's new system will employ both a narrow corridor and averaging. But how will we ensure that there is 'enough' averaging for the martingale to hold? The banking system's net liquidity need is affected not only by the Bank's monetary operations but also by all the other flows between us and the market, not all of which are directly controlled (notably the ebb and flow of bank notes, which the Bank supplies on demand)—these are generally referred to by central banks as 'autonomous factors'. In order to prevent scheme banks' balances at the Bank going into overdraft, another part of the Bank's balance sheet must adjust in a way that offsets movements in these autonomous factors. In principle, there are two ways of delivering this. Either the central bank conducts OMOs with sufficient frequency and size to offset autonomous flows that would otherwise put the banking system into overdraft. That is the Bank's current approach and, in effect, that of the Federal Reserve, which conducts OMOs most days. Alternatively, the central bank has to ensure that the aggregate reserves held with it are sufficient to absorb the largest foreseeable fluctuations in autonomous factors. We are adopting the second approach, which is also employed by the ECB.

For that reason we will pay the repo rate on reserves. In a system of *voluntary* reserves, anything less could lead to material fluctuations in demand depending on how our remuneration rate compared with the return on other asset classes. Since the cost of obtaining the reserves via OMOs will also be the MPC's repo rate, the demand will in theory be unlimited. We will therefore apply ceilings—possibly expressed as a percentage of so-called 'eligible liabilities',(2) and set at a level that, in aggregate, can absorb the volatility of the autonomous flows.

I should also probably note that by fully remunerating reserves, there is no tax on the banking system. There is not, therefore, the tiniest residue of schemes used elsewhere in the past designed to put a wedge between deposit and loan rates and so control monetary growth by raising the cost of bank intermediation.

OMOs and the Bank's balance sheet

It is important to be clear about what OMOs will and will not be doing in the new set-up. As now, they will *not* be used to inject a quantity of reserves according to a plan for the path of the monetary base. And they will *not* be used directly to adjust the quantity of base money to bring about the desired level of short-term interest rates. In other words, base money comprises neither a target nor an instrument of policy.

Rather, the role of OMOs will be to satisfy the system's targeted level of reserves over the maintenance period as a whole.(3) To that end, there will be a weekly repo which, reflecting feedback during the consultative period, will be for a one-week maturity. In addition, we plan to conduct a round of overnight OMOs *as a matter of routine* on the final day of the maintenance period, which will allow us to adjust for any changes in our forecast of the system's position (relative to the

(1) See, for example, Woodford, 2001, *op cit*. The New Zealand system was first described in 'Monetary policy implementation: changes to operating procedures' and 'A cash rate system for implementing monetary policy', by David Archer, Andy Brookes and Michael Reddell, *Reserve Bank Bulletin*, Vol. 62, 1999, pages 46–50 and 51–61, respectively.
(2) Broadly, a measure of the size of a bank's sterling balance sheet after netting out interbank deposits. Interestingly, the regime applying between 1971 and 1981 allowed the London clearing banks to maintain their target operational balances (1½% of eligible liabilities) *on average* over a month. This did not fit especially well with a regime in which, it seems, the Bank aimed to conduct OMOs each day.
(3) Interestingly, the ECB initially gave primacy to OMOs in describing its operations ('pivotal role in steering interest rates'), even though it would seem that that is only part of the story (*The monetary policy of the ECB*, 2001, page 65).

maintenance requirement) between the last weekly OMO and the end of the maintenance period. This *routine* fine-tuning operation is one novel feature of our plan. All short-term repos will, as now, be at the MPC's rate. That is for clarity. Technically, the rate could be determined by a tender, but we wish to rule out speculation about whether the result of a tender revealed anything about the MPC's rate intentions.

These proposed changes—and, in particular, the introduction of remunerated reserves to absorb fluctuations in the 'autonomous factors' during the maintenance period—will, therefore, affect the frequency of our OMOs, which have been daily for as long as anyone can remember. The official Bank historians report that, since the 1890s at least, the Bank placed great weight on being close to market conditions.(1) That remains as true as ever—not just of the sterling money markets but of financial markets generally, as the Governor recently underlined when discussing our Market Intelligence function.(2) To my mind, being 'in' markets frequently can aid intelligence-gathering if the activity is discretionary. By contrast, both today's OMOs, and those under the new system, are mechanical, and so conducting OMOs each day does not of itself yield intelligence. We do not, therefore, think that moving to weekly OMOs should impair the flow of intelligence to the Bank; and we shall take great efforts to stay in touch with all parts of the market so that it doesn't.

The introduction of remunerated reserves will, though, bring changes. In particular, it will almost certainly cause the Bank's balance sheet to grow. Rather than the £45 million currently held, we envisage that the banking system will hold sufficient reserves to absorb the autonomous factors—measured in terms of billions of pounds (at least).

Other things being equal, this would simply get added to the current £20–£25 billion of refinancing, provided via OMOs, which offsets the banking sector's structural short position. In fact, we will need to consider whether it will be more sensible to separate the provision of reserves needed to meet the reserves target from the offsetting of the system's longer-term short position resulting, essentially, from secular growth in the note issue. It may be that part of the latter could be injected via longer-term lending, say through the purchase of longer-term government securities. The Bank would be a rate-taker in any such official operations, which would be akin to the Federal Reserve's purchases of long-maturity Treasury bonds (sometimes known as 'coupon passes'). We will, of course, consult the market on this (if we take it forward at all). The point of mentioning it here is to make clear that, once one separates the concept of OMOs from rate-setting, it is no longer axiomatic that all official market operations should be at very short maturities. What *is* axiomatic is that the framework will be clear and transparent.

The 'classical' system; and why did we later think OMOs could set interest rates?

The role of OMOs in our plans marks a big departure from the system employed in various manifestations since 1981, which appears to have relied on OMOs to set rates. But, at least as employed, they can't. This has prompted us to examine how this state of affairs came about.

For most of its history the Bank *did* have a coherent system for setting rates, and understood perfectly well how it worked. From around the 1890s to the 1970s, the Bank employed what was generally referred to as a 'classical' system, with a somewhat penal Bank Rate which was 'made effective' from time to time by putting the market 'into the Bank'. Open market operations were conducted at market rates and were used to offset the autonomous factors—or not so used, leaving the market short and so forcing it to borrow at Bank Rate, thereby making the Bank the marginal supplier. Until 1981, the Bank did not publish a forecast of the system's shortage, and so market participants could not easily judge when, through its operations, the Bank had squared the system for the day. The Bank, which therefore had all the cards, thought of itself as controlling market rates by adjusting the scale or probability of market borrowing at Bank Rate. The rates on OMOs had *no* special significance. As Deputy Governor Harvey put it in an opening statement to the Macmillan Committee in 1930:

> '... we regard the Bank Rate [lending] as our principal weapon for carrying [that] policy into effect... open market operations... are merely part of

(1) 'The Bank had by 1890 concluded [that] the first condition for adequate influence was that the relationship between the Bank and the market should have the closeness that is consequent on frequent mutual business' (Sayers, 1976, *op cit*, page 33).
(2) In the Governor's Mansion House speech, 16 June 2004, page 350, reprinted in this *Quarterly Bulletin*, pages 349–51.

> the machinery by which the weapon of the Bank Rate is made efficient'.(1)

In 1959, Lord O'Brien and Sir Jasper Hollom—later respectively Governor and Deputy Governor but then Chief Cashier and Deputy Chief Cashier—explained the system in the same way to the Radcliffe Committee. Some of the key exchanges are set out in Annex 3 but, looking ahead to what I shall have to say about how our operational framework relates to financial stability, it is convenient to note here the sense in which Lord O'Brien referred to 'lender of last resort': 'Acting as lender of last resort, it is at Bank Rate. The other method, of buying in bills is... putting out cash in exchange for securities.'

The classical system described by Harvey and O'Brien was based on what might be called 'half a corridor'. Our reform plans are, therefore, in some respects a descendent of the classical system. We too propose to use OMOs simply to steer the quantities, and hence the probability that the market will find itself using penal facilities. But there are differences. We will not be leaving the market guessing as to whether or not we will supply sufficient liquidity to make the market square: we *will* offset the autonomous factors. And our new system will work by aiming to have the market rate in the middle of the corridor rather than, as in the classical system, by occasionally forcing the market rate to the (upper) edge of the corridor.

But the crucial point is that the *ancien régime* knew what it was doing, and didn't imagine that the OMOs *set* rates. Given the strength of induction in the Bank, where one generation learns in a critical way from another,(2) this makes the ensuing regime hard to fathom—at first sight.

Part of the answer lies in the political economy, and ideological monetarism, of the 1970s and early 1980s; and part in not adapting the framework to a profoundly altered overall monetary regime during the 1990s.

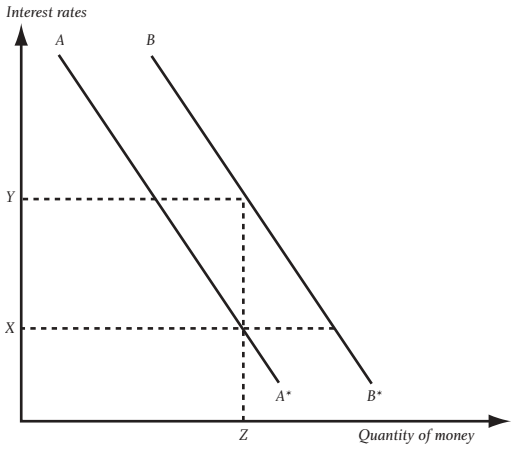
In separate acts of folly a quarter of a century or so ago, the monetary authorities sought to hide the fact that they were setting rates. In the 1970s, Minimum Lending Rate (MLR) replaced Bank Rate. This was not just relabelling, as MLR was supposed to float with market-determined Treasury bill rates, not least because that would disguise the hand of the authorities behind a tightening of credit conditions if they wanted to restrain demand. In the 1980s, a welcome emphasis on monetary variables was fallaciously argued by some to *entail* that policy should be *implemented* via a path for the monetary base, with the outcome being a messy compromise. In both episodes OMOs came to have greater apparent significance because, with Bank Rate/MLR downgraded, the authorities sometimes used the rates in a round of OMOs to institute—that is, to *signal*—a change in the market rate desired by policymakers.

The system introduced in the early 1980s after the debate on monetary base control was a particularly unfortunate aberration—rightly described by Charles Goodhart as 'confused and silly',(3) but regarded by Bank officials at the time as the best compromise they could reach given government policy that it should be consistent with transitioning to monetary base control. The resulting implementation framework was somehow meant to correct for a failure in decision-making (the 'bias to delay' in tightening monetary conditions in the face of incipient inflationary pressures). Specifically, it aimed to reduce official influence on market rates but without actually switching to monetary base control (MBC). In its OMOs, the Bank was to respond to market bids, and the so-called 'stop rate' was supposed to be no more and no less than the outcome of market clearing (although, in fact, there was an undisclosed range of acceptable stop rates agreed with the Chancellor of the Exchequer). Even when, from November 1982, it was made clear that the authorities were, after all, deciding the rate, the mechanics were left largely unchanged. In principle, the Bank was still responding to market bids, setting a rate (by lending at MLR) only intermittently.

Because the logic of the actual system was so obscure, when economists wanted to conceptualise what was going on, they used simple textbook-style models. This is nicely illustrated by Chart 8,(4) which seeks to make a

(1) *Minutes of evidence taken before the committee on finance and industry, Vol. 2*, London: HM Stationery Office, 1931, page 173.
(2) Lord O'Brien joined the Bank in 1927 and so served under both Montagu Norman and Harvey. The Executive Director under whom the current Markets area senior management first learned about the Bank's official operations was Tony Coleby, who worked in the money markets area during O'Brien and Hollom's Governorship and Deputy Governorship. Coleby's 1982 paper on the Bank's operations (see Annex 3) made clear that *'until recently...*, the operational technique for giving effect to official interest rate objectives has stayed close to the classical model' (my emphasis).
(3) 'The Bank of England over the last 35 years', by Charles Goodhart in *Bankhistorisches Archiv*, Beih. 43, *Welche Aufgaben muß eine Zentralbank wahrnehmen: historische Erfahrungen und europäische Perspektiven*, 2004, page 49.
(4) From 'The operational role of the Bank of England', by Charles Goodhart, *Economic Review*, Vol. 2, May 1985, pages 23–27.

Chart 8
The banks' demand for cash



straightforward point about the choice between controlling the price or quantity of our money. When demand for money shifts from AA* to BB*, either the extra demand is accommodated at an unchanged interest rate (*X*) or, alternatively, the price (interest rate) must rise to *Y* if supply is held fixed at *Z*. Since the Bank knew it was not operating MBC (fixing the quantity of money at *Z*), we had to be in the rate-setting version of the model, and so we *had to be* the marginal supplier of 'cash' at our chosen rate. There are many problems with this story. First, the Bank was, in fact, targeting a fixed (but adjustable) level of reserves (bank balances with us)—so we were, somehow, controlling both the rate and the quantity! Second, even when notes as well as bankers' balances are taken into account, we know that we can change the policy rate without having directly and immediately to alter the quantity of central bank money. Related to that, a further problem with the set-up is that the demand for central bank money depends not simply on the absolute level of the short-term risk-free interest rate but on where it is relative to the expected returns on other assets (the opportunity cost), which themselves may not be independent of monetary policy.

The Bank's thinking had, moreover, drifted into blurring the distinction between OMOs and standing facilities, except that the Bank thought of OMOs as modern and market-friendly. And, most important, because—as economists—we knew we *ought to* be supplying marginal liquidity at our chosen rate, we slipped into thinking that that *was*—surely had to be—what we were actually doing. So, *ipso facto*, the OMOs were setting rates.

Against that background, it is interesting that the original operational plans for the 1996–98 reforms (described in Annex 1) did, in fact, retain the insights of the classical model, with a recognition that there might be conditions in which the Bank would need to leave some of the system shortage unrelieved by the daily OMOs, forcing the market into the late lending window, in order 'to ensure that the Bank is—and is known to be—the marginal supplier of liquidity..., preventing banks seeking to substitute themselves'.(1) In the event, this discretion has not been exercised, in order to avoid the risk of any such actions being perceived, mistakenly, to convey signals about monetary policy. Quite separately from debates about OMOs, the United Kingdom moved to a monetary regime where signals via the Bank's operations were not needed and, indeed, would be counterproductive. Our reform plans have been developed with that in mind, and so with the aim that the framework itself should stabilise the market rate in the middle of the corridor rather than relying on the Bank's ability to take the rate to the corridor's edges.

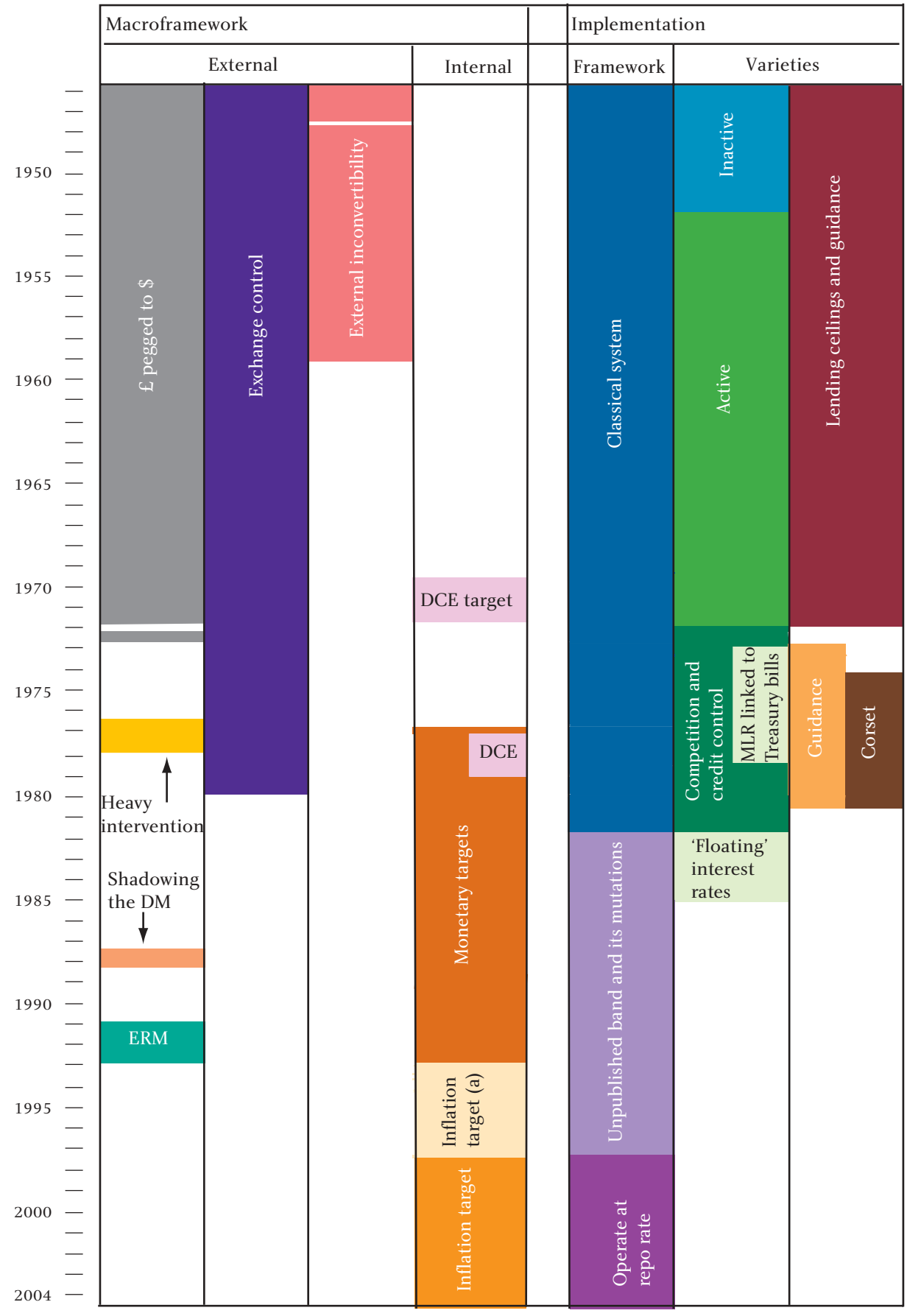
Monetary regimes and implementation frameworks

Discussion of the classical system, introduced when the United Kingdom was on the gold standard; of the confusion sown by the debate about monetary base control; and of the redundancy of using operations to signal policy in a world where the policy rate is periodically decided and announced and where policymakers' view of the monetary transmission mechanism and their reaction function are transparently communicated—all of this might imply that there has been a clear and robust relationship between the authorities' overall monetary regime and the framework for implementing policy. In fact, that does not appear to be the case, judging from Chart 9. Much the same has been found by others.(2)

This is puzzling. The classical system—of *daily* OMOs, with the options of forcing market rates up to Bank Rate and of changing Bank Rate between the Court's weekly meetings(3)—does seem reasonably well suited to the gold standard regime, with its threat of external drain. The market rate sometimes needed to be adjusted at short notice 'with the object either of preventing gold

(1) See Annex 3.
(2) See, for example, 'Instruments, procedures and strategies of monetary policy: an assessment of possible relationships for 21 OECD countries', by J Swank and L van Velden in *Implementation and tactics of monetary policy*, BIS Conference Papers, Vol. 3, 1997, pages 1–12.
(3) Known as 'a Governor's rise', which would be confirmed at the next meeting of Court (see Sayers, *op cit*, page 28).

Chart 9
Post-war monetary regimes and implementation frameworks



(a) With monetary monitoring ranges.

from leaving the country, or of attracting gold to the country'.[1] Consistent with this, Governor Norman and his colleagues are recorded as having pored over the gold position every day.

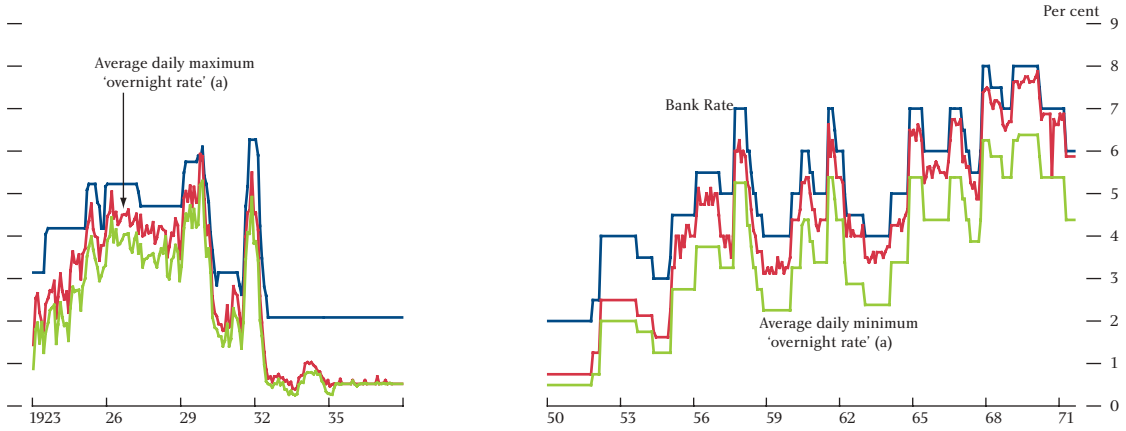
In theory at least, the same goes for any external money anchor, such as the ERM. It is striking that when the United Kingdom joined the ERM in 1990, a good deal was made of its not implying a significant change in the way monetary policy was set or implemented. It could be argued that the overnight rate needed to move to whatever level was needed to stay in the ERM band, and a daily maintenance system should, in principle, have facilitated that. In fact, that was not how policy was operated, reflecting the UK authorities' stress on the ultimate objectives of policy rather than the intermediate means of pursuing them provided by the ERM. By contrast, various other ERM members did base their policy framework on being able to influence their exchange rate via very close control of ultra short-term market interest rates—but some of them had averaging schemes, which on the face of it might have afforded them relatively little day-to-day purchase on the overnight rate.[2]

The overall historical picture is not especially coherent. I suggest that the question of whether, desirably or even optimally, there might be some mapping from monetary regimes to operating frameworks warrants research by the academic community.

In one respect, however, the evolution of the Bank's operating system *does* seem to have tracked the evolution of the overall monetary regime—the precision with which rates are set. This is another area where more research would be useful but some preliminary propositions can be advanced, if only to be knocked down. My impression from Chart 10 is that during the 1920s the Bank was fairly relaxed about the spread between Bank Rate and the market rate; that during the 1930s and the early 1950s,[3] when monetary policy was assigned a minimal role in macroeconomic management, the spread could at times be measured in terms of percentage points; and through the 1960s, when direct credit controls were employed, the authorities seem also to have been fairly indifferent to the range between maximum and minimum market rates. I have already touched on the peculiarities of the 1970s and the early 1980s. During the 1990s, and more recently, we have become more concerned about the relationship between official and market rates. I conjecture, but cannot yet demonstrate, that these patterns have something to do with the monetary regime of the day.

What *is* clear is that in our current monetary regime, we need precision. To date, the smallest change in the MPC's rate has been 25 basis points and members of the Committee each spend a great deal of time deciding the level of rates we individually want rounded to the nearest 25 basis points. The Bank's operating framework needs to deliver that precision. The new framework will make

Chart 10
Bank Rate and overnight interest rates



(a) For the pre-war period, the average daily maximum and minimum 'overnight rates' are monthly averages of the highest and lowest daily rates of interest charged on day-to-day loans in London. For the post-war period, they reflect the range of rates charged by London clearing banks for loans to the discount market on the last Friday of every month.

(1) *Interviews on the banking and currency systems*, Senate document 405, Washington: National Monetary Commission, 1910, page 26. The NMC was the body that recommended the establishment of the Federal Reserve System.
(2) In some cases, eg France, the averaging cushion had been reduced, enabling the central bank to have greater influence over ultra short-maturity rates via OMOs.
(3) There is a gap in the data during World War II.

that apparent through the overnight rate. But, as a matter of routine, we revisit the policy rate once a month, not every day. Reserve averaging seems well-suited to such a regime.

So perhaps at long last, we are planning an operating framework that matches the overall regime.

Velocity shocks and standing facilities

This brings me to the connections between the framework for implementing monetary policy, and financial stability. Here too, our planned changes should bring some significant improvements.

A key financial stability concern is to ensure that the central bank can meet increases in demand for reserves that are either system-wide or, depending on the cause, from individual banks. Either may be needed to avoid a banking system panic having systemic effects: as part of our responsibilities for providing the economy's final settlement asset, we need to be prepared to expand our balance sheet when commercial banks might otherwise be under pressure to contract theirs.(1) Neither need interfere with monetary policy. Indeed, it is important that a system-wide increase in the demand for reserves should be accommodated in order to keep interest rates stable (it is akin to a velocity shock).(2) And idiosyncratic increases in demand can be offset through adjustments to the (net) provision or withdrawal of reserves to/from the rest of the system via routine operations. A well designed framework will cater for this. The current UK system does not do so as effectively as it might.

First, it makes no provision for the banking system as a whole *routinely* to change the level of reserves that it wants to hold—except via banks acquiring more Bank of England notes from us to hold in their tills. Technically, we could increase the targeted level of end-of-day balances; and we can, of course, always simply inject reserves—'excess' to the maintenance requirement—by buying securities. But there is no routine mechanism for the settlement banks themselves to seek such an increase and they may well be deterred from doing so by the lack of remuneration. The new framework will improve on this in a number of ways. Individual banks—and so the banking system in aggregate—will be able periodically to adjust the level of reserves they are targeting. And, during a maintenance period, they will if necessary be able to hold excess reserves.

In terms of *idiosyncratic* demand-for-money shocks, we currently have specific machinery for routine liquidity provision (against high-quality collateral) only to the settlement banks (and, for part of the day, OMO counterparties); no other banks have a *routinely* available mechanism to borrow against collateral from the Bank (even at a penal rate).(3) Furthermore, the overnight lending facility is available only up to the Bank's forecast of the system's *residual net* shortage (relative to the daily maintenance requirement) after the OMOs. As well as these design faults impeding the achievement of a stable overnight rate in the ways described earlier, they may at the margin hinder a smooth response to stressed conditions. Other central banks have penal collateralised Lombard facilities (or 'discount windows') in place for *all* banks *all* of the time. Our new framework will have this feature. But period averaging permits a useful refinement. On the final day of the maintenance period, the corridor will be ±25 basis points around the repo rate, but earlier in the maintenance period the rate charged can be more penal.

(1) It turns out that this was anticipated in the early 19th century by Thornton. In a crucial passage, he argued that '... to allow of some special, though temporary, increase [in the total amount of paper issued] in the event of any extraordinary alarm or difficulty... this seems [*inter alia*] to be the true policy of the directors of an institution circumstanced like that of the Bank of England'. See *An enquiry into the nature and effects of the paper credit of Great Britain*, by Henry Thornton, 1802, edited with and introduction by F A von Hayek, New York: Rinehart, 1937. Similar points were emphasised by the Banking School 40 years later; see *Studies in the theory of international trade*, by Jacob Viner, New York: Harper, 1937 for an overview.

(2) Meeting an extraordinary large and sudden demand for liquidity may be needed to prevent the overnight rate diverging from the policy rate, for example going to the top of the interest rate corridor. It certainly does not, of itself, entail that the overnight rate *must* go to zero (or close to zero), as happened during the Federal Reserve's response to 9/11. In crisis conditions, however, the central bank may know that there is a big increase in the demand for reserves without knowing how big, and accordingly err on the side of overprovision rather than underprovision. If, *ex post*, there is overprovision, the overnight rate will tend to fall to the bottom of the corridor formed by the rate on any standing deposit facility—or to zero if there is no such facility, as in the Federal Reserve's system for example. In theory a central bank with both borrowing and deposit facilities could narrow its corridor for the overnight rate in such circumstances, in order to preserve an overnight rate in line with its policy rate.

(3) In fact, as recorded by Tony Coleby in a 1982 address to mark the centenary of the Bills of Exchange Act ('Bills of exchange: current issues in a historical perspective', *Bank of England Quarterly Bulletin*, December 1982, pages 514–18), in the 19th century: 'The Bank for its part came to understand that access to its lending facilities was a valuable privilege. Consequently, it had the problem of how to retain these facilities (and thus underpin confidence in the financial system) without giving the privileged institutions the ability to on-lend more easily and cheaply than those without access to them. The Bank's conclusion was to concentrate its lending facilities on the discount houses because they did not compete with the banks for overdrafts or other lending business....' In the planned new framework, the opposite solution will be adopted—widening access to the standing facilities to banks generally.

Partly because the way in which banks manage their liquidity affects the payment system and the routine demand for our reserves, and partly because the Bank might be called upon to supply emergency liquidity support (outside of our standard operational framework),(1) we have a legitimate interest in the way that liquidity is managed by banks and across the system as a whole. Other things being equal, our aim is to have a framework that encourages disciplined private sector liquidity monitoring and management, as a contribution to reducing the likelihood of central bank emergency intervention. That points to not giving the banks such easy/cheap access to central bank liquidity as to cause their own front-office/treasury liquidity management capabilities to atrophy or market disciplines to be eroded. And that, in turn, points to 'discount window' lending being available only at penal rates, perhaps ±100 basis points relative to repo (and to overdrafts being more penal still, as a bank in overdraft has failed to manage its liquidity during the day).

A final point needs to be added about standing facilities and the Bank's financial stability mandate. For at least 30 years, and probably longer, academic economists and other commentators have debated whether routine LOLR lending (to clearly solvent banks) should be effected via OMOs rather than via the discount window (or standing facilities), arguing that such lending should be made available only to clearly sound banks and that bilateral lending is therefore not needed: OMOs are sufficient.(2) The part of the argument about lending only to sound banks is irrelevant here as our routine operations are with counterparties that can pledge high-quality collateral. But the argument that only OMOs are needed to meet the liquidity needs of *manifestly* sound banks is flawed. In the first place, in stressed conditions with widespread nervousness about counterparty risk, a *sound* bank may create unwarranted apprehension about its position if, because of (actual or perceived) problems elsewhere, it is unusually short of funds and attempts to borrow unusually large amounts in the market, even against collateral. It can avoid risking that unnecessarily adverse reaction by using the central bank's standing facility, paying the penalty rate. The central bank does not need an informational advantage; and, because it is not itself vulnerable to a run, it is not induced to overreact as a consequence of needing to preserve reserves to maintain the integrity of its own balance sheet. Separately, and I believe decisively, the argument makes the rather splendid assumption that the money markets are always open and functioning properly. The tragic events of 9/11 underline that that cannot be guaranteed.(3) OMOs rely on markets to distribute liquidity to where it is needed. Lending facilities can do the job directly—quite apart from being needed to provide a corridor for rate setting.(4)

In short, the Bank's new system, with better-designed standing facilities, will better support *both* our monetary and financial stability missions.

In doing so, it will take us further in the direction of Bagehot's precept(5) that, so far as possible, central banks should make clear in advance their preparedness to advance liquidity, against collateral and at a penal rate, in stressed conditions. Since Bagehot's day, a lot of the central bank lending that was then discretionary has become 'hard coded' into the operating framework. As was clear from the remark of Chief Cashier O'Brien I quoted earlier, that was true of the old 'late lending' window for the discount houses; and it is true, today, of the lending facilities for the settlement banks. The new system's standing facilities will improve on those arrangements in the way I have described.

From time to time, there will be transient effects on the size of our balance sheet. In the current set-up, the *net* provision of reserves pretty well always equals the *gross* provision, because the scale of our operations is typically limited by our forecast of the system's net shortage. But that will not be axiomatic in the new world, where *gross* provision could diverge from *net* provision by virtue of the standing facilities being used. We see no difficulty with that.

(1) See the Memorandum of Understanding between HM Treasury, the Bank of England and the Financial Services Authority, available at www.bankofengland.co.uk/legislation/mou.pdf. Discretionary support operations are discussed in 'The pursuit of financial stability', LSE lecture by Governor George, *Bank of England Quarterly Bulletin*, February 1994, pages 60–66.

(2) See, for example, 'Financial deregulation, monetary policy and central banking', by Marvin Goodfriend and Robert G King, *Federal Reserve Bank of Richmond Economic Review*, Vol. 74, 1988, pages 3–22; and 'The misuse of the Fed's discount window', by Anna Schwartz, *Federal Reserve Bank of St Louis Review*, September/October 1992, pages 58–69.

(3) See, for example, 'Liquidity effects of the events of September 11, 2001', by James J McAndrews and Simon M Potter, *Federal Reserve Bank of New York Economic Policy Review*, Vol. 8, November 2002, pages 59–79.

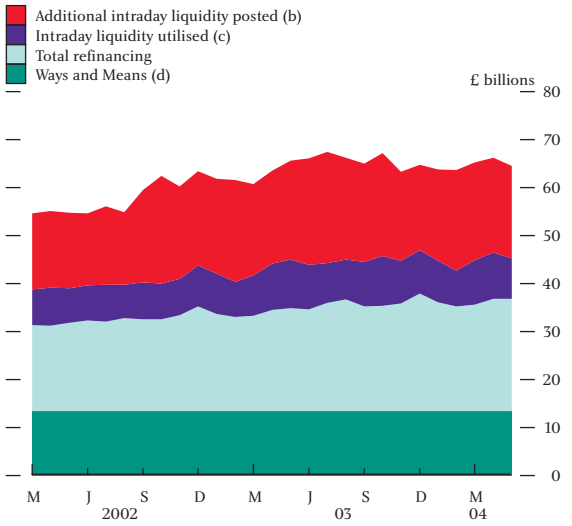
(4) For the stability of the system, it is vital that we should be able to manage liquidity even in circumstances where, for example, a business continuity problem or disaster has knocked out the European time-zone settlement systems. We therefore recently announced that, in exceptional circumstances affecting the infrastructure or firms, we will be prepared to take US Treasury bonds as collateral.

(5) *Lombard Street: a description of the money market*, by Walter Bagehot, New York: Scribner Armstrong, 1873, page 71.

The Bank's market operations, the wholesale payments system, and financial stability

Both those points—about 'hard coding' lending facilities and fluctuations in our balance sheet—already apply *during* the day by virtue of our provision of intraday liquidity to the settlement bank members of the real-time gross settlement (RTGS) wholesale payment system. All of our RTGS lending is bilateral, and so gross. As a result, our balance sheet is bigger during the day than at the close of business (Chart 11). This is all in the cause of avoiding massive daylight credit exposures amongst the settlement banks as part of their payments business, while absolutely minimising the Bank's credit risk (by taking high-quality collateral, via intraday repos).

Chart 11
Intraday liquidity and the stock of refinancing(a)



(a) Monthly averages.
(b) Monthly average of maximum intraday liquidity posted in CHAPS sterling less maximum intraday liquidity utilised.
(c) Monthly average of each day's maximum intraday liquidity utilised in CHAPS sterling.
(d) An illiquid advance to HM Government. This fluctuated prior to the transfer of responsibility for UK central government cash management to the UK Debt Management Office in April 2000. The Ways and Means balance is now usually constant, varying only very occasionally.

And, therefore, analogously with overnight standing facilities, the Bank's monetary and financial stability missions also meet in how the RTGS and 'OMO' machines fit together. The 'OMO' machine has already been described: it provides liquidity at overnight or longer maturities as part of the framework for setting interest rates. The RTGS machine determines how wholesale payments (CHAPS payments) are effected amongst the dozen or so settlement banks. All such transfers are made in real time across the Bank's balance sheet. Where a settlement bank's balance is too small to fund a payment, it borrows from us *intraday*—at a zero interest rate and in amounts limited only by how much eligible collateral it has available. In this way, the wholesale payment system is lubricated. There is squaring off at close of business every day. That is to say, if a settlement bank cannot repay its free intraday borrowing, it is charged a penalty rate on its overdraft, which is the 'bridge' to—and forms part of, now and in the future—the monetary policy machine. In terms of operational mechanisms, the two machines are joined up (settlement banks, collateral etc). In terms of pricing, the intraday and overnight 'markets' are segmented. Up to now the Bank's thinking has been that, so long as there is not a market in intraday money, we do not need to set the price in order to ensure consistency with monetary policy; and that not rationing the supply of reserves intraday promotes payment system efficiency. These are issues that we keep under review,(1) but our current reform plans maintain the segmentation.

In the new framework, liquidity will, however, be provided in a way that should help to meet the needs of the payments system as well as ensuring that monetary policy is implemented cleanly—essentially by facilitating positive reserve balances at the Bank. As in other countries' systems, it will become possible for the settlement banks to use their (remunerated) cash reserves to make CHAPS-RTGS payments during the day; ie they will be able to fund inter-settlement bank payment transfers by drawing during the day on the pot of cash they hold with the Bank, as well as by drawing on a pot of collateral to borrow from us intraday. As I've described, the cash will be provided to the *system* via OMOs; in *aggregate*, the banks will still need to borrow reserves from the Bank, but the maturity will be extended from intraday to that of the OMOs (one week). By contrast, *individual* RTGS members will have the *choice* of acquiring their reserves, and so a means of payment, indirectly via the unsecured money market rather than directly via OMOs or intraday repos with the Bank. We hope that, taken together, these measures will encourage more banks to join RTGS. In most other industrialised countries, almost *all* banks are members of the RTGS system. That eliminates intraday payments-related credit exposures, which regrettably still exist in the United Kingdom between the top tier settlement banks and their 'correspondent' bank customers and amongst the

(1) The use of our balance sheet for settlement of large interbank transfers during the day provides a bedrock of demand for central bank money.

latter. In terms of financial stability, this is a weakness in the United Kingdom's financial architecture, especially where the exposures are, or might in stressed conditions be, large.(1)

Liquidity traps and quantitative easing

I suspect that some in the audience will have been bursting with frustration at two of the assumptions that I have maintained throughout this account: that money can be regarded as largely endogenous, and that we need a system that caters only for setting interest rates. But what if interest rates were to hit the zero nominal bound, ie we were in a liquidity trap? At a policy level, the recipe would of course depend on the diagnosis of the problem; *and* on views about the transmission mechanism and, in particular, the role of money within it.(2) We would, for example, need to form a view—or individual views—on whether the injection of base money was expected to work through affecting the risk-free rate, or risk and liquidity premia on other financial assets, or both. But that lies beyond my scope today. Rather, I want to make two points about the implementation framework. First, as I have described, the Bank's new framework will make provision for the acquisition of longer-term assets (eg government securities) as part and parcel of managing our overall balance sheet in a sensible way, while making sure that the banking system is square. Faced with a liquidity trap, the Bank could in principle make purchases of securities to inject base money, which would be within our vires and technically would be 'excess reserves'. We would need to do so in a way that preserved the integrity of our balance sheet.

The second point is that, in such circumstances, there would potentially be a need to co-ordinate with government debt management, since that by definition also involves the exchange of securities for cash. In a world where OMOs were conceived as an instrument to control the path of reserves, the question of such co-ordination was familiar—as is apparent from Milton Friedman's writings.(3) Most of the time these days, it is not a practical issue.(4) But it is an issue that we have identified,(5) and there is nothing in our planned new framework that would inhibit such questions being explored if they ever needed to be.

Conclusions

In designing a new framework for the Bank's official sterling market operations, we have tried to factor in the interactions between the implementation of monetary policy, the lubrication of the wholesale payments system, and the provision of liquidity insurance to the banking system. All are facets of the management of central bank money and the central bank's balance sheet. In summary, we can implement monetary policy because we are a central bank. We are a central bank essentially because we are the bankers' bank. What we have to offer is central bank money. We have tried to take a comprehensive view of how to deploy it.

One consequence is that, in various ways, the new regime will alter the operational relationship that the Bank has with the banking system. Our aim is that lots of banks should sign up for the standing facilities, which will require little more than fixing legal agreements etc. We hope that plenty of banks—ie beyond the settlement banks—will choose to join the reserve-averaging scheme. Progress on both those fronts will be important to achieve our primary rate-setting objective. We also hope that, having opened reserve accounts with the Bank, more of the large banks will choose to become RTGS settlement banks, which would contribute to the overall safety and soundness of the financial system.

But our pre-eminent aim is to stabilise the overnight rate at the MPC's rate, so that the implementation of monetary policy is cleaner and more transparent. Working with the banking industry in the coming period of detailed planning and implementation, we are hopeful of achieving that, and so of having an implementation framework that measures up to the United Kingdom's overall monetary regime.

(1) The IMF recognised this point in its *Financial system stability assessment on the United Kingdom* (Washington: IMF, February 2003): '... the two-tier structure of the payment system may still result in significant intraday exposures between direct and indirect settling banks.... The UK authorities were encouraged to continue to give very high priority to the identification and overall monitoring of these risks', paragraph 76.
(2) For a summary of these issues see 'Monetary policy and the zero bound to nominal interest rates', by Tony Yates, *Bank of England Quarterly Bulletin*, Spring 2003, pages 27–37.
(3) See especially Chapter 3, 'Debt management and banking reform', of *A program for monetary stability*, New York: Fordham University Press, 1959.
(4) *Government debt structure and monetary conditions*, edited by K Alec Chrystal, Bank of England, 1999.
(5) The Governor discussed some of these issues in his Ely lecture, *The institutions of monetary policy*, at the American Economic Association annual meeting on 4 January 2004, reprinted in this *Quarterly Bulletin*, pages 332–45.

Annex 1

The post-1996 reforms of the Bank of England's official sterling operations

Collateral and counterparties

In the early to mid-1990s, there were two major problems. First, the range of securities eligible in the Bank's operations was narrow and values outstanding had become very small; at times the Bank held a lot of the eligible stock outstanding and the rest could, as a result, be concentrated in a few hands. Second, OMOs were conducted with the discount houses, whose capital had not grown in line with the size of the money market or, post ERM exit when the Bank had made substantial purchases of sterling, the size of the banking system's aggregate collateralised short-term borrowing from the Bank. Specifically, to control the Bank's exposure to credit risk, there were capital-related limits (referred to as Tranches 1 and 2) on so-called 'late lending' to the houses, and these limits could be lifted only by a Director (on delegated authority from the Governor). Unless the working-level operators applied for the limits to be lifted, occasionally they could constrain the supply of reserves to an amount smaller than the system's residual shortage after OMOs had been conducted (so the clearing rate was infinity!). Result: a few big clearers would, and did, shift the market rate in overnight money around at will—by holding much of the eligible collateral not already in Bank hands and by not participating in the OMOs, so that the market could, when they chose, remain very short. Occasionally the overnight rate went very high. The incredible 'supply less than demand' problem was (easily) solved in 1994–95 by allowing the Principal of Discount Office (to use the historic title) routinely to use Tranches 3–4 etc for lending to the houses. In the major reforms of 1996–98, the Bank (i) enlarged eligible collateral to include repo of gilts (and subsequently, in 1999, a much wider range of EU government securities); (ii) moved to dealing with banks and securities dealers in OMOs; and (iii) put bounds on rates via an adapted lending facility (1998) and a new deposit facility (2001).

Although analytically simple and not addressing more fundamental questions about the Bank's operational architecture, this was a major enterprise. First, the Bank had to 'create' a gilt repo market, by getting removed a whole battery of tax and regulatory impediments and by facilitating an industry code to guard against scandals of the types that had accompanied the launch of the US repo market a few years before. (The size of the gilt repo market is now approaching £200 billion.)(1) Second, the Bank had to oversee the orderly demise of the discount houses and stock exchange money brokers. Third, changes to the infrastructure were needed.

The reforms killed the ability of big banks to dominate the market's holdings of eligible collateral; and, through the deposit and lending facilities, capped volatility (see Chart 4 in the main text). But they were not enough.

Simplifications

The 1996–98 reforms also removed layers of complexity. The OMOs were thereafter conducted at the official policy rate, and the myth that the Bank was acquiescing in a 'market rate' was binned. Operations beyond the maturity of the core 'two-week' repo ceased, so that for example outright purchases of bills were confined to bills with a maturity no longer than that of the day's repo; that reduced, but did not eliminate, pivoting. The mechanism of '2.30 pm lending' at Minimum Lending Rate was scrapped. As was a facility for the settlement banks to invite the Bank to buy Treasury bills up to 3 pm each day, which was replaced by a simpler secured borrowing facility. We got rid of one round of OMOs. We increased transparency by announcing the amounts allotted in rounds of OMOs, and also the details of 'late lending'. The 'tranche system' rationing access to the discount window was abolished. And gilts of all maturities were taken as collateral rather than only gilts of up to five years. But, notwithstanding these steps, the system remained complicated.

'Clausing' and the real bills doctrine

Finally, in 2000 we abolished the requirements on the 'clausing' of bills of exchange, which had required that the underlying transaction be 'self liquidating' etc. This was a leftover from a period when the Bank genuflected in the direction of the real bills doctrine (although that seems not to have loomed as large in Bank thinking during the 20th century as it did at the Federal Reserve).(2) We got rid of clausing because we did not think it provided credit enhancement, since the Bank's claim, if the acceptor of a bill failed, would be as a general creditor of the drawer, with no lien on the cash flows from the underlying transaction.(3)

(1) See Chart 30 from 'Markets and operations', *Bank of England Quarterly Bulletin*, Spring 2004, pages 5–20.
(2) For the Federal Reserve's framework, see for example *A history of the Federal Reserve, Vol. 1: 1913–1951*, by Allan H Meltzer, Chicago: University of Chicago Press, 2003.
(3) We have recently learned that there had been an attempt to abolish 'clausing' for similar reasons in 1971 by Andrew Crockett (then a junior official in Discount Office, later a senior IMF official, Executive Director of the Bank, and General Manager of the BIS).

Annex 2

Objectives of the Bank of England's operational framework

- *Objective 1*: Overnight market interest rates to be in line with the MPC's repo rate, so that there is a flat money market yield curve, consistent with the official policy rate, out to the next MPC decision date, with very limited day-to-day or intraday volatility in market interest rates at maturities out to that horizon.

- *Objective 2*: An efficient, safe and flexible framework for banking system liquidity management—both in competitive money markets and, where appropriate, using central bank money—in routine and stressed or otherwise extraordinary conditions.

- *Objective 3*: A simple, straightforward and transparent operational framework.

- *Objective 4*: Competitive and fair sterling money markets.

Annex 3

Some historical insights into the Bank of England's official sterling operations

This annex sets out some of the source materials for the historical parts of the main paper.(1)

In his biography of Governor Norman, Henry Clay records that:

> 'In the last resort the Governor could control the supply of money in the Money Market by varying Bank Rate—its price in last resort—and by influencing its amount by sale or purchase of securities...'.(2)

Deputy Governor Harvey was called back on Day 39 of the 1929–30 Macmillan Committee, on which Keynes sat, for more discussion of monetary policy and its implementation.(3) He made an opening statement (Qu 7512) which includes the following:

> 'I said when I was here before that I regard it as the principal duty of a Central Bank to maintain the stability of the national monetary unit.... If I were asked to state in a few words what the Bank's policy has been, I should say that it has been to maintain a credit position which will afford reasonable assurance of the convertibility of the currency into gold in all circumstances, and, within the limits imposed by that objective, to adjust the price and volume of credit to the requirements of industry and trade. I should say at this stage that we regard the Bank Rate as our principal weapon for carrying that policy into effect.... In speaking of the weapons which the Bank uses I purposely omit any reference to control of the volume of credit by means of open market operations; because, after all, such operations are merely part of the machinery by which the weapon of the Bank Rate is made efficient.'

Nearly 30 years later, in his oral evidence to the Radcliffe Committee, Chief Cashier O'Brien presented a similar and a rather clear picture of the system:

> 'If the discount houses having been to all the banks and found out what they are doing, whether calling cash or lending cash, have finally come to the conclusion that the supply of cash on that day is not going to be sufficient to enable them to carry their books of Treasury Bills and short bonds, they can come to us and we can repair the shortage in one of two ways. The Chief Cashier can buy bills from the market at the market rate. There is no pain to the discount houses; they merely exchange part of their bill portfolio at the going market price for cash. That puts them square. If we are not disposed to help them in that painless way then they have to come round to the Discount Office, and nowadays borrow at Bank Rate on the security of market Treasury Bills or short bonds.'(4)
>
> '*Professor Cairncross*: ...where you are acting as lender of last resort, you are lending at Bank Rate?—Acting as lender of last resort, it is at Bank Rate. The other method, of buying in bills is not lending: it is putting out cash in exchange for securities.'(5)

Other of O'Brien's replies seem to imply clearly that the operating target was an interest rate, rather than a quantity. Moreover, they do not imply that OMOs were directly setting the market rate, but rather that OMOs were used to adjust the quantities so as to control the volume of borrowing at Bank Rate.

> 'If we wanted to raise interest rates, then we would give less help or possibly no help at all, and we would say: 'If you want cash you must come to the Discount Office for it'. And moreover we could if need be so arrange that the market needed a great deal of cash; the influence can be graded almost infinitely.'(6)

Assistant Director Coleby's 1982 paper on operational procedures for meeting monetary objectives brings out

(1) It draws on extensive research by Roger Clews, whose work almost gives the 'archaeology of knowledge' a good name.
(2) *Lord Norman* by Sir Henry Clay, London: Macmillan, 1957.
(3) Sir Ernest Harvey was only the second 'full-time central banker' to be appointed to the Bank's Court of directors, and was subsequently Deputy Governor for seven years. According to his obituarist, in his evidence to the MacMillan Committee 'his candour, no less than his grasp of the subject, greatly impressed those members of the Committee who had been most critical of the Bank's constitution and policy'.
(4) *Committee on the working of the monetary system: minutes of evidence*, London: HM Stationery Office, 1960, question 90.
(5) *Ibid*, question 93.
(6) *Ibid*, question 98.

the continuity in the Bank's operational framework until the early 1980s reforms:

> 'Until recently and despite variations and appearances to the contrary, the operational technique for giving effect to official interest rate objectives has stayed close to the classical model. That involved the setting, and periodic variation, of an official discount or lending rate, which, when necessary, is 'made effective' by open market operations in the money market. 'Making Bank rate effective' means restraining a decline in market rates from an unchanged Bank rate, or bringing them up to a newly established and higher Bank rate; it is accomplished by limiting the availability of cash to the banking system so as to 'force the market into the Bank' to borrow at the somewhat penal rate of Bank rate.'(1)

One of the 'variations' to which Coleby referred was the replacement in 1972 of Bank Rate with a Minimum Lending Rate related by formula to the result of the latest Treasury bill tender. This change was made so that the government, negotiating on pay and price controls, might avoid the accusation that it had raised the price of money.(2) This arrangement could be and was overridden—five times before it was replaced by an explicitly administered MLR in 1978. Setting a very short lending rate by reference to a three-month market rate had proved uncomfortable.

The reforms of the early 1980s came out of the debate on monetary base control (MBC) initiated by the first Thatcher government elected in 1979. Although the case for MBC was eventually rejected by the government, the new money market arrangements were designed to leave open a move in that direction and anyway to loosen official control over rates and give the market more influence on rates within an 'unpublished band'. Continuous posting of MLR was abandoned, as was the preannouncement of OMO dealing rates and the practice of deliberately creating a shortage by overissuing Treasury bills on HMG's behalf. It was also at this point that the Bank began to publish each day its estimate of the market shortage or surplus—relative to the clearing banks' desired operational balances. The Bank aimed to 'broadly offset the cash flows between the Bank and the money markets' so as to leave the clearing banks within reach of their desired balances. The aim was to do this primarily through OMOs and not through lending to the discount houses. In a 1986 BIS paper, Tony Coleby described the scheme's design in the following terms.(3)

> 'The normal conduct of the Bank's money-market operations was therefore envisaged as a market-clearing exercise. The Bank would accept as many of the offers or bids as was necessary to square the market, starting with the best rates and arriving at the 'stop rate' which just cleared the market, the result of the operation, including the range of rates at which the dealings had taken place, being immediately made public. Provision was made to override the normal arrangements if they should produce a stop rate which was unacceptable to the authorities, by lying outside an 'unpublished band' which defined the range of short-term interest rates currently judged to be consistent with policy objectives. If the stop rate was too high, more cash would be put into the system so as to arrive at an acceptably lower one: if too low, the system would be left short of cash so as to drive rates up.'

The system was clearly designed with variable-rate OMOs in mind. But with no continuously posted official rates to offer a focus to the market, the 'stop rates' accepted in the OMOs acquired great significance: '... every downward movement, even as small as $^{1}/_{16}$ per cent, came to be seen as a signal of official intent, not as a passive or incidental response to market fluctuations'.(4)

In the early days of the new regime the market did sometimes initiate rate changes (in the form of changes to banks' base rates, which the Bank then followed in its operations). Later, there were 'growing misgivings among policy-makers over the market's ability to provide a valid second opinion on the conduct of policy',(5) and the official hand was not so hidden. The 1981 regime had reserved the Bank's right to reinstate MLR intermittently by announcing the minimum rate which, for a short period ahead, would apply to any lending to

(1) Published as 'The Bank of England's operational procedures for meeting monetary objectives', *Bank of England Quarterly Bulletin*, June 1983, page 213.
(2) See Goodhart 2004, *op cit*.
(3) 'Changes in money-market instruments and procedures in the United Kingdom', in *Changes in money-market instruments and procedures: objectives and implications*, BIS, March 1986.
(4) *Ibid*.
(5) *Ibid*.

the discount houses. And from 1985 onwards, the Bank did announce MLR from time to time, with the discount houses being invited to borrow at MLR at 2.30 pm (ie the market was 'forced into the Bank'). But, crucially for this paper, the mechanics of the operations on other days remained basically unchanged. In particular, the form was still that, in its OMOs, the Bank was responding to rate offers from its counterparties, with the consequence that it was sometimes frustrated in its attempts to implement a change in rates desired by the authorities.

There were also other residual elements of 'Bank Rate' as a penal rate. Dealing rates in OMOs, when translated from discount rates to interest rates (or yields), were usually lower than the rates charged when the market was forced into the Bank. Even when inflation targeting was introduced in the early 1990s, with official rates explicitly decided by the Chancellor, the Bank's OMO dealing rates were often lower than the rate officially announced. (This was changed in the 1996–98 reforms: see Annex 1.)

One consequence of OMOs taking centre stage was that it fostered a perception that the maturity of rates being set (or targeted) for policy purposes was the same as the maturity of the OMOs. So, for example, the Bank said: '... if official operations could be confined to the shortest paper—maturities of, say, not longer than one month—it would enable the market to become the dominant influence on the shape of the yield curve for longer money-market maturities without requiring either lead or validation from the authorities'.(1) The clear implication was that conducting OMOs at a particular maturity entailed an element of setting or validating rates at that maturity.

In the event, the Bank was not able to restrict its OMOs to short maturities. For a variety of technical reasons,(2) the scale of the banking system's structural shortage and so of the Bank's OMOs increased a lot during the early 1980s. But, until the 1990s, the Bank's daily OMOs were conducted via purchases of commercial bills and Treasury bills, and in consequence there was not enough eligible paper for the Bank to recycle liquidity at short maturities. The result was that the Bank occasionally bought bills with maturities out to three months. From time to time, that fostered perceptions that the Bank was giving signals about official policy intentions.

Through the 1990s, the Bank did not analyse the instruments of monetary policy implementation very closely. Papers typically described the central bank as setting the pivotal interest rate in its role as the marginal source of funds to the economy but did not explore OMOs and standing facilities separately. The Bank's analysis was reflected in 'Monetary policy instruments: the UK experience',(3) which stated clearly that the central bank has to be the marginal source of funds while playing down the distinction between OMOs and standing facilities: 'The classical dichotomy is between open market operations, on the one hand, and discount rate or standing facilities, on the other. *A priori*... the differences between these are more apparent than real, especially when window borrowing is secured on collateral.... Consistent with the increasing market orientation of operations, there has been a gradual shift toward use of open market operations through the 1970s and 1980s, but with the discount window available as a backstop.... Since the Bank of England always stands ready to deal daily in its operations, this mid-point for short-term rates is reinforced frequently.... So there is no need for a formal band or corridor...'.

In other words, the Bank had slipped into thinking of OMOs as the instrument through which we implemented policy.

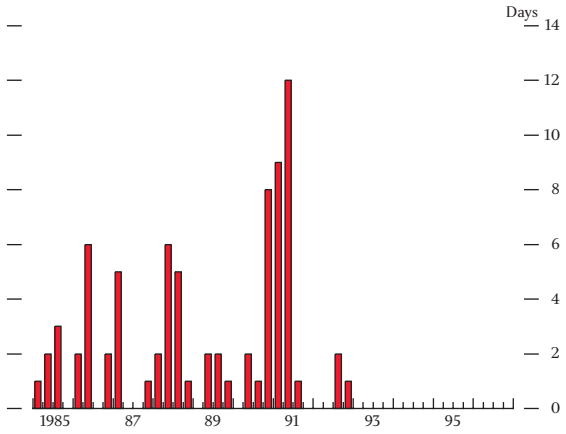
The mid-1990s reforms achieved many useful—indeed vital—improvements, but they did not include a review of the overall framework. That was because, as described in the main paper and Annex 1, they addressed urgent problems with the Bank's counterparties and with collateral. They also made important technical changes, such as conducting OMOs only at a short maturity (two weeks) and actually dealing at the announced official policy rate (ie the discount rates used for outright purchases of bills were set to produce yields at the official rate). With no deposit facility in 1997(4) and lending facilities seen as technical 'squaring up' devices (if our forecast was slightly wrong or if, because of frictions, the OMOs were not used), the OMO rate was a natural way to express policy and we slipped into thinking of it as how we actually implemented policy too. That was a fallacy, as explained in the main paper.

(1) Coleby 1986, *op cit*.
(2) See the box on 'Overfunding and money market operations', *Bank of England Quarterly Bulletin*, June 1982, page 201.
(3) *Bank of England Quarterly Bulletin*, August 1994, pages 268–276, a paper to which a wide range of Bank officials contributed.
(4) The 1996 reform proposals aired the possibility of a deposit facility to put a floor on rates. One was introduced in 2001.

The post-1996/97 system also abolished what had been known as '2.30 pm lending at Minimum Lending Rate'. It was got rid of for two reasons. One was that, apart from such lending having typically been for a maturity of a week, it seemed simply to add yet another layer of complexity in a system that in any case provided for 'late lending' to the market.(1) The other was that use of MLR was tied up with signalling (ie with 'public demonstrations' of the authorities' desired level of rates), and we had moved to a monetary regime where signalling via the Bank's operations was not needed: the official interest rate was decided at a monthly meeting (first by the Chancellor, subsequently the MPC) and simply announced. Indeed, the perception that the Bank might signal had, at times, been a complicating factor during the early 1990s. Explicitly ruling out any such possibility was one of the lasting benefits of the 1996–97 reforms. Reflecting those considerations, '2.30 pm lending' had not been used since the immediate aftermath of the ERM crisis (Chart A). So we got rid of it. Although that did not in principle impair our ability to set rates, it does nicely capture how far the Bank's analysis had drifted away from its historical and analytical base: 2.30 pm lending was the direct descendent of the apparatus used by previous generations to make 'Bank Rate effective', ie to set rates!

In fact, as recorded in the main text, the operational planning in the mid to late 1990s did reflect an understanding of the 'classical system':

Chart A
Usage of '2.30 pm lending'



> 'In addition, we may also in some conditions need to leave some of the daily shortage to be relieved at the end of the day via late lending so as to ensure that the Bank is—and is known to be—the marginal supplier of system liquidity throughout the day, preventing large banks from substituting themselves as the marginal player(s). The known availability of late lending at a known rate should also help to put a cap on the upward volatility of very short rates.'

But such discretion has not been used, in order to avoid any risk of the Bank being perceived to give signals via its operations about the MPC's rate intentions.

(1) Historically, the 'late lending' facility for the discount houses seems to have been thought of as 'banking' rather than an instrument of policy—a muddled distinction which may go back to the 1844 Act's separation of Issue Department and Banking Department.

Household debt, house prices and consumption growth

In this speech,[1] Stephen Nickell, member of the Bank's Monetary Policy Committee, considers two questions. First, what, if any, are the connections between household debt accumulation and consumption growth in the United Kingdom? The answer is that there seems to be no significant relationship. Second, given that the ratio of house prices to earnings is at a record level in the United Kingdom, what can we say about the equilibrium level of this ratio today and what are the implications for prospects in the housing market? For a variety of reasons, in particular the sharp fall in long-term real interest rates since the late 1990s, the current equilibrium ratio of house prices to earnings is well above its average level over the past 20 years. However, the precise level of this equilibrium ratio is difficult to pinpoint as is the speed with which house prices will return to it. As a consequence, while we know that house price inflation will slow, precisely how fast and how far is highly uncertain.

Introduction

For some years now, UK house prices and household debt have been making not just the front pages of business sections but the front pages of the main papers. Since these topics remain of some potential significance in the conduct of monetary policy, they are worth returning to despite my having already discussed them at some length (for example, in Nickell (2003a, 2003b)). Here, I look at two particular questions, first, what, if any, are the connections between household debt accumulation and consumption growth? Second, given that the ratio of house prices to earnings is at a record level in the United Kingdom, what can we say about the equilibrium level of this ratio and thus about future prospects for house prices? Basically, with regard to the first question, I argue that there is not much of a connection between the rate of accumulation of household debt and household consumption growth. Concerning the second question, I find there are very good reasons why the equilibrium level of house prices to earnings has risen significantly since the early and middle 1990s. However, the precise equilibrium level is highly uncertain as is the prospective speed at which house prices will return to this equilibrium.

Since the evidence suggests that house price inflation has an impact on consumption growth, aggregate demand growth and future general inflation, rates of house price inflation have a direct impact on monetary policy. By contrast, the fact that there appears to be little or no connection between household debt accumulation and consumption growth indicates that the rate of household debt accumulation may be expected to have little direct impact on monetary policy (see footnote 1 on page 388, however).

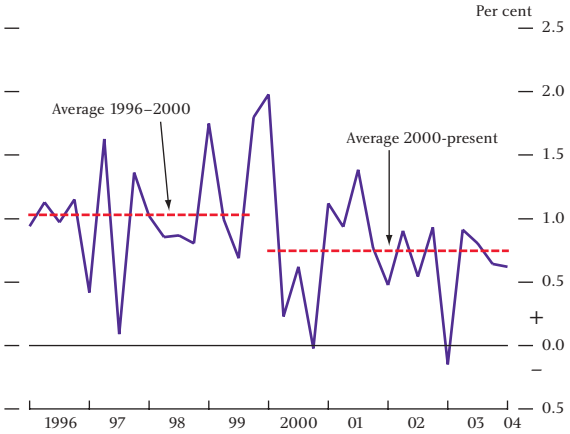
Household debt accumulation and consumption growth

It is often suggested that we are in the middle of a long-lived consumption boom in the United Kingdom funded by a tidal wave of debt. As a matter of fact, this statement is more or less completely incorrect.[2] Starting with the notion of a consumption boom, as we can see from Chart 1, real quarterly consumption growth since 2000 was significantly below the rate in the late 1990s. Interestingly enough, the average quarterly growth rate of real household consumption since 2000 has been around 0.7%, almost exactly the same as the average quarterly growth rate of consumption in the United Kingdom since 1975. And there has been no acceleration of consumption over the past couple of years. Thus we are not in the midst of a consumption boom. So what about the tidal wave of debt?

(1) Given at Bloomberg in London on 14 September 2004. I am grateful to Ryan Banerjee for help in the preparation of this speech and to Peter Andrews, Kate Barker, Charlie Bean, Marian Bell, Ian Bond, Rachel Lomax, Jumana Saleheen and Andrew Wardlow for valuable comments on an earlier draft. This speech can be found on the Bank's web site at www.bankofengland.co.uk/speeches/speech227.pdf.

(2) This is nothing new and the point has been made many times. For example, Broadbent (2003) sets out the facts very clearly.

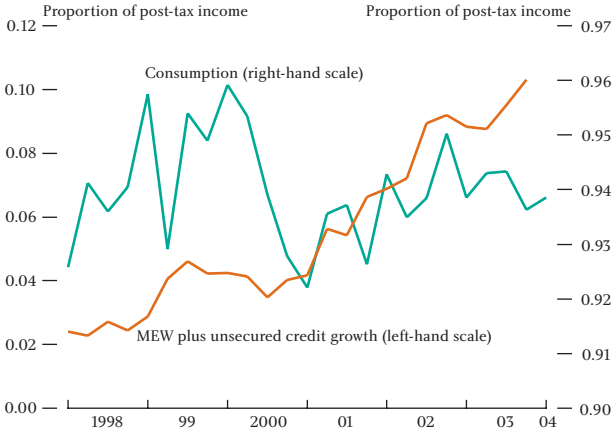
Chart 1
Quarterly consumption growth since 1996



Source: ONS.

UK households are indeed increasing their debt at a very rapid rate, in the form of both mortgage equity withdrawal (MEW) and unsecured debt. Yet as we can see from Chart 2, the proportion of post-tax income that is consumed has been flat since 1998. And this while mortgage equity withdrawal plus unsecured credit growth was rising from around 2% of post-tax household income in 1998 to nearly 10% in the latest data.(1) So what is going on?

Chart 2
Consumption and debt since 1998



Sources: Bank of England and ONS.

First, let us look at the mechanical relationship between the consumption, post-tax income and debt of households. The basic identity is(2)

Consumption ≡ post-tax income – net acquisition of financial assets
– net acquisition of housing assets
+ net acquisition of financial liabilities

This simply says that in aggregate, post-tax income plus new debt can be spent either on consumption or on houses or on financial assets. So where does MEW come into the story? First, financial liabilities can be divided into secured and unsecured. Then MEW is defined by

MEW = net acquisition of secured financial liabilities
– net acquisition of housing assets

So if we add the net increase in unsecured debt to MEW, we get the net acquisition of financial liabilities less the net acquisition of housing assets. This is sometimes known as lending 'available' for consumption. But as Chart 2 has shown, while it may be available for consumption, it is not necessarily used for this purpose because some of it goes towards an increase in the rate of acquisition of financial assets.

Let us look at the facts. First, rewrite the basic identity as

$$\frac{\text{Consumption}}{\text{PT income}} = 1 - \frac{\text{NA financial assets}}{\text{PT income}} - \frac{\text{NA housing assets}}{\text{PT income}} + \frac{\text{NA financial liabilities}}{\text{PT income}}$$

(NA = net acquisition, PT = post-tax)

So to understand how consumption changes relative to post-tax income, we need to look at the net acquisition of financial assets, housing assets and financial liabilities, all relative to post-tax income. In Table A, we see that the net acquisition of housing assets has risen gradually relative to post-tax income since the early 1990s. This term consists basically of the purchase of newly built houses and the money spent on home improvements. Houses purchased by one household from another household cancel out and so make no contribution. The net acquisition of financial liabilities, which simply refers to the accumulation of household debt, increased gradually during the mid-1990s but more than doubled from 1998 to 2003. Interestingly enough, households' net accumulation of financial assets increased rapidly from exactly the same date, nearly doubling from 1998 to 2003. In a mechanical sense, this

(1) The period 1996–97 was the era of building society demutualisations when households received substantial windfall gains. These may have had an impact on consumption growth in the late 1990s.
(2) These are money *flows*. This equation takes no account of the changes in value of the existing stock of assets which are very important in determining changes in the balance sheet position of households.

Table A
Accumulation of household debt and assets

	NA of financial assets ÷ PT income (%)	NA of housing assets ÷ PT income (%)	NA of financial liabilities ÷ PT income (%)		
			Total	Secured	Unsecured
1993	8.9	4.9	3.8	3.2	0.6
1994	10.2	5.3	5.3	4.1	1.2
1995	11.9	5.4	5.7	4.1	1.6
1996	11.3	5.6	6.0	3.9	2.1
1997	12.3	5.7	7.2	5.1	2.1
1998	7.9	5.8	7.8	5.4	2.4
1999	10.5	6.1	10.4	8.1	2.4
2000	9.0	5.9	10.1	8.0	2.1
2001	11.9	6.1	11.9	9.4	2.5
2002	14.8	6.7	16.1	13.2	2.9
2003	15.3	7.1	17.3	14.9	2.5
2004 Q1	17.5	7.4	17.1	14.4	2.7

Note: NA = net acquisition, PT = post tax.

Source: ONS.

is why consumption has not risen as a share of household post-tax income over the past six years. During this period, when the rate of household debt accumulation has been rising rapidly, the rate of household financial asset accumulation has also been rising rapidly. So is this just a happy accident, or are there reasons why the accumulation of debt and assets might be related? The first point to note is that it seems unlikely that the households that are accumulating this extra debt are the same households that are accumulating the extra financial assets. Indeed, we know that most of the new debt is secured on houses (see the last two columns in Table A) so a good part of it will be associated with the accumulation of housing assets by individual households. In aggregate, on the other hand, this is not the case because most house purchases simply involve one household buying a house from another household, with little net accumulation of housing assets in aggregate.

So any possible systematic connection between debt accumulation and financial asset accumulation will typically involve more than one household. An obvious example is when a household takes out a substantial mortgage to purchase a house from a last-time seller who has no mortgage and is either moving into rented accommodation (eg an old people's home) or has received the property as an inheritance. In either case it is entirely plausible that the seller will invest the money from the sale of the property in financial assets and we see a direct correspondence between the increase in household debt generated by the buyer and the accumulation of financial assets by the seller. Furthermore, as house prices rise, we can expect both debt accumulation and financial asset accumulation to be bigger in each transaction of this type.

So it is clear from this example that some housing transactions will generate both net increases in debt and net increases in asset accumulation. Interestingly enough, this example involves mortgage equity withdrawal because there has been an increase in aggregate secured debt and no aggregate housing investment. So here we have an example of mortgage equity withdrawal which does not involve additional consumption. Of course, there are other housing transactions which lead directly to both mortgage equity withdrawal and increased consumption. The obvious example is where households simply borrow more by raising the mortgage on their existing property. But it is important to recognise that a substantial proportion of mortgage equity withdrawal is not of this type and leads not to increased consumption but to increased financial asset accumulation. That is why both the rate of accumulation of financial liabilities and of financial assets have risen together, leaving the proportion of post-tax household income that is consumed remarkably stable over the past six years.

So to summarise, what we have seen is first, the average quarterly growth rate of real consumption since 2000 has been almost exactly equal to the average growth rate over the past 30 years, so there is no consumption boom. Second, since 1998 the proportion of their post-tax income that has been consumed by households has been stable, despite the fact that mortgage equity withdrawal plus unsecured credit growth has risen from 2% of post-tax income to nearly 10% of post-tax income over the same period. Third, these two apparently inconsistent facts are reconciled by the fact that, since 1998, the increasing rate of accumulation of debt by households has been closely matched by the increasing rate of accumulation of financial assets. Furthermore, this is not an accident. There are good reasons why aggregate secured debt accumulation and aggregate financial asset accumulation might be related, particularly in a period of rapidly rising house prices. Finally, therefore, there is no strong relationship between aggregate consumption growth and aggregate debt accumulation.(1)

(1) For those readers who are more persuaded by the paraphernalia of Granger Causality Tests, no debt measure or combination of debt measures comes close to Granger-causing real consumption once real post-tax labour income is included in the model.

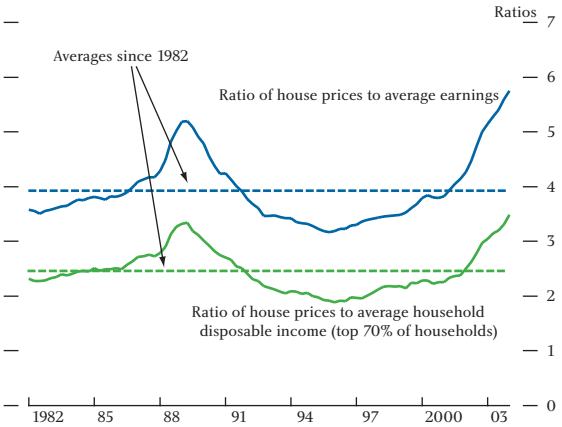
Prospects for house prices

Historically, there is an empirical relationship between household consumption and house prices. This relationship is the result of various mechanisms. First, houses are a significant part of household wealth and this higher wealth is typically associated with higher consumption, at least among those who own houses. However, an increase in house prices arguably makes non-homeowners worse off via higher rents or the higher savings required for future house purchase. So the consumption of this group may fall and the overall wealth effect may be negligible. Second, households may borrow vastly more cheaply if they own housing equity which may be used as collateral. Then an increase in house prices raises housing equity and cheaper borrowing typically results in increased consumption. Third, both house prices and household consumption tend to be positively related to household expectations of future earnings.

This empirical relationship between household consumption and house prices is by no means a stable one, but it is nevertheless important for monetary policy because house price inflation, being positively related to household consumption, is therefore positively related to aggregate demand and hence future inflation. So even though house prices are not included in the consumer prices index, monetary policy must pay them close attention (see Aoki *et al* (2001) for more detail).

The level of house prices today is apparently very high in the sense that it is well above its average level relative to earnings (see Chart 3). Currently, house prices are close to six times average earnings and this ratio would have to fall by around 32% to reach its average level since 1982. As we shall see, however, there are good reasons for believing that today the ratio of house prices to earnings in equilibrium may be higher than the average ratio since 1982. Precisely how much higher is very uncertain. Furthermore, the length of time it will take for house prices to get back to the equilibrium ratio relative to earnings is also very uncertain. This double uncertainty explains why commentators and analysts produce such a wide variety of prognoses for the housing market, from the very softest of soft landings to crashes of dramatic proportions.

Chart 3
House price to income ratios



Sources: General Household Survey, Halifax, Nationwide and ONS.

Turning to the reasons why the equilibrium house price to earnings ratio may have risen in recent years, the first obvious point is that the level of individual earnings is not the natural denominator. Rather, average household disposable income seems more reasonable. This is relevant because the proportion of two-earner households has been rising steadily over the past 25 years. So if we restrict ourselves to the top 70% of income earners, because the majority of the rest are on state benefits and are unlikely to be in the market for house purchases, we see from Chart 3 that the ratio of house prices to the average household income of the top 70% of households is around 3.5 and would have to fall by about 28 % to reach its average level since 1982, a fall that is some 4 percentage points lower than if we use earnings in the denominator. This fall is still substantial, however, so why might the equilibrium ratio have risen in recent years?

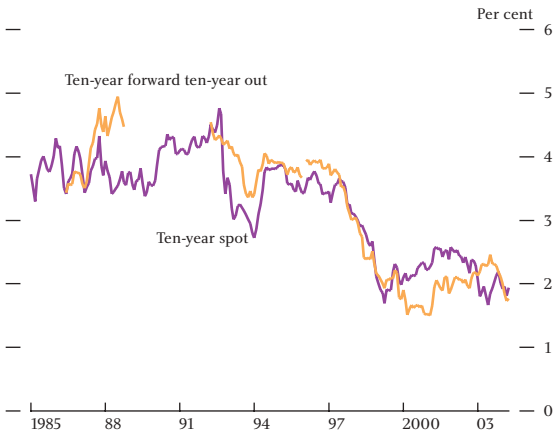
There are three factors that may be of some significance. First, the rate at which new dwellings are being built is at an historical low whereas, for a variety of reasons, the growth in the population of working age and the net rate of formation of new households is relatively high (high divorce rates, high immigration rates etc).(1) Second, the disappearance of the front-end loading problem when inflation rates and nominal interest rates are low. For example, it might be quite sensible for young professionals to borrow, and for banks to lend them, four or even five times annual earnings to purchase a house given both their very high level of job security and their very rapid rate of prospective earnings growth. But in times of high inflation and high nominal interest rates, this is not possible. For example, suppose real interest rates are 3%. Then if inflation is 12% and nominal interest rates are 15%, a person borrowing four times their annual pre-tax salary will be paying over 60% of

(1) The Barker Interim Report (2003) has a lot of information on these issues.

this pre-tax salary in mortgage payments in the first year—this simply cannot be done. Of course, in later years this proportion will fall rapidly. Nevertheless, the early years will provide a binding constraint on the multiple of earnings households can borrow.(1) In a low inflation environment, this binding constraint disappears. If inflation is 2% and nominal interest rates are 5%, an individual borrowing four times their annual salary will only be paying 20% of it in mortgage payments in the first year. Perfectly possible. So the elimination of this constraint as we have gradually moved from a high inflation, high interest rate era to a low inflation, low interest rate period will have raised the demand for housing in equilibrium, even when real interest rates remain unchanged.

The third factor underlying the potential rise in the equilibrium house price to earnings ratio is the apparently substantial and sustained fall in long-run risk-free real interest rates. In Chart 4, we see the time paths of both the ten-year real rate and the ten-year forward, ten-year real rate, both derived from prices in the index-linked gilt market. Both these rates have fallen from close to 4% in the mid-1990s to around 2% since 1999. And the fact that the ten-year forward, ten-year real rate has fallen in exactly the same way as the spot rate suggests that markets expect the fall to have some degree of permanence. It is, however, possible that the measured fall in the risk-free real rate derived from the index-linked gilt market may be overstated because of the Minimum Funding Requirement announced in the 1997 Pensions Act. This introduced an element of demand for index-linked gilts which was almost independent of the real yield. However, a long-term risk-free real rate close to 2% is not particularly unusual in the United Kingdom given that the average long-term real rate in the period 1951–97 was 2.21% according to Chadha and Dimsdale (1999, Table 3). Furthermore, Larsen *et al* (2003) indicates that ten-year risk-free real rates computed from a consumption-based CAPM model with habit persistence also fell significantly from 1997 on. Long-term real rates are, of course, crucial in the housing market since they reflect the average rate that should be used to discount the returns on a long-lived asset and the real cost of long-term borrowing. One way of measuring the consequences of a fall in real interest rates on equilibrium house prices is to make use of the equilibrium relationship between rents in the housing market and house prices (see Weeken (2004) and Goldman Sachs (2004) for examples). If real net rentals (ie after subtracting maintenance and management costs) today are D and they are expected to grow at a rate of g, then in equilibrium, the real price of houses will equal the discounted present value of real rents, that is $P_h = D/(r_f + \rho - g)$ where r_f is the risk-free real interest rate and ρ is the risk premium.(2) This means that for plausible values of ρ and g, real house prices are sensitive to changes in the risk-free real rate. For example, suppose rents grow at the same rate as real wages, which implies that $g \cong 2\%$ and the long-run risk premium averages around 3% (see Weeken (2004)). Then if the risk-free real rate falls from 4% to 2%, the equilibrium ratio of real house prices to real rents will rise by nearly 67%. Given our assumption that real rents tend to grow at the same rate as real wages, an assumption broadly consistent with the facts, the equilibrium ratio of house prices to earnings may be expected to rise by a similar amount solely because of the observed fall in the long-term real interest rate. And since the actual ratio of house prices to earnings has risen by around 70% since the mid-1990s to the present day, it may be argued that it is close to equilibrium. Of course this is a very rough and ready calculation. The remains of MIRAS were still in operation in the mid-1990s, although its impact was small by that stage. Transactions costs in the housing market are substantial and the rental market is subject to many tax and regulatory distortions. Furthermore, as we have seen,

Chart 4
Ten-year real interest rates



Source: Bank of England.

Note: Real interest rates implied by index-linked gilts.

(1) Of course, the front-end loading problem can be entirely eliminated if the lender, at the end of each year, raises the nominal mortgage loan to offset at least some part of the real reduction in the loan which has come about via inflation. Presumably because of the high transactions costs involved, such behaviour was not common during the high inflation period.

(2) The present value of real rents is $\int_0^\infty De^{gt}e^{-(r_f+\rho)t}dt = D/(r_f+\rho-g)$, so long as $r_f+\rho-g>0$.

estimates of equilibrium house prices are sensitive to the value of the long-run real interest rate. For example, in Goldman Sachs (2004), it is assumed that the real long rate will rise to 2.75%. This is a key factor underlying their prediction of a 20% fall in house prices by 2008.

Overall, this discussion leads us to the following conclusions. First, there are good reasons for believing that the equilibrium ratio of house prices to earnings is currently well above the average ratio of house prices to earnings over the past two decades. Second, the precise level of the equilibrium ratio of house prices to earnings is very uncertain and is very sensitive to the 'equilibrium' level of the long-term real interest rate.

On top of this latter uncertainty there are two further key uncertainties relating to the operation of the housing market. First, as we have already noted, if the house price to earnings ratio is currently above the equilibrium rate, how rapidly will it return? Second, how big is the impact of a slowdown in house price inflation on household consumption? Given the above discussion, it is obvious that there is a significant probability that house prices will fall at some stage. Despite this, it is quite possible that house prices will not fall at all, although they are very likely to go down relative to earnings (that is, house price inflation will fall below around 4.5% per year).

Debt, consumption, house prices and monetary policy

In the previous sections, we have noted that there is very little relation between debt accumulation and consumption growth and hence between debt accumulation and future aggregate demand and inflation. We have also noted that there does appear to be some relationship between house price inflation and consumption growth, although it seems not to be a very stable one. However, because of this relationship, it is worth speculating on the prospects for house price inflation since future house price inflation will affect household consumption growth and hence the future path of general inflation.

Since monetary policy is governed by the inflation target, it is clear from the above that the scale of household debt accumulation is unlikely to have much of a direct impact on monetary policy.(1) By contrast, the current and future expected level of house price inflation will have a direct impact on monetary policy because of the effect on general inflation via household consumption growth.

(1) It may, of course, be argued that high levels of household debt may affect the behaviour of the economy in response to shocks which may have implications for the conduct of monetary policy. Generally, I do not find such arguments very persuasive (see Nickell (2003a, 2003b)).

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Weeken, O (2004), 'Asset pricing and the housing market', *Bank of England Quarterly Bulletin*, Spring, pages 32–41.

Bank of England speeches

Speeches made by Bank personnel since publication of the previous *Bulletin* are listed below.

Monetary policy, data uncertainty and the supply-side: living with the statistical fog.
Speech by Marian Bell, member of the Monetary Policy Committee, to the Society of Business Economists at the Chartered Institute of Public Finance and Accountancy in London on 15 September 2004. www.bankofengland.co.uk/speeches/speech228.pdf.

Household debt, house prices and consumption growth.
Speech by Stephen Nickell, member of the Monetary Policy Committee and Professor at the London School of Economics, at Bloomberg in London on 14 September 2004. www.bankofengland.co.uk/speeches/speech227.pdf.
Reproduced on pages 383–89 of this *Bulletin*.

Global demographic change: some implications for central banks.
Speech by Charles Bean, Chief Economist, at the Overview Panel, FRB Kansas City Annual Symposium, Jackson Hole, Wyoming on 28 August 2004. www.bankofengland.co.uk/speeches/speech226.pdf.

Managing the central bank's balance sheet: where monetary policy meets financial stability.
Lecture by Paul Tucker, Executive Director and member of the Monetary Policy Committee, to mark the 15th anniversary of Lombard Street Research held in London on 28 July 2004. www.bankofengland.co.uk/speeches/speech225.pdf.
Reproduced on pages 359–82 of this *Bulletin*.

Some current issues in UK monetary policy.
Speech by Charles Bean, Chief Economist, to the Institute of Economic Affairs in London on 28 July 2004.
www.bankofengland.co.uk/speeches/speech224.pdf. Reproduced on pages 355–58 of this *Bulletin*.

Keeping the party under control—anniversary comments on monetary policy.
Speech by Rachel Lomax, Deputy Governor, at the British Hospitality Association Annual Luncheon in London on 1 July 2004.
www.bankofengland.co.uk/speeches/speech223.pdf. Reproduced on pages 352–54 of this *Bulletin*.

Mansion House Dinner.
Speech by Mervyn King, Governor, at the Lord Mayor's Banquet for Bankers and Merchants of the City of London at the Mansion House on 16 June 2004. www.bankofengland.co.uk/speeches/speech222.pdf. Reproduced on pages 349–51 of this *Bulletin*.

CBI Scotland Dinner.
Speech by Mervyn King, Governor, at the Glasgow Hilton Hotel on 14 June 2004.
www.bankofengland.co.uk/speeches/speech221.pdf. Reproduced on pages 346–48 of this *Bulletin*.

Contents of recent Quarterly Bulletins

The articles and speeches that 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/qbcontents/index.html.

Articles and speeches (indicated S)

Summer 2002

Public attitudes to inflation
The Bank of England's operations in the sterling money markets
No money, no inflation—the role of money in the economy
Asset prices and inflation
Durables and the recent strength of household spending
Working time in the United Kingdom: evidence from the Labour Force Survey
Why are UK imports so cyclical?
Monetary challenges (S)
The Monetary Policy Committee: five years on (S)
Household indebtedness, the exchange rate and risks to the UK economy (S)

Autumn 2002

Committees versus individuals: an experimental analysis of monetary policy decision-making
Parliamentary scrutiny of central banks in the United Kingdom and overseas
Ageing and the UK economy
The balance-sheet information content of UK company profit warnings
Money and credit in an inflation-targeting regime
International Financial Architecture: the Central Bank Governors' Symposium 2002
The monetary policy dilemma in the context of the international environment (S)
Monetary policy issues: past, present, future (S)

Winter 2002

What do measures of core inflation really tell us?
Estimating the impact of changes in employers' National Insurance Contributions on wages, prices and employment
Equity valuation measures: what can they tell us?
Profit expectations and investment
Financial pressures in the UK household sector: evidence from the British Household Panel Survey
Money market operations and volatility in UK money market rates
The Centre for Central Banking Studies

Winter 2002 (continued)

The external balance sheet of the United Kingdom: recent developments
Public sector debt: end-March 2002
Speech at the Northwest Development Agency/Bank of England Dinner (S)
The inflation target ten years on (S)
The MPC and the UK economy: should we fear the D-words? (S)
Macroeconomic policy rules in theory and in practice (S)

Spring 2003

Market-based estimates of expected future UK output growth
Monetary policy and the zero bound to nominal interest rates
The measurement of house prices
Report on modelling and forecasting at the Bank of England
The Bank's regional Agencies
A review of the work of the London Foreign Exchange Joint Standing Committee in 2002
Speech at the Chartered Institute of Bankers in Scotland Biennial Dinner (S)
Economists and the real world (S)
Adjusting to low inflation—issues for policy-makers (S)
Six months on the MPC: a reflection on monetary policy (S)
House prices, household debt and monetary policy (S)

Summer 2003

What caused the rise in the UK terms of trade?
Long-run equilibrium ratios of business investment to output in the United Kingdom
An analysis of the UK gold auctions 1999–2002
Assessing the extent of labour hoarding
Asset finance
Public attitudes to inflation
Foreign Exchange Joint Standing Committee e-commerce subgroup report
The Governor's speech at the Islamic Home Finance seminar on 27 March 2003 (S)

Summer 2003 (continued)
The role of the Bank of England in the gold market (S)

Autumn 2003
Trends in households' aggregate secured debt
Public expectations of UK inflation
Non-employment and labour availability
The information content of regional house prices: can they be used to improve national house price forecasts?
Balance sheet adjustment by UK companies
Inflation targeting and the fiscal policy regime: the experience in Brazil
The optimal rate of inflation: an academic perspective
The EU Financial Services Action Plan: a guide
Credit conditions and monetary policy (S)

Winter 2003
Understanding and modelling swap spreads
The distribution of unsecured debt in the United Kingdom: survey evidence
Innovations in retail payments: e-payments
The macroeconomic impact of revitalising the Japanese banking sector
Financial stability and the United Kingdom's external balance sheet
The Governor's speech at the East Midlands Development Agency/Bank of England dinner (S)
Inflation targeting: the UK experience (S)
UK monetary policy in a changing world (S)
Two current monetary policy issues (S)

Spring 2004
Durable spending, relative prices and consumption
Asset pricing and the housing market
The relationship between the overnight interbank unsecured loan market and the CHAPS Sterling system
How much does capital matter?
Measuring total factor productivity for the United Kingdom
The Governor's speech at the annual Birmingham Forward/CBI business luncheon (S)
Inflation targeting—achievement and challenges (S)
Risk, uncertainty and monetary policy regimes (S)
E-commerce and the foreign exchange market—have the promises been met? (S)

Summer 2004
Assessing the stability of narrow money demand in the United Kingdom
Deriving a market-based measure of interest rate expectations
The economics of retail banking—an empirical analysis of the UK market for personal current accounts
The financing of smaller quoted companies: a survey
Recent developments in surveys of exchange rate forecasts
Sterling money market funds
The new Bank of England Quarterly Model
Public attitudes to inflation
Perfect partners or uncomfortable bedfellows? On the nature of the relationship between monetary policy and financial stability
A review of the work of the London Foreign Exchange Joint Standing Committee in 2003
Reform of the Bank of England's operations in the sterling money markets
Puzzles in today's economy—the build-up of household debt (S)
Speech at the National Association of Pension Funds Annual Investment Conference (S)
Boring bankers—should we listen? (S)
Speech at CBI Yorkshire and the Humber annual dinner (S)

Autumn 2004
How should we think about consumer confidence?
Household secured debt
Housing equity and consumption: insights from the Survey of English Housing
Why has world trade grown faster than world output?
The institutions of monetary policy (S)
The Governor's speech to the CBI Scotland dinner (S)
The Governor's speech at the Mansion House (S)
Keeping the party under control—anniversary comments on monetary policy (S)
Some current issues in UK monetary policy (S)
Managing the central bank's balance sheet: where monetary policy meets financial stability (S)
Household debt, house prices and consumption growth (S)

Bank of England publications

The Bank of England publishes information on all aspects of its work in many formats. Listed below are some of the main Bank of England publications. For a full list, please refer to our web site www.bankofengland.co.uk/publications.

Working papers

Working papers are free of charge; a complete list is available from the address below. An up-to-date list of working papers is also maintained on the Bank of England's web site at www.bankofengland.co.uk/wp/index.html, where abstracts of all papers may be found. Papers published since January 1997 are available in full, in PDF.

No.	Title	Author
213	Investment-specific technological change and growth accounting *(February 2004)*	Nicholas Oulton
214	An empirical model of household arrears *(March 2004)*	John Whitley Richard Windram Prudence Cox
215	How can the IMF catalyse private capital flows? A model *(April 2004)*	Adrian Penalver
216	IMF lending and creditor moral hazard *(April 2004)*	Andrew G Haldane Jörg Scheibe
217	International financial rescues and debtor-country moral hazard *(April 2004)*	Prasanna Gai Ashley Taylor
218	Health, disability insurance and labour force participation *(April 2004)*	Brian Bell James Smith
219	Bail out or work out? Theoretical considerations *(April 2004)*	Andrew G Haldane Gregor Irwin Victoria Saporta
220	Does job insecurity affect household consumption? *(May 2004)*	Andrew Benito
221	Female labour force participation in the United Kingdom: evolving characteristics or changing behaviour? *(May 2004)*	Maria Gutiérrez-Domènech Brian Bell
222	The roles of expected profitability, Tobin's Q and cash flow in econometric models of company investment *(June 2004)*	Stephen Bond Alexander Klemm Rain Newton-Smith Murtaza Syed Gertjan Vlieghe
223	Real exchange rates and the relative prices of non-traded and traded goods: an empirical analysis *(June 2004)*	Jan J J Groen Clare Lombardelli
224	The informational content of empirical measures of real interest rate and output gaps for the United Kingdom *(July 2004)*	Jens D J Larsen Jack McKeown
225	Exploring the relationship between credit spreads and default probabilities *(July 2004)*	Mark J Manning
226	Corporate capital structure in the United Kingdom: determinants and adjustments *(July 2004)*	Philip Bunn Garry Young
227	The Phillips curve under state-dependent pricing *(July 2004)*	Hasan Bakhshi Hashmat Khan Barbara Rudolf
228	The UK labour force participation rate: business cycle and trend influences *(August 2004)*	Mark Schweitzer David Tinsley
229	On the resolution of banking crises: theory and evidence *(August 2004)*	Glenn Hoggarth Jack Reidhill Peter Sinclair
230	Financial interlinkages in the United Kingdom's interbank market and the risk of contagion *(September 2004)*	Simon Wells

External MPC Unit discussion papers

The MPC Unit discussion paper series reports on research carried out by, or under supervision of, the external members of the Monetary Policy Committee. Papers are available from the Bank's web site at www.bankofengland.co.uk/mpc/extmpcpaper0000n.pdf (where n refers to the paper number). The following papers have been published recently.

No.	Title	Author
9	The pricing behaviour of UK firms *(April 2002)*	Nicoletta Batini Brian Jackson Stephen Nickell
10	Macroeconomic policy rules in theory and in practice *(October 2002)*	Christopher Allsopp
11	The exchange rate and inflation in the UK *(October 2002)*	Amit Kara Edward Nelson
12	Measuring the UK short-run NAIRU *(April 2003)*	Nicoletta Batini Jennifer Greenslade
13	UK consumers' habits *(May 2003)*	Ryan Banerjee Nicoletta Batini

Monetary and Financial Statistics

Monetary and Financial Statistics (*Bankstats*) contains detailed information on money and lending, monetary and financial institutions' balance sheets, banks' income and expenditure, analyses of bank deposits and lending, external business of banks, public sector debt, money markets, issues of securities, financial derivatives, interest and exchange rates, explanatory notes to tables and occasional related articles.

From 2004 *Bankstats* continues to be published monthly on the Internet but paper copies are available on a twice-yearly basis. Paper copies were published for the January and July editions in hard copy on Monday 2 February 2004 and Friday 30 July 2004 respectively. The price per annum in the United Kingdom is £40, or £20 per copy. *Bankstats* is available on a monthly basis free of charge from the Bank's web site at: www.bankofengland.co.uk/mfsd/latest.htm.

Further details are available from: Daxa Khilosia, Monetary and Financial Statistics Division, Bank of England: 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's web site at www.bankofengland.co.uk/mfsd/current/ms/articles.htm.

Title	Author	Month of issue	Page numbers
Prospective change in the Bank's measure of Divisia money: consultation with users		July	23–24
Data cleansing for banking and monetary statistics	Julie Bigwood	July	22
Population review for other specialist mortgage lenders	Lorna Hall	July	20–21
A work programme in financial statistics—April 2004 update	Sheila Watson	July	14–19
A new Statistical Code of Practice for the Bank of England	Chris Wright	July	11–13
Developments in UK international banking statistics	Pat O'Connor	July	5–10
An introduction to financial soundness indicators	Andrew Moorhouse	July	1–4

Financial Stability Review

The *Financial Stability Review* is published twice a year, in June and December. Its purpose is to encourage informed debate on financial stability; survey potential risks to financial stability; and analyse ways to promote and maintain a stable financial system. The Bank of England intends this publication to be read by those who are responsible for, or have interest in, maintaining and promoting financial stability at a national or international level. It is of especial interest to policymakers in the United Kingdom and abroad; international financial institutions; academics; journalists; market infrastructure providers; and financial market participants. It is available from Financial Stability Review, Bank of England HO-3, Threadneedle Street, London, EC2R 8AH and on the Bank's web site at: www.bankofengland.co.uk/fsr/index.htm.

Practical issues arising from the euro

This is a series of booklets providing a London perspective on the development of euro-denominated financial markets and the supporting financial infrastructure, and describing the planning and preparation for possible future UK entry. Recent editions have focused on the completion of the transition from the former national currencies to the euro in early 2002, and the lessons that may be drawn from it. Copies are available from Public Enquiries Group, Bank of England, Threadneedle Street, London, EC2R 8AH and on the Bank's web site at: www.bankofengland.co.uk/euro/piq.htm.

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. An update was published in September 2000 and is available free of charge.

Quarterly Bulletin

The *Quarterly Bulletin* provides regular commentary on market developments and UK monetary policy operations. It also contains research and analysis and reports on a wide range of topical economic and financial issues, both domestic and international.

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/bulletin/index.html.

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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* (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 €105 per volume or €2,510 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.

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- analysis of money and asset prices;
- analysis of demand;
- analysis of output and supply;
- analysis of costs and prices;
- summary of monetary policy during the quarter; and
- assessment of the medium-term inflation prospects and risks.

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Publication dates

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