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Foreword

Every three months, the Bank of England publishes economic research and market reports in its *Quarterly Bulletin*. This quarter, the *Bulletin* explores the relationship between house prices and consumer spending. It also examines companies' motives for investing in inventories. And, as usual, it reviews the latest movements in sterling financial markets.

House prices and consumer spending have often moved together in the past. But as the Monetary Policy Committee has noted in the *Inflation Report* and the Minutes of past policy meetings, the relationship between the housing market and spending is more subtle than is often supposed. It depends on causal links, such as the impact of house prices on the amount that people can borrow to finance spending. And it depends on common influences that affect both house prices and consumption, such as people's expectations about their future income.

This relationship is explored in *House prices and consumer spending*, by Andrew Benito, Jamie Thompson, Matt Waldron and Rob Wood. The authors explain how the strength of the links between the housing market and spending can vary over time. Causal links are affected by factors such as the amount of housing equity that households already have available and the extent to which credit constraints are inhibiting spending. The reasons why house prices move are also important. Sometimes common factors drive changes in both house prices and consumer spending. At other times, house prices may shift on account of developments that are of limited significance for spending. In general, the implications of a rise in house prices therefore rest on why the rise has occurred.

In the past few years, house prices and consumption have moved together less closely. One explanation is that the causal links between the housing market and spending have weakened. An alternative hypothesis is that recent fluctuations in house prices have not been the result of movements in common influences like expected income, but reflect a different set of factors that have had a more limited impact on consumer spending. The article concludes that both explanations have played a part in the recent weakening of the association between house prices and consumer spending.

Investment in inventories accounts for a much smaller proportion of total spending than consumption. But it is much more volatile, and fluctuations in inventories often have a noticeable impact on GDP growth. *Investing in inventories*, by Rob Elder and John Tsoukalas, examines companies' motives for holding inventories and assesses the impact of inventory investment on the volatility of output. It also considers the contribution of changing stock management behaviour to the stability of the UK economy in recent years.

The regular *Markets and operations* article describes financial market developments since the previous *Bulletin*. In May, there was a pickup in financial market volatility and substantial falls in some asset prices, particularly in commodity and equity markets. In common with other countries, UK short-term and long-term interest rates

increased over the review period, while the effective exchange rate for sterling appreciated. But despite the rise in interest rates and falls in equity prices, credit spreads did not widen significantly. This suggests that any repricing of risk has been limited only to certain asset classes. Finally, the article records the introduction, on 18 May, of fundamental reforms to the way that the Bank implements the MPC's interest rate decisions in the sterling money markets. The changes are designed to keep overnight interest rates in line with the official Bank rate and also to improve the management of banking system liquidity in both normal and stressed times.

Charles Bean
Chief Economist and Executive Director for Monetary Policy, Bank of England.

This edition of the *Quarterly Bulletin* also includes:

- *Cost-benefit analysis of monetary and financial statistics* (by Andrew Holder). Data collected by the Bank of England from UK banks are used in compiling a range of economic statistics that contribute to meeting the inflation target and maintaining financial stability. But data collection inevitably imposes some costs on those supplying the information. This article describes a cost-benefit analysis framework that has been developed to help balance the demands on data suppliers with the needs of users;

- *Public attitudes to inflation* (by Colin Ellis). Over the past six and a half years, GfK NOP has carried out surveys of public attitudes to inflation on behalf of the Bank of England. This article analyses the results of the surveys from May 2005 to February 2006, a period in which there was an increase in public perceptions of past inflation as well as expectations of future inflation;

- *The Centre for Central Banking Studies* (by Gill Hammond). The Centre for Central Banking Studies at the Bank of England organises seminars, workshops and conferences in London and abroad. These are attended by central bankers from all over the world. This article describes the Centre's origins and current activities; and

- *A review of the work of the London Foreign Exchange Joint Standing Committee in 2005*. The Foreign Exchange Joint Standing Committee was established in 1973, under the auspices of the Bank of England, as a forum for bankers and brokers to discuss broad market issues. This note reviews the work undertaken by the Committee during 2005.

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.

Bank of England Quarterly Bulletin

Summer 2006

Recent economic and financial developments

Research and analysis

Reports

Speeches and papers

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Except where otherwise stated, the source of the data used in charts and tables is the Bank of England or the Office for National Statistics (ONS) and all data, apart from financial markets data, are seasonally adjusted.

Volume 46 Number 2

Markets and operations

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

- *Volatility picked up in a number of asset markets towards the end of the period. In particular, emerging market asset prices and some commodity prices fell sharply. This seemed to reflect an adjustment in investors' perceptions of risk, at least in these markets.*
- *There was a more moderate pickup in volatility in sterling interest rate markets. Short-term nominal sterling interest rates rose over the period as a whole.*
- *Long-term nominal sterling rates also increased, on account of higher real rates and a pickup in inflation expectations and/or inflation risk premia. The rise in real rates was common across currencies.*
- *Despite higher interest rates and lower equity prices, corporate bond spreads did not widen much.*
- *The Bank implemented fundamental reforms to modernise its operations in the sterling money markets.*

During May, sterling markets were caught up in a global increase in asset price volatility. Commodities, equities and emerging market asset prices fell sharply.

These developments might have reflected a reappraisal of the global macroeconomic outlook. But consensus projections for economic growth in the major industrialised countries remained firm and there were few signs of slowing in corporate profit growth.

Some market commentators have highlighted a possible rise in global inflationary pressures as a reason for the asset price adjustment. Others have attributed it to changes in investors' perceptions of risk. According to contacts, some speculative investors have reduced their positions. Higher asset price volatility may have added to perceptions of somewhat greater risk, for example, through increased Value-at-Risk measures of traders' positions.

Equity markets

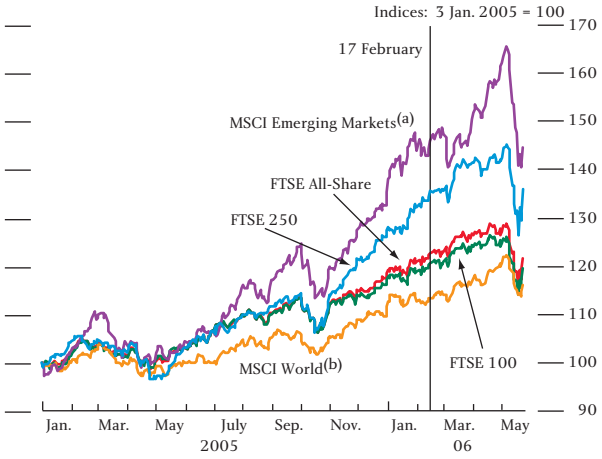
In the United Kingdom, the rise in financial market volatility was manifested in a sharp fall in equity indices. The FTSE All-Share declined 5.4% from its recent peak on 21 April, and around 1% over the period as a whole (Chart 1). Mid-cap stocks fell by more in mid-May, although the FTSE 250 ended the period more than 8% higher than at the start of 2006. At the same time, expected future volatility implied by option prices increased, especially at short horizons (Chart 2).

Long-term sterling real interest rates rose, which other things being equal might have been expected to reduce equity prices via higher discount rates. But whereas long-term real interest rates increased fairly steadily over the period, the equity price falls were sudden and concentrated toward the end of the period.

The equity price falls could have been amplified by hedging of some over-the-counter equity derivatives.

(1) This article focuses on sterling markets. The period under review in this article is 17 February (the data cut-off for the previous *Quarterly Bulletin*) to 26 May.

Chart 1
UK and international equity indices



Sources: Bloomberg, Morgan Stanley Capital International Inc. (MSCI) and Bank calculations.

(a) The MSCI Emerging Markets index is a capitalisation-weighted index that monitors the performance of stocks in emerging markets.
(b) The MSCI World index is a capitalisation-weighted index that monitors the performance of stocks from around the world.

Chart 2
FTSE 100 equity index implied volatility(a)

Sources: Bank of England and Euronext.liffe.

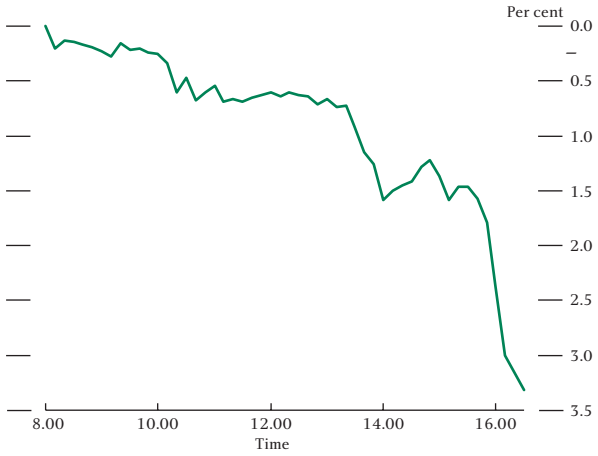
(a) The solid line shows three-month (constant maturity) implied volatility. The dots indicate three-month volatility, three, six and nine months ahead respectively.

For example, as explained in the box on page 127, hedging of equity variance swaps might have added to volatility. The pay-off from a variance swap is typically computed using closing prices, so a trader's overall position may not be known until late in the day. As a result, hedging may be delayed until just before the market closes. This may have been the case on 17 May when the FTSE 100 index fell sharply in late trading (Chart 3). However, some market contacts believe this amplification effect was modest.

Commodities

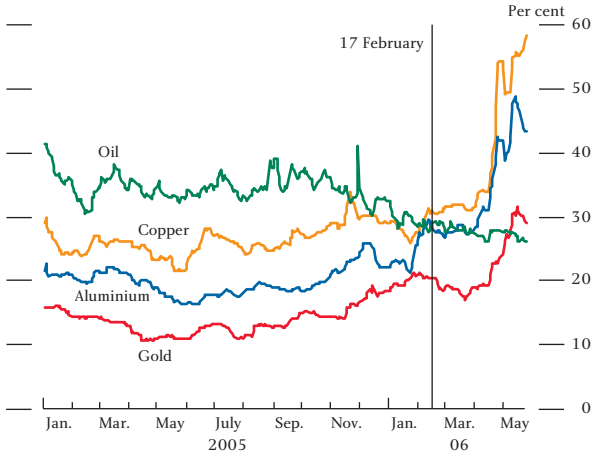
Realised and implied volatility also rose sharply in some commodity markets, especially industrial and precious metals (Chart 4). At the same time, the prices of some commodities fell sharply, following a period of rapid rises.

Chart 3
Change in FTSE 100 on 17 May



Source: Bloomberg.

Chart 4
Three-month implied volatilities on selected commodity indices



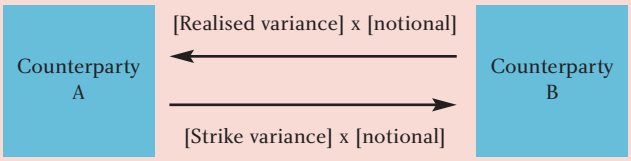
Sources: Bloomberg, COMEX, NYMEX and Bank calculations.

These earlier rises might have reflected pension funds increasing their exposure to commodities with the aim of increasing asset diversification and/or boosting overall returns. This has been facilitated by new investment vehicles such as exchange-traded funds (ETFs), commodity indices, and more sophisticated bespoke structured products. For example, the first silver ETF, launched in April 2006, accumulated an amount equivalent to more than 5% of total global inventories of silver in its first week of trading. Greater involvement of speculative investors might also have contributed to recent volatility.

Equity variance swaps

Variance swaps are instruments that allow investors to trade and hedge the volatility of asset prices. At maturity, the pay-off of the swap is equal to the difference between the realised variance in the underlying asset price over the life of the swap and the pre-agreed 'strike' variance (Chart A).

Chart A
Illustrative variance swap



Variance swaps provide a straightforward exposure to asset price volatility. To obtain a similar exposure using a 'vanilla' option would be more complicated because it is exposed to both the volatility and the level of the underlying asset price. Moreover, the sensitivity of the price of a vanilla option to changes in volatility depends upon the level of the underlying asset price. By contrast, a variance swap can provide a more stable exposure to volatility as its value does not depend directly on the price of the underlying asset.

Pricing and hedging

In principle, a variance swap is straightforward to price because its pay-off can be replicated with an appropriately weighted portfolio of vanilla options across a range of strike prices. Such a portfolio also provides a good hedge for a position in a variance swap. But to ensure that this portfolio remains a good hedge over time, it needs to be adjusted dynamically to neutralise the effect on its value of any changes in the underlying asset price. This is typically achieved by buying or selling an appropriate amount of the underlying asset, and is known as 'delta-hedging'; the so-called delta measures the sensitivity of an option price to changes in the price of the underlying asset.

In practice, even a delta-hedged portfolio of vanilla options is not a perfect hedge for a position in a variance swap. First, an investor seeking to hedge a position in a variance swap may be restricted if options across a wide range of strike prices are not actively traded and/or if the cost of constructing the ideal hedge is prohibitive.

Second, the investor is exposed to so-called 'jump risk', ie the risk of sharp discontinuous jumps in the underlying asset price. The theoretical hedge assumes the underlying asset price evolves according to a continuous process. In the presence of jumps, there may be a mismatch between the impact on the variance swap and the hedge. For example, a jump downward in the underlying asset price would cause an investor hedging a long position in a variance swap with a short position in a portfolio of options to realise an overall loss — the gain on the swap would be less than the loss on the hedge.

Variance swaps and recent moves in equity indices

Some contacts have suggested that delta-hedging could have amplified recent falls in equity indices. More specifically, it has been reported that some traders, including hedge funds, sold a large amount of equity index variance swaps over the past year or so, as a way of maintaining returns in an environment of generally low financial market volatility. The counterpart was that equity derivative dealers bought volatility, which they may have hedged by selling vanilla equity options.

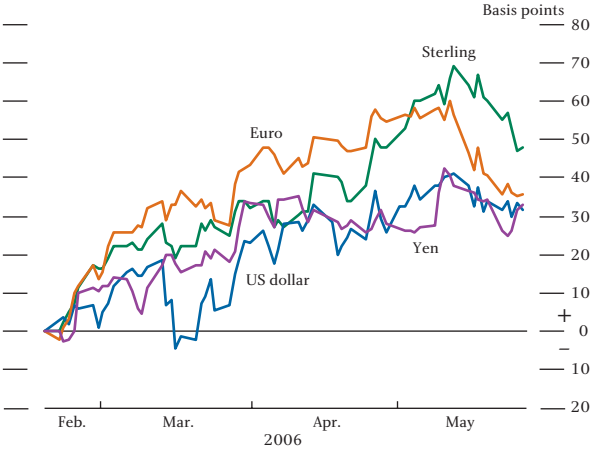
Selling vanilla options leaves a dealer 'short gamma'. Gamma measures the sensitivity of the delta to changes in the price of the underlying asset. Being 'short gamma' means that to delta-hedge a position, an investor should sell the underlying asset as its price declines.(1) For small price falls, only small adjustments are required for the position to remain delta-neutral. But when price moves are large, as was the case on some days during the review period, more material changes may be required. In turn, the additional selling pressure exerted by the hedges may amplify the initial price falls.

(1) For more information on 'short-gamma' option positions see the box entitled 'Market dynamics and options selling', *Bank of England Financial Stability Review*, June 2005, pages 60–61.

Short-term interest rates

Alongside the sharp rise in financial market volatility, short-term market interest rates in most developed economies declined towards the end of the period (Chart 5). Nonetheless, over the period as a whole, forward rates implied by short sterling futures contracts had increased. That occurred against a background of rising short-term market interest rates in the other major currencies and reflected further evidence of the continuing strength of global macroeconomic conditions and some signs of a slight pickup in inflationary pressure.

Chart 5
Cumulative changes in June 2007 interest rate futures contracts since 17 February



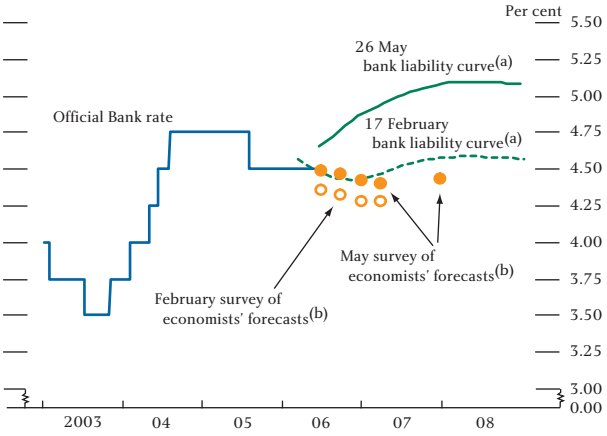
Sources: Bloomberg and Euronext.liffe.

On 26 May, the profile for forward sterling interest rates (derived from instruments that settle on Libor) implied that, broadly, the market expected two 25 basis point increases in the official Bank rate over the next two years (Chart 6).

In contrast to information from financial markets, the May Reuters survey of UK economists' expectations suggested that the majority of economists expected the official Bank rate to remain at 4.5% until at least the end of 2007. As explained in the box on page 129, there are several possible reasons for the divergence between economists' expectations and market-based forward rates.

Measures of uncertainty surrounding short-term sterling interest rates increased over the period, and the skew of the implied distribution of future sterling interest rates became less negative (Chart 7). Early in the review period, market participants had assigned a higher probability to a large downward move in short-term interest rates than a comparable upward move. By the end of May, option prices suggested a roughly balanced probability that sterling forward rates would rise or fall.

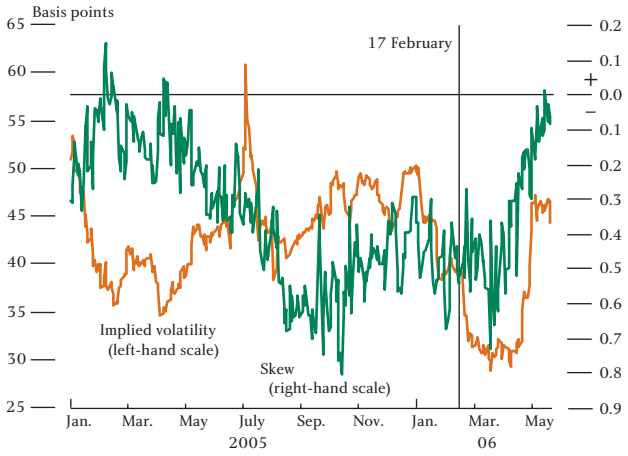
Chart 6
Sterling official and forward market interest rates plus survey expectations



Sources: Bank of England, Bloomberg, Euronext.liffe and Reuters.

(a) One-day nominal forward rates implied by a curve fitted to a combination of instruments that settle on Libor.
(b) Survey expectations based on mean of end-of-quarter forecasts.

Chart 7
Six-month implied volatility and skew from interest rate options



Sources: Bank of England and Euronext.liffe.

Exchange rates

Accompanying higher short-term sterling market interest rates, the sterling effective exchange rate index (ERI) rose by around 2% over the period, with most of the appreciation occurring towards the end of the review period (Chart 8). This largely reflected an increase in the value of sterling against the dollar of around 6½%.

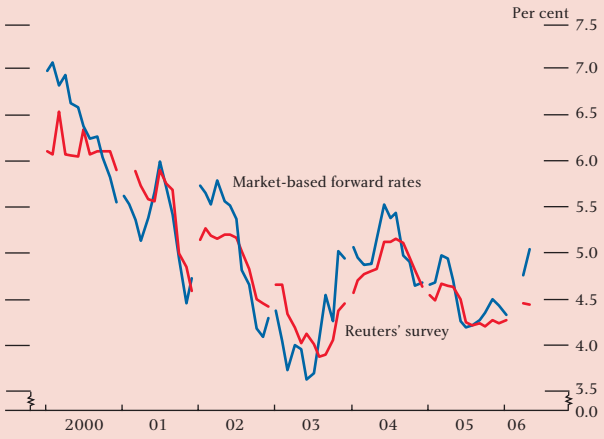
The dollar also depreciated against other currencies — its ERI fell by around 5%. Most of the fall occurred in the final month of the review period and, in particular, following the publication of a G7 communiqué in late

Forward rates and economists' expectations

In general, market-based sterling forward rates tend to track closely the mean expectation for the future official Bank rate from surveys of economists (Chart A). Since 2000, the average gap between the series has been only 6 basis points. In early May, the gap was 60 basis points, equivalent to nearly two standard deviations from the mean.

There are several possible reasons for the unusually large divergence observed recently, although their relative importance is unclear. First, economists may have had different views from financial market participants about the economic outlook and hence the path for future interest rates.

Chart A
Survey expectations and sterling forward interest rates(a)



Sources: Bank of England, Bloomberg, Euronext.liffe and Reuters.

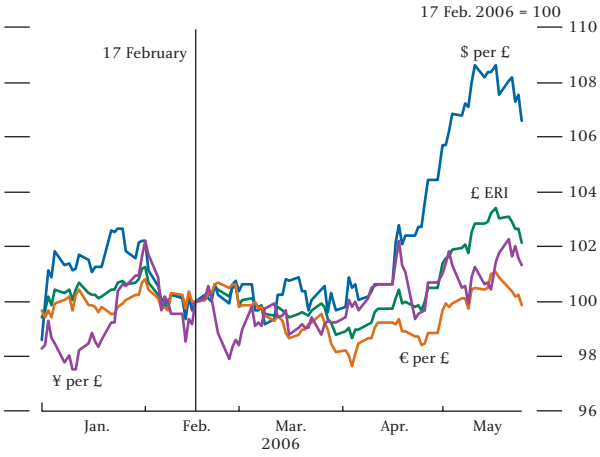
(a) Breaks in each series occur where the data refer to a different calendar year. The chart shows mean interest rate expectations for the end of the full calendar year following the survey date. Forward interest rates are taken from the Bank's interbank liability curve, with rates adjusted downwards by a moving average of the spread between six-month Libor rates and six-month GC repo rates to account crudely for the credit risk implicit in Libor rates.

Second, the two groups may update expectations at different times. Financial market prices typically adjust quickly in response to new information, whereas the economists surveyed may update their forecasts less regularly. This might imply a tendency for the market-based measure to lead mean survey expectations, for which there is some evidence, particularly during 2003 and 2004 H1.

Third, unlike survey expectations, market rates are likely to incorporate term premia that compensate investors for the uncertainty surrounding the path of future short-term interest rates.

April, which called for greater exchange rate flexibility in emerging economies, and especially China, to help reduce global imbalances.

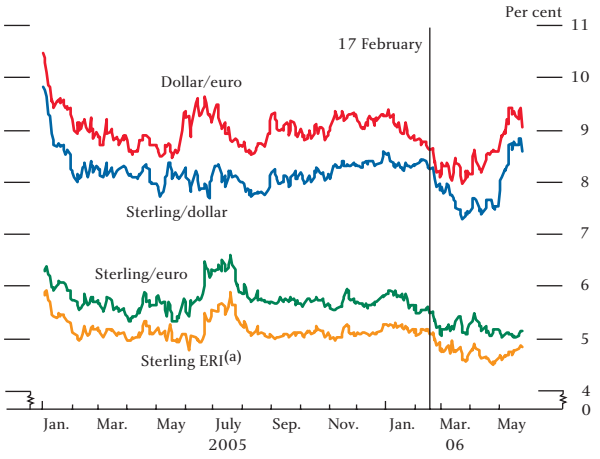
Chart 8
Cumulative change in sterling exchange rates



Source: Bloomberg.

Information from option prices suggests that uncertainty about the future level of the major dollar bilateral exchange rates increased slightly, particularly from early May onwards (Chart 9). But despite a rise in implied dollar-sterling volatility, based on techniques explained in the box on pages 130–31, the derived implied volatility for the sterling ERI fell slightly over recent months.

Chart 9
Three-month implied volatility from foreign exchange options



Sources: Bank of England and British Bankers' Association.

(a) Based on a simplified sterling ERI as discussed in the box on pages 130–31.

Moreover, the same information from option prices suggested that even if the dollar were to fall by a further 10% against the euro, the mean expectation was for a relatively small change in the sterling ERI. This reflects

Using option prices to derive a probability distribution for the sterling exchange rate index

Foreign currency option prices contain information about market participants' expectations of future movements in exchange rates. This box outlines a technique that uses option prices to gauge expectations about the future path of the sterling exchange rate index (ERI).(1)

A 'simplified' sterling ERI probability distribution

As there is no actively traded market in options on the sterling ERI, the risks to the future value of the index cannot be inferred directly. An indirect approach is to model the probability distribution of a 'simplified' sterling ERI based solely on the prices of options on euro-sterling and dollar-sterling, which are the key bilateral exchange rates in the sterling ERI.(2)

A statistical tool (known as a copula function) can be used to map the euro-sterling and dollar-sterling implied distributions onto a joint distribution. The process by which this is done can be explained in the following steps:

Step one — Use option prices to estimate (risk-neutral) probability distributions for euro-sterling and dollar-sterling.(3) Then construct a joint distribution using (arbitrary) initial values for the copula function parameters.

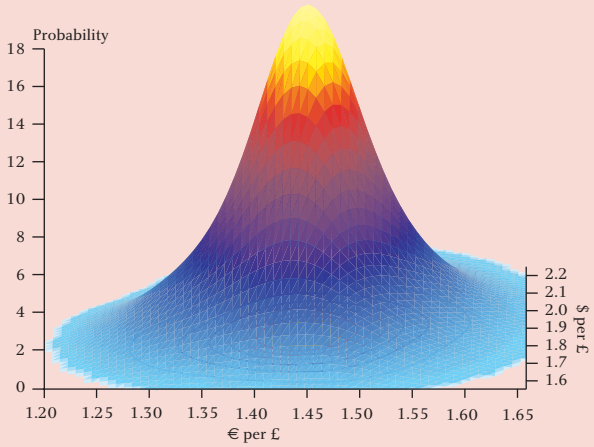
Step two — From this joint distribution, back out the implied marginal distribution for the euro-dollar exchange rate and compare it with a distribution estimated directly from euro-dollar option prices.

Step three — Update the parameters of the copula function so that they reduce the difference between the directly and indirectly inferred distributions for euro-dollar.

Step four — Repeat steps two and three until the difference between the two euro-dollar distributions is negligible.

An example of the resulting joint distribution for the euro-sterling and dollar-sterling exchange rates is shown in Chart A.

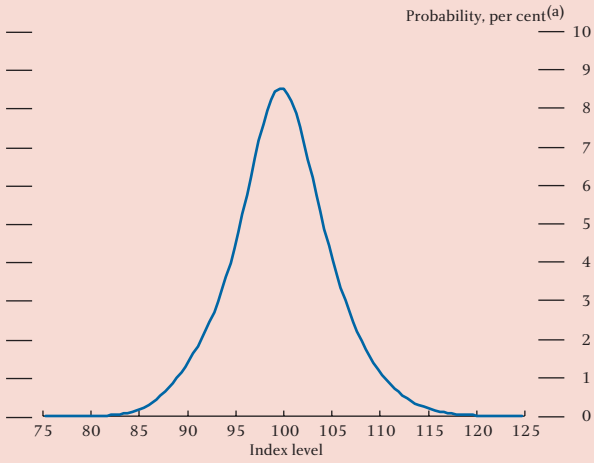
Chart A
Joint probability distribution



Source: Bank calculations.

From the joint distribution, an estimate of the implied probability distribution for the simplified sterling ERI can be constructed. More specifically, using weights of 0.7 for euro-sterling and 0.3 for dollar-sterling, it is possible to back out an implied probability distribution for the sterling ERI.(4) Chart B shows the

Chart B
Twelve-month sterling ERI probability distribution



Source: Bank calculations.

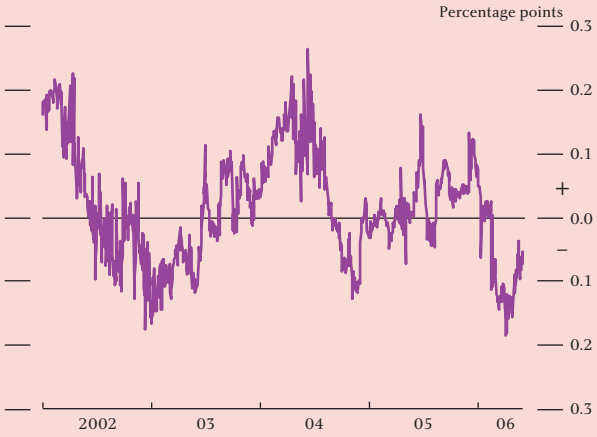
(a) Probability of the sterling ERI being within ±0.5 index points of any given level. For example, the probability of the ERI being at 100 (between 99.50 and 100.50 in a year's time was around 9%.

(1) For a more in-depth discussion of this topic see Hurd, M, Salmon, M and Schleicher, C (2005), 'Using copulas to construct bivariate foreign exchange distributions with an application to the sterling exchange rate index', *CEPR Discussion Paper no. 5114*.
(2) The euro-sterling exchange rate has a weight of around 55% and the dollar-sterling exchange rate a weight of around 20% in the sterling ERI.
(3) For more details on risk-neutral distributions see Clews, R, Panigirtzoglou, N and Proudman, J (2000), 'Recent developments in extracting information from options markets', *Bank of England Quarterly Bulletin*, February, pages 50–60.
(4) These weights were found by regressing euro-sterling and dollar-sterling against the overall ERI index.

distribution of the twelve-month ahead sterling ERI on 26 May 2006.

Given the probability distribution for the sterling ERI, it is possible to construct synthetic measures of implied volatility and risk-reversal statistics. Chart 9 in the main text shows that the implied volatility of the sterling ERI has declined a little over recent months. And, as shown in Chart C, the probability distribution has recently become less negatively skewed — on 26 May the perceived risks to the sterling ERI were broadly balanced.

Chart C
Twelve-month 'synthetic' risk reversal for the sterling ERI



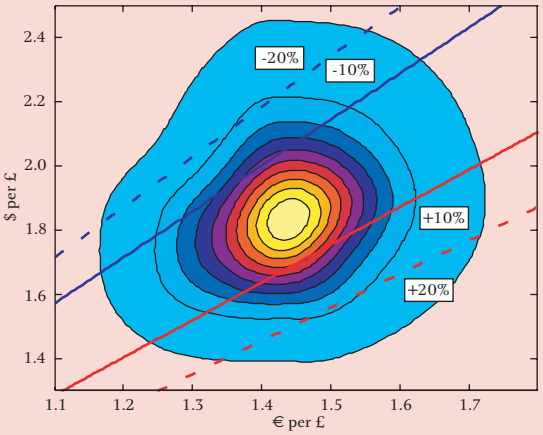
Sources: Bank of England and British Bankers' Association.

Estimating conditional probabilities

Another use of the joint distribution is to calculate conditional probabilities. For example, it is possible to construct an implied distribution for the sterling ERI over the next twelve months given an assumed change in the euro-dollar exchange rate.

Chart D shows an aerial view of the joint probability distribution for the simplified sterling ERI shown in Chart A. Essentially, a conditional distribution takes a vertical 'slice' of the joint distribution.(5) The location of the 'slice' is determined by the combination of dollar-sterling and euro-sterling exchange rates that are consistent with the assumed fall in the euro-dollar exchange rate. The diagonal lines in Chart D correspond to the locations of the conditional distributions (or 'slices') for a 10% or 20% appreciation (+) or depreciation (-) of the dollar versus the euro.

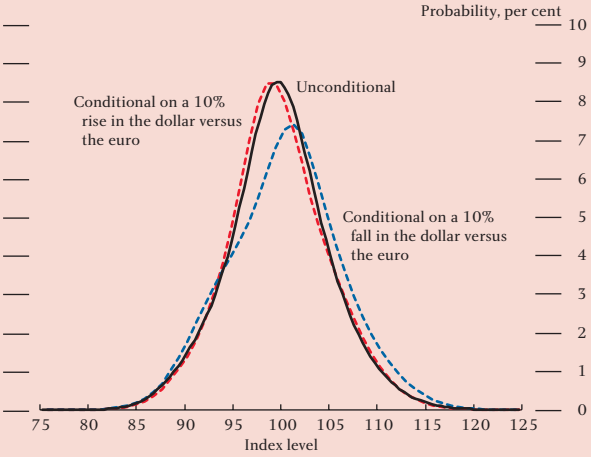
Chart D
Contour 'map' of joint probability distribution



Source: Bank calculations.

Chart E shows the conditional distributions for the sterling ERI in the event of a 10% fall/rise in the value of the dollar against the euro at the twelve-month horizon, as well as the unconditional distribution. At face value, the distributions indicate that option market participants perceived that even relatively large bilateral movements in the value of the dollar against the euro would tend have a relatively modest impact on the probability distribution of the ('simplified') sterling ERI.

Chart E
Twelve-month unconditional and conditional sterling ERI probability distributions(a)



Source: Bank calculations.

(a) Probability of the sterling ERI being within ±0.5 index points of any given level.

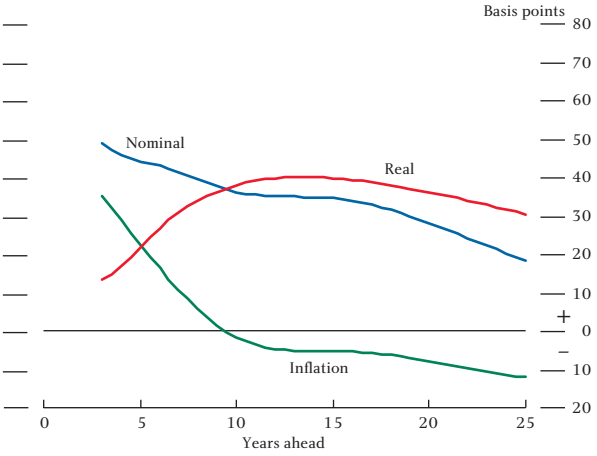
(5) More precisely, the conditional probabilities are calculated by applying Bayes' Law. See Hurd, Salmon and Schleicher (2005) for more details.

an expected appreciation of sterling against the dollar roughly offsetting an anticipated depreciation in sterling against the euro. And the risks around that conditional projection appeared to be broadly balanced (Chart E in the box on pages 130–31).

Long-term interest rates

Looking along the yield curve, sterling nominal forward rates rose (Chart 10). Out to around a five-year horizon, that predominantly reflected an increase in inflation expectations and/or inflation risk premia. Some market contacts reported that the move was consistent with the possibility of higher energy and commodity prices feeding through into consumer price inflation.

Chart 10
Changes in sterling forward curves since 17 February(a)



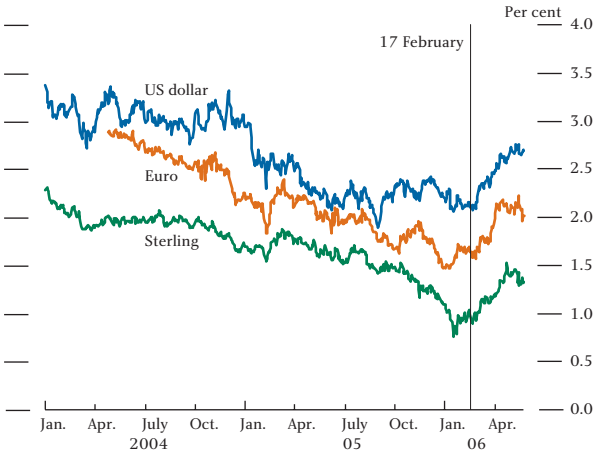
(a) Instantaneous forward rates derived from the Bank's government liability curves.

Sterling real forward rates rose across the curve. Much of the rise was in line with international long-term real rates, which increased steadily from mid-January until mid-May (Chart 11). However, towards the end of the review period long real forward rates fell slightly, perhaps reflecting some 'flight to quality' as financial market volatility rose and equity indices fell.

The increase in real forward rates over the period partly reversed the steady falls observed during the previous two years.(1) But just as it was difficult to be categorical about what had pushed them lower, so it is hard to be certain about the reasons for the recent rise.

It is possible that a change in sentiment among bond investors may have pushed up term premia on long-dated bonds over the review period. However, implied volatilities derived from long-dated swaptions prices provided little evidence of a sharp pickup in uncertainty surrounding long-term interest rates.

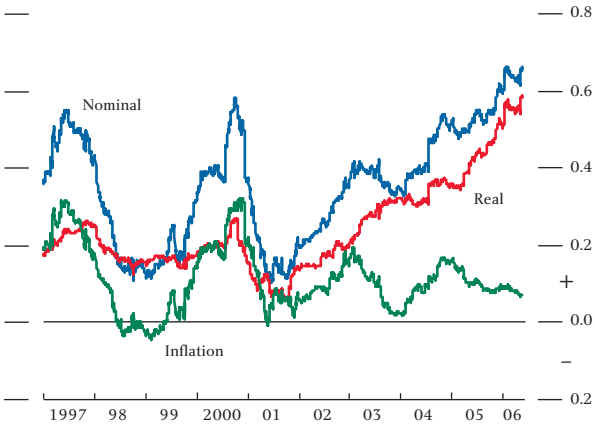
Chart 11
International nine-year real forward rates(a)



(a) Real component of euro rates implied by nominal government bond yields less inflation swap rates. Sterling and dollar real rates derived from the Bank's government liability curves.

Alternatively, sterling long real forward rates may have been influenced by the rise in short-term market interest rates. In principle, long real forward rates should be related to the equilibrium real interest rate, which is likely to be fairly stable over time. But over the past few years, movements in long-term real and short-term nominal interest rates have been highly correlated (Chart 12). One possible explanation is that market participants might have been updating their beliefs about the long-run equilibrium real rate based on observed moves in short-term rates.

Chart 12
Comovement of one-year nominal forward rates with ten-year nominal, real and inflation forward rates(a)(b)



(a) Instantaneous forward rates derived from the Bank's government liability curve.
(b) Coefficient from 260-day rolling regression of changes in ten-year nominal, real and inflation forwards on one-year nominal forward rates.

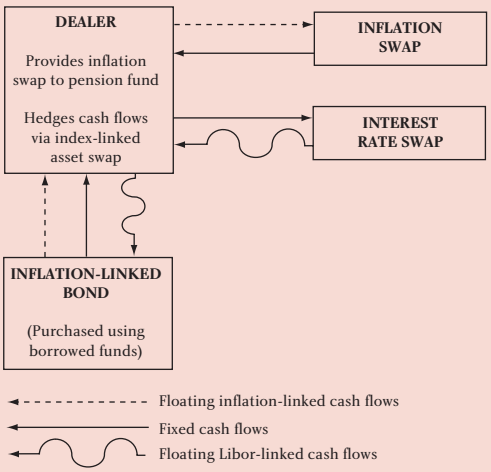
(1) Previous *Bulletins* have identified several possible explanations for the gradual drift down in long real forward rates, which began in late 2003. For example, see page 6 of the Spring 2006 *Quarterly Bulletin*.

Hedging inflation exposures by swap dealers

Dealers providing inflation swaps can hedge their exposure by isolating the inflation-linked cash flows on index-linked bonds using so-called asset swaps.

More specifically, having entered an inflation swap transaction, a dealer can convert fixed payments into floating (Libor-linked) payments using an interest rate swap (Chart A). The dealer can then borrow cash, on which it pays floating (Libor-linked) payments, which it invests in an index-linked bond to provide inflation-linked cash flows. Dealers may enter into asset swaps themselves or receive inflation-linked cash flows from hedge funds that undertake the asset swap. To the extent that these hedge funds are located overseas, this highlights the need for care in interpreting statistics on the location of gilt holdings, as the interest rate and inflation risk exposures on the gilts may have been transferred to a different location through the swap market.

Chart A
Hedging using an inflation-linked bond asset swap



Dealers can sometimes find hedges for their inflation-linked exposures in other parts of their business, such as making inflation-linked loans to companies, private finance initiative (PFI) projects or commercial property leases, although they may still need to retain exposures until they can find a suitable hedge. Alternatively, they can use non-government sterling-denominated inflation-linked bonds, issuance of which picked up recently. Over the review period, more than £1 billion of bonds linked to PFI projects were issued. There has also been a steady stream of index-linked bond issuance from utilities companies and other corporates, for example retailers.

Despite the rise in long real forward rates, the sterling curve remained inverted. As discussed in previous *Bulletins*, the inversion may indicate continued robust demand, relative to available supply, for long-maturity index-linked bonds from defined-benefit pension funds.

Over the review period, there were announcements by the UK Debt Management Office and by the UK Pensions Regulator (summarised on pages 135), which had the potential to affect the balance of anticipated supply of, and demand for, long-dated gilts. However, there were no obvious significant reactions in implied forward rates around the time of the announcements.

In addition to demand for long-dated gilts from defined-benefit pension funds, defined-contribution pension schemes may add to demand for long-dated gilts if scheme members purchase annuities on retirement and the annuity-provider then hedges its exposure in the bond market. The relationship between annuity prices and long-term interest rates is described in the box on this page.

Previous *Bulletins* have also noted that a large part of the demand for ultra-long dated sterling assets has been in the form of interest rate or inflation swaps tailored to match the future liabilities of pension funds. The providers of such swaps subsequently have exposure to inflation risk. Some ways in which they might seek to hedge this risk are outlined in the box on this page.

Credit markets and the search for yield

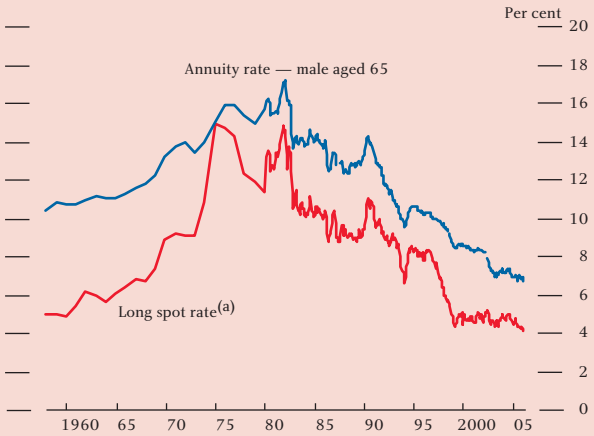
Despite the rise in long-term interest rates and falls in equity and other prices, spreads on sterling-denominated corporate bonds ended the period narrower, although they did widen a little around the middle of May (Chart 13).

Elsewhere, there was some evidence of a slight repricing of risk. For example, spreads on emerging market corporate debt widened by around 50 basis points during May, although they still remained quite close to historical lows recorded earlier in the year. Primary issuance also slowed in some corporate credit markets, and a few initial public offerings (IPOs) were postponed. But more generally, credit conditions did not appear to have changed significantly in the wake of the recent pickup in financial market volatility.

Decomposing changes in annuity rates

On retirement, an individual with a defined-contribution (DC) pension scheme will usually purchase an annuity, to provide a future income stream.(1) Providers of annuities typically purchase bonds in order to hedge this exposure, implying a link between bond yields and annuity rates.

Chart A
Sterling annuity and long-term interest rates since 1957



Sources: Bank of England, Edmond Cannon (Bristol University), GlobalFinancialData.com, William Burrows Annuities.

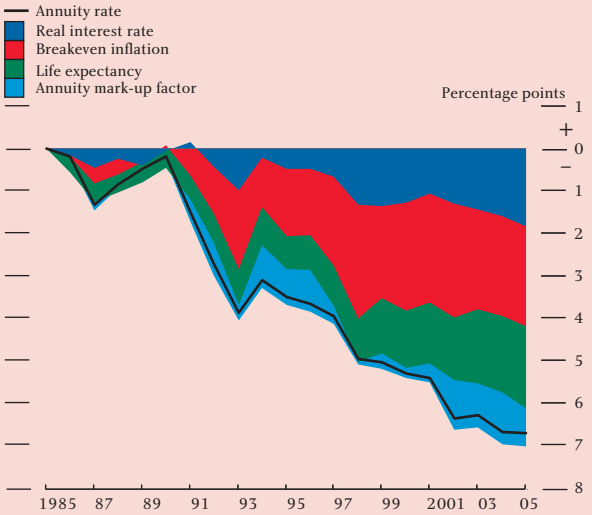
(a) 2½% consol yield until 1980 then 15-year spot rate. Spot rates derived from the Bank's government liability curve.

In recent years, annuity rates have fallen steadily, and at the end of 2005 had reached the lowest levels observed in several decades (around 7%). In part, these falls reflected declines in long-term interest rates (Chart A). However, annuity prices are determined by a number of factors. Annuity rates fall as discount rates fall; as life expectancy increases; and as the 'mark-up factor' (ie the expected compensation to the annuity provider) rises.

To see how these factors can affect annuity rates, it is informative to consider a simple model of fixed annuities with the price of an annuity equal to the present value of the expected future cash flows paid to the pensioner (adjusted to provide some expected profit to the annuity provider). Using the Bank's government liability yield curves, together with mortality data from the ONS,(2) it is possible to decompose changes in annuity rates into changes in these underlying components (Chart B).

Approximately 35% of the decline in annuity rates since 1985 can be attributed to a fall in breakeven inflation, with

Chart B
Contributions to cumulative changes in annuity rates (1985–05)(a)



Sources: Bank of England, Edmond Cannon (Bristol University), GlobalFinancialData.com, ONS, William Burrows Annuities and Bank calculations.

(a) Decomposition is a linear approximation of a non-linear relationship. As a result, the components of the chart do not sum exactly to the observed annuity rate.

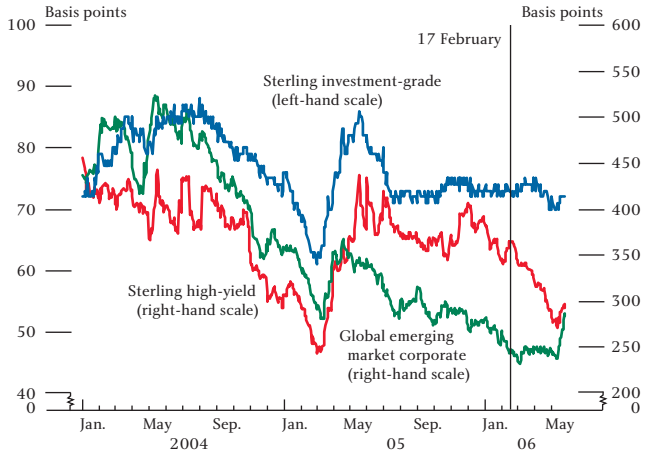
the largest falls following Bank operational independence in 1997. A further 27% of the decline is attributed to lower real interest rates. Twenty nine per cent of the decline reflects increased life expectancy, while the remainder appears to be attributable to an increase in the mark-up factor, estimated here as a residual.

One explanation for the rise in the mark-up is that annuity providers may have become more risk-averse as a result of unanticipated upward revisions to life expectancy. Increased life expectancy and a higher mark-up factor are likely to reduce pensioners' expected retirement income. In response, DC scheme members may choose to increase their age of retirement and/or increase their pension saving.

Lower inflation expectations do not neccessarily reduce the expected *real* retirement income of DC scheme members. At the same time, lower real interest rates should only reduce expected real retirement income if they are perceived to be permanent. And to some extent this effect may be offset by a rise in the value of these members' pension funds. For example, a simple dividend discount model of equity prices would predict a rise in the value of equities when *real* interest rates fall.

(1) Although there are a variety of annuity products on the market, this box focuses on a simple annuity that provides a fixed nominal payment each period until death, with a five-year guarantee, purchased by a male who retires aged 65.
(2) These data provide estimated survival probabilities for the *general population*. The analysis also assumes that changes in general population life expectancy proxy changes in the life expectancy of the annuity holder.

Chart 13
Option-adjusted corporate bond spreads



Source: Merrill Lynch.

Against a generally benign global macroeconomic backdrop, it is perhaps too early to tell whether the recent increase in financial market volatility and the gradual withdrawal of monetary accommodation is prompting a widespread repricing of risk.

Anecdotal evidence suggests that some market participants, especially hedge funds and others in the speculative community, have either reappraised the amount of financial risk associated with particular asset classes or reassessed their overall attitude towards risk. However, there are as yet few signs that other investors with longer investment horizons (for example pension funds and insurance companies) have significantly increased their required compensation for taking on risk.

Moreover, a number of the key elements of the 'search for yield' — described in previous *Bulletins* and in the Bank's recent *Financial Stability Reviews* — would appear to have remained largely intact over recent months. In particular, the repackaging of credit risk through collateralised debt obligations backed by assets such as leveraged loans, commercial real estate loans, home equity loans and investment-grade bonds continued apace. And credit conditions for leveraged buyouts of companies remained favourable.

Developments in market structure

Over the review period, there were two significant developments affecting the supply of and demand for long-dated sterling-denominated bonds. In addition, the Bank launched fundamental reforms to modernise the way in which the MPC's interest rate decisions are implemented in the sterling money markets. The box on pages 136–37 describes the work of the Securities Lending and Repo Committee over the past year.

DMO funding remit

On 22 March, HM Treasury announced the UK Debt Management Office (DMO) financing remit for the 2006–07 financial year. It stated that, of a total planned £63 billion of gilt issuance, there would be a minimum core programme of £53 billion comprising at least £10 billion in short conventional gilts (up to seven years' maturity), £10 billion in medium conventional gilts (7 to 15 years), £17 billion in long conventional gilts (over 15 years) and £16 billion in index-linked gilts. As well as the core programme, a £10 billion programme of supplementary issuance was introduced to allow the DMO to respond to changes in market conditions and the pattern of demand for gilts within the financial year. The supplementary issuance will be allocated on a quarterly basis, with the first quarter's £2.5 billion share allocated to long conventional gilts. The second quarter's share, announced on 31 May, will be split by the DMO between £1.25 billion of long conventional gilts and £1.25 billion of index-linked gilts.

The pensions regulator's approach to funding of defined-benefit pension schemes

On 4 May, the Pensions Regulator announced how it would regulate the funding of defined-benefit (DB) pension schemes, following a consultation exercise that began in October 2005. The main points noted by market commentators were: the increased emphasis on Section 179 and FRS17/IAS19 valuations for deficit measurements (which discount liabilities using market interest rates), rather than valuations on a buyout basis (which is the payment required by an insurer to take on the liabilities); that triggers should not be seen as standards or targets against which DB schemes would be measured; and that there would be no requirement for schemes sponsored by companies in good financial health to change their investment strategy.

Money market reform

The new framework for the implementation of UK monetary policy launched by the Bank on 18 May has four objectives:

- Overnight market interest rates to be in line with the official Bank rate, so that there is a flat money market yield curve, consistent with the official

The work of the Securities Lending and Repo Committee

The Securities Lending and Repo Committee (SLRC), chaired by the Bank, was formed in 1990. It provides a forum for discussion of market, infrastructure and legal developments in securities lending and repo markets and, where appropriate, makes recommendations to market participants and relevant authorities. It typically meets quarterly and comprises representatives from repo and securities lending practitioners, trade associations, infrastructure providers and UK authorities (the FSA, DMO and HM Revenue and Customs). SLRC membership has recently been widened to ensure a broader representation of market practitioners and trade associations. The minutes of SLRC meetings are available on the Bank's website.(1)

Over the past year, the SLRC has discussed proposed changes to the infrastructure supporting the UK securities lending and repo markets, including:

- *Euroclear's consultation on securities financing on its future Single Platform*, to which it is planned that the current national central securities depositories in the Euroclear group (including CREST in the United Kingdom) will migrate. SLRC members emphasised that the Single Platform should include the best features of the current national systems, including CREST. In particular, delivery-by-value (DBV), or something analogous, should be available on the new platform to enable bundles of securities to be financed overnight, or for a longer period, in a straightforward way. Relatedly, the Bank has been pressing for any DBV facility to be not just overnight, as at present in CREST, but also to include provision for term transactions to remain 'intact' during the day in order to reduce the intraday liquidity required to unwind DBVs at the start of each day.

- *LCH.Clearnet gilt DBV repo clearing project*, scheduled to be introduced in 2006, which aims to introduce the benefits of a central counterparty, including netting, for repos against bundles of gilts selected using the DBV service offered in CREST. In particular, SLRC members have discussed the proposed standard size (shape) for trades sent to LCH for clearing, favouring no compulsory size on the basis that failed trades were rare in the gilt DBV market.

The SLRC's market participant members have also discussed the impact of proposed regulatory changes affecting securities lending and repo markets, in particular two new EU directives:

- *The Transparency Directive*, due for implementation in January 2007, and in particular its requirements regarding notification of interests in shares in securities lending transactions. SLRC practitioner members had raised concerns about the limited value of this information and the potential reporting burden on securities lending market participants. SLRC has discussed further how these requirements might be implemented in a way that meets the requirements of the Directive while being workable and cost-effective for market participants.

- *The Market in Financial Instruments Directive (MiFID)*, due for implementation in November 2007. It seems that MiFID's implications for repo and securities lending will be limited; for example, the best execution requirement will not apply to repo and security lending transactions conducted between Eligible Counterparties (over 90% of the total securities lending market). The Committee has also discussed whether additional reporting requirements to the FSA would apply to securities lending and repo.

The SLRC has worked to improve understanding of the securities lending and repo markets and explain their important role at the heart of the modern financial system. For example, the Committee has contributed to debates about how lenders of shares can meet their corporate governance responsibilities. To this end, in conjunction with a number of trade associations representing the various participants in the market and the London Stock Exchange, the SLRC has sponsored two publications:

(1) www.bankofengland.co.uk/markets/gilts/slrc.htm.

- An *Introduction to Securities Lending*, which aims to describe the modern markets for a non-expert; and

- *Securities Lending and Corporate Governance*.

Both publications are available on the SLRC pages on the Bank of England website.(1)

One important function of the SLRC is to maintain voluntary codes of market conduct for the gilt repo, securities lending and equity repo markets. The Securities Borrowing and Lending Code and the UK Annex to the Code were first published in December 2000 and updated in December 2004. The Gilt and Equity Repo Codes are currently being updated and new versions should be issued later in 2006 or early 2007.

Other issues recently discussed by the SLRC included:

- *Basel II requirements*, in particular relating to the disclosure of underlying principals in securities loans. Except where borrowing is undertaken through what is classed as a 'central counterparty', this requirement will require borrowers to identify the individual lenders of securities and to identify what collateral is being allocated to the lender.

- *The ESCB/CESR(2) standards on clearing and settlement*, which aim to promote the safety and efficiency of European clearing and settlement systems and to create a level playing field through the provision of a harmonised regulatory framework. Standards relevant to securities lending include a dedicated standard on securities lending and a standard on risk controls to address participants' failures to settle. The finalisation and subsequent implementation of the ESCB/CESR standards will continue to be monitored by SLRC.

- *Amendments to the FSA rules to allow securities lending through Euroclear's automated lending programme by UK insurance companies*. Securities lending is 'approved' if certain conditions are met concerning the assets lent, the counterparty and the collateral provided. Approval means the securities lent are still treated as being the lending company's assets for solvency purposes.

- *The 2003 Giovannini group report on EU cross-border clearing and settlement arrangements*, setting out a process to overcome 15 barriers to efficiency. Current issues include work under way to harmonise national rules relating to corporate actions processing, which could have an impact on securities lending.

An SLRC subgroup, comprising trade association representatives and legal advisers, is responsible for obtaining legal opinions on the effectiveness of the close-out netting provisions in the Global Master Securities Lending Agreement (GMSLA), the Overseas Securities Lender's Agreement (OSLA) and the Master Gilt Edged Stock Lending Agreement (GESLA) under different jurisdictions around the world. UK authorised firms are required to obtain these legal opinions in order to support the reporting of securities lending exposures to the FSA (on a net basis) for capital adequacy purposes.

Recently the subgroup has been discussing the potential to harmonise this exercise in gathering legal opinion with the similar process organised by the International Capital Markets Association (ICMA) and The Bond Market Association (TBMA) for repo transactions under the Global Master Repo Agreement (GMRA). That would probably yield cost savings and efficiency gains for participating firms. Further work will be carried out to finalise the format, timing and funding of combined opinions, as well as establishing the appropriate committee structures to review them.

(1) Available at www.bankofengland.co.uk/markets/gilts/securitieslending.pdf and www.bankofengland.co.uk/markets/gilts/skgjun05.pdf.
(2) European System of Central Banks/Committee of European Securities Regulators.

Bank 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.

- 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.
- A simple, straightforward and transparent operational framework.
- Competitive and fair sterling money markets.

The framework is based on a system of voluntary remunerated reserves with a period-average maintenance requirement, together with standing borrowing and deposit facilities available on demand throughout the banking day to a wide range of commercial banks.

Reserve accounts are current accounts with the Bank that are remunerated at the official Bank rate decided by the MPC. Banks target average balances with the Bank over the periods between the MPC's monthly interest rate decisions rather than having to 'square up' at close of business every day, making it easier for them to manage day-to-day cash flows. In the interests of simplicity, it has therefore been possible to discontinue two facilities previously used by banks to manage their end-of-day payments flows.

Specifically, the Bank of England Late Transfer Scheme (BELTS) End-of-Day Transfer Scheme (EoDTS) facilities ended on 17 May. There is, however, still a short window for settlement banks to make payments to each other after the payment system has closed on the last day of each maintenance period (when banks need to achieve their average reserve targets). This is in addition to the overnight standing facilities.

The averaging mechanism for reserves allows banks to run their balances at the Bank up or down in response to changes in market interest rates. Arbitrage should smooth overnight market interest rates so that they do not deviate materially from the rate expected to prevail on the final day of the monthly maintenance period. And on the final day of the maintenance period, the standing facilities perform a rate-setting function, setting a narrower ±25 basis points corridor for market rates.

The standing facilities provide liquidity insurance to financial institutions. A wide range of banks and building societies can borrow (against collateral) from, or deposit money with, the Bank in unlimited amounts. Except on the final day, the penalty rates are ±100 basis points (around the official Bank rate).

The Bank has also changed its open market operations (OMOs). The purpose of OMOs is to finance banknotes in circulation and ensure that the banking system can achieve its aggregate reserves target over the maintenance period. The Bank's short-term OMOs have changed to weekly repo operations for one-week maturity. A routine overnight fine-tuning operation is conducted on the final day of the maintenance period.

To reduce the size of the weekly short-term OMOs, monthly long-term repo OMOs were introduced in January 2006. These provide financing at market rates, at maturities of three, six, nine and twelve months. The Bank also plans to purchase conventional gilts and high-quality foreign currency bonds swapped into fixed-rate sterling to back the enduring part of the banknote issue;(1) further details will be announced following consultation with OMO counterparties, and liaison with the DMO.

The Bank's new framework is set out in more detail in its 'Red Book' issued on 15 May.(2)

Bank of England official operations

Changes in the sterling components of the Bank of England balance sheet

The size of the sterling components of the Bank's balance sheet grew following the reforms to the Bank's sterling monetary operations (Table A). To reflect better the structure of the balance sheet following the launch of the new framework, the Bank has revised the weekly Bank Return published on its website.(3)

(1) A joint statement by the Bank and the DMO was issued on 15 May and is available at www.bankofengland.co.uk/markets/money/documentation/boe_dmo.pdf.
(2) 'The Framework for the Bank of England's Operations in the Sterling Money Markets' is available at www.bankofengland.co.uk/markets/money/publications/redbook0506.pdf.
(3) Available at www.bankofengland.co.uk/publications/bankreturn/index.htm.

Table A
Simplified version of Bank of England consolidated[a] balance sheet[b]

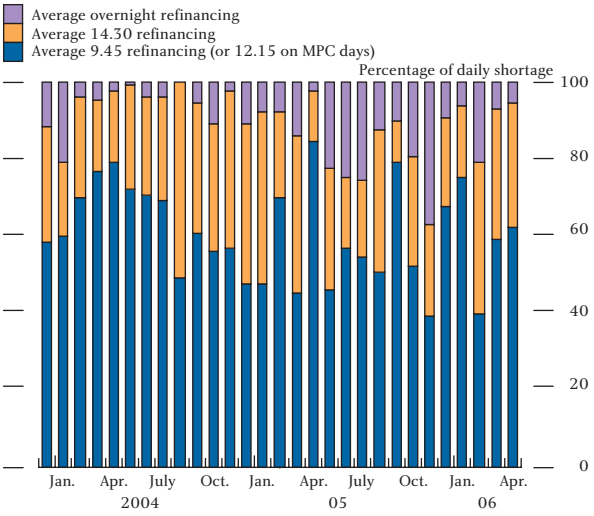
£ billions

Liabilities	26 May 2006	17 Feb. 2006	Assets	26 May 2006	17 Feb. 2006
Banknote issue	41	40	Short-term sterling reverse repo	37	23
Settlement bank balances/reserve balances	22	<0.1	Long-term sterling reverse repo	15	6
Standing facility deposits	0	n.a.	Ways and Means advance	13	13
Other sterling deposits, cash ratio deposits and the Bank of England's capital and reserves	9	10	Standing facility assets	0	n.a.
Foreign currency denominated liabilities	15	14	Other sterling-denominated assets	4	4
			Foreign currency denominated assets	18	18
Total[c]	**87**	**64**	**Total**[c]	**87**	**64**

(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 2005 *Annual Report*, pages 38–39 and 61–69 for a description.
(c) Figures may not sum to totals due to rounding.

Until mid-April, the majority of lending in the Bank's short-term OMOs continued to be carried out daily at a two-week maturity at the official Bank rate (Chart 14). From the middle of April the Bank changed the maturity of its daily repos from two weeks to one week. This change was implemented in order to smooth the transition to the larger, weekly short-term OMO following the introduction of the new framework on 18 May.

Chart 14
Lending via the Bank's open market operations[a][b]



(a) Monthly averages.
(b) Up to and including 17 May 2006.

A key element of the money market reforms is that eligible UK banks and building societies may choose to hold remunerated reserves with the Bank. The initial group of 41 reserve account holders set an aggregate reserves target for the first maintenance period (18 May to 7 June) of £23 billion.[1]

The introduction of these reserves significantly increased the amount of funds the Bank needs to provide to the market via its OMOs. Broadly, the Bank has to provide sufficient financing to meet demand for banknotes and to enable reserve banks to achieve their targeted reserves. Notes in circulation remained the largest liability on the Bank's balance sheet and rose slightly over the period as a whole.

Since the launch of the new framework, the Bank has conducted weekly OMOs for one-week repo at its official rate. The first two operations, for settlement on 18 and 25 May, were for £36 and £37 billion and were covered 1.03 and 1.90 times respectively.

In order to help manage its balance sheet and limit the size of its short-term repo lending, the Bank has provided £15 billion of longer-term financing through three, six, nine and twelve-month repos at market rates determined in monthly tenders, which began in January.

The Bank held three long-term repo operations during the review period. These were fully covered and yield 'tails'[2] were small, particularly in the nine and twelve-month repos where the amounts on offer were smallest (Table B).

From late February to April, there was a slight increase in the use of gilts and Treasury bills and a corresponding fall in the use of euro-denominated European Economic Area (EEA) government debt as short-term OMO collateral (Chart 15). Following the launch of the new framework, the Bank's counterparties used a slightly

(1) A list of institutions participating in the reserves scheme is available at www.bankofengland.co.uk/markets/money/documentation/participants060515.pdf.
(2) These measure the difference between the lowest accepted rate and the weighted average accepted rate and so give an indication of the spread of accepted bid rates.

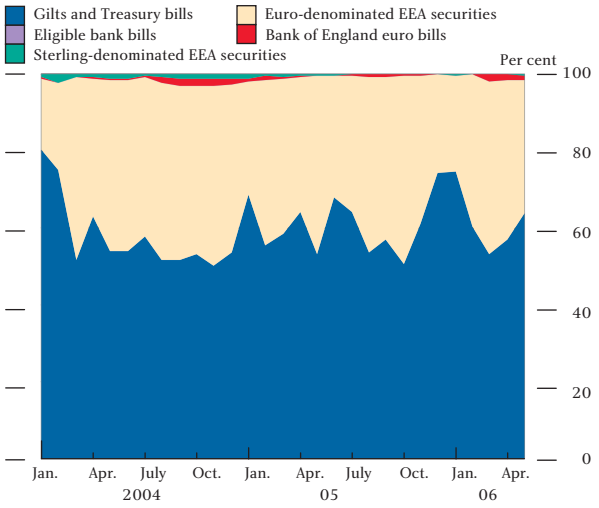
higher proportion of gilts in short-term OMOs than in the period running up to the reforms. In the longer-term repo operations, counterparties used a slightly larger proportion of euro-collateral relative to that used in the short-term operations. Contacts suggested that this was mainly due to cost considerations.

Table B
Long-term repo operations

	Three-month	Six-month	Nine-month	Twelve-month
14 March 2006				
On offer (£ millions)	2,850	750	400	200
Cover	2.67	5.12	3.25	5.15
Weighted average rate[a]	4.417	4.457	4.515	4.565
Highest accepted rate[a]	4.430	4.460	4.515	4.565
Lowest accepted rate[a]	4.410	4.455	4.455	4.565
Tail[b] (basis points)	0.7	0.2	0	0
18 April 2006				
On offer (£ millions)	2,850	750	400	200
Cover	2.34	3.35	3.25	3.75
Weighted average rate[a]	4.468	4.513	4.575	4.64
Highest accepted rate[a]	4.48	4.515	4.575	4.64
Lowest accepted rate[a]	4.46	4.505	4.575	4.64
Tail[b] (basis points)	0.8	0.8	0	0
16 May 2006				
On offer (£ millions)	2,850	750	400	200
Cover	3.16	2.48	2.31	4
Weighted average rate[a]	4.548	4.65	4.755	4.845
Highest accepted rate[a]	4.57	4.65	4.755	4.845
Lowest accepted rate[a]	4.541	4.65	4.755	4.845
Tail[b] (basis points)	0.7	0	0	0

(a) Per cent.
(b) The yield tail measures the difference between the weighted average accepted bid rate and the lowest accepted rate.

Chart 15
Instruments used as OMO collateral in short-term operations[a]

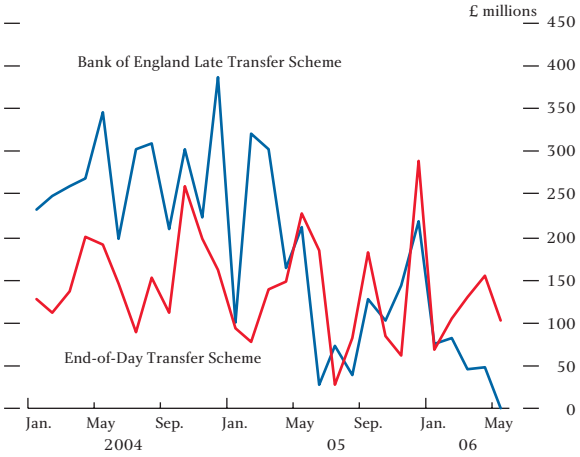


(a) Monthly averages.

Late transfer schemes

The relatively low level of flows in the end-of-day schemes continued (Chart 16). Average daily payments in the Bank of England Late Transfer Scheme (BELTS) were less than £50 million on average, while average daily flows in the End-of-Day Transfer Scheme (EoDTS) were generally less than £150 million. As reported above, these facilities are not needed in the modernised system and have been withdrawn.

Chart 16
Bank of England Late Transfer Scheme and End-of-Day Transfer Scheme[a][b]



(a) Monthly averages.
(b) Up to 17 May 2006.

Changes in the foreign-currency components of the Bank of England balance sheet

As part of the new monetary regime introduced in 1997, the Bank has been able to hold its own foreign exchange reserves. These, and other assets used to facilitate participation in the euro area's TARGET payment system, are financed by issuing foreign-currency securities.

On 28 March 2006, the Bank auctioned €1 billion of the 2009 note as part of its euro-denominated notes programme; the first €2 billion tranche had been auctioned on 24 January 2006. Cover in the auction of the second tranche was 2.8 and the average accepted yield was 3.393%, approximately 13.2 basis points below the euro swaps curve at the time. This was the second and final auction of the 2009 note and increased the value outstanding in the market to €3 billion. The total nominal value of Bank euro notes outstanding in the market rose to €7 billion.

On 24 April, the Bank of England announced it would issue no further euro bills, with the April 2006 euro bill auction being the last in the series. The final euro bill will mature on 12 October 2006.

Employment of the Bank of England's capital

As set out in previous *Bulletins*, the Bank holds an investment portfolio of gilts (currently around £2 billion) and other high-quality sterling-denominated debt securities (currently £1.1 billion) of approximately

the same size as its capital and reserves and aggregate cash ratio deposits with the Bank. These investments are generally held to maturity. Over the current review period, gilt purchases were made in accordance with the published screen announcements: £37.6 million of 4.75% 2020 in March, £37.6 million of 4.75% 2015 in April and £37.6 million of 5% 2014 in May. A screen announcement on 1 June 2006 detailed the purchases to be made over the following three months.

House prices and consumer spending

By Andrew Benito, Jamie Thompson, Matt Waldron and Rob Wood of the Bank's Monetary Analysis area.

This article explores the complex relationship between house prices and consumer spending. It explains that the strength of the relationship can vary considerably over time. And it highlights the key roles that both common factors and causal links have played in the weakening association between house prices and consumer spending in recent years.

Introduction

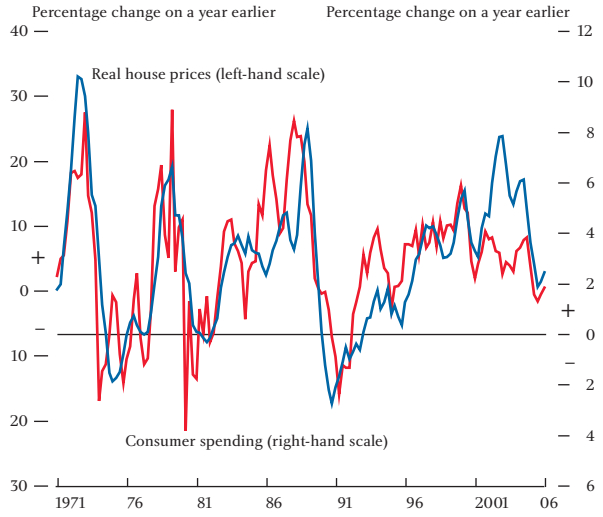
In a famous experiment, Pavlov showed how a past association between two events could be mistaken for a causal link between the two. In his experiment, a bell was rung as his dogs were provided with food. Over time, the dogs learned to associate the two, believing that the ringing of a bell would be accompanied by the arrival of food. Of course, that was not necessarily the case. It is an example of the fact that correlation is not causation.

A similar point applies to the interpretation of correlations among many macroeconomic time series. The link between consumer spending and house prices is a good example. The two series have tended to move together in the past. In part, that is because house price movements can cause changes in spending. But the correlation also reflects the influence of common factors, like expectations of future income, that affect both house prices and consumption.

More recently, the empirical association between house prices and spending has waned (Chart 1). That might reflect a weakening in the causal links between them. Or it could be the case that, in contrast with the past, recent fluctuations in house prices have not been driven by common factors like expected income. Instead, a different set of factors might have been important. They could have boosted house prices, but had a more limited impact on consumer spending. This illustrates that the implications of a rise in house prices for consumer spending depend on why house prices have risen.

This article starts by discussing the common factors and causal links that lie behind the association between house prices and consumer spending. It then examines how changes in the strength of these different channels, and the impact of other influences, might account for the apparent weakness of that relationship in recent years. Throughout the article, a common theme is that the linkages between house prices and consumer spending are more subtle — and rather less stable over time — than is often supposed.

Chart 1
Real house prices[(a)] and consumer spending



Sources: Nationwide and ONS.

(a) Nationwide house price index deflated by the consumer expenditure deflator.

What explains the past empirical association?

Common factors

There are a number of factors that affect both house prices and consumer spending. For example, a reduction in interest rates, an increase in people's access to credit, and an improvement in income expectations would all tend to boost demand for consumer goods and

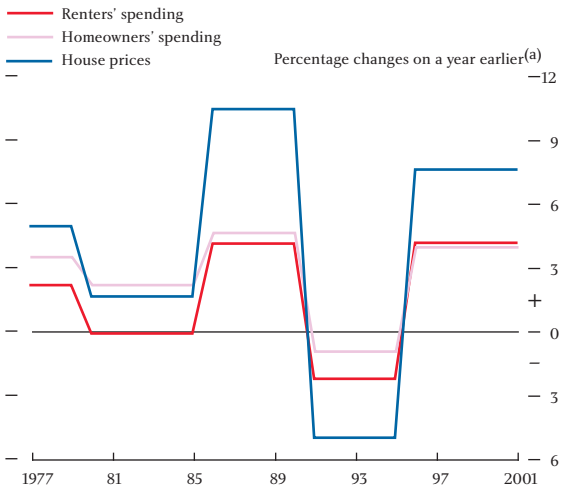
services, as well as demand for housing. In such cases, there might appear to be a direct relationship between higher house price inflation and higher consumer spending growth. But, in reality, both outcomes are driven by a common influence.

The key common factor is probably expected income (see King (1990) and Attanasio and Weber (1994)). If there is an increase in the income households expect to earn in the future, that would lead them to plan higher spending — both now and in the years ahead. Households would demand more consumer goods and services, and their demand for housing would rise too. The increase in future expected income would therefore lead to a rise in both consumer spending and house prices.

Evidence suggests that income expectations have at times played an important role in the comovement between house prices and consumer spending. For example, changes in income expectations should affect the behaviour of renters as well as homeowners. So if income expectations had played a key role, we might expect the spending of renters to have moved with house prices — even though they do not own a home. Based on evidence from household surveys, that appears to have been the case (Chart 2).

Similarly, if income expectations have been important, then house price movements would tend to be more closely related to the spending of the young than the old. Younger households have more years of work ahead

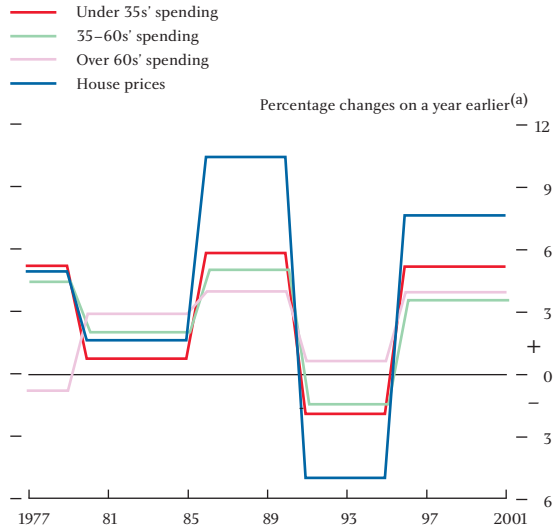
Chart 2
House prices and consumer spending by tenure group



Sources: Attanasio *et al* (2005) and the ONS Family Expenditure Survey.

(a) In order to smooth year-on-year fluctuations, annual data are averaged over periods of high or low consumption growth: 1977–79, 1980–85, 1986–90, 1991–95, and 1996–2001. Underlying data are for calendar years until 1992 and for financial years thereafter.

Chart 3
House prices and consumer spending by age group



Sources and footnote: see Chart 2.

of them and should benefit most from a general rise in the wages that people expect to earn in future. Chart 3 shows that the spending of younger households did indeed appear to move more closely with rising house prices in the late 1980s and late 1990s, as well as with the fall in house prices in the early 1990s. As the box on page 145 explains, however, some studies have also pointed to a strong link between house prices and the spending of older households. So evidence on the spending behaviour of different age groups is not clear-cut.

House prices and household wealth

Wealth and consumer spending are closely linked. The amount that a household can spend over its lifetime is limited by the wealth it can accumulate. And, in general, a household is likely to respond to an increase in wealth by spending more both now and in the future.

As a result, it is often supposed that house prices influence consumer spending because housing is a major part of households' wealth. Housing accounts for around 40% of total household assets. More people own homes than shares (see Banks and Smith (2000)). And, for many households, housing is the most valuable asset they own (see Barwell *et al* (2006)).

But, in reality, the link between house prices and aggregate wealth cannot explain the historical association between house prices and consumer spending (see Aoki *et al* (2001)). That is because of a key characteristic of housing.

What makes housing different?

Housing is very different from other assets, such as shares. People not only own houses, they obtain a service from them — they live in them. By contrast, households only own shares; they do not 'consume' them.

This characteristic means that house price movements affect people in two key ways. First, they affect the value of the houses that people own. Second, they affect the cost of living in them. When house prices rise, typically rents do too — so renters face higher housing costs.(1) And even though homeowners' mortgage payments do not necessarily change, they have to pay more for their housing as well. A homeowner who intends to move house will have to pay more to live in the new home. Those staying put will also pay more, albeit implicitly, by continuing to stay in their now more expensive house.(2)

The overall impact on the wealth accumulated by an individual — and hence their spending — depends on the balance of these two effects. For some households, they will roughly cancel each other out. The rise in the value of their home is matched by the rise in their future housing costs. But an increase in house prices can also generate winners and losers.

Broadly speaking, homeowners planning to 'trade down' to a cheaper home, or sell for the last time, are likely to be better off following a rise in house prices. Their gain from the increased value of their home should exceed their loss from the increased housing costs they face in the future. By contrast, renters or homeowners who plan to 'trade up' tend to be worse off.

In aggregate, gains in household wealth would be slightly larger than losses, to the extent that some part of the increase in future housing costs is borne by future generations. However, when forming their spending plans, people may take into account the cost of higher house prices to be faced by their children and grandchildren. Some will plan to leave them money (or even a home) to assist with their future housing costs. Such households may not perceive any change at all in the resources that they have available for spending over their lifetimes.

Housing is therefore very different from other assets.(3) In particular, house price rises cannot provide a significant boost to consumer spending by raising aggregate wealth. But housing has a number of other characteristics, such as its role as collateral against which people can borrow to finance spending. As the next section highlights, this means that house price increases can stimulate spending in ways that many other assets cannot.

Causal links between house prices and consumer spending

Redistribution of wealth

Changes in house prices redistribute wealth. When house prices rise, those who plan to trade down gain while those who intend to trade up lose (see above). If these groups respond differently to changes in their wealth, that redistribution of wealth could be a significant influence on aggregate spending.

In practice, households planning to trade up tend to be younger households and those planning to trade down are often older homeowners. Older households do not need to spread any change in wealth over as much time as younger households, which could lead them to react more strongly to a change in wealth than younger households.

However, other factors may dampen that redistributional impact. First, the extent to which house price changes redistribute wealth may be limited by bequests (see above). Second, constraints on borrowing may mean that younger households' spending is more closely related to changes in disposable income than that of older households.(4) So when house prices and rents increase, they may be forced to cut back on their consumption in line with the increase in their housing costs. That could lead them to react more strongly to a change in wealth than older households.(5)

(1) Weeken (2004) discusses developments, such as falls in real interest rates, that can lead to higher house prices relative to rents.
(2) This cost is often referred to as an opportunity cost. The opportunity cost of living in a house as an owner-occupier is the rent that would be received if the house were let to a tenant. As house prices and rents rise, so too does the opportunity cost of being a homeowner or the implicit cost of living in that home.
(3) A further reason is that housing is not traded internationally. As a result, UK households in aggregate cannot realise their capital gains on housing when house prices rise.
(4) Younger households, and particularly renters, are more likely than older households to face constraints on their ability to borrow. This may make it difficult for these households to maintain their current level of consumer spending as housing costs rise. See Flemming (1973) for a broader discussion of the implications of borrowing constraints for consumption.
(5) Other factors could have a dampening effect. For example, some households may be so uncertain about their future housing needs, or about future movements in house prices, that they are unwilling to adjust their spending plans when house prices change.

How important are the different channels from house prices to consumer spending?

Aggregate data may not be sufficiently informative to explain why house prices affect consumer spending. That is because different theories predict broadly similar behaviour in aggregate. But the same theories make distinct predictions for how households with certain characteristics should respond to changes in house prices. This box considers what we can learn from the spending behaviour of those individual households.

If the links between house prices and consumer spending reflect a common influence like income expectations, then house prices should have a stronger impact on the spending of the young than the old (see page 143). By contrast, a causal link like wealth redistribution points to a stronger effect on the spending of older households — those most likely to trade down in the future and benefit from house price rises.

The different theories also have implications for the behaviour of renters and homeowners. On the one hand, higher income expectations would affect renters and homeowners, so the spending of both of these groups might rise with house prices (see page 143). On the other hand, the collateral and precautionary savings channels should affect only those who own their homes. That implies a closer relationship between house prices and spending for homeowners than renters.

Two recent studies have attempted to use these insights to explore the practical importance of the explanations for the comovement between house prices and consumer spending. Both use data from the Family Expenditure Survey, a survey of UK households that provides information about their spending behaviour, income and family demographics over the past few decades. But they adopt different methodological approaches.

The study by Attanasio *et al* (2005), using data from 1978 to 2001/02, provides evidence that income expectations have in the past played a crucial role in accounting for aggregate variation in consumption and house prices. The authors find that the association between house prices and consumer spending was stronger for the young than for the old, and broadly similar for homeowners and renters. A study by Campbell and Cocco (2005), using data from 1988 to 2000/01, is also consistent with income expectations being important. But it provides evidence of a strong link between house prices and consumer spending for older households as well. The reason why the studies' results differ is not clear.

Existing studies do not provide a definitive guide to the links between house prices and spending. Nonetheless, analysis of the behaviour of individual households appears to be key to gauging the relative importance of the various links between house prices and consumer spending.

Overall, redistributional effects may help to explain the positive relationship between house prices and consumer spending shown in Chart 1. But the influence of the factors discussed above is very uncertain and is likely to vary from time to time — for example, as the borrowing constraints faced by households change. As such, there is no reason to expect the strength of this channel to be stable over time.

Housing as collateral

Unlike many other assets, housing can be used as collateral for loans. When house prices rise, there is an increase in the amount of housing equity and hence collateral at homeowners' disposal. That can boost spending because lenders are usually prepared to lend more, and at a lower interest rate, when there is more collateral. (It also implies a link between mortgage equity withdrawal and consumer spending. The strength of that link is examined in the box on page 146.)

This affects the spending of two different sorts of household. The first are households who wanted to borrow and spend more prior to a rise in house prices, but were unable to do so because they did not own any equity in their homes and lenders refused to extend them credit. A rise in house prices would allow these households to borrow where they previously could not.

More homeowners probably fall into a second category. They already have access to credit of some form. But the

The role of mortgage equity withdrawal

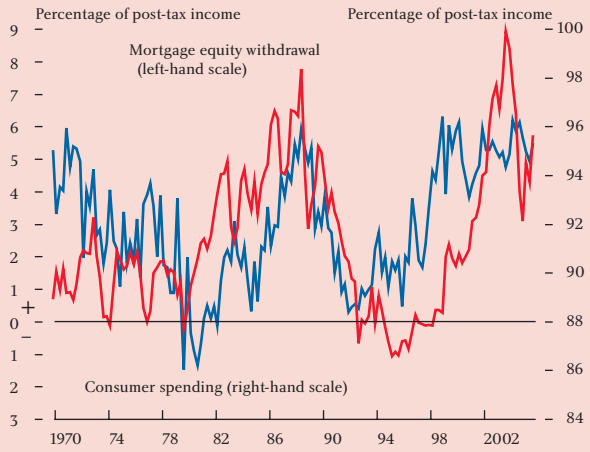
Mortgage equity withdrawal (MEW) occurs whenever households, in aggregate, increase the borrowing secured on housing assets without spending the proceeds on improving or enlarging the housing stock. MEW can be thought of as a mechanism by which households can finance spending.(1)

Different types of household behaviour contribute to MEW. Equity can be withdrawn when someone remortgages or takes out an additional secured loan to finance their spending. But other types of equity withdrawal do not increase the indebtedness of the individual withdrawer. For example, households might trade down or leave the housing market entirely. As such, the motivation for withdrawing equity — and the propensity to consume out of funds withdrawn — varies considerably between households.

The link between MEW and consumer spending can also vary markedly over time. Until the mid-1980s, it was difficult for homeowners to borrow actively against the value of their house to finance spending. As a result, MEW did not move closely with consumption. With financial liberalisation, however, credit constraints were eased and equity could be withdrawn to meet pent-up consumer demand. For a while, MEW and consumption moved together. But that period was exceptional: over the past decade, the association between MEW and consumer spending has been weaker (Chart A).

This weak association between MEW and consumption should not be surprising. Consumption need not be financed by equity withdrawal: it can also be funded by income, the sale of financial assets(2) and unsecured borrowing. Moreover, the bulk of equity withdrawals are related to trading down or sales where there is no subsequent purchase. Households making such withdrawals are more likely to pay off debt or save withdrawn equity than immediately spend the proceeds. And the value of those withdrawals will tend to move with house prices, rather than reflect any decision to finance additional spending (see Benito and Power (2004)).

Chart A
Mortgage equity withdrawal and consumer spending



(1) MEW is most often associated with the collateral effect discussed on pages 145–47. However, it may also be associated with other channels like the redistribution channel (for example, older households may spend increased housing wealth by releasing housing equity); and the precautionary channel (households who become unemployed may release some of the equity in their homes to tide them over). See pages 144–45 and 147 respectively.
(2) For example, the proceeds from building society demutualisations might have been used to fund consumption. In 1997, households received around £35 billion from this source.

issue for them is the price (or rate of interest) at which that credit is available. The rate of interest on secured borrowing is generally lower than on unsecured borrowing because it is less risky for lenders: collateral limits their potential losses should the borrower default on the loan. And, to a certain extent, the greater the collateral held by households the cheaper it is for them to borrow. That provides another reason why increases in collateral can lead to greater borrowing and spending.

Research suggests that these effects could be important. For example, Aoki *et al* (2001) show how house prices can affect consumer spending — and housing investment — through the collateral channel.

Evidence also suggests that the strength of the collateral channel is likely to vary from year to year. One reason is the availability and price of unsecured credit (see Bridges *et al* (2006)). The interest rate charged on unsecured loans may be higher than for secured borrowing. But it could still be attractive to some homeowners since unsecured loans do not typically incur a fixed fee, whereas there may be fixed costs associated with the withdrawal of equity. The impact of house price gains might therefore vary as the availability and price of unsecured credit changes over time.

In addition, the strength of this channel depends on the collateral households already have at their disposal.

When levels of housing equity are low (or even negative as they were for a significant number of households in the early 1990s), then house price rises that increase the level of equity and collateral could provide a relatively large boost to consumer spending. But when borrowing is already supported by the widespread availability of collateral — most notably, following a period of sustained house price rises — then the impact on consumer spending should be more limited.

Finally, the collateral effect of house prices on spending is complicated by its impact on future, as well as current, spending. An increase in the amount of collateral available to homeowners does not, by itself, increase household wealth. So rather than implying an increase in overall lifetime consumption, the collateral channel implies a change in the timing of consumption. By withdrawing equity, a homeowner boosts current spending at the expense of lower spending in the future.(1)

Precautionary saving

House prices can also affect consumer spending via precautionary saving. This is saving by households as a response to uncertainty about their future financial situation. For example, if it is difficult or costly to take out insurance against unanticipated future events like redundancy, households can instead save as a form of 'self-insurance' (see Benito (2006a)).

Housing wealth can form part of households' precautionary savings. For instance, if homeowners fall ill and this affects their earnings, they may be able to withdraw equity from the home to tide them over until their earnings recover. As house prices and housing equity rise, the need to hold other forms of wealth for precautionary reasons may be reduced.(2) That can provide further support to spending.(3)

Research suggests that households may respond to income uncertainty by leaving housing equity in the home, instead of extracting it, as well as accumulating liquid savings (see Carroll *et al* (2003)). That suggests that households look to their housing equity as fulfilling some kind of precautionary savings role.

The strength of this channel would vary in response to changes in perceived uncertainty. For example, households may be less willing to run down their precautionary savings if they became more uncertain about their future job prospects.

In common with the collateral channel, the strength of the precautionary savings channel is also likely to depend on the amount of housing equity that households have at their disposal. When households already have a sufficient amount of equity in their homes to satisfy the need for precautionary saving, further increases in equity provide no further insurance. In such cases, homeowners are less likely to run down financial balances of precautionary saving and consumer spending is less likely to increase.

But the precautionary saving channel is distinct from the collateral channel. To the extent that households were saving to provide a cushion against unexpected events like redundancy, a higher home value means that saving is no longer so important. And rather than respond to that increased home value by borrowing more, they may just save less instead.

Housing market activity and spending

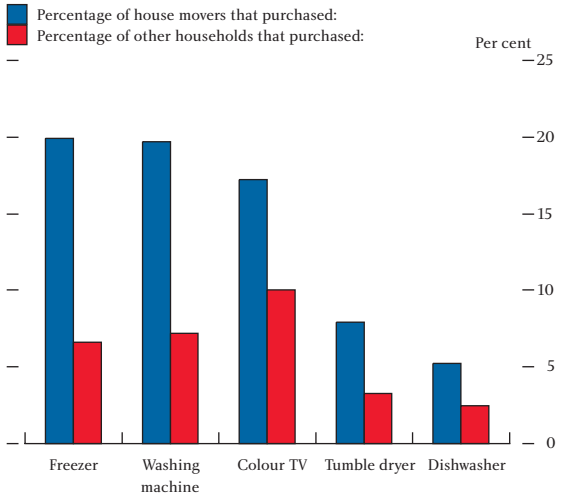
Another way in which housing market developments can cause changes in consumption is through spending related to moving home. Housing transactions may be associated with consumer spending if households are more likely to purchase some goods and services when they move home (Chart 4). And, in the past, housing transactions have tended to move closely with house prices (see Benito (2006b)). That could explain some of the observed comovement between house prices and consumer spending.

But any effect on consumer spending from this channel is likely to be small and short-lived.(3) The types of goods and services that are closely related to moving house account for a relatively small proportion of total consumption. And the number of households that move

(1) The effect on current spending could be quite large if the homeowner were credit constrained prior to the rise in house prices. By contrast, the effect on spending in any particular period in the future is likely to be much smaller as that lower future spending is spread out over time.
(2) Housing equity is an imperfect substitute for other types of precautionary savings, such as bank deposits, because its future value is more uncertain and it is more costly to access. As a result, households may not wish to hold a high proportion of precautionary savings in the form of housing equity — notwithstanding recent innovations in mortgage markets that allow households to draw on equity when required (see Smith and Ford (2002)).
(3) In common with the collateral channel, this represents a change in the timing of consumption: any additional current spending comes at the expense of future expenditure.

home each year typically constitutes only a small proportion of all households (see Benito and Wood (2005)).

Chart 4
Consumer spending and moving house(a)



Source: British Household Panel Survey 1992–2002.

(a) Refers to purchases and house moves over the past year.

Why did the empirical relationship weaken?

The previous section highlighted the likely factors behind the historical association between house prices and consumer spending. Common factors are likely to have played a key role. Certain causal links, such as the collateral channel, may have been important too. But why should these channels have weakened in recent years?

Common factors

The influence of common factors can vary considerably over time. But, in many cases, these factors cannot be directly observed. That is the case for perhaps the most important common influence — income expectations.

Fortunately, a number of measures provide an indirect indication of households' perceptions of future income prospects. Recent income growth can be informative if households use past developments as a guide to future income growth. The pattern of consumer spending may also be telling. Any change in household perceptions of future income prospects would tend to affect the share of durable spending in overall consumption, as adjusting the stock of durable goods to a new desired level requires a large initial swing in expenditure (see Power (2004)). Finally, surveys of consumer confidence might provide a rather more direct read on households' perceptions (see Berry and Davey (2004)).

Over recent decades, marked movements in house prices and consumption have typically been accompanied by similar fluctuations in these indicators of expected income. That would be consistent with this common influence playing an important role in driving movements in both house prices and consumer spending.

But the indicators have remained relatively stable over the past few years, at or around the average levels of the past 30 years (Table A). That is illustrated by Chart 5, which presents a simple proxy for income expectations — the average difference of each indicator from its mean. The relative stability of the proxy contrasts markedly with the pickup, and subsequent fall, in real house price inflation over this period.

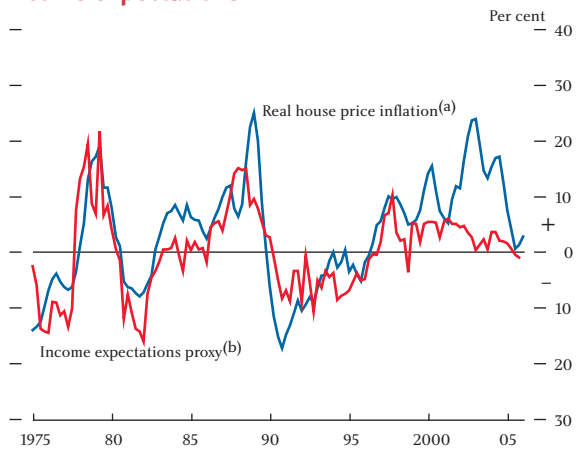
Table A
Indicators of income expectations(a)

	Average since 1975	2001	2002	2003	2004	2005
Percentage changes on a year earlier						
Real post-tax labour income(b)	2.4	4.2	2.8	1.9	2.6	1.5
Percentage of total nominal spending						
Spending on durables	12.0	12.2	12.1	12.3	12.4	12.0
Balance						
GfK consumer confidence	-6.3	1.1	3.1	-4.4	-3.4	-3.1
Memo: Percentage changes on a year earlier						
Household consumption(c)	2.8	3.0	3.5	2.6	3.5	1.7

Sources: GfK and ONS.

(a) Averages of quarterly data.
(b) Deflated by consumer expenditure deflator.
(c) Chained volume measure.

Chart 5
Real house price inflation and a simple proxy for income expectations



Sources: Bank of England, GfK, Nationwide and ONS.

(a) Four-quarter rate. Real house prices were calculated by deflating the Nationwide house price index by the consumer expenditure deflator.
(b) Simple average of the Table A indicators' deviation from mean. The indicators differ in their variability so, for comparability, each series was normalised by dividing by its standard deviation relative to house price inflation.

The evidence suggests that, in contrast with the past, recent fluctuations in house prices have not been driven by common influences like expected income. That appears to be a key reason why consumer spending growth remained relatively stable as house prices surged. Indeed, the relative stability of spending growth is, in itself, an indication that income expectations had not risen sharply.

Instead, it seems likely that a different range of factors has driven house prices higher in recent years. Demand for housing has been boosted by the rate of household formation, which has tended to exceed the limited response of supply. A further source of increased demand may have been investment demand. And other developments, like the decline in long-term real interest rates, may have been important too.

Such factors are likely to have had a less marked influence on consumer spending than on house prices. And that should explain some of the divergence between house prices and consumer spending in recent years.

Causal links

Redistribution of wealth

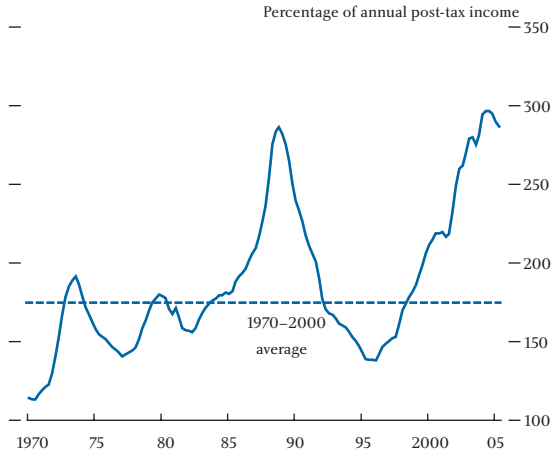
The earlier discussion noted that a rise in house prices could increase aggregate spending by redistributing wealth from younger to older households. It also noted that the size of this wealth redistribution would be smaller if older households transferred some of their increased wealth to their children. Such transfers might be more likely to occur when house prices rise sharply, as they have in recent years. Indeed, Tatch (2006) estimates that the proportion of first-time buyers under the age of 30 receiving assistance with their deposit increased from less than 10% in 1995 to almost 50% in 2005. Correspondingly, the amount of wealth redistributed from younger to older generations over this period is likely to have been smaller than it otherwise would have been.

Housing as collateral

The strength of the collateral channel depends crucially on the extent to which households are prevented from bringing forward spending by borrowing against the value of their homes. Those constraints may have been particularly binding prior to the rapid rise in house prices of the late 1980s, given that lenders only began to offer equity withdrawal in the mid-1980s (see the box on page 146). But there are a number of reasons to believe that such constraints on households were relatively weak at the beginning of this decade.

House prices rose significantly in the latter half of the 1990s. That had a large impact on the amount of equity at homeowners' disposal. By 2000, housing equity was twice as large as annual household income — above the average of recent decades (Chart 6). So at the start of the current decade, the aggregate amount of collateral at homeowners' disposal was already substantial.

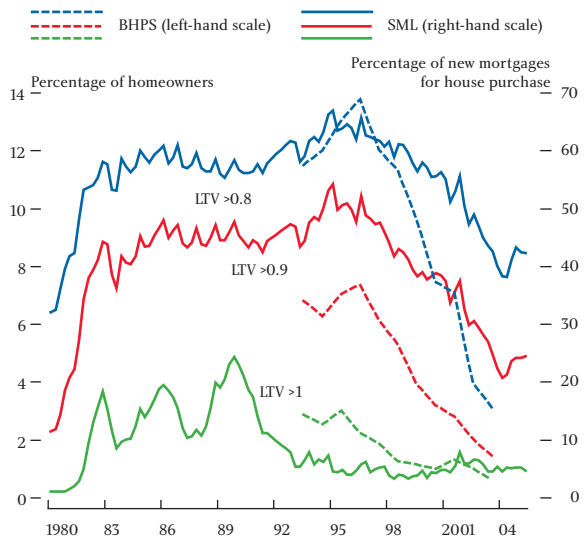
Chart 6
Housing equity



The large amount of collateral available could indicate that households were generally not prevented from bringing forward spending. However, the aggregate amount of collateral can be a poor guide when equity is unevenly distributed. As such, it is also important to consider the disaggregate picture.

The British Household Panel Survey (BHPS) and the Survey of Mortgage Lenders (SML) provide information about the distribution of housing equity (see Hancock and Wood (2004)). According to the BHPS, the proportion of homeowners with a large mortgage and hence low equity, relative to the value of their house, fell sharply in the latter half of the 1990s (Chart 7). The SML, which covers only those taking out a new mortgage, reports similar findings. It suggests that, by the beginning of the current decade, high loan to value ratios were less prevalent than they had been throughout the previous 20 years. Some of that decline might be related to more cautious bank lending policies. But it is also consistent with a broadly based rise in the collateral at households' disposal.

Chart 7
Loan to value (LTV) ratios



Sources: British Household Panel Survey (BHPS) and Survey of Mortgage Lenders (SML).

Moreover, homeowners (and non-homeowners) would also have benefited from greater access to unsecured credit during the 1990s. Households appear to have taken increasing advantage of more flexible types of unsecured debt, such as credit cards (see May *et al* (2004)). And that could also have weakened their dependence on house price gains to facilitate spending (see Bridges *et al* (2006)).

Overall, it seems likely that households were rather less constrained at the beginning of this decade than they had been prior to previous periods of rapid house price rises. That points to a less important role for house prices in loosening spending constraints. And it suggests that, over the past few years, the collateral channel should have been weaker.

Precautionary savings

Precautionary savings provide a type of self-insurance against unanticipated future events. So the strength of this channel depends on both households' desire for such insurance and the role of further house price gains in providing it.

It is possible that households' desire for precautionary savings has declined in recent years. The economic environment has been much more stable since the inflation-targeting framework was introduced (see Benati (2005)). That increased stability might have lowered households' perceptions of the probability of future adverse developments, like redundancy.(1) And, in turn, that could have reduced households' desired precautionary savings.

It also seems likely that recent house price gains have played a less important role in providing insurance. As discussed above, housing equity had already reached high levels by the beginning of the current decade. So many households would already have had more than enough equity in their homes to satisfy the need for precautionary savings — especially if they required less insurance on account of the more stable economic environment. In addition, housing equity may have become a less important provider of precautionary savings in recent years because of the easier availability of unsecured credit on favourable terms. These developments would point to a weaker impact of house prices on consumer spending through this channel.

Additional influences

Consumption is affected by a range of factors other than house prices. So the looser empirical association between house prices and consumer spending might not only reflect weaker causal links and the limited role of common factors like income expectations. It could also be related to other determinants of consumption, such as financial wealth. Direct and indirect holdings of shares account for around a third of household net assets. And the FTSE All-Share index fell by around 40% between 2000 Q1 and 2003 Q1.

The implications of that decline in financial wealth are not straightforward. Share prices are much more volatile than house prices, so households may look through some share price movements in case they are quickly reversed. Two thirds of households' equity wealth is held indirectly, for example in pension funds. The value of that wealth might not be as easily observed, or indeed accessed, as directly held equity wealth (see Davey (2001)). And, crucially, the implications for consumer spending of any change in share prices depend on its cause.(2)

Moreover, share prices affect both consumption and house prices.(3) By lowering household wealth, a fall in

(1) This might not have lowered overall earnings uncertainty if earnings at the household level have become more variable. There is evidence that earnings were more uncertain in the early 1990s than they had been in the late 1970s and 1980s (see Dickens (2000)).
(2) See Labhard *et al* (2005), Millard and Power (2004), and Millard and Wells (2003).
(3) The factors that cause movements in share prices — such as changes in expected future economic prospects — can also affect house prices and consumption (see pages 142–43).

Estimating the role of housing

The relationship between house prices and consumer spending appears to have weakened in recent years. This box examines the extent to which the association has waned.

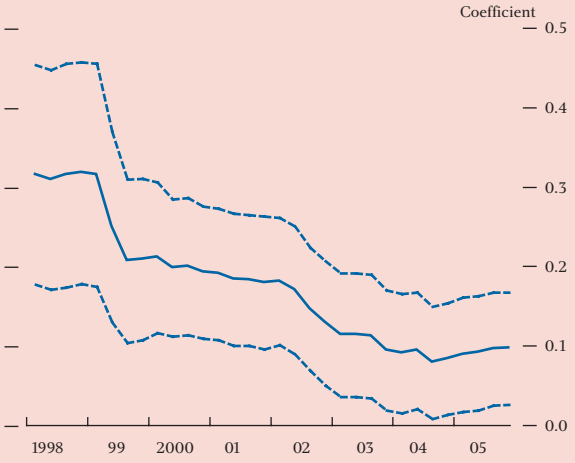
A common way of quantifying the relationship between house prices and consumption is to estimate an economic model. One such model is the *Bank of England Quarterly Model* (see Harrison *et al* (2005)). The Bank model maintains that, in the long run, aggregate consumption depends on financial wealth like shares and non-financial wealth such as households' lifetime earnings. Consumption does not depend on house prices in the long run,(1) given the special characteristics of housing described on page 144. In the short run, consumption growth depends on changes in housing wealth, income, employment, interest rates, how much consumption and net financial wealth differ from their long-run or 'core' values, and an error term.(2)

The coefficient on housing wealth provides a guide to how closely house prices move with consumption, when we allow for other factors that also influence spending. It conflates a variety of links between house prices and consumption. It captures the impact of causal links, like the collateral channel. And it may also reflect the influence of common factors like income expectations.(3)

To assess whether the association between housing wealth and consumption has changed over time, we estimated the short-run equation over rolling 20-year periods.(4) In other words, we estimated the equation over the first 20 years of data, and moved that sample window forward one quarter at a time. As we did so, we recorded how the estimated coefficient on the housing variable changed. This is shown in Chart A.

The chart shows that the housing wealth coefficient varies considerably. That is consistent with the idea that the implications of a house price rise for spending depend on the factors behind the house price rise, and those factors are likely to differ from period to period. It is also consistent with marked changes over time in the strength of causal links between house prices and spending.

Chart A
Rolling estimates of housing wealth coefficient in *Bank of England Quarterly Model*(a)



(a) Each data point represents the housing wealth coefficient obtained when the short-run equation was estimated over the 20-year period to that quarter. The dotted lines show the 95% confidence interval.

Further, the chart shows that the coefficient on housing wealth tends to decline as we use more recent data.(5) We obtained similar results when estimating the coefficient in a more conventional error-correction consumption function, similar to that estimated by the IMF (2006). This suggests that the empirical relationship between house prices and consumption has indeed weakened.(6)

Overall, the empirical association between house prices and consumer spending appears to have declined, even when we allow for additional influences like income and financial wealth. That accords with the idea that causal links may have been weaker, and common factors less influential, in the recent past. But, as the box on page 145 discusses, there is a limit to what aggregate models can tell us about the factors behind the waning association between house prices and spending.

(1) Note that changes in the value of the housing stock that are caused by home improvements or the building of new homes, rather than changes in the general price of housing, do affect consumption in the long run.
(2) The core values are from the theoretical part of the *Bank of England Quarterly Model*, which can be thought of as an organising framework for analysing economic issues. See Harrison *et al* (2005) for more details.
(3) The model directly controls for the common influence of interest rates, by including it as an explanatory variable. It may also indirectly control for some of the influence of common factors like income expectations, to the extent that they are captured in the core part of the model or proxied by other variables in the equation such as current income.
(4) This included the variables listed above as well as a constant.
(5) The Wald coefficient test suggests that this decline is statistically significant: the coefficient estimated over the first 20-year period is significantly different to the coefficient estimated over the most recent 20-year period.
(6) In practice, the *Bank of England Quarterly Model* includes an additional variable that allows the incorporation of judgements that change the size of the effect on consumption of changes in the value of housing (see pages 203–04 of Harrison *et al* (2005)).

share prices would lead households to demand fewer consumer goods and services and less housing. So the decline in share prices earlier this decade should have depressed not only consumption but also house prices.(1)

Overall, the decline in share prices is likely to have depressed spending growth in the early part of this decade. But even allowing for such additional influences, the empirical association between house prices and consumer spending appears to have declined (see the box on page 151).

Conclusion

House prices and consumer spending have often moved together in the past. But that relationship is unlikely to be driven by the impact of house prices on aggregate wealth. Instead, it is more subtle. The relationship depends on causal links, such as the impact of house prices on the equity that people can withdraw from their homes to finance spending. And, crucially, it depends on common factors — influences that affect both house prices and consumer spending.

The strength of these channels can vary considerably over time. For example, collateral effects depend importantly on the amount of equity already available to households. The causes of house price movements are also important. Sometimes common factors can drive changes in both house prices and consumer spending. At other times, house prices may shift on account of housing market developments that are of limited significance for spending. In general, the implications of any rise in house prices rest on why house prices have risen.

The evidence suggests that causal links have been weaker, and common factors less influential, in the recent past. To what extent is unclear. Unfortunately, controlled experiments, such as those by Pavlov, are not feasible when examining the economy and attempting to quantify such effects. But, overall, it seems likely that both common factors and causal links are key to the weaker association between house prices and consumer spending of the past few years.

(1) This effect could have been mitigated by a shift in investors' preferences from equities to housing.

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Investing in inventories

By Rob Elder and John Tsoukalas of the Bank's Structural Economic Analysis Division.

As well as investing in capital, firms invest in inventories or stocks. For some businesses, investing in stocks is crucial for their profitability. Shops are better able to attract consumers if their shelves are full and they can offer a wide variety of products. Manufacturers are more likely to win contracts if their customers can trust them to cope with sudden swings in their orders by holding sufficient stocks. Nevertheless, investment in stocks is actually a very small proportion of total spending in the United Kingdom. On average between 2000 and 2005 it was just 0.4% of GDP. But it is volatile. For example, annual GDP growth slowed from 3.1% in 2004 to 1.8% in 2005. Weaker investment in stocks can account for 0.4 percentage points (or a third) of that slowdown. This article examines firms' motives for investing in inventories in order to understand the role it plays in swings in whole-economy output.

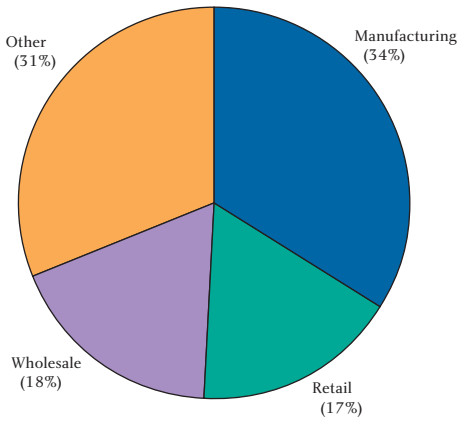
What are inventories?

Investment in inventories occurs when a firm puts goods on one side to hold in reserve, rather than immediately sell them or use them in production. For example, if a manufacturer buys steel to use in production that is classed as an input. If the steel is not used, but rather kept in a warehouse in case the supply of steel is interrupted in the future, then it is an inventory.

As defined by the ONS, inventories include many different goods and services. They include stocks of raw materials, and of finished goods, held by manufacturers. They also cover stocks of goods held by retailers and wholesalers, including the produce held on shop shelves. Inventories also include 'work in progress' which can cover either goods or services. For example, if a solicitor's firm puts in hundreds of hours of work on a case, but has not billed the client because the case has not been completed, then that output is measured as an increase in inventories.

The ONS typically refers to 'changes in inventories' when it presents the expenditure components of GDP. That is what we mean by 'investing in inventories'. 'Stockbuilding' is also used by some commentators to denote the same thing. In this article we will use those terms interchangeably. The concept covers increases in inventories, whether due to purchase or internal transfer (ie when a firm allocates some goods it has produced to stocks). It also includes disposals whether due to sales, internal transfers or if they are simply used up. So, investment in inventories can be negative if firms allow their stocks to run down over a period. Inventories are measured before the deduction of any depreciation, consistent with other types of investment. They are measured by asking firms to assess the change in their inventories in nominal terms, and then deflating those numbers with the appropriate price index to arrive at a volumes measure. In the National Accounts, inventory investment includes the so-called 'alignment adjustment', which is the ONS's residual category used to align different measures of GDP growth. Because that adjustment is not a direct measure of investment in inventories, we remove it from any measures reported here.

Chart 1
Sectoral breakdown of stocks

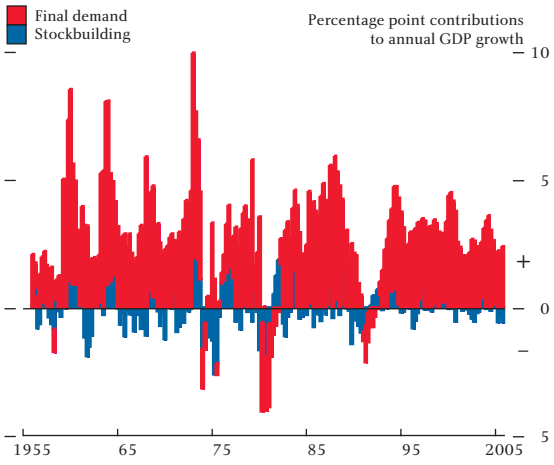


Stock holdings are concentrated in the manufacturing and distribution sectors. Broadly speaking, the manufacturing sector and the distribution sector each account for about a third of all stocks (Chart 1). But each only accounts for a sixth or less of whole-economy output. The remaining two thirds of the economy accounts for just a third of all stock holdings.

Has investment in stocks reduced the volatility of output?

Although investment in inventories is the smallest expenditure component of GDP, it often has a noticeable impact on aggregate GDP growth, because it can be volatile. Chart 2 shows the contribution to four-quarter GDP growth from investment in inventories, compared with the contribution from all other elements of demand ('final demand'). The inventories contribution has varied significantly: between -2.6 and +2.1 percentage points since 1955.

Chart 2
Final demand and stockbuilding



Another feature of Chart 2 is the apparent tendency for the contribution from stockbuilding to be sharply negative during downturns in final demand. That is apparent in the downturns of 1975, 1980 and 1991 in Chart 2. It would suggest that stockbuilding has exacerbated the volatility of output growth, relative to final demand. To check that more precisely, Table A shows the standard deviation of growth rates of whole-economy final demand and output. For both quarterly and four-quarter growth rates, output has been more volatile than final demand. The only difference between output growth and final demand growth is the contribution from stockbuilding. So that would suggest that movements in inventories have increased the volatility of output. This is true for the manufacturing and distribution sectors, and for periods of above and below average growth.

Table A
Volatility of growth rates

Standard deviations (percentage points)

	Output (GDP)	Final demand (GDP excluding stockbuilding)
Quarterly	0.98	0.92
Annual	2.12	1.77

Sample: 1960–2005.

Motives for holding stocks

The fact that investment in inventories has added to the volatility of output seems puzzling. But it is more explicable once one considers all of the motives firms might have for holding stocks. The three main motives, as set out by Blinder and Maccini (1991), are considered below. Firms may place weight on all three motives.

(a) Firms can hold stocks of inputs to ensure that they have adequate materials for their production needs. That offers protection against disruption to supplies, or price volatility, and also against any shortages that might arise from a need to increase production sharply.

(b) Firms can hold stocks of finished goods to avoid having to change production levels. For this to be the motive, the firm must find changing production rates expensive. That might be true if, for example, it is necessary to pay overtime in order to raise production levels.

(c) Firms can have a target stock level. They hold stocks of finished goods to ensure that they always have adequate supplies to meet demand. They react strongly if actual stocks move too far below or above their target level. If stock levels fall too low, firms face the risk of not being able to meet their customers' demands and possibly losing that custom altogether. But if stock levels rise too high, then firms' stock holding costs will become excessive.

If the predominant motive is to avoid changing production levels, then we would expect stockbuilding to reduce the volatility of output relative to the volatility of final demand. Whereas if firms have a target stock level, they might be willing to see sharp changes in output rates to ensure their stock levels do not depart too far

from their desired levels. For aggregate behaviour all three motives could be important, in which case actual stockbuilding might represent some compromise between reducing the volatility of output and of stock levels.

The weight given to each motive will depend upon the cost of changing output versus the cost of allowing stock levels to deviate too far from desired levels. There are several factors that will affect the flexibility of output: does the firm use skilled staff that are difficult to recruit and train?; is there a high overtime premium?; is production capital intensive and does that place an upper bound on output? But there are also various factors that will affect how costly it is for stock levels to diverge from desired levels: how variable does demand tend to be (as that determines the risk in allowing stock levels to fall)?; how costly are the materials to store?; how likely is it that the customer will go elsewhere if their demand cannot be met instantly?

Another key factor that will affect the dynamics of stock adjustment is the degree to which any change in demand is expected to persist. If demand picks up and is expected to stay strong, a company is more likely to raise output. They will judge that the adjustment cost of changing production cannot be avoided, and that it is worth paying that adjustment cost to ensure demand can be met. But if the rise in demand is only expected to be temporary, the stronger demand is more likely to be met out of stocks. The desired stock level is also likely to be affected by a company's financial position, just like any other form of investment. Other things being equal, higher interest rates should put downwards pressure on desired stock levels, because some firms may judge that at the higher rate of interest they would be better off investing their capital in financial assets rather than in inventories. And if the general corporate financial position were to worsen, say due to a fall in profits or a credit crunch, that would also push down on the desired stock level. Both of these factors might help to explain why stockbuilding has tended to follow protracted upturns and downturns in final demand, rather than moving in the opposite direction.

Evidence on the importance of different motives

The standard deviations reported in Table A suggest a tendency for inventory investment to increase the volatility of output. That would seem to imply that firms are reluctant to let their stock levels deviate too far from desired levels. Firms' desired stock levels will reflect the level of their expected demand: they will effectively have a target for the ratio of stocks to expected demand. But that target will change over time, for example in response to changes in the cost of investing in stocks and trends in production technologies. Chart 3 shows the actual ratio of whole-economy stocks to final demand, compared with a fitted trend. Chart 4 shows the gap between the two. If the fitted trend picks up movements in the target stock/demand ratio, then deviations from that trend would show undesired changes in stock levels.

Chart 3
The ratio of stocks to final demand

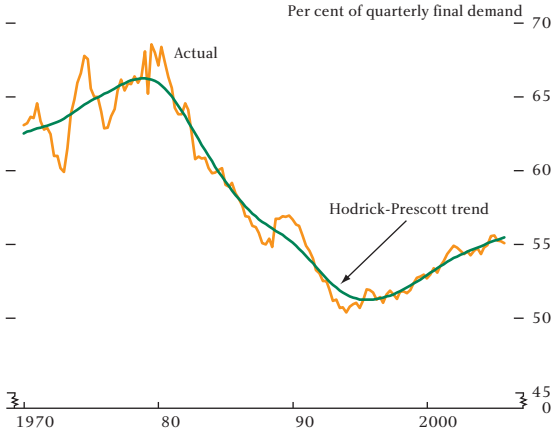


Chart 4
Final demand and deviations of the stock/demand ratio from trend

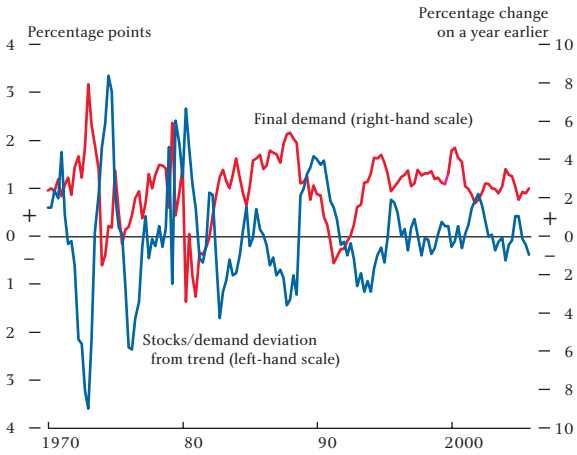


Chart 4 also compares the deviations of stocks from this estimated target with final demand growth. Deviations of stocks have tended to be countercyclical. The correlation coefficient between the two series in Chart 4 is -0.5. So when demand growth has been above average, stocks have tended to fall relative to target. Similarly, when demand has been weak, stocks have

tended to rise above target levels. That evidence suggests that investment in inventories reflects a balance between stabilising output growth, and maintaining a desired level of stocks. Stockbuilding has not been sufficiently countercyclical to reduce the volatility of production relative to final demand. But neither has it been sufficiently procyclical to stabilise the ratio of stocks to demand.

As a further illustration of that point, we can calculate how volatile GDP growth might have been if stock levels had always been kept at their target level (as proxied by the fitted trend in Chart 4). Table B compares the standard deviation of annual and quarterly GDP growth from such an experiment with the actual standard deviations of output and final demand. It shows that if companies had put 100% weight on achieving a target ratio of stocks to demand, then the volatility of GDP growth (especially at the quarterly frequency) might have been considerably higher than the actual outturn. Again that demonstrates that some companies put significant weight on reducing the volatility of their output when choosing how much to invest in inventories.

Table B
Volatility of growth rates

Standard deviations (percentage points)

	Counterfactual (stocks always held at desired levels)	Output (GDP)	Final demand (GDP excluding stockbuilding)
Quarterly	1.69	0.98	0.92
Annual	2.24	2.12	1.77

Sample: 1960–2005.

Tsoukalas (2005) reports an attempt to estimate the different weights that firms place on the costs of volatile stock levels and of volatile production. That involves constructing a detailed model of inventory investment for the manufacturing sector and estimating adjustment costs explicitly. Inventory accumulation of inputs and of outputs are modelled separately, which is shown to improve the ability of the model to fit the data. The results suggest that manufacturing firms face significant costs of adjusting production levels. But it is also costly for inventory levels to deviate far from desired levels. As a result the inventory decision reflects a compromise between reducing the volatility of output and avoiding large deviations of the stock level from target. That result is consistent with the standard deviations reported in Table B. Similar research has been carried out for the United States (for example Humphreys, Maccini and Schuh (2001)) and reaches broadly the same conclusions.

Has stock management behaviour changed over time?

The UK economy appears to have become more stable over the past decade or so (see for example Benati (2004)). As an example, the standard deviation of four-quarter GDP growth rates between 1993 and 2005 was two thirds lower than between 1960 and 1992 (Table C). Is there any evidence that changes in stock management have contributed to that greater stability?

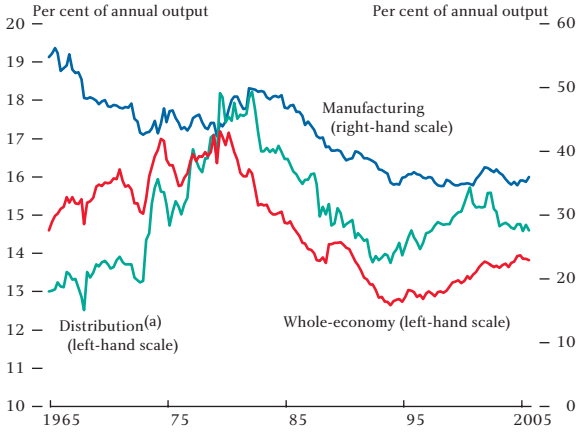
Table C
Volatility of growth rates

Standard deviations (percentage points)

	Output (GDP)	Final demand (GDP excluding stockbuilding)
Quarterly		
1960–92	1.15	1.06
1993–2005	0.30	0.34
Change	-0.84	-0.72
Annual		
1960–92	2.44	2.03
1993–2005	0.81	0.72
Change	-1.62	-1.32

Sample: 1960–2005.

Chart 5
Stock levels relative to output



(a) Volume of distribution stocks divided by volume measure of household spending on goods.

The ratio of whole-economy stocks to GDP declined through the 1980s (Chart 5). Recognising the cost of holding stocks, management practices seized on so called 'lean production techniques' that attempted to reduce stock levels. That was achieved by increasing the frequency of deliveries into and out of the company, by reorganising production to minimise the need for stocks using so-called 'just-in-time' inventory operations, and by making greater use of information and

communication technology to manage stocks (see for example McConnell, Mosser and Perez-Quiros (1999)). The drive to economise on stock holdings may have reflected the increase in real interest rates that companies faced from the early 1980s. Since the early 1990s the aggregate stock/output ratio has picked up a little, but remains below the levels in much of the 1970s.

The decline in the ratio of whole-economy stocks to GDP in part reflected the restructuring of the UK economy away from manufacturing. That reduced aggregate inventory levels relative to GDP because manufacturing firms tend to hold more stocks, relative to their output, than other types of firms. But even within manufacturing there was a sharp reduction in the stock to output ratio (Chart 5). The distribution sector also economised on stocks through that period, although the ratio of stocks to sales has picked up modestly since the mid-1990s.

In theory, it is not clear whether the trend to economise on stocks would increase or reduce output volatility. The lower the desired stock to output ratio is, the less stockbuilding has to increase when demand rises in order to maintain the ratio of stocks to demand. So that might suggest that lower stock levels reduce the volatility of output. But that logic only applies if the fall in the ratio of stocks to demand reflected an improvement in stock management techniques. If the desired stock to sales ratio falls because of a higher cost of investing in or holding stocks, then that would suggest that companies were willing to accept greater volatility of output for the sake of economising on their stock holdings. Clearly, if that has been the case we would not expect to see lower output volatility.

Table C shows the volatility of final demand and of output, over the period 1960–92 and 1993–2005. For both quarterly and annual growth rates, output volatility has declined more than final demand volatility. That indicates that stockbuilding has played a role in reducing the volatility of output growth since the early 1990s, suggesting that firms have improved their inventories management. However as is also clear from Table C, stockbuilding has only played a small part in the decline in overall volatility. Much of the reduction in output volatility reflects the decline in the volatility of final demand.

Conclusions

One reason for firms to hold inventories is to allow them to meet fluctuations in demand without adjusting production rates. But firms are also unwilling to see stock levels move too far from their desired levels. As a result, in aggregate at least, inventory adjustments have not acted to reduce output volatility. Since the early 1980s, there has been a marked reduction in stockholdings relative to output levels. That largely reflected an improvement in stock management techniques and appears to have been responsible for a small part of the reduction in GDP volatility evident since the early 1990s.

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Cost-benefit analysis of monetary and financial statistics

By Andrew Holder of the Bank's Monetary and Financial Statistics Division.

Data collected by the Bank of England from UK banks are used in compiling a range of economic statistics published by the Bank, the Office for National Statistics and other organisations. These data help the Bank maintain monetary and financial stability, and contribute to many other economic analyses. But data collection inevitably imposes some costs on those supplying the information. This article describes a cost-benefit analysis (CBA) framework that has been developed to help balance the demands on data suppliers with the needs of users. It sets out some of the practical solutions employed in applying CBA to monetary and financial statistics and early results of the project.

Introduction

The Bank of England's Monetary and Financial Statistics Division (MFSD) collects monetary and financial data from all banks operating in the United Kingdom. These data are used by the Bank of England in compiling the monetary aggregates and other banking data;(1) by the Office for National Statistics (ONS) for estimating the contribution of the banking sector to the National Accounts and the balance of payments; and by a range of national and international organisations.

The data contribute to the Bank's analyses of economic and financial conditions used in ensuring monetary stability and in contributing to the maintenance of financial stability. For instance, information on bank deposits and lending can help in assessing the strength of demand in the economy or the vulnerability of UK banks to shocks affecting particular sectors or countries. More generally, MFSD data provide policymakers and economists with information about the behaviour of the banking sector and, through their contribution to key ONS economic indicators, the economy as a whole.

The banking sector accounts for 3% to 4% of UK GDP, and provides key services to other sectors of the economy. There are around 350 banks operating in the United Kingdom, although the market is highly concentrated: the top ten banks, for example, account for 55% of total banking sector assets. Banks provide statistical data to the Bank of England;(2) some of these are passed on to the ONS or to the banks' supervisory body, the Financial Services Authority. The ONS does not collect monetary or financial data directly from banks.

Many of the statistics produced by MFSD are based on information covering a very high proportion of the banking sector: a quarterly balance sheet summary return is required from all banks; and monthly returns are made by 216 banks covering 99.3% of total assets. So the data are likely to be high quality and less prone both to error and to revision than statistics based on a sampling framework.(3) A system of reporting thresholds means that the largest banks complete all of the main forms, while the smallest banks complete rather fewer. Almost all forms require information that is taken from banks' accounting systems. Most forms are returned electronically to the Bank of England, which reduces the scope for processing or scanning errors.

Data collection inevitably imposes some costs upon reporting institutions. For the banks, this means IT set-up costs for systems to produce the required information; and ongoing costs to compile and check returns, and to deal with any follow-up questions. The scale of these costs will reflect factors such as the difficulty of extracting information and how closely the

(1) Banking data are published in a number of Bank of England statistical releases and in the monthly compilation, *Monetary and Financial Statistics*; these are available at www.bankofengland.co.uk/statistics/statistics.htm.
(2) The 1998 Bank of England Act includes a statutory obligation for banks to provide statistical data to the Bank of England.
(3) Franklin (2005) examines the reliability of first estimates of key series published by the Bank of England.

data required by the Bank match concepts that the banks need for their own management purposes or to meet statutory financial reporting requirements.

In common with most statistical organisations, the Bank of England does not wish to impose undue burden on reporters. MFSD's Statistical Code of Practice, which is similar to the standards required by *National Statistics*,(1) includes a requirement that the burden placed on reporting banks is kept to 'an acceptable level consistent with legislative requirements and balancing the needs of users against the demands on suppliers'.(2)

Overview of MFSD's work on CBA

As part of MFSD's aim to balance the burden on reporting banks with the needs of users, the cost-benefit analysis (CBA) project(3) seeks to develop a framework for assessing whether the benefits that users obtain from the statistics justify the costs of producing them. There have been three main areas of work, focusing on:

- the extent to which other statistical institutions use or are developing CBA;
- how to analyse and estimate banks' statistical reporting costs; and
- how to assess the benefits that users obtain from MFSD statistics.

CBA techniques have not been used frequently in the context of statistical provision. The box on page 163 discusses the use of CBA by some other institutions; none of these has applied CBA to the full range of their existing statistics.

The MFSD project has been designed to apply CBA both to existing statistics and to any requests for potential new statistics. Set-up costs should be considered when assessing new data requests but not for existing data collections, because such fixed costs should then be treated as sunk costs. But the costs of changing systems do need to be taken into account when considering changes to existing forms. CBA is being applied to MFSD's existing data collections primarily through an ongoing review of the main statistical forms.

The CBA project aims to consider not only the total costs and benefits of a particular statistic, but also some of its key characteristics. In general, greater benefits would be expected from statistics that are frequent, timely, accurate (eg based on a large sample), detailed (eg totals broken down into their main components) and that shed light on economic or financial issues of importance to users. But most of these features would also be likely to increase the costs of providing those data. One of the challenges for CBA is to be able to shed light on such trade-offs.

Measuring costs

There are inevitably costs associated with collecting data from UK banks. Their information systems contain a vast amount of information, but this might not always correspond well with the specific concepts required for statistical returns. At the start of the CBA project, MFSD staff visited a number of banks to gain a better understanding of the main influences on reporting costs; some other banks offered information by email.(4) While there was considerable common ground, there were also some significant differences between banks, reflecting factors such as size and type of business, internal organisation, and the structure of banks' information systems.

The recording and provision of information, including meeting statutory financial reporting requirements, are part of banks' normal business practice and it is not always easy to identify the additional cost of providing statistical information to the Bank of England. For those banks that did offer estimates of their statistical reporting costs, these were a very small fraction of total operating costs.

In general, banks found balance sheet items less costly to report than information on flows: information from the balance sheet requires only a single reading at the end of the period, while information on flows requires

(1) Data deemed to be *National Statistics* are produced in accordance with the Framework for National Statistics and comply with professional principles and standards set out in the National Statistics Code of Practice. Further details are set out in Office for National Statistics (2002).
(2) Respondent burden is covered in Section 6 of the Statistical Code, Bank of England (2004). Wright (2004) provides a summary of the Code, the reasons for its introduction and the process planned for implementation.
(3) The project was formally launched in late 2004, and announced in Statistical Notice to reporting banks 2004/07, available at www.bankofengland.co.uk/statistics/reporters/snotice/sn200407/sn200407.doc.
(4) MFSD would like to record its thanks to those banks and their staff who helped through visits or responding to the questionnaire.

Cost-benefit analysis in other institutions

CBA is an established tool for assessing public investment projects and similar policy proposals. HM Treasury's approach to CBA in central government is set out in the 'Green Book',(1) which recommends that 'all new policies, programmes and projects … should be subject to comprehensive but proportionate assessment, wherever it is practicable, so as best to promote the public interest'. In this context, CBA should aim to quantify all relevant costs and benefits, where necessary making estimates when prices cannot be observed.

The Financial Services Authority (FSA) is obliged to publish a CBA for all significant changes in policy, providing an estimate of the costs and a qualitative analysis of the benefits.(2) The rationale for this approach is that a full quantitative evaluation of costs and benefits is difficult to achieve and often unnecessary; and that undertaking CBA is itself costly and should be done in the most practicable and cost-effective manner.

Information on the extent to which CBA has been applied to statistical provision was gained from a questionnaire sent to other central banks and statistical agencies, and also from an international workshop on CBA of statistics hosted by MFSD in July 2005.(3) These showed that so far there has been limited use of CBA by institutions responsible for collecting statistics. One reason suggested by some for not pursuing CBA was the difficulty of assigning monetary values to benefits.

The ONS has applied a CBA-based approach to specific issues, such as the 2011 Census, attempting to estimate benefits from particular collections. More generally, the ONS has a ceiling for the total compliance cost of its business surveys,(4) although these estimates mainly reflect the time taken to fill in forms rather than the full cost of obtaining information.

The European Central Bank (ECB) has developed a 'Merits and Costs' approach that aims to ensure that any new data collections are cost-effective and are justified by the benefits of the new information.(5) One key difference from the approach adopted within MFSD is that the ECB procedure currently only applies to new data requests.

(1) See HM Treasury (2003).
(2) See Alfon and Andrews (1999).
(3) See Holder (2005) for a report of the international workshop, including the ONS's use of CBA and the ECB's 'Merits and Costs' approach.
(4) See Office for National Statistics (2005).
(5) The Council Regulation (EC) no. 2533/98 concerning the collection of statistical information by the ECB requires the ECB to keep the burden placed on reporting agents to a minimum.

keeping track of a potentially large number of transactions over a reporting period. And balance sheet information tended to be more closely related to what was available on banks' own systems. In addition, supplying totals was less costly than disaggregating information, for example by the residency or industry of the counterparty.

While the overall reporting burden is uncertain, the information provided by banks has been used by MFSD to develop a model of the *relative* costs to UK banks of different reporting forms. This indicates which forms impose high reporting costs relative to other forms. It can be used to estimate each form's share of the overall burden imposed by MFSD, as well as the effect of proposed changes to forms.

The current version of the costs model takes as its starting point the number of boxes(1) on each form. Many forms ask for totals to be split into a number of components — this information is generally treated as additional to the totals: for example, where an item is disaggregated by currency, each currency is counted as a different box. A slightly different treatment is needed for country analysis, where the model is based on the average number of countries for which non-zero data are reported, rather than the total number of countries on the form. This approach prevents the cost estimates being dominated by those forms that include information on around 230 countries.

The number of boxes, adjusted in this way, offers a basic metric for the amount of information contained in a

(1) Boxes are broadly equivalent to items of information that can be identified separately.

form, which can be multiplied by the number of reporting banks and the frequency of reporting to get a crude estimate of the annual amount of information requested from the banking sector in that form. These estimates can be calculated for whole forms or for sections of forms.

Such an approach, however, does not recognise that some pieces of information are more costly to supply than others. MFSD's visits to and responses from banks gave some indication of relative costs, which have been refined through a further survey and internal discussions. The current model therefore increases the estimated cost for some types of more complex information:

- information on transactions (ie flows);
- National Accounts sectoral or industrial classification;
- UK/non-UK resident split;
- items other than own account (eg third-party holdings);
- consolidated reporting for bank groups;
- more detailed information on financial instruments; and
- flows in gross rather than net terms.

These factors can be combined — for instance if there were a UK/non-UK resident split of transactions, then the estimated cost would take account of both factors. The model will be refined over the next few months, with the aim of a finalised version to assess the effect of reviews on banks' costs later this year.

No model can accurately capture all of the factors that affect banks' statistical reporting costs. The costs model is designed to be a useful analytical tool, but it rests on a number of assumptions and simplifications. Some influences on costs are not amenable to inclusion in this sort of framework. For example, timing can be important if banks are required to report very recent information, or indeed if many different returns are due in at the same time. And banks incur costs in dealing with follow-up questions, which may be asked when there are large changes or more details of particular movements are required. A separate exercise is under way within MFSD, aiming to reduce the number of such questions asked.

Set-up costs associated with new forms or changes to forms can be significant too; these need to be taken into account when evaluating new data requests or prospective changes to forms. There might be limited costs associated with small changes, such as moving information from one form to another. But introducing large new forms, or asking for information that banks did not previously collect, would usually prove more costly. These costs can be mitigated, however, by introducing changes gradually and by giving sufficient advance notice to reporting banks.

Measuring benefits

Any assessment of benefits needs to take account of the wide variety of uses of MFSD data, across a range of users. Benefits are more disparate than costs, and are more difficult to identify and to estimate. Within the Bank, MFSD data contribute to meeting the inflation target and maintaining financial stability. For example, the behaviour of monetary aggregates and lending can help in assessing the pressure of nominal demand in the economy; and information on bank lending can indicate whether the UK banking system is becoming heavily exposed to particular sectors or countries. MFSD data are used by the ONS as part of the National Accounts and the balance of payments, and more generally by economic policymakers, researchers, analysts and commentators. And they are also used by international organisations, such as the European Central Bank, the Bank for International Settlements, the International Monetary Fund and the Organisation for Economic Co-operation and Development.

The absence of a market price for MFSD data presents a challenge for valuing the benefits that users derive from these data. A frequent recourse for CBA in such cases is to survey how much people would be willing to pay (in this case for the data), or alternatively what amount of money would compensate them for any loss (here, if data were discontinued). But this approach may not offer a reliable guide, given the subjective nature of such estimates and the limited community of primary users.

In principle, the benefit from the main uses could be estimated directly by assessing first the contribution of MFSD statistics to a policy decision or piece of analysis;

and second the consequence of wrong decisions (or incomplete analysis). In the case of the Monetary Policy Committee's interest rate decisions, such an exercise would thus combine estimates of the welfare cost of cyclical fluctuations,(1) the effect of 'wrong' interest rates, and finally the contribution of MFSD data to the particular policy decision. Overall, these sorts of estimates are conceptually possible but would be subject to such wide confidence intervals that they would offer little help in the CBA project.

Given the inherent difficulties in putting a monetary value to the benefits, attention has focused on assessing the *relative* benefits from different data. As a first step, a survey of users within the Bank of England sought views on the relative importance of various uses of MFSD data — in terms of both the importance of an activity and the contribution made by MFSD data. The most important uses were believed to be monetary and financial stability and the direct contribution to the National Accounts.

The information from the survey does not, however, give a complete picture of the overall benefits from these statistics. A simple benefit assessment form has been developed to enable a fuller assessment of the relative benefits of MFSD data.(2) It calculates an overall summary score based on the following criteria:(3)

- *Policy use*. This is based on the internal survey, with the highest marks given to data that contribute to the assessment and maintenance of monetary and financial stability, or that are used directly in the National Accounts.

- *Policy relevance*. A judgement of how important these data are to the principal policy use(s) and decisions identified under the previous criterion.

- *Value added*. A high mark is given where no alternative data source is available, a low mark where there is only a marginal improvement over the alternative.

- *Quality*. This is concerned with statistical quality — a high mark is given here for data with high sampling accuracy and a low number/magnitude of revisions.

- *Meeting international standards and additional uses*. These are given additional marks to capture the incremental benefit.(4)

Table A shows the full list of criteria and their weights in the overall score.

Table A
Components of the benefit assessment

Form	Percentage weight
Policy use	up to 25
Policy relevance	up to 25
Value added	up to 15
Statistical quality	up to 10
Additional benefits:(a) Meets legal obligation Meets international standard Helps international comparisons Helps outside research Helps inform general public/media Helps other economic policies Published, eg as Statistical Release Helps consistency check or selection of reporting panel	up to 25

(a) In broadly descending order of marks awarded.

The benefits assessment form can be used to arrive at an initial view of the relative benefits of particular data. It can help focus discussions, but it is not a substitute for dialogue with users. The latter is essential for developing an accurate understanding of how data are used and their benefits relative to other sources.

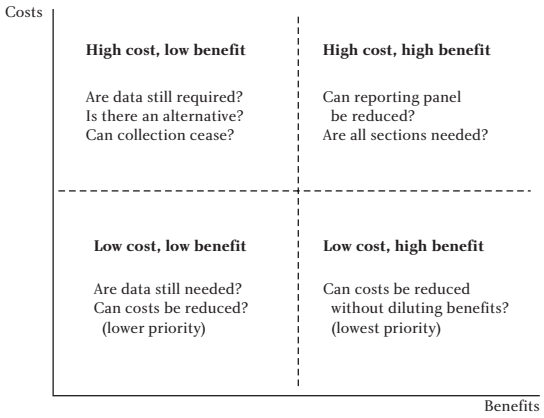
Bringing costs and benefits together

The assessment of costs and benefits described above delivers a view of the relative costs and relative benefits of data. Chart 1 summarises some of the key questions to be asked, depending on the balance of costs and benefits.

Where the assessment of costs and benefits shows that data have relatively low benefits but high costs, there is a need to investigate whether continued data collection is justified. That would have to be established in conjunction with users, not least to ensure that the benefit assessment is fair and that ceasing any collections would not cause undue difficulty. Where data are still needed, it may be possible to obtain

(1) See, for example, Lucas (2003) and Canzoneri *et al* (2004).
(2) The European Central Bank's 'Merits and Costs' procedure for new data also uses a form to assess overall benefits, though with some differences in the factors included and the relative weights.
(3) The categories on the form relate to some of the wider definitions of data 'quality' that can be found in the literature. Brackstone (1999), for example, lists six dimensions of data quality: relevance, accuracy, timeliness, accessibility, interpretability and coherence.
(4) The benefit of data to researchers may be longer lasting than for other uses, given the value of long time series of data for econometric estimation of key economic relationships.

Chart 1
Balancing relative costs and benefits



satisfactory estimates at lower costs from alternative sources.

For most collections, there is likely to be a more even balance of costs and benefits. Even so, there may be smaller changes to the form or to reporting practices that could reduce banks' reporting costs, without significantly diluting the benefits and ensuring that data remain 'fit for purpose'. Close consultation with users and providers is necessary to ensure that theoretical gains are translated into practical ones. The next section discusses how CBA is applied in practice through a review of MFSD's statistical forms.

CBA can also be applied to any requests for new data that fall outside of the review timetable. In these cases, the benefits assessment form is used to judge the merits of the new collection relative to other MFSD data, in the light of discussions with potential users. The overall judgement on whether to proceed will need to take account of the potential set-up costs to banks if the data are to be collected, as well as recurrent reporting costs.

The application of CBA has also focused attention on other aspects of banks' reporting costs and, in particular, the rationale for follow-up questions asked of banks. For instance, if the aim of questions were to improve the accuracy of the estimated totals across all UK banks, then responses should not be queried if any resulting change would not be expected to have a significant effect on the total.(1) But there are other reasons for asking questions — these include seeking explanation for particularly large changes, which can help the economic interpretation of observed movements. A better understanding of the expected benefits from asking such questions will help MFSD's work to reduce the overall number of questions asked of banks, as part of its concern to keep banks' statistical reporting costs to an acceptable level.

Putting CBA into practice

The main vehicle for putting CBA into practice is a review of the 20 or so main forms that MFSD uses to collect information from banks, to ensure that the data collected are still required and could not be provided more cost effectively from a different source.(2) To spread the workload, the programme of reviews is taking place over a period of five years. The overarching aim of the review is to ensure that MFSD statistics remain fit for purpose without placing an unnecessary burden on reporting institutions. CBA plays a key role in delivering that. In some cases, the content of a form is sufficiently homogeneous to allow CBA to be undertaken for that form as a whole. More complex or diverse forms are likely to require separate analyses for different sections.

One of the first steps in reviewing a form is to identify users, both internal and external. Discussions are then held to establish both how the information is used and users' requirements from the data. These allow the reviewer to complete the benefits assessment form, and compare the results with information on the relative costs of data collection. Where the costs of data appear high relative to benefits, users are consulted on options including alternative data sources, estimation and simply ceasing to collect the data. Where information is valued by users, the aim is to continue to provide data that are fit for purpose, though reducing the burden on reporting banks where possible. Proposals for amending data collections are discussed with the British Bankers' Association before implementation and are also made available on the Bank of England website.(3) If the outcome of the review is a recommendation for significant changes to data collection (including discontinuations or introductions), the approval of the Governor or appropriate Deputy Governor must be sought. Public consultation will be undertaken where significant changes are proposed.

(1) This practice is often known as selective editing. Engström and Granquist (2005) give a good overall summary of the approach.
(2) MFSD's Statistical Code requires that existing forms be reviewed every five years, see Section 6.1.2 of Bank of England (2004). The review started in 2004, and was announced in Statistical Notice to reporting banks 2005/01, available at www.bankofengland.co.uk/statistics/reporters/snotice/sn200501/sn200501.doc.
(3) Available at www.bankofengland.co.uk/statistics/about/BBAlist.pdf.

Case study: review of information collected on the industrial composition of banks' business with UK residents (forms AD and AL)

Quarterly information on the industrial composition of banks' business with UK residents is collected in forms AD (deposits) and AL (lending) and published in a quarterly Bank of England Statistical Release, *Analysis of bank deposits from and lending to UK residents*.(1) The two forms were introduced following the 1997 *Review of Banking Statistics* and they have recently been reviewed as part of MFSD's ongoing programme of form reviews. The Bank of England is consulting over proposed changes to the forms and to published data.(2)

The review included consultation with users in the Bank, the ONS and the Financial Services Authority to establish the main uses of the data. Within the Bank, the data are used by economists in Monetary Analysis and Financial Stability to analyse trends in the UK economy and the financial sector, for example to show which sectors of the economy have been relying heavily on bank lending and which have been building up (or running down) bank deposits. The ONS uses some of the data in calculating private non-financial companies' profits and their industrial allocation.

The review and consultations identified some areas of the industrial dataset where data offer relatively low benefits compared with costs, and one area where a modest expansion seems justified. The proposals include:

- ceasing to collect and publish a quarterly industrial breakdown of bank holdings of commercial paper and of acceptances granted, which are both very small in relation to outstanding loans and deposits;
- amending the industrial categories collected: a less detailed breakdown is required in a number of cases, though the 'transport, storage and communication' category would be split into 'transport and storage' and 'communication' as these behave quite differently; and
- removing data on deposits from and lending to individuals from the industrial data set, as these are available more extensively and with wider coverage elsewhere in the Bank's monetary statistics publications.

These changes would cut the number of boxes on the two forms by over 40%, which should reduce banks' recurrent reporting costs. Comments on these proposals are invited by the end of June and the results will be summarised in the July edition of *Monetary and Financial Statistics*.

(1) Westley (1999) discusses the data collected on these two forms.
(2) Weldon (2006) invites comments from users of the data and sets out the proposed changes more fully.

A number of forms have already been discontinued as a result of the review. These were cases where the relative benefits did not appear to justify the costs, including some where data of satisfactory quality could be estimated using other sources. For other forms, there may be scope to reduce the number of boxes on forms, so that less information is required from reporting banks. The box above presents a case study of a review currently under way: that of the information provided on the industrial composition of banks' business with UK residents.

There may also be scope to reduce banks' reporting costs further by revisiting the number of banks that are required to return a particular form, or the frequency of returns, while aiming to maintain data quality — in terms of Chart 1 above, this would represent a downward shift. The concentration of the banking sector means that many of the smaller banks have little effect on the overall aggregates, so there may be scope to obtain good quality estimates with smaller reporting panels.(1) Although there will be no direct cost saving to banks that remain in the reporting panel, the savings for those banks removed from the panel can be significant.

Table B presents results from those form reviews where proposals for change have been finalised. Taking preliminary results from the model of banks' costs that is being developed, these forms together are estimated to

(1) Boyle (1997) discusses the criteria for selecting reporting panels, given the structure of the UK banking sector, and illustrates these with recommendations for panels of planned balance sheet forms.

have accounted for over 10% of banks' recurrent statistical reporting costs in 2004. In three cases, the review found that the data collected on these forms were no longer required or could be provided from other sources (though some of the forms were actively selected for early review because it was already believed that there was little continuing need for them). For example, form P1 collected banks' own account transactions in securities issued by non-residents and overseas residents' transactions in UK equities; these data were used in balance of payments estimates. However, banks found such transactions data costly to provide and the form involved a significant workload for them. Research within MFSD showed that these flows could be estimated using stock data from another form, and the ONS has agreed that switching to these alternative estimates would be acceptable.

Table B
Changes from forms already reviewed

Form	Percentage of estimated costs in 2004[a]	Main changes	Percentage changes in Number of boxes	Percentage changes in Reporting panel	Estimated change as per cent of 2004 costs
A2/CH: custody holdings on behalf of non-residents	2½	Forms dropped	-100[b]	-100	-2½
AD/AL: industrial analysis[c]	4	Simpler decomposition and some cuts	-43	–	-1½
B1: country exposure for UK branches of foreign banks	4	Form dropped	-100	-100	-4
BG: country analysis of payments	1½	Moved to quarterly to meet EU regulation[d]	–	+87	+1½
P1: securities transactions	1	Form dropped	-100	-100	-1

(a) Estimated share of banks' recurrent reporting costs from preliminary version of MFSD's costs model, rounded to nearest ½%.
(b) Removing these forms required a few boxes to be added to form CL.
(c) These proposals are subject to public consultation, as described in the box on page 167.
(d) A European Council and European Parliament regulation passed in early 2005 requires a limited geographic breakdown of the quarterly balance of payments. The increase in reporting panel is because of larger banks moving to quarterly reporting. The cost of this may be an overestimate, as consultations during the review indicated that banks may not incur much cost in moving from annual to quarterly reporting for this information.

Of the other reviews, the proposals for information collected on the industrial composition of banks' business with UK residents (forms AD and AL) would reduce the number of boxes by over 40%. Further cost savings to the banking sector may result from the forthcoming panel review for those forms. The review of information on the country composition of banks' payments to and from non-UK residents (form BG), however, resulted in a greater number of forms needing to be completed each year, because European regulation requires information from that form on a quarterly rather than annual basis.

Overall, MFSD's data collection is equivalent to around 7½ million data cells a year.[1] Including provisional proposals from form reviews that are under way but not yet completed, over half of the annual data collection has been reviewed. The proposed reduction in data collection corresponds to around 1¾ million data cells (approximately one quarter of the annual data collection).

Conclusion

MFSD data contribute to meeting the inflation target, maintaining financial stability and understanding the behaviour of the UK economy. The CBA project has developed ways of assessing the costs and benefits of MFSD data. Monetary valuation of both costs and benefits has proved elusive, but estimation of *relative* costs and benefits has been more tractable. A methodology has been established for assessing benefits and work on costs is advancing well.

A key aim of the project has been to develop a framework and tools that can be used as part of the ongoing review of forms. The benefits assessment tool has been used in reviews since the second half of 2005 and it is hoped that a finalised relative costs model will be ready for use in reviews later this year. Over and above these formal methods, however, the review of forms has already embraced the principles underlying CBA; namely seeking a better balance between benefits and costs, rather than the highest possible quality of data, regardless of cost.

So far, application of CBA through the form reviews has resulted in the withdrawal of four forms and proposals for significant simplification of two more. These changes should reduce statistical reporting costs for all banks that return these forms. The reviews also aim to ensure that any data from discontinued forms that are valued by users can be estimated or replaced from alternative sources. Over the course of this year, reviews currently close to completion are expected to propose changes to other forms that should result in further reductions in banks' reporting burden.

MFSD will continue to develop tools to bring CBA to bear on its statistical data collection. Over time, the CBA framework should help the Bank to focus its efforts on those data that are most important to users, while bearing down on the burdens imposed on data providers.

(1) This estimate is based on 2004 figures and the same assumptions as the costs model for country analysis.

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Defined benefit company pensions and corporate valuations: simulation and empirical evidence from the United Kingdom

Working Paper no. 289

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Shareholders of sponsoring companies are primarily responsible for ensuring the solvency of the defined benefit (DB) pension schemes that firms offer their workers. Hence, even though the assets and liabilities of such pension schemes are distinct from the company's balance sheet, corporate sponsors are clearly the residual claimants or guarantors, and hence they should be analysed together. This paper investigates whether this feature of UK company pensions affects how company stock prices respond to common shocks. We consider two channels through which common shocks to companies' real business values can be amplified. First, to the extent that defined benefit pension liabilities are debt-like, they add to the overall leverage or indebtedness of companies. For given asset risk, we should expect that more highly levered stocks are more volatile. Second, in the United Kingdom pension scheme assets are largely invested in equities of other UK companies. These cross-holdings of equity mean that common shocks to company valuations are transmitted among each other via their defined benefit pension schemes, and the response of stock prices to such a shock can be amplified.

If it does exist, this kind of amplification is clearly of relevance to systemic financial stability, since it can rapidly push corporate valuations upwards or downwards, and there could be corresponding knock-on effects on the wider macroeconomy. For example, if capital investment is sensitive to corporate valuations, through either cost of capital or Tobin's Q effects, then this could exacerbate the real economic cycle. In addition, stock return volatility can also be costly for individual companies and their shareholders. Higher volatility can increase a company's perceived riskiness, and therefore its cost of external capital. Alternately, as a company's stock price becomes a less informative signal of 'true' value, stock-based compensation becomes less effective at providing appropriate incentives to managers.

To investigate these issues we start with a stylised model of a company's balance sheet — in which pension fund assets and liabilities are treated in exactly the same way as a company's ordinary, or on balance sheet, liabilities. Using the model we demonstrate how common shocks can be amplified on account of 'economic leverage' and equity cross-holdings. We then calibrate this model for about 90 of the FTSE 100 companies and simulate it to illustrate the possible size of such amplification effects. We perform two simulations where the company's business value is reduced by 5%. In the first simulation the total effect of the shock is the sum of the effect from the cross-holdings channel and the leverage channel. We compare these effects with a second simulation where we switch off any effects from the cross-holdings channel (consistent with the company's pension fund equity assets being invested abroad). The comparison allows us to break down the total impact of the 5% shock into the part that comes from additional leverage and the part that comes from cross-holdings. Our main result is that on average, the shock causes a 10.5% reduction in market value. Of the additional 5.5% reduction, 1.4% was due to companies holding other companies' equity in their pension funds. The remainder is due to the higher leverage induced by pension liabilities.

We also examine whether such effects, in fact, exist in data within the framework of a standard Capital Asset Pricing Model (CAPM). Empirical analysis using matched balance sheet data (from Datastream) and pension scheme data (collected by hand from individual FRS 17 disclosures) suggests that stock return volatility is systematically related to proxies for the two channels of amplification discussed above. These effects are statistically significant and robust to the inclusion of control variables and the exclusion of outliers.

UK monetary regimes and macroeconomic stylised facts

Working Paper no. 290

Luca Benati

The UK historical experience, with the remarkable variety of its monetary arrangements over the course of the past few centuries — from the *de facto* silver standard prevailing until 1717, up to the post-October 1992 inflation-targeting regime — and the high quality of its historical data, provides a unique 'macroeconomic laboratory' for the applied monetary economist. This paper exploits the marked changes in UK monetary arrangements since the metallic standards era to investigate continuity and changes across monetary regimes in key macroeconomic stylised facts in the United Kingdom. Our main findings may be summarised as follows.

First, the post-1992 inflation-targeting regime appears to have been characterised, to date, by the most stable macroeconomic environment in recorded UK history. Since 1992, the volatilities of the business-cycle components of real GDP, national accounts aggregates, and inflation measures have been, post-1992, systematically lower than for any of the pre-1992 monetary regimes or historical periods, often markedly so, as in the case of inflation and real GDP. The comparison with the period between the floating of the pound *vis-à-vis* the US dollar (June 1972) and the introduction of inflation targeting (October 1992) is especially striking, with the standard deviations of the business-cycle components of real GDP and inflation having fallen by about 50% and 70%, respectively.

Second, the so-called Phillips correlation between unemployment and inflation at business-cycle frequencies appears to have been weakest under the gold standard, and strongest between 1972 and 1992. Under inflation targeting the correlation has exhibited, so far, the greatest extent of stability in recorded history. In line with Ball, Mankiw and Romer, evidence points, overall, towards a positive correlation between average inflation and the strength of the Phillips correlation, both across monetary regimes and over time (especially over the post-WWII era).

Third, historically inflation persistence — broadly speaking, the tendency for inflation to be comparatively high (low) in one period, having been comparatively high (low) in previous periods — appears to have been the exception, rather than the rule. Inflation is only found to have been very highly persistent only during the period between the floating of the pound and the introduction of inflation targeting. Under inflation targeting, inflation exhibits little or no persistence based on all the price indices we consider. In line with a recent, and growing, literature, in particular the recent work of Cogley and Sargent, and in contrast with the 'traditional' position of, eg, Fuhrer and Moore or Blanchard and Gali, our results provide compelling evidence that high inflation persistence is not an intrinsic, structural feature of the economy. Instead, the extent of inflation persistence may crucially depend on the monetary regime in place over the sample period.

Fourth, we document a remarkable stability across regimes in the correlation between inflation and the rates of growth of both narrow and broad monetary aggregates at the very low frequencies. The exception is base money growth under the current inflation-targeting regime, for which the correlation clearly appears to have been, so far, negative. Our results, in particular, suggest that a key finding in Rolnick and Weber, a stronger correlation between inflation and the rates of growth of monetary aggregates under fiat standards than under commodity standards, may find its origin in their exclusive focus on the raw data (in other words, in their failure to distinguish between the different frequency components of the data).

Finally, we show how Keynes, in his dispute with Dunlop and Tarshis on real wage cyclicality, was entirely right: during the inter-war period, real wages were strikingly countercyclical. By contrast, under inflation targeting they have been, so far, strongly procyclical.

Affine term structure models for the foreign exchange risk premium

Working Paper no. 291

Luca Benati

The ability to produce reliable estimates of foreign exchange risk premia would be of potentially paramount importance for policymakers. For example, a given appreciation of the currency bears markedly different implications for monetary policy when it originates from a movement in the risk premium, as opposed to (say) a change in the equilibrium exchange rate. Four decades ago, Fama first called the attention of the economic profession to the so-called 'forward discount anomaly', a puzzling violation of the uncovered interest parity (UIP) hypothesis according to which future foreign exchange rate depreciation should exactly reflect the current spread between foreign and domestic interest rates. Given that the presence of a time-varying foreign exchange risk premium represents a possible explanation for the failure of UIP to hold, in the intervening years economists have been trying to estimate risk premia within several different econometric frameworks. A first strand of literature has tried to estimate models based on strong theoretical restrictions, encountering, as of today, near-universal lack of success. Typical problems found within this approach include implausible estimates of the degree of risk aversion and, almost always, the empirical rejection of key theoretical implications of the underlying model.

A second group of studies has reacted to the rejection of models based on strong theoretical restrictions by pursuing a radically alternative strategy, namely by adopting a pure time-series approach that imposes a minimal theoretical structure on the data. While studies in this vein are capable of identifying a predictable component in the foreign exchange excess return, they typically suffer from the drawback that, by not imposing enough structure on the data, they cannot guarantee that such an estimated predictable component truly is a risk premium.

In this paper we adopt an intermediate approach, based on semi-structural models imposing minimal restrictions on the two countries' so-called pricing kernels — the processes on which all of the assets within the two countries, and the nominal exchange rate between them, can be priced. Such models should be considered as a 'bridge' between the two previously discussed groups of studies, imposing on a time-series structure a set of restrictions just sufficient to identify a foreign exchange risk premium with a reasonable degree of confidence, but otherwise leaving the model largely unconstrained. Although, on strictly logical grounds, it is clearly suboptimal — ideally, we would like to be able to impose a solid theoretical structure capable of generating a time-varying risk premium — at the moment such an approach is probably the most promising.

We extract historical estimates of foreign exchange risk premia for the pound with respect to the US dollar based on two affine (ie linear) term structure models. The term structures of interest rates for the two countries are estimated jointly, together with the dynamics of the nominal exchange rates between them, via maximum likelihood. The likelihood function is computed via the Kalman filter, and is maximised with respect to unknown parameters. Particular attention is paid to the robustness of the results across models; to the overall (filter plus parameter) econometric uncertainty associated with risk premia estimates; and to the ability of estimated structures to replicate Fama's 'forward discount anomaly', the key conditional stylised fact pertaining to the foreign exchange market.

The paper's main results may be summarised as follows. First, the risk premia estimates generated by the two models, although exhibiting a qualitatively similar time profile, are numerically quite different, to the point of casting doubts about the possibility of using them within a policy context. Second, both models fail to replicate the forward discount anomaly. Third — and not surprisingly, given the well-known difficulty of forecasting exchange rates — the estimated models exhibit virtually no forecasting power for foreign exchange rate depreciation.

Switching costs in the market for personal current accounts: some evidence for the United Kingdom

Working Paper no. 292

Céline Gondat-Larralde and Erlend Nier

Bank current accounts play a pivotal role in the relationship between a bank and its customers and may serve as a gateway through which banks can cross-sell other products. This paper analyses the competition in the market for personal current accounts in the United Kingdom. Using the Financial Research Survey (FRS) data collected by National Opinion Poll (NOP), we first describe some stylised facts on market shares and prices associated with the current account, such as the interest rate offered on positive balances and the rate charged on overdraft. While the level of concentration has remained high in this market, the market appears to have become gradually more competitive, with building societies and direct banks making some significant inroads during the 1996–2001 period. Against this, we find a marked dispersion in price, which appears to persist through time.

To assess the level of competition in the current account market more formally, we derive the elasticity — that is the sensitivity — of bank market shares with respect to the set of prices that relate to the current account product. This analysis controls for differences in current account characteristics (such as the extent of the branch network) in order to isolate the effect of price differentials on changes in market share. We find a moderate sensitivity of changes in market share to differences in the current account rate across banks. The elasticity of market share with respect to the overdraft rate is considerably lower. Overall our findings are consistent with a moderate degree of imperfect competition in the market for personal current accounts.

We proceed to investigate further the type of friction in this market that best characterises the data. We find a positive relationship between levels of market share and price — again controlling for non-price characteristics. This finding points to the importance of the cost of changing banks and is consistent with dynamic models of competition with switching costs developed recently. The basic intuition is that each bank faces a trade-off: raising the price increases the profit the bank achieves on its existing customer base, but also implies that the bank might lose some of its present customers and is less likely to attract new customers. The bank's current market share determines how this trade-off is resolved. A bank's incentive to raise its price is more pronounced, the larger is the bank's current market share. The model also predicts that the relationship between market share and price should be stronger, the lower the elasticity of demand with respect to price. Consistent with this prediction, we find that the relationship between market share and price is strongest for the overdraft rate, for which the elasticity of demand is lowest.

Since the end of our sample period, there have been several initiatives to facilitate switching. In response to the Cruickshank report in 2000, the Government asked a group led by DeAnne Julius to review the Banking Code. One set of recommendations in the report that has since been implemented specifically focuses on ways to facilitate switching accounts. Moreover, the banks have implemented improvements to the logistics of the switching process — eg as regards the exchange of information between the switchers' old and new banks — to improve the speed and the accuracy of the account transfer. In addition to initiatives to reduce the cost of switching, steps have also been taken to increase consumer awareness of the potential benefits of changing banks. Even though it may be too early to assess the impact of these initiatives empirically, the results of this study appear broadly supportive of such initiatives, in that they document empirically the presence of switching costs in the UK market for personal current accounts.

Resolving banking crises — an analysis of policy options

Working Paper no. 293

Misa Tanaka and Glenn Hoggarth

This paper develops a simple but general framework which can be used to analyse alternative policies to restructure failed banks when the authorities cannot observe banks' balance sheets. We demonstrate that without regulatory intervention, weak banks have the incentives to hold on to the non-performing loans (NPLs) and gamble for the small chance of recovering these loans ('gamble for resurrection'). But if the authorities cannot force weak banks to liquidate their NPLs because they cannot observe their balance sheets, they may have to rely on financial incentives to induce banks to liquidate their bad assets. Our paper considers the optimal design of such financial incentives, taking into account their impact both on managerial moral hazard and fiscal cost of resolution.

We first examine actual policies used in recent banking crises to clarify why certain choices have been made. Subsequently, we use a model to consider five different policy options for resolving banking failures when the authorities cannot observe the level of non-performing loans held by each bank. When faced with this asymmetric information, the first-best outcome is achievable when the authorities can close all banks that fail to raise a minimum level of new capital. But when the authorities cannot close banks and must rely instead on financial incentives to induce banks to liquidate their NPLs, equity (Tier 1 capital) injection would be the second-best policy, whereas subordinated debt (Tier 2 capital) injection is suboptimal. If the authorities do not wish to hold an equity stake in a bank, they should subsidise the liquidation of non-performing loans rather than inject subordinated debt. We also show that the cost of this subsidy can be reduced if it is offered in a menu that includes equity injection. Thus, our analysis clarifies the conditions under which each policy should be used, and provides a practical guidance to policymakers in resolving bank failures when they cannot immediately assess the problems at each bank.

How does the down-payment constraint affect the UK housing market?

Working Paper no. 294

Andrew Benito

Buying a home usually requires a significant amount of cash. Lenders typically require that a home-buyer has some equity in the home. There are good reasons for why this should be the case. This paper considers the implications of this borrowing constraint for the UK housing market.

For the aggregate housing market, the paper shows that several features can be explained by the model which attaches an important role to the down-payment constraint: first, a positive correlation between the rate of change of house prices and transactions; second, the greater volatility in the rate of change of house prices among former owner-occupiers' properties than for first-time buyers; third, the presence of more former owner-occupiers relative to first-time buyers in the market when the rate of change of house prices is high; and fourth, house prices are more sensitive to the incomes of the young than to aggregate income.

An important feature of the model highlighted in this paper is that it is based on the economic fundamentals of the housing market. This contrasts with some discussions of the housing market which draw on the idea of housing market 'bubbles' to attempt to rationalise outcomes, in particular significant swings in activity and prices. Any model based on bubbles is difficult to test. Moreover, used in this paper also suggests that there can be episodes of price 'overshooting' in the housing market, as prices increase beyond their new equilibrium in response to an increase in income and then decline. Traditional models find this difficult to explain. This may be why, by default, some commentators have attempted to explain house price fluctuations by appealing to notions of bubbles instead.

Much commentary on the housing market appeals to ratios such as the ratio of house prices to incomes or earnings as being a key attractor to which house prices should return in the long run. Yet basic economic theory suggests that prices are not determined by averages, but instead, are set at the margin. If the marginal buyer is a young first-time buyer then this suggests that the prices should be more sensitive to the incomes of the young than to average income. This paper demonstrates that in the early 1990s, when house prices declined significantly, there was a notable decline in incomes among young, potential first-time buyers relative to the wider population, suggesting a greater sensitivity to their income than to the wider population. More generally, higher volatility in the incomes of the young than for the population as a whole suggests that house prices will be more volatile than if they were related to average incomes.

The paper also explores variation across districts. Despite some remarkable movements witnessed in house prices in recent years, there is much more variation across districts than over time in the rate of change of house prices. Examining these differences across districts can also shed light on the behaviour of the housing market. Market professionals themselves argue that different districts should be thought of as quite distinct housing markets: so using aggregate data to examine changes in house prices could be misleading. But there are few, if any, studies of local housing markets in the United Kingdom that can be said to cover a large part of the country.

By focusing on variation in house price inflation across districts, the paper examines another key implication of these down-payment models, namely the role for leverage (loan to value ratios) in influencing the response of local house prices to incomes. The paper finds that a large incidence of households with relatively high loan to value ratios in an area increases the response of prices in that area to local incomes and financial shocks. This justifies many commentators' focus on loan to value ratios in their discussion of the housing market. In recent years loan to value ratios have been declining in the United Kingdom among first-time buyers, suggesting a lower sensitivity of house prices to shocks in future.

Productivity growth, adjustment costs and variable factor utilisation: the UK case

Working Paper no. 295

Charlotta Groth, Soledad Nuñez and Sylaja Srinivasan

The aim of monetary policy is to keep inflation low and stable. A key influence on inflationary pressure is the balance between the demand for and the economy's capacity to supply goods and services. This capacity depends both on the quantities and qualities of the inputs into the production process (capital and labour), and on the efficiency with which they are combined. The latter concept is often referred to as total factor productivity (TFP). A good understanding of past and current TFP growth is thus important for understanding aggregate supply capacity, and so is relevant for the conduct of monetary policy.

During the 1990s, productivity growth did not increase in the United Kingdom while it rose sharply in the United States. This diverging performance looks puzzling, especially when considering that, following the 1990–92 recession, the macroeconomic environment in the two countries was similar. This research tries to estimate underlying productivity growth by accounting for a number of factors that may bias the standard estimate of productivity growth, and thereby give us a distorted picture of underlying technological progress. By doing so, it tries to assess and account for the lack of a pickup in UK productivity growth during the 1990s.

The starting point of the analysis is a standard measure of aggregate TFP growth, or the so-called Solow residual. This is calculated as that part of aggregate output growth that cannot be accounted for by the primary factors of production, under the assumptions of perfect competition, constant returns to scale, no costs to adjusting the factors of production and therefore full utilisation of available factors.

When any of these assumptions is violated, the Solow residual may not correctly measure underlying technological progress. For example, increasing returns to scale in the production of output may cause this measure of TFP growth to rise whenever input growth rises. And if firms face adjustment costs when hiring and firing workers or changing the level of capital, they could respond to short-run fluctuations in demand by adjusting the intensity with which they use labour and capital. This would cause larger fluctuations in output than in capital and labour, and hence procyclical movements in measured TFP growth. In addition, if firms face costs to adjusting capital and labour, marketable output (which matters for the Solow residual) may be low during periods of rapid investment or hiring growth. This is because firms may spend resources internally to install capital or labour, rather than producing marketable output. In this paper, we try to control for these types of non-technological factors, to see whether this affects our conclusions about the United Kingdom's productivity performance during the 1990s.

It is not possible to observe how hard companies are working capital and labour — or their utilisation levels — directly. But by assuming that firms maximise profits, we can derive links between variables such as hours worked and the amount of intermediate inputs used, and changes in the rate of utilisation of capital and labour. The paper also tries to account for the amount of resources that is used by firms to install new capital and hire new labour, instead of producing marketable output.

The results suggest that the aggregate Solow residual underestimates underlying UK total factor productivity growth through the 1990s, since it does not account for falling utilisation rates and high capital adjustment costs. We find, however, that these non-technological factors had a similar impact on the Solow residual during the first and the second half of the 1990s. The broad movement in the aggregate Solow residual through the 1990s is therefore similar to that of our estimate of underlying productivity growth. Thus the puzzle of the apparent lack of a pickup in UK productivity growth during the 1990s remains.

In a comparison with the United States, the paper notes that the US experience of a rise in TFP growth between the first and the second half of the 1990s was, to a large extent, driven by strong growth in ICT-producing industries, the distribution sector and financial services. A broadly similar pattern is found for the United Kingdom. One difference, however, is that whereas the US durables manufacturing sector as a whole contributed to rising rates of TFP growth, UK estimates suggest that most durables industries did not see an increase in TFP growth over the same periods. So the results suggest that the rise in TFP growth appears to have been more broadly based in the United States than in the United Kingdom, and this may partly explain the difference in the aggregate data.

Sterling implications of a US current account reversal

Working Paper no. 296

Morten Spange and Pawel Zabczyk

The US current account deficit reached a new high of 6.3% of GDP in 2004 Q4. The deficit is large in comparison with the current account balances of other countries and this has led a number of commentators to question its sustainability. This paper explores the potential implications for sterling of a restoration of the US current account deficit to balance. The analysis is based on a model calibrated to represent the United Kingdom, the United States and a third region covering the rest of the world. Different triggers that might bring about a realignment of the US current account deficit are considered. We begin by analysing the implications of a negative shock to US consumers' demand. In addition, we study a scenario in which such a demand shock is supplemented by a positive productivity shock in the US tradable sector — helping the United States bridge its trade deficit and so improving the current account. Finally, we also assess the impact of revaluation effects on international investment positions and how this affects the results.

Our analysis suggests that the magnitude of sterling adjustment depends heavily on (a) the cause of the US current account adjustment, ie the type of shock that brings it about; (b) the assumptions made about the associated adjustments of the United Kingdom and rest of the world current account deficits, ie how the adjustment to the US unwinding is split geographically; and (c) assumptions about key judgements such as the degree of substitutability between different types of goods (tradable and non-tradable) and goods produced in different regions.

Assuming that the UK current account deficit deteriorates in proportion to sterling's share in the dollar effective exchange rate index (ERI), we can derive estimates for movements in the sterling real effective ERI ranging from a depreciation of 1.4% to an appreciation of 4.2%, depending on different judgements about substitutability and the cause of the adjustment. If we assume that the dollar pegs maintained by a number of Asian economies result in a larger proportion of the adjustment falling on the United Kingdom, then the model generates estimates ranging from a depreciation of the sterling real ERI of 0.7% to an appreciation of 4.9%. However, in the event that all current accounts were to move to balance (implying a UK current account improvement) the model predicts a real ERI sterling depreciation in the range of 0.6% to 7.8%. It is important to note that the exchange rate movements presented in this paper are a symptom of rebalancing global demand, and they are not associated with unemployment or recessions.

Optimal monetary policy in a regime-switching economy: the response to abrupt shifts in exchange rate dynamics

Working Paper no. 297

Fabrizio Zampolli

A common concern among central bankers is that the true or perceived existence of financial imbalances or asset price misalignments could at some point in time lead to sudden and large adjustments in asset prices, with potentially adverse consequences for inflation and output. For instance, one of the major risks that has worried some members of the Bank of England's Monetary Policy Committee (MPC) in the past has been the possibility that sterling could suddenly fall by a material amount. Other risks routinely debated by actual policymakers, including oil price hikes or abrupt changes in key econometric relationships, may also be asymmetric — that is, a given change may be more likely to occur in one direction than in the opposite. Nevertheless, modelling of asymmetric risks is not very common in the monetary policy literature, possibly because of the lack of readily-applicable technical tools.

In this paper we examine the trade-offs that the policymaker faces when the exchange rate can experience sustained deviations from its fundamental value (ie the value implied by interest rates absent any economic shock) and occasionally collapse. To do so we use a simple method which has rarely been applied in the economics literature. The method allows us to solve for the optimal monetary policy in an economy subject to regime shifts, while retaining the flexibility and simplicity of more commonly applied methods. The method could be applied in other ways that are not considered in this paper and can be considered as a general tool for studying uncertainty in monetary policy. In particular, it provides an example of how policymakers can incorporate judgemental information about a potential misalignment (and the uncertainties associated with it) into their macroeconomic model, and work out the best policy response based on that judgement.

Our analysis is based on a small open economy model, comprising a demand equation, a Phillips curve which determines prices, and an equation linking the real exchange rate to the domestic real interest rate. We modify this model to incorporate regime switching in the exchange rate. In one regime, which we call the bubble regime, any shock can lead the exchange rate to increasingly deviate from its fundamental value. Depending on the sign of the shock, the exchange rate can continue to rise above its fundamental value, or it can continue to fall below it. In the other regime, which we call the no-bubble regime, the exchange rate displays transitory fluctuations around its fundamental value. The times at which the bubble begins and ends are uncertain to the policymaker. Moreover, the size of the correction in the exchange rate, which occurs when the economy switches from the bubble to the no-bubble regime, will vary over time as it depends on the past behaviour of the exchange rate as well as the interest rate.

Analysis of the optimal regime-switching policy rule shows the existence of an intuitive link in the bubble regime between the optimal response of the interest rate to the exchange rate and the expected duration of a bubble. When the bubble is expected to last for at least two years, the optimal interest rate is negatively related to movements in the real exchange rate and becomes more responsive as the expected duration of the bubble lengthens (an increase in the exchange rate being an appreciation). Similarly, in the no-bubble regime there is an intuitive link between the response to the exchange rate and the probability of the bubble emerging: for lower probabilities of bubbles the interest rate is positively correlated with exchange rate fluctuations (reflecting the likely transitory nature of exchange rate movements) but becomes less responsive as the probability of a bubble increases. For high probabilities of the bubble the interest rate responds negatively and becomes more reactive to exchange rate fluctuations as the probability rises further (reflecting the likely onset of a bubble). Another characteristic of the optimal regime-switching interest rate rule is that in both regimes the interest rate is for the most part less responsive to inflation and output fluctuations than in the absence of regime uncertainty, with the degree of caution increasing as both transition probabilities approach a half.

A key result of the paper concerns the assumptions that the policymaker makes about the (unknown) probabilities of moving between bubble and no-bubble regimes. These probabilities could be highly uncertain since historical experience might provide little or no help in quantifying them. We find that there are 'robust' values of the probabilities corresponding to more muted policy responses, where by 'robust' we mean values of the probabilities which can be assumed by the policymaker without fear of causing unnecessary volatility in output and inflation, were they to prove wrong in hindsight. This result is interesting as in the robust control literature uncertainty is often found to lead to more reactive policy responses than in the absence of uncertainty.

Optimal monetary policy in Markov-switching models with rational expectations agents

Working Paper no. 298

Andrew P Blake and Fabrizio Zampolli

Uncertainty is one of the major problems faced by policymakers. Economic models are simple representations of how the economy works, and might turn out to be wrong. For example, the way the economy works might change over time in an unanticipated manner which would not be captured by normal economic models. This paper focuses particularly on this type of uncertainty. As interest rates normally affect output and inflation with a lag, rates must therefore be set while bearing in mind how the economy might change by the time that the interest rates exert influence on inflation and aggregate output. Unfortunately, the normal way of modelling the economy is to assume that it does not change over time and that the only uncertainty faced by the policymaker is about the type and duration of the shocks that hit the economy — for example, changes in foreign demand. To put it differently, the normal way of modelling the economy is to assume that the policymaker knows how economic shocks affect inflation and output (ie the transmission mechanism), and also to assume that this mechanism will not change. In this paper, instead, we consider an economy in which the transmission mechanism can change over time in an uncertain manner. For example, aggregate demand may become more sensitive to changes in interest rates, or the degree to which the exchange rate affects consumer prices can become larger. This implies that the shocks hitting the economy might not have always the same impact on the variables targeted by policymakers. By ignoring these potential changes, policymakers might be in danger of missing the inflation target more often than otherwise, or to cause inflation and output to be more volatile than is really necessary.

The main contribution of this paper is to develop simple methods for working out the best interest rate response to shocks in such an evolving economy. More specifically, the economy is modelled as a so-called Markov-switching framework. That is, the economy is assumed to alternate over time between a number of regimes (eg high and low exchange rate pass-through regimes) according to some given probabilities. It is also assumed that in this economy the private sector forms so-called rational expectations. That is, in forming their views about the future they understand what the transmission mechanism is in the different regimes and they also understand how policymakers set the interest rate in response to shocks. The paper also shows how the methods for calculating the best interest response can be applied to the case in which policymakers and the private sector differ in their views as to the probability of the regime change. Another important feature we consider in this paper is the possibility of assuming that uncertainty is asymmetric — that is, a given change is more likely to occur in one direction than in the opposite (eg an increase in the sensitivity of aggregate demand to interest rates is more likely than a fall of the same size).

We apply our procedure to a small open economy model in which some of its key features can suddenly change. In this application we are considering so-called time-consistent policies, ie policies which continue to be the best possible as time passes. With such policies the monetary authority is unable to affect the private sector's expectations. In our results, which should be thought of as first steps, we find that for the most part interest rates are set more cautiously when uncertainty about changes in the economy is symmetric. That is, in response to shocks the interest rate is varied by less than when such uncertainty is absent or ignored. Being less cautious would make the economy more volatile without the benefit of an improved trade-off between output and inflation, which would result from the ability of policymakers to affect the private sector's expectations. We also find that the optimal policy can be significantly affected by differences between the policymaker and the private sector in their views about the probabilities of parameter changes. When changes in the economy are asymmetric, the findings about the optimal policy response cannot be easily generalised.

Optimal discretionary policy in rational expectations models with regime switching

Working Paper no. 299

Richhild Moessner

Structural change is an important feature of economies. One aspect of such change is that features of the macroeconomy may vary over time — for example, intrinsic inflation and output persistence, the interest elasticity of demand, or the persistence of shocks. Moreover, uncertainty is an important issue facing policymakers, including uncertainty about structural change, about the best model of the economy, as well as about shocks hitting it. It is therefore interesting to study the implications for policymakers of structural changes that are not known with certainty. This paper considers policy design in the presence of structural change which is not known with certainty, and which may take the form of time variation in the parameters of an economic model. We handle this time variation by assuming there are Markov processes underlying the parameters, so that they can take on several different values and switch between them according to given probabilities. Moreover, structural change may take many different forms, and in particular it may be abrupt, transitory and asymmetric in nature; modelling structural change as Markov processes also enables us to capture these features. By contrast, other work on optimal monetary policy with parameter uncertainty, which assume that policymakers have symmetric uncertainty about parameters, do not capture all of these features.

Optimal policy with Markov switching in model parameters has previously been considered for backward-looking models. This paper extends the analysis to forward-looking models of the economy for the case of discretionary policy, when both the central bank and the private sector face uncertainty about model parameters. Deriving the solution for the case of forward-looking models with rational expectations is useful, since in contrast to purely backward-looking models, such models include forward-looking private sector expectations. This makes the treatment of private sector expectations consistent with the forward-looking behaviour of the policymaker. The macroeconomic models currently used for economic policy analysis mainly incorporate rational expectations, to ensure consistency, and to be able to base them — at least in part — on optimising microeconomic behaviour. In related work at the Bank, Fabrizio Zampolli derives optimal policy for the case of Markov switching of model parameters in backward-looking models, while Andrew Blake and Fabrizio Zampolli consider time-consistent optimal policy in forward-looking models within a semi-structural model representation. In related academic work, Lars Svensson and Noah Williams derive optimal policy with Markov switching in forward-looking models under both commitment and discretion.

As an illustration, we apply our method to study optimal monetary policy in the presence of structural changes in output persistence, within a forward-looking model estimated for the euro area. The main reason for adding this output persistence to the basic forward-looking model is to improve the fit with the data. Output persistence may change, for example, because of changes in the degree to which firms' investment decisions are constrained by cash flow, rather than being purely forward-looking. We assume there is a Markov process driving these changes. We find that the coefficients of the optimal policy rule depend on the state of the economy characterised by different values of output persistence, and the coefficients depend on the transition probabilities of the Markov process governing the structural change. For uncertainty about output persistence, the optimal policy rule is non-linearly related to the transition probabilities. We find that if the probability of moving from a state with low output persistence to a state with high output persistence is high, it is optimal for monetary policy in the former state to respond more aggressively to the lagged output gap, lagged inflation and the two shocks (to output and inflation) we consider, than in the absence of uncertainty about changes in output persistence.

Public attitudes to inflation

By Colin Ellis of the Bank's Inflation Report and Bulletin Division.

Over the past six and a half years, GfK NOP has carried out surveys of public attitudes to inflation on behalf of the Bank of England. As part of an annual series, this article analyses the results of the surveys from May 2005 to February 2006. Public perceptions of past and future inflation picked up recently, while most people thought interest rates had risen over the past year. Public understanding about the monetary policy framework remained limited, but people were generally satisfied with the way the Bank has been setting interest rates.

Introduction

In May 1997, the Government gave the Bank of England operational responsibility for setting interest rates to meet its inflation target. The Bank believes that monetary policy will be most effective if people understand and support the goal of price stability, as well as the use of interest rates to achieve it.

One of the ways the Bank monitors public support for price stability is via surveys of public opinion and awareness. Such a survey has now been published for five years: the survey is described in more detail in the box on page 182. And since 2001, each year there has been an article in the *Quarterly Bulletin* describing the survey results. This article describes the results from May 2005 to February 2006.

Economic conditions

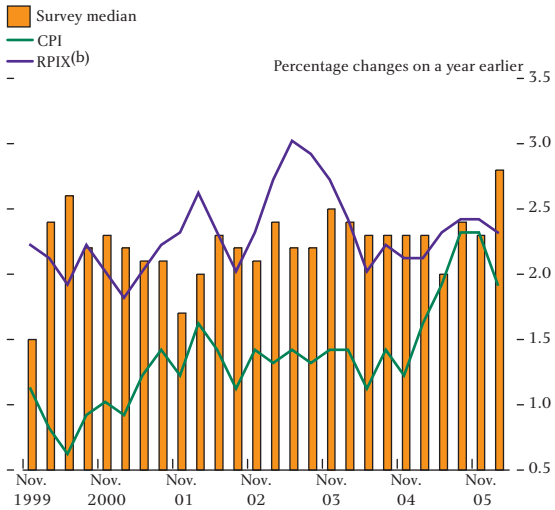
The survey questions can loosely be divided into two sections: respondents' views on economic conditions, including recent and likely outturns for inflation and interest rates; and their general attitudes to monetary policy, covering the inflation target, interest rates, and the Bank's performance.(1) This section examines the survey responses on economic conditions.

Inflation perceptions (*Question 1*)

Question 1 asks about people's perceptions of the current annual inflation rate — that is, how fast the prices of goods and services in the shops have risen over the past year. However, the precise measure of inflation — for example the consumer prices index (CPI) or the retail prices index (RPI) — is not defined. Respondents are offered a range of responses, from falling prices to inflation of 5% or more.

The median(2) view of the current annual rate of inflation was 2.8% in February 2006, the highest since the survey's inception (Chart 1). It also marks a notable rise since May 2005, when the typical respondent believed inflation was 2.0%, equal to the CPI inflation target. Although the proportion of respondents who thought inflation was between 2% and 3% was

Chart 1
Median survey and official estimates(a) of inflation



(a) Official estimates in the months before surveys.
(b) The RPI excluding mortgage interest payments.

(1) The precise wording of all the questions is shown in the annex. The data from the survey are available on the Bank's website at www.bankofengland.co.uk/statistics/nop/inflationattitudesfeb06b.xls.
(2) To calculate the median (a type of average), responses are assumed to be evenly distributed within bands, ie a response of 2% to 3% is assigned a value of 2.5%.

The Bank of England/GfK NOP survey on Inflation Attitudes

The Monetary Policy Committee (MPC) sets interest rates to hit the Government's inflation target. The nine members of the MPC use a variety of methods to explain their interest rate decisions, including speeches and lectures, and publications such as the *Inflation Report*. Bank staff also spend a considerable amount of time explaining monetary policy to a wide audience, for example through the annual 'Target Two Point Zero' competition for schools. These activities are designed to raise public awareness and support for monetary policy. But public support for price stability is hard to measure. As such, the Bank decided that one way to gauge it was to carry out quarterly surveys of public opinion and awareness.

The resulting survey on Inflation Attitudes was piloted in November 1999, and following trials was first published in February 2001. The survey covers 14 questions, the precise wording of which is shown in the annex.(1)

The early trials showed that the results for five of the questions varied only a little from quarter to quarter. As a result, these questions are asked only once a year, in February. The questions ask about the relationship between interest rates and inflation, and who actually sets interest rates.

The nine other questions are asked every quarter, so they are also included in the annual survey. The questions cover views of past and future interest rates and inflation, the impact of inflation and interest rates on the economy and individuals, and how satisfied people are with the way the Bank of England is doing its job of setting interest rates to meet the inflation target. The quarterly surveys are carried out after the publication of the *Inflation Report* in February, May, August and November. The sample size for the quarterly surveys is around 2,000 people, roughly half the size of the annual February survey.

The February 2006 survey was carried out between 16 February and 14 March, as part of the regular GfK NOP Omnibus surveys. GfK NOP interviewed 3,939 people aged 15 and over in 350 districts throughout Great Britain. They use a random location sample designed to be representative of all adults in Great Britain, and interviewing is carried out face-to-face in homes. The raw data were then weighted to match the demographic profile of Great Britain as a whole — unless otherwise stated, these weighted data are the ones reported in this article.

(1) Since February 2004, the annual survey has included two extra parts to *Question 3*, asking respondents about the change in the inflation target made by the Chancellor of the Exchequer in December 2003.

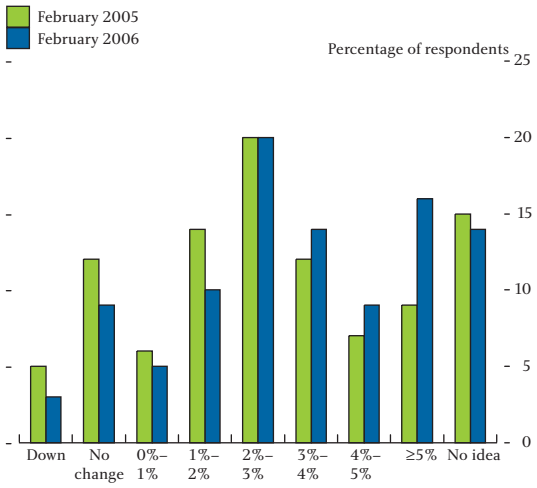
unchanged, fewer people thought it was lower than 2%, and more thought it was higher than 3%. Most striking was the sharp rise in the proportion of people who thought that inflation was over 5% (Chart 2).

The change in respondents' views of past inflation is statistically significant — so it is unlikely to be caused by sampling fluctuations. Official estimates of inflation at the time of the February 2006 survey were higher than a year earlier. But the extent of these rises was relatively small, and in the past the match between official data and the survey responses has been imprecise at best (Chart 1). Although the question asks about prices in the shops, it could be that the 'headline' announcement of rises in the prices of some goods and services, such as gas and electricity, have led people to believe that prices overall are rising at a faster rate than was previously the case.

As in previous years, responses varied across different demographic groups. The distribution of responses across those demographic groups is normally broadly unchanged from survey to survey, and the past year was no exception. In some groups the largest single proportion of people had 'no idea' about what inflation had been. These included 15–24 year olds and low-skilled workers and those living on benefits.(1) But in other instances, the largest proportion were those

(1) These are categorised as the 'DE' respondent class.

Chart 2
The distribution of price changes over the past twelve months



who thought inflation had been 5% or higher; these included people aged over 55, people earning between £9,500 and £17,499 a year, and respondents who left school before the age of 16.(1)

Inflation expectations (*Question 2*)

The second survey question asks people about what they think inflation will be over the next twelve months. The median expectation for future inflation also picked up recently, reaching 2.7% in February 2006 — again, the highest outturn on record.

Since the survey began, respondents' expectations of future inflation have moved closely in line with their perceptions of past inflation (Chart 3). That correlation between past perceptions and future expectations is also evident in other surveys, such as the GfK NOP survey of consumer confidence (Chart 4).

The link between backward and forward-looking views can also be seen in the distribution of responses across the range of options offered to survey respondents (Chart 5) — although intriguingly 29% of those respondents who had 'no idea' about past inflation did hazard a guess at future inflation. At the same time, the range of responses across demographic groups was similar for the backward and forward-looking questions: for example, older respondents' perceptions of past inflation and expectations of future inflation tended to be higher than for younger people, and rose by more between the November 2005 and February 2006 surveys.

Chart 3
Median outturns and expectations of inflation

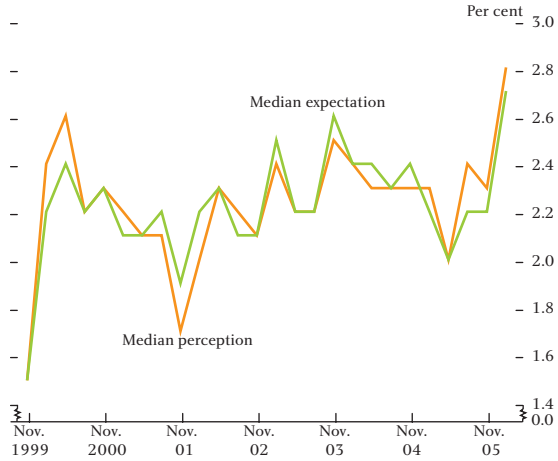
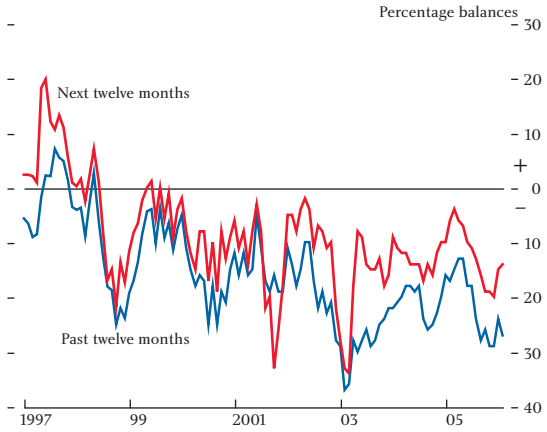
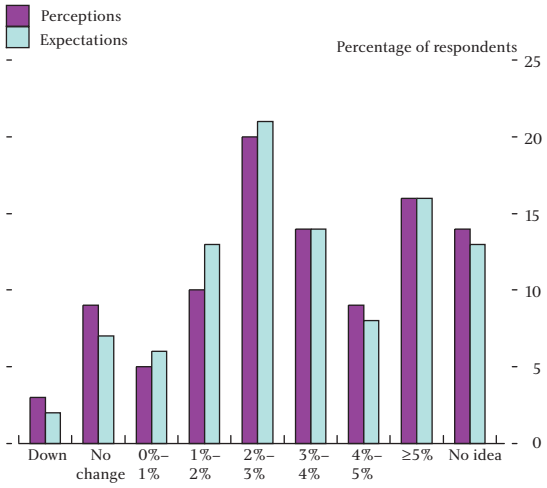


Chart 4
Households' perceptions about the general economic situation



Source: GfK NOP.

Chart 5
The distribution of price changes over the past and next twelve months(a)



(a) From the February 2006 survey.

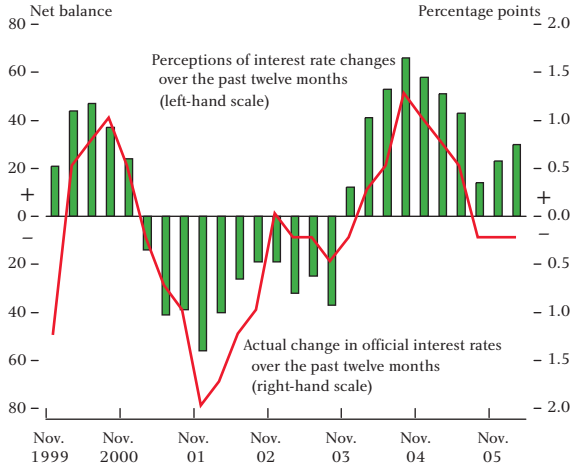
(1) Note that these demographic groups are overlapping, ie some of the over-55s left school before the age of 16.

We can also examine whether respondents tend to base their individual expectations on their own past perceptions, using the detailed breakdown from the Inflation Attitudes survey. The correlation between individuals' past perceptions and future expectations was 0.61 in the February 2006 survey, indicating a statistically significant relationship between respondents' forward and backward-looking responses. The same was also true for correlations of the median estimates (0.91, Chart 3) and the distribution of changes (0.97, Chart 5). The evidence is consistent with individuals forming expectations on the basis of their recent perceptions.

Interest rate perceptions and expectations (*Questions 5 and 6*)

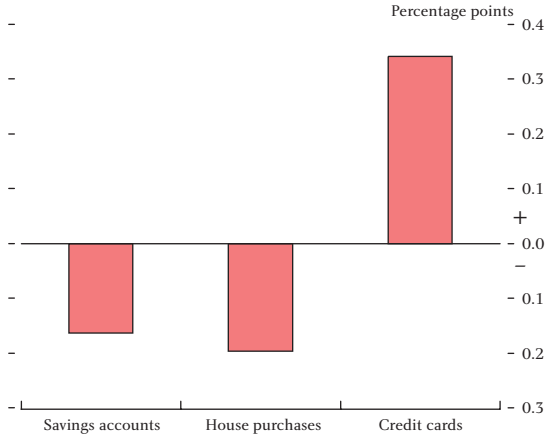
The survey also asks what people think has happened to interest rates over the past twelve months. In the past, people's perceptions have broadly matched the actual change in the Bank of England's official interest rate (Chart 6). But in the February 2006 survey, 41% of respondents thought rates had risen, and only 11% thought they had fallen; in fact, the Bank's official interest rate was 0.25 percentage points lower than in February 2005.

Chart 6
Perceptions of interest rates and actual changes in official rates



One reason for this divergence could be that respondents' views reflect their personal experience over the past year, based on interest rates on any savings, mortgages and loans they may have. These rates do not always move in line with official rates. Over the past year, the interest rates households receive on savings accounts, and pay on mortgages, have fallen on average. In contrast, the average rate they pay on credit card bills has risen (Chart 7).

Chart 7
Changes in effective interest rates(a)



(a) Between February 2005 and February 2006. Effective interest rates are defined as the flow of interest payments divided by the stock of debt (savings). The savings account rate is for so-called time deposits, where savers are unable to access the entire savings balance without penalty within a day.

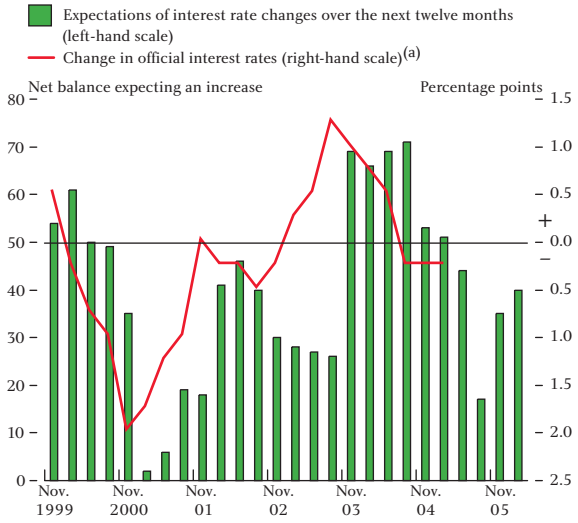
It is possible that people take relatively little notice of mortgage or savings rates, unless they are looking for a new account. But credit card rates may be more noticeable, for example if individuals transfer balances from existing cards to new providers offering attractive introductory offers. So, to the extent that credit card rates are more prevalent in individuals' minds than other interest rates, that could explain the perceived rise in rates. Similarly, more 15–24 year olds thought rates had risen than other age groups; these individuals are less likely to have mortgages or significant savings, but may hold credit cards. Across other demographic groups, those who put most weight on rates having risen included unskilled workers and council tenants.

Over the next year, 47% of respondents expected interest rates to rise, and 7% expected a fall. In past surveys, respondents have always expected rates to rise, even when official rates have subsequently fallen (Chart 8).

How do individuals' views on future changes in interest rates compare with their views on other future developments? The median expected inflation rate from the survey is positively correlated with the net balance of respondents expecting a rise in rates, although the relationship is weak. This could reflect individuals' beliefs that the Bank responds to higher inflation by raising rates.

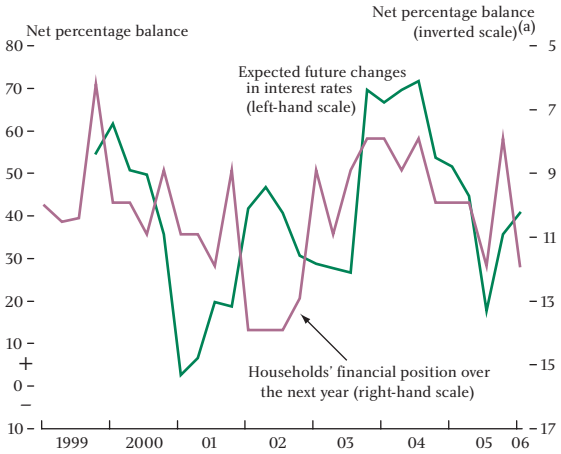
There is also a loose relationship between individuals' beliefs about future rate changes and their own financial situation. In particular, when more people expect rates

Chart 8
Expectations of future changes in interest rates and outturns



(a) Moved backwards twelve months, to correspond to the survey question.

Chart 9
Expectations of future changes in interest rates and households' financial situation



Sources: Bank of England and GfK NOP.

(a) The scale has been inverted so that a fall in the pink line reflects an improvement in households' expectations of their future financial situation. Data are shown for the same months as the Inflation Attitudes survey.

to rise, they also tend to be more pessimistic about the outlook for their own financial situation (Chart 9; the correlation between the two series is -0.36). When interest rates rise, some households (savers) will be better off, and others (borrowers) worse off. But the net impact for consumption is likely to be negative, as indebted households are likely to cut back on spending more than creditor households increase their spending. The relationship between expected changes in rates and households' own financial situation is consistent with this view that debtors are more affected by changes in interest rates than creditors.

General attitudes to monetary policy

The remainder of the survey questions cover individuals' attitudes to policy, including the role and performance of the Bank of England and the response of prices to changes in rates.

Inflation (*Questions 3* and *4*)

As in previous years, the majority of respondents thought that higher inflation had a negative impact on the economy. The proportion of people who thought this rose to 54% in February 2006, the highest on record and up from 48% a year earlier. And just 23% of respondents thought higher inflation would make little difference, down from 27% in February 2005.

Following the introduction of the new inflation target in December 2003, two extra parts to *Question 3* were added to the survey to monitor public awareness of the change. In February 2006, 22% of people identified that the target was between 1.5% and 2.5%, but almost half the respondents (47%) did not know what the target was. In addition, 29% of people correctly thought the inflation target was the same as last year — but another 29% thought it was higher than last year, and 33% had no idea. These data suggest that public awareness of the inflation target is still not widespread.

Question 4 asks people whether the target of 2% was too high or too low — as in previous years, the majority of respondents (56%) thought the target was 'about right'. Around one in ten people saw the current target as too low, and around one in five thought it was too high.

Interest rates (*Questions 7* and *8*)

The survey asks respondents what they think should happen to interest rates, from the perspective of what would be best for the economy, and what would be best for them personally. Based on their personal situation, the largest group (36%) of respondents would prefer interest rates to fall. That is consistent with the relationship between future rate changes and households' financial situation described earlier (Chart 9). Unsurprisingly, this tendency was particularly pronounced among mortgagors, 51% of whom would prefer a cut in rates. And 54% of all respondents aged 25–34 also preferred a cut. Recent evidence from the NMG Research survey suggests that 25–34 year olds are more likely to have unsecured debts than people from other age groups, and are generally also less likely

to have savings or investments:[1] together with moves in effective credit card rates (Chart 7) this could explain the high percentage of young people preferring a rate cut. Alternatively, these individuals may be keen to get on the housing ladder but are concerned about affordability — the median age of a first-time buyer was 29 at the end of 2005.[2]

The largest group of respondents thought that leaving rates unchanged would be best for the economy, although the distribution of responses was more skewed towards a cut in rates than a year ago (Chart 10). This shift meant that previous divergence in responses between what would be best for the economy and what would benefit respondents personally has now largely closed (Chart 11).

Inflation versus interest rates (*Questions 9* and *10*)

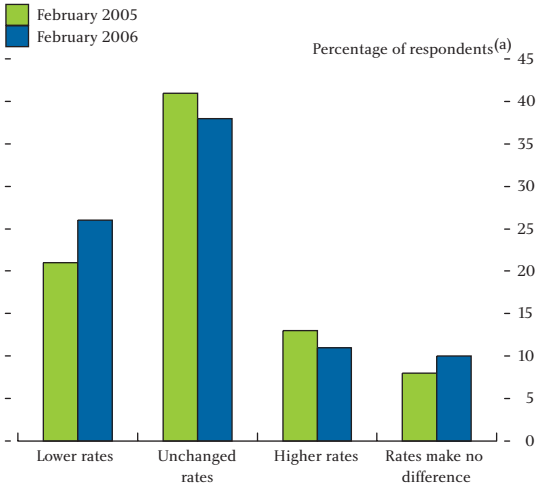
The survey also asks about how monetary policy works: in particular, the link between interest rates and inflation. As in previous surveys, the biggest proportion of respondents thought that a rise in interest rates would make high street prices rise more slowly, both over a month or two (37%) and over a year or two (40%). This suggests that respondents are still not aware of the timing delay between a change in rates and its impact on inflation: inflation would probably be unaffected by a rise in rates after a month or two, but would be lower a year or two later.

When asked to choose between higher interest rates to keep inflation under control, or lower rates and faster increases in shop prices, 57% of people preferred the former, up slightly from 55% in February 2005. Nineteen per cent of respondents preferred faster rises in prices, down from 25% last year. These changes could reflect unease at the recent sharp rises in utility bills and households' views of past and future inflation.

The Bank of England (*Questions 11–14*)

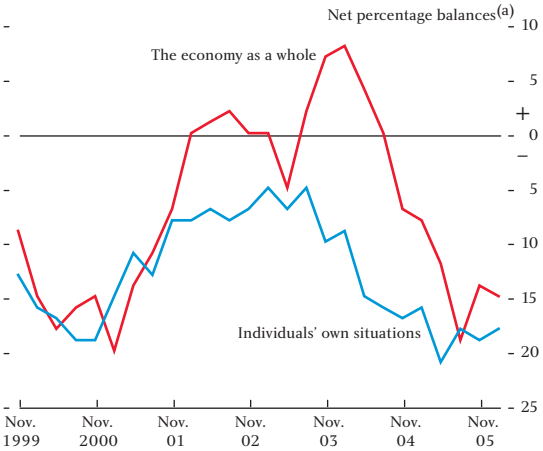
Understanding of the monetary policy process appears to have changed little over the past year. When asked, without prompting, who sets 'Britain's basic interest rate level' (*Question 11*), 36% replied the Bank of England, and a further 4% the Monetary Policy Committee: these proportions were similar to previous years. Similarly,

Chart 10
Respondents' views on what would be best for the economy as a whole



(a) Answers to the question 'What do you think would be best for the British economy?', excluding those with no idea.

Chart 11
Respondents' views on what would be best for interest rates



(a) Percentage citing an increase in rates minus that citing a fall.

over half the respondents (53%) replied 'don't know', broadly unchanged from previous years.

When respondents were given five options, 68% chose the Bank, 14% answered 'government ministers', and 12% had no idea. Overall, awareness of who sets interest rates has changed little since the survey started in 1999.

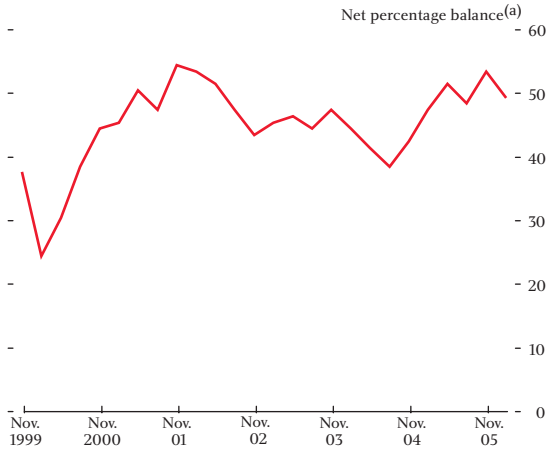
Knowledge of how the MPC is appointed was little changed in February 2006 compared with a year earlier; 37% answered that it was an independent body, partly appointed by the government, and 22% thought the

(1) See Barwell, May and Pezzini (2006), 'The distribution of assets, income and liabilities across UK households: results from the 2005 NMG Research survey', *Bank of England Quarterly Bulletin*, Spring, pages 35–44.
(2) See 'CML publishes data from the new regulated mortgage survey', Council of Mortgage Lenders Press Release on 15 February 2006.

MPC was completely independent. Seventeen per cent had no idea, while 6% thought the MPC was a quango, wholly appointed by the government.

The final question in the survey asks participants whether they are satisfied with the way the Bank is doing its job. The proportion of satisfied responses was 57% in February 2006, broadly unchanged from February 2005 (56%). This continued the trend of the majority of individuals being satisfied with the Bank setting interest rates to control inflation (Chart 12). And within all demographic groups, the highest proportion of respondents was fairly satisfied with the Bank's performance.

Chart 12
Public satisfaction with the Bank of England



(a) Percentage of satisfied respondents minus percentage of dissatisfied respondents.

Conclusion

The GfK NOP survey of public perceptions suggests that individuals' views on past and expected inflation have picked up recently. A majority believe that interest rates have risen over the past twelve months, perhaps reflecting the difference between the Bank's official interest rate and the interest rates households face. As ever, respondents expect interest rates to rise over the next year — there is some evidence that this is consistent with an expected worsening in their own financial situation. Public understanding of monetary policy is little changed from a year earlier, with a significant number of people being unfamiliar with the policy framework. But there is a general understanding that high inflation is bad for the economy, and people are satisfied with the way the job the Bank of England is doing.

Annex

Wording of questions in the Inflation Attitudes survey

Q1 I would like to ask you some questions about the prices we pay for goods and services ... which of the options on this card best describes how prices have changed over the last twelve months? (Show card)

Gone down / Not changed / Up by 1% or less / Up by 1% but less than 2% / Up by 2% but less than 3% / Up by 3% but less than 4% / Up by 4% but less than 5% / Up by 5% or more / No idea

Q2 And how much would you expect prices in the shops generally to change over the next twelve months? (Show card)

Gone down / Not changed / Up by 1% or less / Up by 1% but less than 2% / Up by 2% but less than 3% / Up by 3% but less than 4% / Up by 4% but less than 5% / Up by 5% or more / No idea

Q3A If prices started to rise faster than they are now, do you think Britain's economy would end up stronger, or weaker, or would it make little difference?

Q3B The Government sets a target each year for what it thinks inflation should be. What do you think that the target is for this year?

Q3C Do you think the figure the Government has given for the current target is higher, lower or the same as last year's figure?

Q4 The Government has set an inflation target of 2%. That means that prices generally should rise by around 2% a year. Do you think this target of 2% is too high, and that inflation should be less than 2%, or too low, and it wouldn't matter if inflation was higher than 2%, or is 2% about right?

Q5 I would now like to ask about interest rates. How would you say interest rates on things such as mortgages, bank loans and savings have changed over the last twelve months? Have they:

Risen a lot / Risen a little / Stayed about the same / Fallen a little / Or fallen a lot / No idea

Q6 And how do you expect interest rates to change over the next twelve months? Do you think they will:

Rise a lot / Rise a little / Stay about the same / Fall a little / Or fall a lot / No idea

Q7 What do you think would be best for the British economy — for interest rates to go up over the next few months, or to go down, or to stay where they are now, or would it make no difference either way?

Q8 And which would be best for you personally — for interest rates to go up over the next few months, or to go down, or to stay where they are now, or would it make no difference either way?

Q9 How strongly do you agree or disagree, using the phrases on this card, with the following statements? (Show card)

A rise in interest rates would make prices in the High Street rise more slowly in the short term — say a month or two

Strongly agree / Agree / Neither agree nor disagree / Disagree / Strongly disagree / Don't know

A rise in interest rates would make prices in the High Street rise more slowly in the medium term — say a year or two

Strongly agree / Agree / Neither agree nor disagree / Disagree / Strongly disagree / Don't know

Q10 If a choice had to be made either to raise interest rates to try to keep inflation down, or keep interest rates down and allow prices in the shops to rise faster, which would you prefer — interest rates to rise, or prices to rise faster?

Q11 Each month a group of people meets to set Britain's basic interest rate level, do you know what this group is?

Q12 Which of these groups do you think sets the interest rates? (Show card)

Government ministers / Civil servants / Bank of England / High street banks / European Central Bank / No idea

Q13 In fact the decisions are taken by the Monetary Policy Committee of the Bank of England. Which of these do you think best describes the Monetary Policy Committee? (Show card)

Part of the Government / A quango, wholly appointed by the Government / An independent body, partly appointed by the Government / A completely independent body / No idea

Q14 Overall, how satisfied or dissatisfied are you with the way the Bank of England is doing its job to set interest rates in order to control inflation? (Show card)

Very satisfied / Fairly satisfied / Neither satisfied nor dissatisfied / Fairly dissatisfied / Very dissatisfied / No idea

The Centre for Central Banking Studies

By Gill Hammond of the Bank's Centre for Central Banking Studies.

This article describes the origins and current activities of the Centre for Central Banking Studies (CCBS) at the Bank of England. The CCBS was set up in 1990 to provide training for central banks overseas. The catalyst for its creation was the increase in demand for such training from former communist countries in transition to market economies. Since then, the CCBS has evolved and today acts as a forum for the study of the analytical and technical aspects of central banking, in order to promote best practice in all central banks. Through the Centre, the Bank of England has relationships with almost all the other central banks in the world; to date, more than 15,500 delegates from 173 central banks have taken part in our activities, in London or abroad.

Introduction

The CCBS organises seminars, workshops and conferences in London and abroad, attended by central banks from all over the world.(1) The subject matter is primarily the study of key central bank functions such as monetary policy, money market operations and financial stability, from both theoretical and practical viewpoints. The events are usually fairly specialised, focusing on the latest thinking and research in topics of current interest to central banks. This article describes the origins and evolution of the CCBS, and its current role in the Bank of England.

Origins of the CCBS

The Bank of England has historically had a strong international outlook, and a longstanding tradition of co-operation with central banks overseas. From early in the 20th century, it offered advice and assistance to other central banks, including those in the former British colonies as they gained independence, but also to several others that requested help at various times. International seminars for overseas central bankers have been held by the Bank of England in London regularly since 1957.

At the start of the 1990s, there was significant demand from central banks in former communist countries for assistance in setting up central banking operations in evolving market economies. The Bank of England saw this as a unique opportunity to help with a transfer of knowledge to these countries and, at the same time, to foster a mutually supportive network of central banks worldwide. This recognised the fact that central banks are unique institutions in each country and, while there is no common set of functions that central banks carry out, there is a huge amount of common ground between them and strong mutual benefit to be gained from sharing knowledge and experience. The CCBS was established to deliver these twin objectives of sharing knowledge and building relationships. Other central banks also provided training, but the Bank of England was the first to set up a separate centre for this purpose.

Formally, the CCBS was established by the Bank of England in 1990 with the following responsibilities and objectives:

- develop and deliver training in central banking for overseas central bankers;
- develop for training purposes the comparative study of the constitutions, functions and methods of operation of central banks;
- act as the focal point within the Bank of England for requests from overseas for training and technical assistance; and
- co-operate with external organisations inside and outside the United Kingdom in delivering training

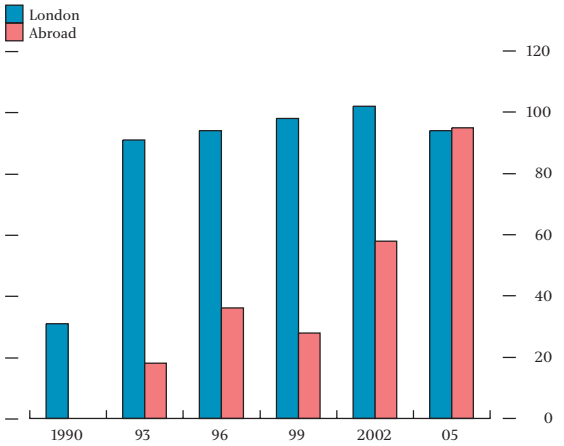
(1) Details of events can be found in the appendix. For further details, see the *CCBS Prospectus 2006*, available on the Bank's website at www.bankofengland.co.uk/education/ccbs/prospectus.pdf.

and technical assistance both in central banking and banking and financial services more generally.

The immediate focus was on central banks in transition countries in Central and Eastern Europe (CEE) and in the former Soviet Union (FSU). These central banks faced huge challenges in bringing inflation under control, and trying to construct solvent, competitive banking systems. The first three CCBS courses were held in late 1990, for six countries in this region. The Bank of England's ability to help these countries in the 1990s was greatly assisted by financial support from the British Government's Know How Fund, and the PHARE and TACIS programmes of the European Commission.(1)

In 1991 CCBS ran five courses for CEE central banks and one for central banks from FSU countries. There was also a special course for central banks from Commonwealth countries, one for the People's Bank of China, and one for EC countries. By the end of 1992, representatives from 101 different countries had attended CCBS courses. Since then, participants from more than 90 countries have attended CCBS seminars in London each year (Chart 1). From the outset, the aim of the CCBS was to provide high value-added seminars, for current and future policymakers in central banks, rather than going for high volume courses on the basics.

Chart 1
Number of countries participating in CCBS events



The evolution of the CCBS

From its origins in providing training primarily for central banks in Eastern Europe and the FSU, the CCBS has evolved into a forum for the exchange of ideas and best practice among central banks. It has a global focus and concentrates on disseminating the latest thinking on the analytical and technical aspects of central banking.

From late 1991, the CCBS began to offer a number of training activities abroad, in addition to the programme of seminars in London. It was recognised that in many cases it was more cost effective for Bank of England experts to go abroad and deliver training on site to the host central banks, rather than for participants to come to London. Moreover, the seminar could be tailor-made to the particular needs of the recipient central bank(s), and a greater number of delegates could benefit from locally delivered training than would be possible on a London event. By 1995, the CCBS was delivering around 20–25 seminars in London and a similar number abroad, attended by a total of around 1,000 participants each year. These numbers have remained broadly constant since then (Charts 2 and 3). Increasingly, CCBS

Chart 2
Number of CCBS seminars

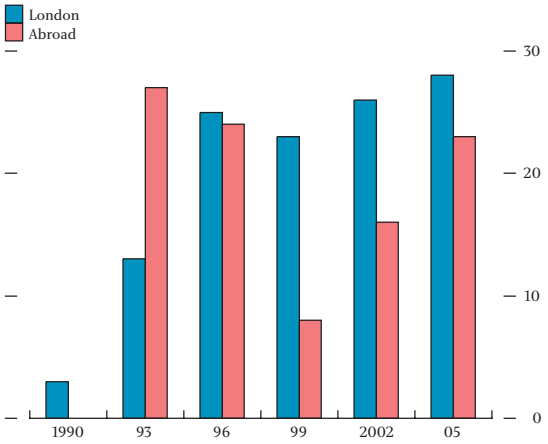
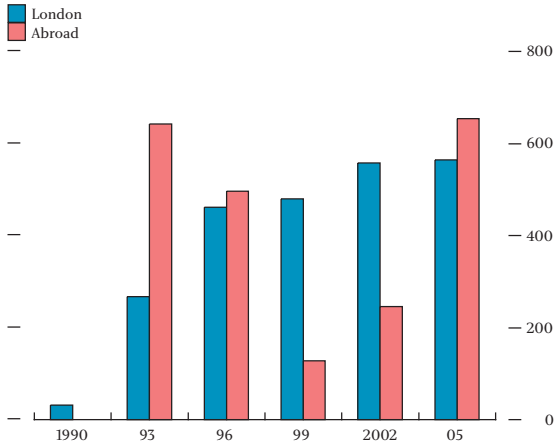


Chart 3
Number of participants on CCBS events

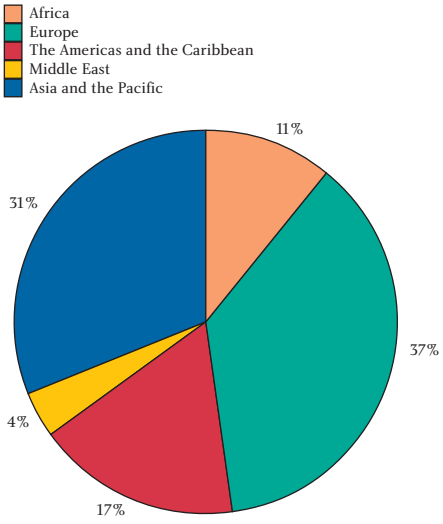


(1) The PHARE programme provided funding from the European Communities to assist the applicant countries of Central Europe in their preparations for joining the EU. The TACIS programme provided grant-financed technical assistance to twelve countries of Eastern Europe and Central Asia mainly aimed at enhancing the transition process in these countries.

seminars abroad tend to be regional events, co-hosted by one central bank and the CCBS, and attended by a number of other central banks in the region. This allows the focus to be on issues of common interest in the region, and for the sharing of experiences by a number of central banks.

Although the focus in the early 1990s was on central banks in Central and Eastern Europe and the former Soviet Union, over time the CCBS has evolved into a global forum, with a more diverse attendance. In 1996, central banks from Eastern Europe accounted for 26% of all participants on CCBS events; by 2005 this had declined to 14%. Over the same period, the proportion of participants from the EU and other OECD countries has risen markedly. There has been an increase in the proportion of participants from the Americas and Caribbean, Asia and the Middle East. African central banks have consistently accounted for about 12% of participants. Currently there is a very good geographical spread of participants attending CCBS events, as shown by Chart 4.

Chart 4
Percentage of participants by region on CCBS events, 2005



The demand for ever more specialist events led the CCBS to change the nature of its programmes of events, and to introduce workshops to the programme. An increasing number of participants had post-graduate degrees as well as practical experience in their field. The workshops did not deliver formal teaching; rather, participating central banks presented their own work and discussed it with each other. In 1997, a high-level workshop was held in conjunction with the Annual Symposium for Central Bank Governors, and in 1998 Academic Workshops were introduced. At these workshops a panel of international academics was invited, together with participants, to analyse shared central banking problems from a comparative perspective. The workshops were usually followed by a joint research project between researchers from overseas central banks and the CCBS or other Bank of England researchers.(1)

One of the most successful research projects studied the monetary policy frameworks in central banks around the world in the 1990s. The project team, led by Gabriel Sterne and Lavan Mahadeva, surveyed 94 central banks to investigate which type of monetary policy frameworks had been most successful in achieving low inflation, and whether this was the same in industrialised countries as in developing and emerging market economies. The project was supported by a Research Workshop at CCBS, attended by experts from 28 countries as well as the IMF and BIS.(2)

As part of the effort to raise the technical level of events, the CCBS has since 2004 organised a special seminar open only to central bank chief economists. The first seminar dealt with the relationship between financial stability and monetary stability, and the second with exchange rate regimes and capital flows. This year the topic was 'Thirty years of the Lucas critique', taking as its theme an influential paper published in 1976 by Nobel Prize winner Robert E Lucas Jr. He showed how the conventional analysis of policy problems based on traditional econometric models could lead to misleading conclusions. This insight still has important practical and theoretical implications for central banks today. For these workshops, papers are commissioned from distinguished international academics as well as the chief economists themselves. Reports on the proceedings are published in the *Bulletin*.(3) In 2005, the CCBS also hosted a very successful high-level event on external communications, attended by the directors of communication or equivalent, from most of the world's major central banks. Issues discussed included central

(1) Several of the research projects investigated on academic workshops have been published as books. For a full list of publications see: www.bankofengland.co.uk/education/ccbs/publications/index.htm.
(2) The results are published in Mahadeva, L and Sterne, G (eds) (2000), *Monetary policy frameworks in a global context*.
(3) For example, see Fisher, C and Lund, M (2004), 'Perfect partners or uncomfortable bedfellows? On the nature of the relationship between monetary policy and financial stability', *Bank of England Quarterly Bulletin*, Summer, pages 203–09, and Hammond, G and Rummel, O (2005), 'Chief Economist Workshop April 2005: exchange rate regimes and capital flows', *Bank of England Quarterly Bulletin*, Summer, pages 202–10.

bank transparency (how to achieve it and whether there are limits), communicating to the media and to the general public, and use of the internet.

The current role of the CCBS

The CCBS is a department within the Bank of England, not a separate training centre. As such, its objective is to contribute towards the core purposes of the Bank of England, namely maintaining monetary and financial stability. The CCBS does this by promoting best practice among central banks — institutions at the heart of the world's financial centres. In addition to the programme of seminars in London and abroad, CCBS also offers expert advice and technical co-operation to other central banks at their request. Finally, the CCBS produces research and other written materials in support of its overall objectives. These three elements are discussed in turn below.

Promoting international monetary and financial stability

The Bank of England has two Core Purposes: maintaining monetary stability, and maintaining financial stability. These are distinct, but related goals. Monetary stability means stable prices and confidence in the currency. In practice the Government sets a target for the rate of inflation — currently 2% as measured by the consumer prices index — and the Bank has to achieve this by setting interest rates at the appropriate level. Financial stability entails detecting risks to the financial system as a whole through the Bank's surveillance and market intelligence functions and working alongside other UK public authorities to reduce them.

While the main focus for the Bank is domestic monetary and financial stability, international developments clearly have a major influence on the United Kingdom. Moreover, the increasing integration and globalisation of markets means that shocks in one economy are more rapidly transmitted around the world. There is an increasing recognition that the domestic monetary policies of one country can have an effect on others around the world. The Bank therefore works closely with other central banks and international organisations to promote international monetary and financial stability.

The CCBS supports both of the Bank of England's Core Purposes by encouraging knowledge sharing and the dissemination of best practice among central banks in monetary and financial stability. It acts as a forum for experts from central banks together with academics and private sector practitioners to exchange views and share experience. CCBS events promote the study of and research into the technical and analytical aspects of central banking. This recognises that the development of effective monetary and financial policies in central banks around the world is one of the best ways to ensure global monetary and financial stability.

Technical assistance and expert advice

CCBS can occasionally provide on-site technical advice and hands-on assistance to a foreign central bank with a particular technical need. This can involve anything from discussing an issue by telephone or email, to making a series of visits to the central bank in question. An extreme version of this was the support provided to the Central Bank of Iraq from early Summer 2003. Simon Gray, an adviser at the CCBS, spent four months in Baghdad, assisting in setting up a new central bank. The early tasks were to provide a currency that the population would trust: good quality notes,(1) a stable exchange rate, and sound central and commercial bank laws that would prevent monetary financing and support monetary and financial stability. Overcoming immense challenges, the introduction of the new Iraqi dinar was accomplished on time, and the new currency has become universally accepted around the country. The CCBS has subsequently supported seminars held in the region for the Central Bank of Iraq, as well as receiving participants in London-based seminars.

In 2004, two advisers from the CCBS helped Banco Central de Guatemala build a small macro model of the Guatemalan economy for use in forecasting and monetary policy. They also provided feedback on research into modelling conducted at the central bank. The work included providing advice on estimates and calibrations undertaken by staff in the research department; estimating and calibrating a small model of the Guatemalan economy; and demonstrating how the model could be used to produce forecasts.

CCBS research and publications

The CCBS places considerable emphasis on excellent academic research related to all aspects of central banking. Seminars and conferences disseminate and

(1) This is described in a book *A new currency for Iraq*. Details at www.bankofengland.co.uk/education/ccbs/publications/simongray.htm.

discuss research from a theoretical point of view, as well as capturing the lessons learned from country case studies. CCBS personnel are frequently consulted about research projects by participants and colleagues in other central banks, particularly in the field of model building and forecasting in monetary policy. The emphasis at the CCBS, as in the Bank of England more generally, is on applied research, encompassing many aspects of econometrics and economic theory. The CCBS has a particular interest in cross-country studies and the study of different models and approaches to central bank functions. To this end, CCBS staff undertake collaborative research with central bankers around the world, as well as with other Bank of England economists and academics at leading universities and research institutes.

The production of written materials to aid the study and understanding of central bank functions has for many years been a core CCBS objective. In 1996, a series of *Handbooks in central banking*(1) was initiated. These *Handbooks* cover many of the main central bank functions from both a theoretical and practical point of view. All are freely available on the Bank of England website, and have proved enormously popular with readers around the world. Several are available in Spanish, Russian and Arabic.

In addition to the CCBS *Handbooks*, more specialist research work is published in the research and lecture series. Recent additions to the series include 'Unit root testing to help model building', 'Consumption theory', 'Monetary operations' and 'Monetary and financial statistics'.

Outlook

The CCBS has been in operation now for more than 15 years, continuing a much longer tradition in the Bank of England of co-operation and interaction with other central banks. Central banks face common challenges in the areas of monetary and financial stability and the need for central banks to exchange views and work together to develop best practice is as great as ever. The CCBS will continue to promote research and facilitate debate among central bankers from around the world, working and thinking at the frontiers of central banking.

(1) The text of all CCBS *Handbooks* can be downloaded from our website www.bankofengland.co.uk/education/ccbs/handbooks/index.htm.

Appendix
CCBS programme of events in 2006(1)

The CCBS organises seminars, workshops and conferences in London and abroad, attended by central banks from all over the world. The subject matter is primarily the study of key central bank functions such as monetary policy, money market operations and financial stability, from both theoretical and practical viewpoints. The events are usually fairly specialised, focusing on the latest thinking and research in topics of current interest to central banks. The programme varies each year, but aims to reflect the current hot topics among central bankers in their fields of expertise, while focusing on those areas where CCBS and the Bank of England possess a comparative advantage in terms of specialist knowledge and experience.

CCBS events are not open to non-central bank personnel.

The following seminars will be held in London in the second half of this year:

July	
3–6 July	Expert Forum: forecasting with calibrated models
10–14 July	Government debt management
17–21 July	Senior management seminar: key policy issues for central banks
September	
4–8 September	People's Bank of China governance seminar(2)
18–21 September	Selected Economists' Research Forum: modelling the financial sector(2)
25–29 September	Liquidity forecasting
October	
2–6 October	The structure of financial markets
10–12 October	Workshop: managing operational risk in a central bank
16–20 October	Monetary operations
23–27 October	Financial stability: issues for central bankers
30 October–3 November	Exchange rates and capital flows
November	
6–10 November	Practical policy analysis of financial regulation
13–16 November	Strategic human resources issues
December	
27 November–8 December	Economic modelling and forecasting
19–20 December	Workshop: enhancing a central bank's effectiveness through knowledge management

(1) Full details of events can be found in the *CCBS Prospectus 2006*, available on the website at www.bankofengland.co.uk/education/ccbs/prospectus.pdf.
(2) These events are by invitation only.

A review of the work of the London Foreign Exchange Joint Standing Committee in 2005

This article reviews the work undertaken by the London Foreign Exchange Joint Standing Committee during 2005.

Introduction and overview

The Foreign Exchange Joint Standing Committee (FXJSC — 'the Committee') was established in 1973, under the auspices of the Bank of England, as a forum for banks and brokers to discuss broad market issues. The Committee comprises: senior staff from many of the major banks operating in the foreign exchange market in London; representatives from brokers; the Association of Corporate Treasurers (ACT), corporate users of the foreign exchange market; the British Bankers' Association (BBA); and the Financial Services Authority (FSA). A list of the members of the Committee, as at end-2005, may be found at the end of this review.

The Committee met six times during 2005. The main focus of the Committee's work was on updating the Non-Investment Products (NIPs) Code; progress was also made on further refining contingency preparations, the establishment of a Chief Dealers' subgroup and further development of the Committee's semi-annual survey of the UK foreign exchange market. Much of the Committee's work has been progressed by the legal, operational and other *ad hoc* working groups.

Non-Investment Products Code — updated in January 2006

The NIPs Code is a voluntary code of good market practice drawn up by market practitioners, covering the foreign exchange market in the United Kingdom as well as wholesale bullion and wholesale deposits. The Code was first published in its current form in 2001, reflecting changes to the UK regulatory landscape following the introduction of the Financial Services and Markets Act (FSMA). A revised Code published in January 2006 wholly replaced the 2001 version. Work to update the Code was co-ordinated through the FXJSC, together with the Sterling Money Markets Liaison Group (MMLG) and the Management Committee of the London Bullion Market Association (LBMA).

The January 2006 Code incorporates the sections on undisclosed principal trading and best practice guidelines for foreign exchange settlement in CLS (Continuously Linked Settlement), which were agreed separately in 2003. There have also been significant changes to the format of the updated Code; this is now available solely in electronic format on the Bank of England's website. The number of annexes in the Code has been reduced and re-ordered to cover the areas of business the Code covers, ie wholesale sterling deposits, wholesale foreign currency deposits and foreign exchange, and wholesale bullion. It is hoped that these changes will make it easier to use and apply to specific areas of the market.

The main changes of substance were to update the Code to reflect current best practice. A section has been added on the use of mobile phones in the dealing room, the chapter on confirmations and settlement has been significantly updated, and changes were made on the exchange of Standard Settlement Instructions (SSIs) and the inclusion of timely deadlines for the exchange of confirmations. The FXJSC also took the opportunity to remove outdated language on the settlement of differences in the FX market, and on the Committee's arbitration role. The new Code also embodies new sterling interest rate conventions following periods of market disruption, developed by a working group of the MMLG. The LBMA provided updated language for the bullion annex to reflect changes such as the modernisation of the gold fixing process.

Going forward, the Code will be updated on a regular semi-annual basis, and re-published in October and March each year. Consultation from the most recent update has already identified a number of issues to be considered, including best practice in and around electronic trading and settlement in the FX market. Suggestions for any future amendments should be made to the Secretariat of the FXJSC at PO Box 546

Threadneedle Street (HO-1), London EC2R 8AH. As is currently the case, changes will be made after consultation with associations which endorse the Code, including the Association of Corporate Treasurers, British Bankers' Association, Building Societies Association, Chartered Institute of Public Finance and Accountancy, London Bullion Market Association, London Investment Banking Association and the Wholesale Markets Brokers' Association.

Contingency planning and work of the contingency subgroup

As in other markets, there was a good deal of work on contingency preparations in 2005, involving collaboration between all of the FXJSC subgroups and other market committees. Most recently, the FXJSC has produced a table showing what the Committee and some of the major pieces of infrastructure in the foreign exchange market would do in a major operational disruption. This was drawn up with contributions from the contingency subgroup, an operational subgroup and the main Committee. The table has been published, alongside a similar table produced by the MMLG, on the Bank of England's website.

The legal subgroup also responded on behalf of the FXJSC to questions sent to the Committee by the Tripartite Authorities on the adequacy of foreign exchange contracts in a major operational disruption. The group produced a table of answers using the checklist developed by the Financial Markets Law Committee and concluded that London foreign exchange market contracts contain satisfactory provisions for contingency situations. Members were encouraged to examine documentation in their own firms to ensure that firms' latest contracts reflect these provisions.

The Committee once again participated in the market-wide test organised by the Tripartite Authorities, on 28 November 2005. The FXJSC and operations subgroup held conference calls as part of the test and provided information about the foreign exchange market to the Authorities and, in turn, passed information gathered in the call to the Cross Market Business Continuity Group (CMBCG) for use in their conference call.

The contingency subgroup established last year began to consider individual contingency scenarios, allowing members of the operations subgroup to consider and discuss contingency issues in the foreign exchange market in more detail, particularly the FXJSC's own contingency arrangements for individual events. The Chief Dealers' subgroup has also been providing details of contingency scenarios from a front office perspective for the operations subgroup to consider. In addition, the contingency subgroup has been assisting in practical preparations including dissemination of contact information, such as updated contact details.

Work of the legal subgroup

The legal subgroup has been very active this year, making an invaluable contribution through its provision of legal support to the work of both the FXJSC main committee and operations subgroup. During the year the legal subgroup has made notable contributions including advising and drafting sections of the update of the NIPs Code, creating draft mandate standard documentation, considering existing prime brokerage documentation, advising on contingency preparedness in standard foreign exchange documentation and generally assisting the working groups of the main Committee and operations subgroup. The legal subgroup has also provided assistance in helping the basis swaps market in preparing an alternative set of 'fix' exchange rates to replace the 11.00 am page of foreign exchange rates currently published by the Bank of England, which was what that market was previously using as its reference.

Markets in Financial Instruments Directive (MiFID) working group

A new working group was established under the direction of the FXJSC's legal subgroup to provide guidance to the main Committee on MiFID and its impact on the foreign exchange market, particularly its implementation in the United Kingdom and to assist the market in liaising with the HMT and the FSA. This has included drafting a formal response to HMT consultation on implementation of MiFID in the United Kingdom with regard to its application to the foreign exchange market. The working group will continue to facilitate liaison between the market and the FSA and the HMT.

Establishment of Chief Dealers' subgroup

In July 2005 the Chief Dealers' subgroup met for the first time. The group comprised eleven experienced foreign exchange market professionals active in the London foreign exchange market. Meeting quarterly, members discuss conjunctural and structural

developments in the foreign exchange market and assess their impact on its functioning and on related financial markets. Market structure topics discussed have included the impact of algorithmic trading and MiFID.

The purpose of the group is to brief the FXJSC and other subgroups on topical market issues, to respond to requests from the FXJSC for views on issues relating to activity in the foreign exchange market or its operation as they arise, and to liaise with the FXJSC and its contingency subgroup on developments in business continuity. The subgroup has contact with and exchanges views with the New York Chief Dealers' group.

Work of the operations subgroup

The major event in the first half of 2005 was the Global Operational Managers conference, held on 20–21 April in London at the Bank of England conference centre, sponsored by the FXJSC. The conference followed on from the first global conference for operations managers held in September 2003, hosted by the New York Foreign Exchange Committee (FXC) at the Federal Reserve Bank in New York. The two-day event, involving over 130 delegates from around the world, was structured to allow for presentations, panel discussions and question and answer sessions; the theme was entitled 'the challenges facing operations in the 21st century'. Sessions on continuing challenges such as contingency, operational risk and the regulatory environment proved as interactive and relevant as the previous conference in New York in 2003 and demonstrated that these areas remain a priority for operations managers globally. However, sessions on developments in CLS, FX prime brokerage and e-commerce were especially topical with significant growth in these businesses since the previous conference. The growth in offshoring initiatives for many companies provided an excellent opportunity to share experiences and lessons learnt, while client panels proved insightful and relevant.(1) The next conference is scheduled to take place in 2007, hosted by the ECB Operations Group.

Throughout the year, the operations subgroup worked on updating the NIPs Code, specifically the chapter on Confirmations and Settlement. Much of the work was taken forward by the Standard Settlement Instructions (SSIs) and confirmations working groups. Among other changes, the SSIs working group concluded that in future it would be acceptable to use SWIFT(2) broadcast as the electronic mechanism to establish standing instructions, provided this was followed by a confirmation. This was a change from previous guidance which had suggested it was not best practice. The confirmations working group introduced a two-hour best practice guideline for the exchange of confirmations. With the assistance of a working group from the legal subgroup, the mandates working group also made some progress on issues relating to mandates between corporates and banks, and its work is expected to be included in the next update of the Code.

The group contributed operations expertise to a number of other working groups, including prime brokerage and e-commerce. Members also followed up on work in other forums on non-deliverable forwards (NDFs) which led to the formation of an NDF working group; this is in close discussion with the FXC group which has been progressing work in this area.

Other working groups

There have been a number of issues addressed by the Committee over the year that members believed could be best progressed by working groups composed of members of other FXJSC subgroups, or even market participants from institutions not directly involved as members of the Committee or its subgroups. This fits with a wider aim of the Committee to involve as many parts of the foreign exchange market as possible in its work. One area where this has been achieved is the FXJSC's semi-annual turnover survey, with 30 active London banks now contributing data. Also, the FXJSC, together with the FSA and representatives from the wider market, considered the interpretation and practical implementation of CP205 (Conflict of Interest in Investment Research) for the foreign exchange market.

Work of the prime brokerage/e-commerce group

The prime brokerage and e-commerce subgroup was established to explore the operational risks in prime brokerage and recent developments in e-commerce. The group is drawn from volunteers from the FXJSC main Committee, operations subgroup and the wider market.

(1) Details of the discussions and presentations can be accessed at www.bankofengland.co.uk/markets/forex/fxjsc/GOM_conference.htm.
(2) SWIFT provides secure messaging services to financial institutions and market infrastructure including CHAPS, TARGET, CREST and CLS.

The subgroup met three times in 2005. The first meeting established the objectives of the group, its potential outputs and identified significant themes for discussion. The following two meetings were focused specifically on prime brokerage and e-commerce, respectively. For prime brokerage, the subgroup discussed the implications of the changing trading model prevalent in the market and the operational risks involved. The e-commerce discussion looked at market and technology developments, and potential risks and growth areas since the previous FXJSC report on e-commerce in 2003. The preliminary findings of the subgroup were presented to the main FXJSC in the first half of 2006.

International co-operation

Over the year the Chair and/or Secretariat attended meetings of the New York FXC, the Canadian Foreign Exchange Committee and the ECB contact group. The Chair also met with a number of members of the newly re-formed Australian Foreign Exchange Committee, the Hong Kong Treasury Markets Association and the Singapore Foreign Exchange Market Committee. The meetings involved very useful discussions on issues that impact the global foreign exchange market.

The FXJSC Secretariat have continued to host quarterly conference calls with the other global foreign exchange committee secretaries, to update on the work of individual groups and topical issues; these have involved participants from Singapore, Tokyo, New York, the ECB, Toronto, Sydney and Hong Kong. One strand of work where there has been much co-operation has been the foreign exchange market turnover surveys. Members of these committees also attended and made valuable contributions to the Global Operations Managers conference in April 2005.

International survey results overview

Thirty banks, drawn from committee members and the most active participants in the foreign exchange market, contributed to the second and third semi-annual surveys of foreign exchange turnover in London conducted by the FXJSC. The survey showed strong growth in foreign exchange turnover during 2005. Average daily turnover recorded in the October 2005 survey was $863 billion, some 31% higher than in October 2004. This was mirrored by a rise of 28% in the turnover recorded by the New York FXC in its survey over the same period. The Singapore Committee also decided to publish its survey results to the same timetable, starting with the October 2005 survey.

Members of the London Foreign Exchange Joint Standing Committee as at December 2005

Name	Firm/Organisation
Ivan Ritossa	Barclays
Robert Loewy	Bank of China
Henri Foch	BNP Paribas
Jeff Feig	Citigroup
Matthew Spicer	Credit Suisse
Robert McTamaney	Goldman Sachs
Andrew Brown	HSBC
Adam Burke	JPMorgan Chase
Marcus Browning	Merrill Lynch
Paul Blain	Morgan Stanley
Peter Nielsen	Royal Bank of Scotland
Nick Beecroft	Standard Chartered
Michael Kahn	State Street
Darren Coote	UBS
Jack Jeffery	EBS
Phil Weisberg	FXAll
John Herbert	ICAP
Brian Welch	Association of Corporate Treasurers
Alex Merriman	British Bankers' Association
Ian Stevenson	Wholesale Markets Brokers' Association
David Bloom	HSBC Chair, legal subgroup
Leigh Meyer	Citigroup Chair, operations subgroup
David Hacon	Financial Services Authority
Paul Fisher (Chair)	Bank of England
Sumita Ghosh/Howard Jones (Secretariat)	Bank of England

Members of the London Foreign Exchange Joint Standing Committee operations subgroup as at December 2005

Name	Firm/Organisation
Jos Dijsselhof	ABN Amro
Michael Douglas	Bank of America
Bob Jordan	Bank of England
Duncan Lord	Barclays
Lincoln Burkitt	CSFB
Darryl Webb	Deutsche Bank
Susan Balogh	Goldman Sachs
Chris Roberts	HSBC
Graeme Munro	JPMorgan Chase
Derrick Pearson	Lloyds TSB
Kim Surendran	Mellon Bank
Isabelle Dennigan	Royal Bank of Scotland
Stephen Smith	State Street
William Deighton	UBS
Phil Kenworthy	CLS Services
Colin Perry	ICAP
John Moorhouse	Reuters
Elizabeth Swanton	SWIFT
John Whelan	Association of Foreign Banks
Alex Merriman	British Bankers' Association
Leigh Meyer (Chair)	Citigroup
Sumita Ghosh/Howard Jones (Secretariat)	Bank of England

Members of the FXJSC legal subgroup

Name	Firm/Organisation
Janet Wood	Bank of America
Sahar Kasenally	Barclays Capital
Julia Elliott	Citigroup
Ulrike Schefe	CSFB
David Entwistle	Deutsche Bank
Anne Moore-Williams	FSA
Felicity White	HSBC
David Lewis	JPMorgan Chase
Pania Kouris	Lloyds TSB
Annabeth Bates	Morgan Stanley
Alex Bouchier	Royal Bank of Scotland
Martin Oakley	Reuters
Simone Paul	State Street
Kate Binions	UBS
David Bloom (Chair)	HSBC
Jacqueline Joyston-Bechal (Secretary)	Bank of England

Members of the FXJSC Chief Dealers' subgroup

Name	Firm/Organisation
Hiroshi Morioka	Bank of Tokyo Mitsubishi
Danny Wise	Barclays Capital
Raymond Ng	Citigroup
Mark Iles	The Royal Bank of Canada
Mike Leighton	CSFB
Angus Greig	Deutsche Bank
Bernie Kipping	Commonwealth Bank of Australia
Chris Freeman	State Street Bank and Trust Company
Chris Kreuter	UBS
Keith Carpenter	ABN Amro
Roger Hawes	Royal Bank of Scotland
Christopher Nicoll	Morgan Stanley
Martin Mallett (Chair)	Bank of England

Uncertainty, the implementation of monetary policy, and the management of risk

In a speech to the Association of Corporate Treasurers, Paul Tucker(1) *— Executive Director for Markets and a member of the Monetary Policy Committee — discussed sources of volatility and uncertainty facing firms and financial markets. He explains that undesirable volatility in short-term sterling money market interest rates has, in the past, been a source of avoidable uncertainty for users of the sterling money markets such as banks, asset managers and corporate treasurers. And he outlines how the Bank's new framework for implementing monetary policy, introduced in May, aims to remove that uncertainty as far as possible. Turning to less easily avoidable risks facing businesses, he considers how uncertainty about how to manage pension fund asset-liability mismatches may have been one of a number of factors behind recent weakness in measures of UK business investment. Starting with a discussion of the wider effects on financial markets of funds' asset-liability management, he reviews arguments on whether or not risk may have been underpriced in capital markets. To the extent that structural factors may have lowered the price of risk, he notes that the consequent reduction in risk premia would broadly have a one-off effect on* ex-post *asset returns. Finally, he highlights some possible implications of recent innovations in structured finance, including whether the trade-off between the demand for financial engineering and for liquidity may switch in stressed conditions; and whether risk could flow back to the banking system in adverse circumstances.*

Many of us would probably say that we do not much like uncertainty, whether at work or home. But we cannot escape it, and it provides opportunities. Rather, we want to be compensated for the risk, or to mitigate it, or both.

What I think we actively dislike is avoidable uncertainty. And from the point of view of society, we should dislike uncertainties that are both avoidable and especially costly to mitigate for those who bear the consequent risks.

I am going to discuss some sources of avoidable uncertainty — or volatility — that have affected you as corporate treasurers. And I will discuss some unavoidable sources of uncertainty, and what they might mean for risk management, at the level of firms and of the financial system as a whole.

Avoidable uncertainties: the monetary regime, and the implementation of monetary policy

For too many years in the United Kingdom, we lived with a large but avoidable element of macroeconomic uncertainty. It was unclear what rate of inflation households and businesses should expect to prevail over the medium to long run. In other words, it was unclear what policymakers were trying to achieve; whether their goals shifted about; and whether policymakers would succeed in delivering those goals. That was resolved progressively during the 1990s, culminating in the Government's announcement in 1997 that an operationally independent Bank of England was charged with achieving a clear inflation target. A stable monetary environment has reduced the quite unnecessary risk of self-induced 'boom and bust' flipping about demand conditions across the economy as a whole.

For users of financial markets, the most visible sign of the change was the reduction in yields on conventional government bonds with long maturities, which had

Table A
Annualised volatility of UK interest and inflation rates

	Ten-year spot yield	Ten-year forward yield	Ten-year forward inflation rate
1970–92	211	236	
1985–92			124
1993–2006	125	117	85
1998–2006	98	78	54

Note: Average monthly standard deviation, annualised and expressed in basis points.

Sources: Bloomberg and Bank of England calculations.

(1) My thanks for comments to Peter Andrews, Charles Bean, Roger Clews, Michael Cross, David Rule, Simon Wells and Peter Westaway. For comments and research to Damien Lynch and Robin Windle. And for secretarial support, to Katherine Bradbrook.

previously compensated for high and highly uncertain prospective inflation rates. By ushering in a world with a credible nominal anchor, one source of uncertainty and risk was significantly reduced. The *ex-post* annualised volatility of ten-year gilt yields has halved: from over 200 basis points between 1970 and 1997, to under 100 basis points since the current monetary regime was introduced (Table A).

That means that, as corporate treasurers, one source of unavoidable uncertainty about your long-run borrowing costs has been very significantly reduced.

The introduction of the new monetary regime did not, and of course could not, remove uncertainty about the quarter-to-quarter, or indeed year-to-year, path of the economy and inflation. And so there remains a degree of unavoidable uncertainty about the short-term path of official rates, as the Monetary Policy Committee responds to cyclical developments. Transparency can reduce that uncertainty, through our making clear what we think is going on in the economy and how, generally, we react to changes in the outlook. We do that through the minutes of our monthly meetings and the quarterly *Inflation Report*; and, in terms of our individual analyses, through speeches, etc. But, like anybody else, we cannot predict with certainty what will happen in the economy. There are always material risks around the central outlook. We have to weigh those risks in our policy decisions in much the same way as you do in your business and financing decisions.

In the midst of all this unavoidable uncertainty, however, a few things are not in doubt. The MPC's official interest rate is certain. So there should be no uncertainty about the general level of overnight rates in the money markets. In fact, though, overnight rates in the United Kingdom have historically been highly volatile. Various steps taken over the past decade or so moderated that volatility — with some success; it has for some while been much lower than in the mid-1990s (Chart 1). But it has remained greater — from day to day, and during the day — than overnight rates in dollars, euros, etc (Charts 2 and 3).

Chart 1
Volatility of sterling overnight interest rates

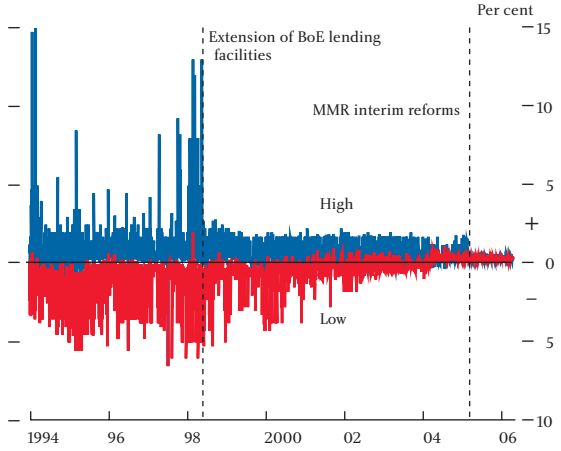
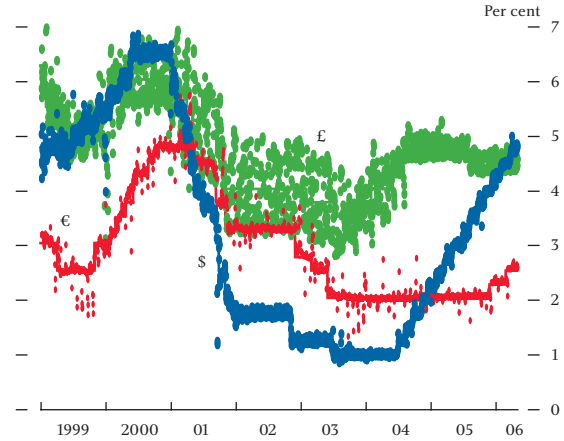


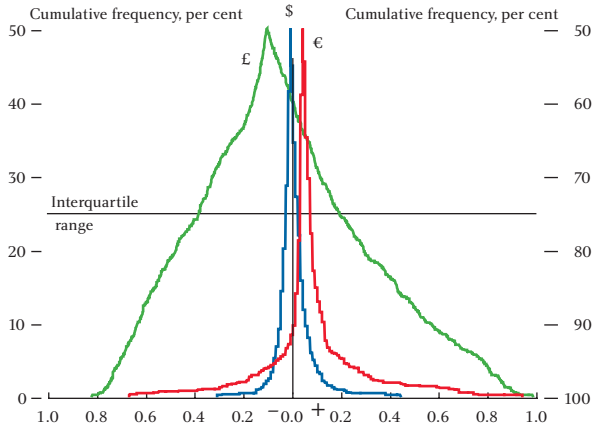
Chart 2
Volatility of international overnight interest rates



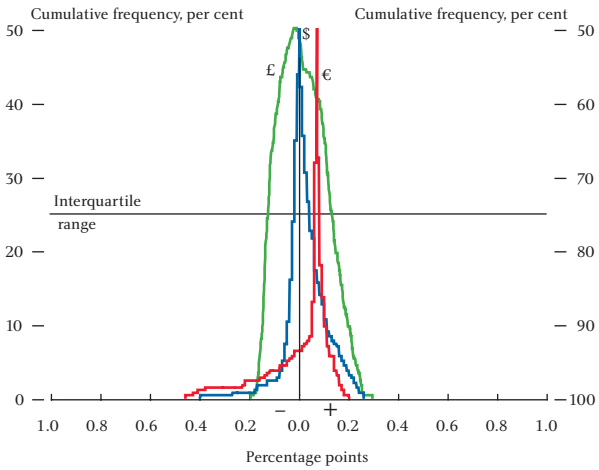
Sources: Bloomberg and Bank of England calculations.

Chart 3
Cumulative folded distributions of overnight/policy rate spreads

Sample period: 2 Jan. 2002–11 Mar. 2005



Sample period: 14 Mar. 2005–9 May 2005



That has created uncertainty for users of the sterling money markets — banks, asset managers and, of course, corporate treasurers. Avoidable uncertainty.

It is the Bank of England's responsibility to remove that uncertainty as much as we possibly can. And yesterday, after more than three years' preparation and extensive collaboration with market participants, we introduced a completely modernised system to do just that.

It provides a new framework for the Bank's implementation of monetary policy; our operational engagement with the banking system; and for the sterling money markets.

I shall spare you the details, but I do want to sketch the main features of the system, by way of underlining that it is directly relevant to you as corporate treasurers. I am keen that you should hear this directly from the Bank.

For as long as anyone can remember, a small group of clearing banks — which these days we call 'settlement banks' — have had to balance their books with the Bank at the close of business each evening. Volatility resulted if the Bank had not provided pretty well exactly the amount of liquidity the banking system as a whole needed each day; or if our money was not distributed in the money markets to those banks that were short. And traders would speculate on that volatility — perhaps a rare instance of financial market activity with little social utility.

The new system relaxes the overnight constraint and liberalises access to the Bank. A broader group of banks — initially just over 40, accounting for around 90% of the UK banking system's sterling liabilities — will maintain a target balance with the Bank on average over each month. (In the first maintenance period, which started yesterday, the target is just under £23 billion.) These reserve-scheme banks, and other banks who so choose, also have access to a standing deposit facility and a standing (secured) lending facility. At a modest penalty to the Bank's policy rate, they can use those facilities in unlimited amounts, and so can turn to them if the rate in the market threatens to be less attractive. Together, this should keep the market rate in line with our policy rate.

Indeed, our objectives have been fourfold. First, to stabilise overnight market rates in line with the MPC rate. Second, to improve the efficiency of the framework for banking system liquidity management in normal conditions, and to make it more resilient in stressed conditions. Third, to simplify our method of implementing monetary policy. And fourth, to foster efficient and fair markets.

For too long, too many people have been deterred from using the short-term sterling markets as much as they might because it seemed to require special expertise, and therefore a disproportionate commitment of resources.

Judging by the ACT's very positive response to one of the Bank's early consultation papers, the modernisation of our framework should be helpful to companies, which of course use the money markets to borrow, employ cash balances, and manage risk.

At the end of last year, firms' short-term sterling borrowing in the United Kingdom was around £300 billion. There are no data on how much of that was at very short maturities, but there is anecdotal evidence of overnight volatility acting as a deterrent. For example, when in late 2004 the Bank announced our intention to introduce reforms, the European treasury department of one of the largest companies in the world wrote to me in the following terms:

'I write to express our support and appreciation ... The excessive volatility in the overnight market precluded high-quality issuers ... from participating. ...The steps you are taking will surely increase the depth, stability and overall liquidity of the sterling money market.'

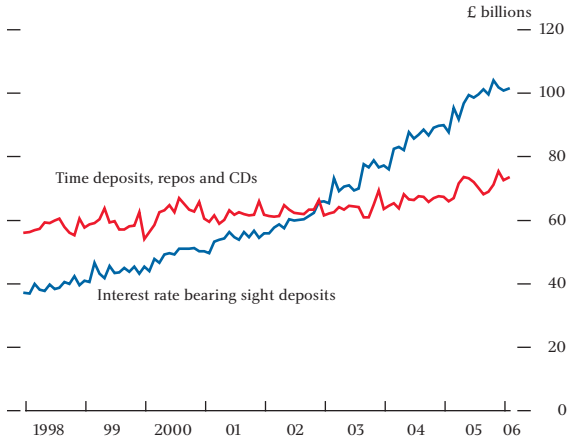
That kind of support has been a great encouragement.

In terms of risk management, many companies swap fixed-rate term borrowing (and other cash flows) into floating-rate. This can be into a six or three-month Libor rate of interest, or into a stream of payments linked to the overnight money market rate. In the United Kingdom, the overnight index swap (OIS) market has developed rather less than its counterpart in the euro area, which is used by large non-financial companies. One obstacle seems to have been the intraday volatility in the sterling market, which has entailed uncertainty about the spread between the average overnight rate on any particular day (as measured by the sterling overnight index average, or

SONIA rate) and the rate actually paid on overnight cash at different times during the day. Many market participants believe that if the reforms introduced yesterday significantly reduce intraday volatility, the sterling OIS swap market will grow, making it a more useful risk management tool.

The evidence of corporate treasurers as placers of short-term money is more concrete. For a few years now, UK companies' domestic operations have been producing surplus cash flows: £12 billion, or about 1% of GDP, in 2005. The counterpart has, of course, been an accumulation of financial assets. A lot of that has gone in to the money markets — in particular, holdings of call-deposits with banks (Chart 4) and investments in money market funds. In placing that liquidity, you should be in a position where you need to negotiate only the spread paid relative to a stable money market rate, not the underlying rate itself. Our overhaul of the system should deliver that.

Chart 4
Outstanding sterling bank deposits by private non-financial companies



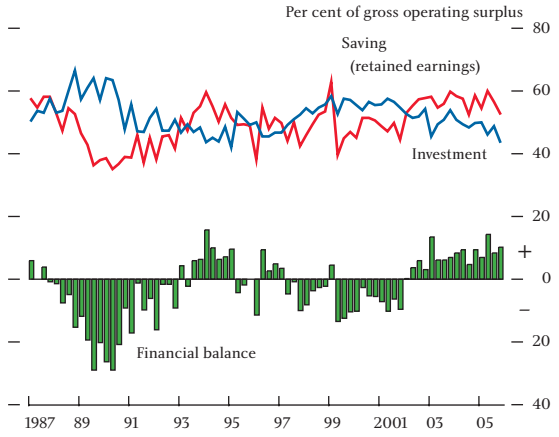
By taking the noise out of the sterling money markets, we aim to achieve greater stability and greater transparency. That won't revolutionise your businesses, but I trust that it will bring a welcome reduction in the avoidable uncertainties you confront.

Business risk management and pension-scheme uncertainties

At an aggregate level, the recent financial management of the company sector has, in fact, posed some puzzles about your assessment of uncertainty and risk. This has been important to our understanding of what is going on in the money markets, and indeed financial markets more generally, as part of the backdrop to our role of promoting monetary and financial stability.

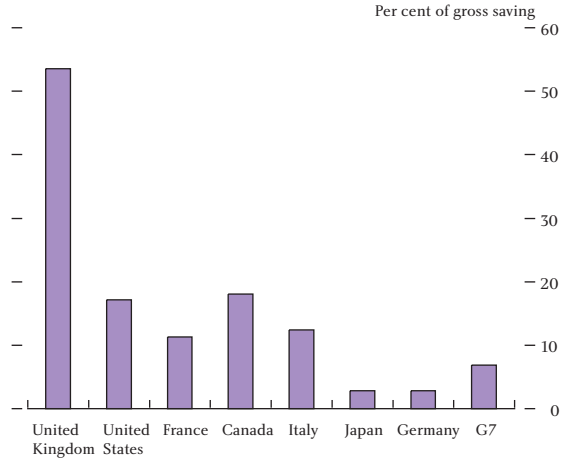
The surplus cash flows I described earlier, in the context of your treasury management, are a product of UK cash profits having exceeded, by some margin, business investment (Chart 5).

Chart 5
UK corporate sector retained earnings, investment and financial balance



The same is true across the G7 economies as a whole. Companies have acted to repair balance sheets following the excesses of the late 1990s, and may conceivably have built a cushion of financial assets to support them through a period of uncertainty as they adjust to the new competitive forces associated with globalisation. But the UK corporate sector stands out as having employed its surplus in 'cash' to a far greater extent than its G7 peers (Chart 6).

Chart 6
Accumulation of cash by private non-financial corporate sector (average 2003–04)

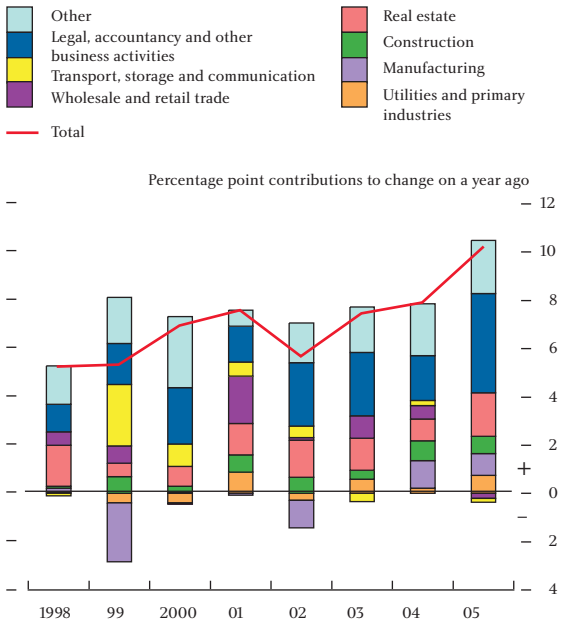


Note: Gross saving is defined as non-financial corporate profits after net interest and taxes, less dividends paid.

Source: IMF.

The IMF hypothesise[1] that this may have been motivated by a desire to accumulate a precautionary pot of liquid savings for managing pension fund deficits. I do not know whether or not that is so. For example, the build-up of deposits has been concentrated in a few sectors: real estate, and business services, and it is not obvious that these sectors have big pension fund deficits (Chart 7).

Chart 7
Contributions to growth in UK non-financial company sterling deposits



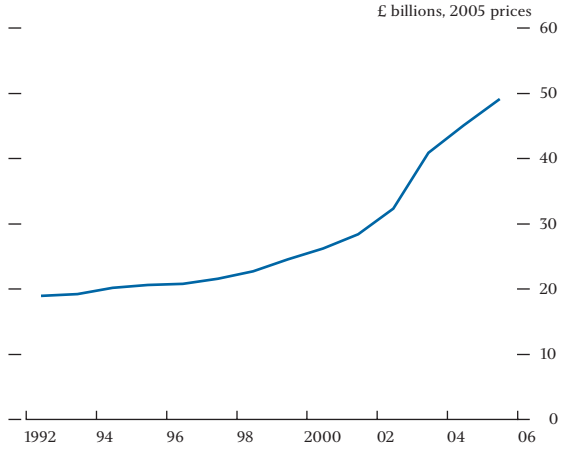
But that pensions have been a material component in firms' cash management is not in doubt. That is apparent in the share of gross corporate savings accounted for by employers' contributions to pension funds (Chart 8). Contributions have tripled — or in real terms doubled — since the late 1990s (Chart 9).[2] Part of this reflects 'special' or 'one-off' contributions to reduce deficits. But, judging by self-administered schemes,[3] regular contributions have doubled (Chart 10). What is going on here?

Well, it might have something to do with your management of risk, bearing in mind avoidable and unavoidable sources of uncertainty.

A corporate sponsor of a defined-benefit pension scheme is, in effect, providing a guarantee or, broadly, writing a very complex option:[4] one on which the

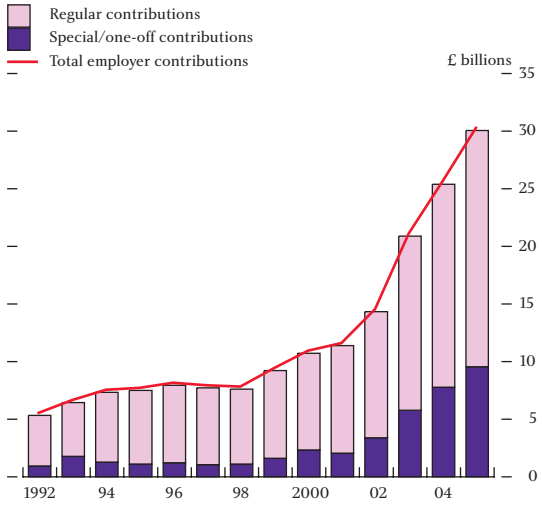
Chart 8
Employer pensions contributions

Chart 9
Employer pensions contributions



Source: ONS; data shown are expressed in 2005 prices using RPI inflation.

Chart 10
One-off and regular employer pension contributions



Note: Covers self-administered occupational schemes only.

(1) See footnote 18, Chapter IV 'Awash with cash: why are corporate savings so high?', *World Economic Outlook*, April 2006, page 151.
(2) For the household sector, the effect has been that employer contributions more than account for total net savings.
(3) A breakdown of contributions into 'one-off' and 'regular' is available only for self-administered schemes. They account for around half of total employers' contributions to private pension schemes.
(4) It is option-like because of the asymmetry between extracting surpluses from pension funds and making good deficits.

present value of the pay-offs is related to, among other things, the future growth in earnings of its workforce, their longevity, and the yield on an equivalent-maturity risk-free bond. Apart from the design of the scheme itself and the associated balance of wages and pensions in employee remuneration, the sponsor makes two big choices: the level of contributions it makes to the fund, and the asset allocation of the fund. (It may seem odd to say that the sponsor makes a decision about fund asset allocation, because of course that is formally the responsibility of trustees. But as guarantors, those decisions affect the risk run by sponsors who, in principle, could make adjustments to their own balance sheet if they regarded trustee choices as suboptimal.)

Past increases in life expectancy entail higher contributions and, other things being equal, add to the marginal cost of a firm's labour force. An unavoidable source of uncertainty is future developments in longevity.

In the asset allocation of a fund, company sponsors face, at one remove, a trade-off. On the one hand, if a fund holds risky assets, it will earn a risk premium but its value will tend to be more volatile, varying with the long-term risk-free rate used to discount its liabilities and the value of its risky assets. On the other hand, a fund could choose to hold only risk-free assets matching the characteristics of the scheme's liabilities; for example, buying annuities which can hedge the duration and longevity risk in known pension liabilities. In that case, the fund's expected returns will be lower, and so sponsor contributions will have to be higher in order for the fund to meet the scheme's future obligations.

In short, company sponsors face some sources of avoidable uncertainty about the future value of their pension funds, with the level of their contributions akin to a premium paid to reduce or remove that uncertainty. (The funds' trustees face a subtly different risk trade-off, in which they need to weigh the correlation of the risks in the asset-liability mix of their fund with the risks to the sponsor's business and net worth, and so to its capability to meet any future fund shortfall.)

How much risk a company should take in its core business and in the provision of pensions is obviously a matter for its board. A famous paper in corporate finance[1] finds that, subject to some (admittedly fairly strong) assumptions about tax etc, the market value of a company (measured as the sum of the value of all its financial liabilities, equity and debt) should not depend on its capital structure. Rather, its capital structure affects the risk to equity holders, and so the headline return they should rationally require to compensate for risk. Within this framework, defined-benefit pension schemes can be viewed as deferred compensation and so as entailing a form of indebtedness (in many cases, *de facto* indexed-linked borrowing) for their sponsors, to be 'serviced' alongside their more conventional external indebtedness. Perhaps that has become most obvious when a fund is calculated as being in deficit.

It would seem that in recent years there has been a keener awareness of this way of thinking analytically about pension obligations. If there has been an 'awakening', maybe it was triggered by a combination of the volatility of the value of equities held by funds, especially when they fell sharply a few years ago; the volatility of the discounted value of their liabilities as long-maturity real rates fell; regulatory requirements governing the closure of deficits; and fluctuations in the net value of funds having for the first time to be reflected in firms' capital in their financial accounts.

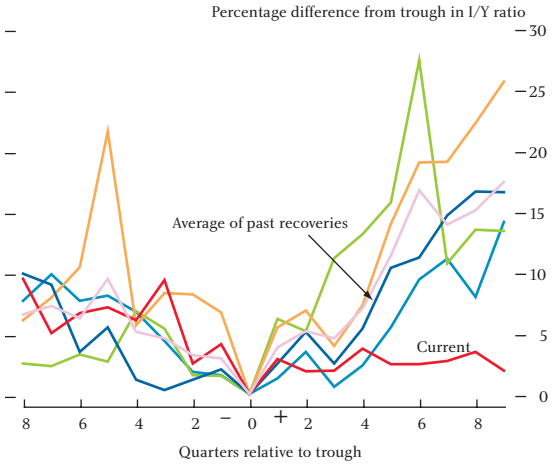
Firms may, therefore, have been reviewing their preferences between risk-taking in their core business and risk-taking via pension provision, and for a while may have been unusually uncertain about how equity markets value those different sources of uncertainty. If so, that may conceivably offer part of the explanation for the measured recovery in UK business investment having been weak, relative to the economy's total output, compared with past cycles (Charts 11 and 12). Some have suggested that the need to close deficits may have been a factor, via the call on cash flows. The possibility I am airing is that another factor may be the size of a scheme's discounted liabilities and the prospective volatility of the associated fund's net value relative to the sponsor's underlying business and capitalisation.

I do not want to push that too far. There have, of course, been other possible explanations for weak fixed-capital expenditure. These include competition from China, India and elsewhere; the rise in oil and commodity prices; and the uncertainty about how both will play

(1) Nobel Prize winner, Modigliani, F and Miller, M (1958), 'The cost of capital, corporation finance and the theory of investment', *American Economic Review*, Vol. 48, pages 261–97.

Chart 11
UK business investment

Chart 12
UK business investment recoveries

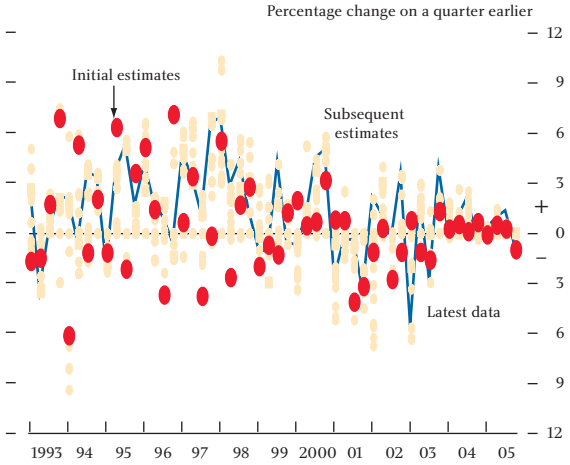


out, and thus about prospective demand for UK output. All of this might have been thought to make the external environment unusually risky and so to warrant deferral of investment decisions.

Another possible explanation is, simply, that the level of investment has been underrecorded, and that the data will be revised up, as they have been frequently in the past (Chart 13). Indeed, as the share of economic activity accounted for business and financial services increases, it is even possible that a growing part of business investment is simply unmeasured. When your teams spend time developing spreadsheets that will be used for three to five years, do you count that as investment?

So it is difficult to know whether or not the management of risks associated with pension provision has had a bearing on the recent measured weakness in business investment.

Chart 13
Revisions to UK business investment



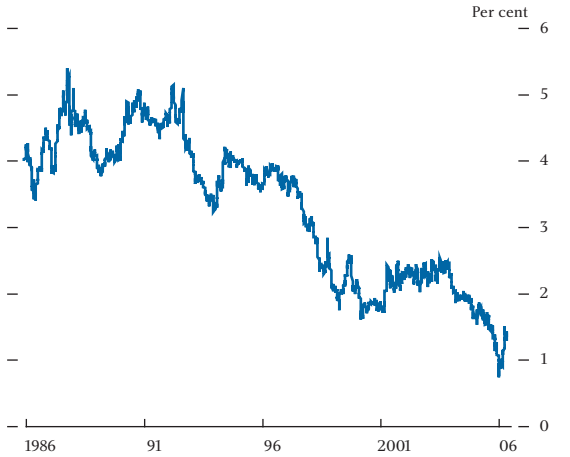
Financial market uncertainties

It has, though, surely been an important factor in financial markets in recent years.

The most obvious manifestations have been associated with their own jargon: liability driven investment (or LDI), and so-called 'alpha-generating' active-management strategies.

LDI involves matching a fund's assets more closely with its quasi fixed income liabilities, via purchases of long-duration conventional bonds, inflation-indexed (or real) bonds, interest rate swaps and inflation swaps. This may well have amplified the fall in very long maturity real forward rates, which has been such a puzzle in recent years (Chart 14).

Chart 14
Long-maturity real sterling forward rates



Sources: Bloomberg and Bank of England calculations.

Greater asset-liability matching represents a reduction of risk, and so — at least at first blush — does not

obviously square with a more aggressive approach to active management via increasingly popular 'alpha' strategies. But quite what such strategies entail may need a bit of unpacking.

Conventionally, in the framework of the Capital Asset Pricing Model, 'alpha' would refer to excess risk-adjusted return (a nice thing if you can get it!). In practice, the term seems to be deployed rather loosely, being used variously to cover allocations to assets whose returns have in the past been relatively uncorrelated with a fund's liabilities; leveraged — that is to say, risk-enhancing — plays across almost any asset class; and giving greater freedom to fund managers. For pension funds, one motivation has probably been to diversify asset portfolios, perhaps evidenced by bigger allocations to private equity, commodities etc. Another motivation, both here and overseas, seems to be to try to close deficits partly by earning high investment returns on some proportion of their asset portfolios. Cast in that light, it appears to be part of the broader 'search for yield', which has been offered by some as contributing over the past couple of years to the compression in credit spreads and other market-based indicators of risk, such as the price of options on most asset classes.

Two responses to this have circulated among market participants, both intermediaries and asset managers. One is that falls in implied risk premia truly have reflected a reduction in risk. The other is that, while that story might hold up to a point, risk has been underpriced.

It is certainly plausible that structural change has caused risk to decline somewhat over the past decade or so. First, monetary policy regimes have become more credible. That being so, central banks may be able to stabilise demand and output growth more effectively than in the past. Most obviously, cuts in interest rates are now much more likely to be understood as a response to an adverse demand shock rather than as attempts to generate extra demand and jobs in the short run at the cost of stoking up higher medium-term inflation. And so it is easier for central banks to cut interest rates when that would be desirable in order to stabilise demand conditions and so keep inflation in line with the target. Related to that, greatly increased transparency across the central banking world makes policy surprises — and so outsized market reactions to policy decisions — somewhat less likely. Second, more competitive and transparent product markets (partly thanks to the internet), together with more flexible labour markets, may have improved the real economy's ability to absorb nasty shocks without persistent large falls in output. Third, developments in banking probably mean that more households have access to credit to help them to smooth their consumption by borrowing during 'bad times'. And by routinely distributing more risk to non-banks, the banking system may be less likely to wish or need to conserve capital, refraining from taking risk, when faced with increased demand for liquidity from its corporate and household customers. For these reasons, consumption growth may be less prone to violent lurches than during, say, the 1970s and 1980s.

In parallel, new techniques for unbundling and distributing risk, and possibly also asset managers working under fewer constraints than in the past, may have made financial markets more efficient. For any given level of expected volatility in the economy, that may have enabled investors to hold more diversified portfolios, reducing the excess returns (or risk premia) required for bearing the residual undiversified risk.

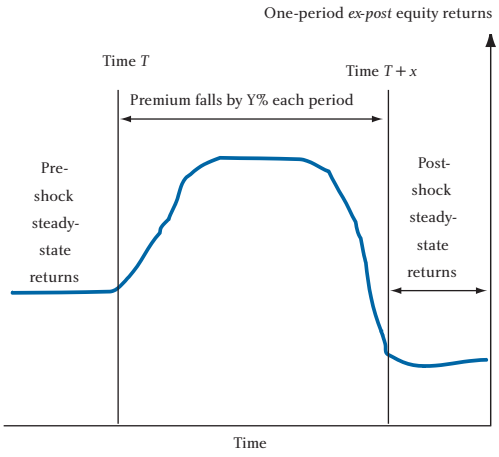
Taken together, other things being equal, these factors would tend to work in the direction of reducing inflation risk premia and term premia in government bond yields, credit spreads, equity risk premia, and implied volatilities derived from options.

But there are important qualifications to this story, especially regarding what it implies looking forward.

First, various cyclical developments, such as corporate sector balance sheet repair, have probably reduced risk. And, of course, growth is currently robust pretty uniformly across the world economy. Those features of the environment may have reduced risk premia, cyclically. There is no way to separate out with any precision the cyclical and structural, potentially more persistent, influences on the price of risk. Second, the importance of some of those structural factors may be exaggerated by market participants. Closest to home for me, I would not want anyone to think that central banks are capable of delivering uninterrupted growth indefinitely. And while central banks no longer seek to spring surprises on the market, our community could not rule them out if circumstances were to evolve where the market misperceived the implications of a central bank's analysis of the outlook.

But perhaps the most important point for the pricing of risk in capital markets is the following. To the extent that a structural story of some kind holds true, the consequent reduction in risk premia, and the associated rise in asset prices, would broadly be a one-off — even if drawn out. In other words, it would not be sensible for market participants both to place weight on the argument that risk premia were lower because there was fundamentally less risk, and at the same time to extrapolate *ex-post* returns on assets into the future. Headline returns would be lower than in the hypothesised 'old world' when risk premia were higher; and would be a lot lower than during the period when risk premia were falling to a new, lower level (Chart 15).

Chart 15
Stylised effect on equity returns of a fall in risk premia



This may not be completely idle speculation in a market environment where, anecdotally, fund managers have been chasing returns. And, of course, to the extent that past returns have in degree been extrapolated into the future, the effect might be an over compression of risk premia.

That has to be for you and other market participants to judge. What, from the sidelines, we have observed is striking innovation in ways of taking and distributing risk, against a background of strong asset-price performance in recent years and a presently benign macroeconomic environment. Over the past few years and currently, this has, perhaps, been most obvious, and most topical, in the structured finance markets. These are the markets in which portfolios of loans to households and companies — or synthetic versions of such loans created via credit derivatives — are bundled up into, for example, collateralised loan obligations (CLOs) and collateralised debt obligations of asset-backed securities (CDOs of ABS). The slicing and dicing of credit portfolios into different risk tranches can give end-investors access to assets more finely tailored to their particular demands and risk appetites. In most circumstances, that should distribute risk more effectively, buttressing the stability of the market and of the financial system as a whole. Looking ahead, a few questions are nevertheless posed by market participants.

One is whether the CDO factory has amplified the compression of credit spreads. The argument advanced goes roughly as follows: that, as credit spreads have fallen, the returns have become unattractive unless leveraged up; that the new technology for acquiring leverage(1) has drawn new sources of capital — including hedge funds — in to the credit markets; and that this increase in demand has fed through to a lower price for credit risk — ie lower spreads, easier covenants, etc — in the underlying loan markets, including for financing LBOs. These new instruments have of course emerged, and so have been priced, during a period when the default rate has been extraordinarily low.

A second question is whether the trade-off between the demand for financial engineering and the demand for liquidity in the structured finance markets, not just among leveraged players, could switch — back to liquidity — if market conditions were to shift from benign to stressed. An illustration of what can potentially happen is perhaps provided by the disruption just over a decade ago in the US Collateralised Mortgage Obligation (CMO) market. After a period of ever more refined financial engineering of mortgage claims into capital market instruments, resulting in some fairly illiquid tranches being created, stress occurred when the dollar yield curve rose sharply in 1994. This underlines the importance of industry

(1) Leverage, in this sense, can be understood as the sensitivity of the spread over risk-free rates on a particular credit instrument to a given change in credit spreads generally. In a CDO, the credit risk on an asset portfolio is split into tranches of varying seniority. The vast majority of expected losses from credit risk are concentrated in the most junior (or 'equity') tranche. In consequence, the prices of such junior tranches are highly sensitive (up to 20 times greater than the price of the entire portfolio) to changes in the general level of credit spreads, giving a highly leveraged exposure. In turn, CDO tranches may be repackaged into 'CDOs of CDOs' or leveraged in other ways. For example, a popular product has been so-called 'leveraged super-senior' in which an investor sells credit protection on part of the most senior tranche of a CDO but earns an additional return by agreeing to bear losses if, say, the tranche's market value breaches a trigger point. For further information see Belsham, T, Vause, N and Wells, S, 'Credit correlation: interpretation and risks', *Bank of England Financial Stability Review*, December 2005, pages 103–15; and Rule, D, 'The credit derivatives market: its development and possible implications for financial stability', *Bank of England Financial Stability Review*, June 2001, pages 117–40.

scenario analysis building in some allowance for the possibility of system-wide liquidity stresses.

A counterpart to whether market volatility could occur is the question of whether risk could flow back to the banking sector in adverse circumstances. Over the past decade, many banks have moved towards business models based around originating and distributing credit assets rather than holding them. But no one suggests that banks escape the risk completely. They warehouse risk before it can be securitised, and those warehouses will probably have grown with the volumes flowing through the securitisation markets. To a greater or lesser extent, they hold on to loans and securitised participations if they think them attractive, or perhaps punitively expensive to distribute. Through their prime brokerage operations, they finance leveraged holdings against collateral. And they sometimes provide committed lines of credit. Overall, this is akin to writing deeply out-of-the-money options, exposing the banking system to tail risk. That should not be too surprising given that commercial banks' liabilities are money, and so they are in the business of providing liquidity insurance. But it does make it difficult for market participants to assess, and price for, how much risk there is, albeit contingently, in the system as a whole.

Conclusion

Many of the developments I have reviewed are, of course, good news. Most obviously, longer life expectancy! Greater macroeconomic stability; financial innovation distributing risk more efficiently — these are pretty good things too, including for you as corporate treasurers. As a result, some risks have been reduced or are now easier to manage.

But risk management challenges do unquestionably remain for you as corporate treasurers. Some, such as those arising from pension provision, essentially boil down to your appetite for risk and the mix of business/financial risk you want. Others stem from a range of uncertainties in capital markets. When and how global imbalances will be resolved. Whether risk is underpriced. How still-new structured finance markets would withstand a marked pickup in defaults. You will each have your own list.

Those uncertainties and risks have to be identified, priced and managed. The official sector cannot make them go away.

But it is our mission to reduce uncertainties stemming from monetary policy and its implementation. Some important sources of uncertainty in the past were, in fact, avoidable. For some years now, monetary policy decision-taking has benefited from having a clear framework and from the Bank being transparent about its analysis of the economic outlook. Yesterday, by modernising the sterling money markets, the Bank provided a similarly clear framework for how we implement those interest rate decisions. I hope it makes your jobs a little easier.

Reflections on operating inflation targeting

In this speech,[1] Paul Tucker, Executive Director for Markets and a member of the Monetary Policy Committee (MPC) — sets out some reflections on the operation of an inflation-targeting regime after four years on the MPC. Addressing the key objectives of modern central banking and how they may be met, the central role of anchoring medium to long-term inflation expectations is emphasised. On the second element in the conduct of policy — stabilisation of the path of demand and output, to help meet the inflation target and as worthwhile in its own right — he argues that 'rough tuning' is a more feasible objective than attempts at fine tuning, in the face of limited knowledge about structural change in the economy and inevitably imperfect data. Turning to four issues of strategy for modern policymakers, he offers some comments on whether central banks should publish an expected policy path; on whether there is a time-consistency problem in their operation of stabilisation policy; on whether price-level targeting could make stabilisation policy more effective; and on how central banks should respond to asset prices. A thread running through the speech is that the successful operation of policy requires straightforward communication by central banks about policy objectives and the conduct of policy, without glossing over uncertainties and risks.

Next month will be the fourth anniversary of my appointment to the Monetary Policy Committee. It is time to draw together some of my thoughts on operating an inflation-targeting regime. Very much from the perspective of a practitioner, but engaging with some of the academic literature on our mission and, in particular, policy strategy.[2] At the outset, I should make it absolutely clear that these are my own personal views, and do not necessarily represent those of individual colleagues on the MPC or those of the Committee as a whole.[3]

Scene setting

The United Kingdom was not quite the first country to adopt inflation targeting — Canada and New Zealand got there before us. But it has certainly taken off since our conversion, in 1992. It is now the explicit framework of over 20 countries, including more than 15 in the emerging market world. And the IMF recently reported[4] that another 20 have sought technical assistance on introducing it.

The spread of inflation targeting has coincided with a period — pretty well everywhere in the developed world, except Japan — of low, stable inflation, and well-anchored inflation expectations. The Great Moderation cannot plausibly be attributed to inflation targeting narrowly defined, because the biggest monetary systems — the United States and the euro area — are *not* explicit inflation targeters. But some commentators do attribute the Great Stability — as it gets called in the United Kingdom, since we have enjoyed stable growth as well as low inflation — to shared ideas about the conduct of monetary policy, ideas that are embodied in inflation targeting.

Is all this too good to be true? Are there no challenges facing us? Or have central bankers finally cracked how to do monetary policy after around a century of managing fiat money?

A simple story of what central bankers do

As background, I am going to work within the framework of what has become the most commonplace stylised

(1) Delivered at the Chicago Graduate School of Business on 25 May 2006. The speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2006/speech274.pdf.
(2) Some of the points made here were prefigured in my written submission to the House of Commons' Treasury Select Committee ahead of a confirmation hearing on my reappointment to the MPC. See 'Treasury Committee Questionnaire ahead of appointment hearing for Mr Paul Tucker', The Monetary Policy Committee of the Bank of England: appointment hearing, First Report of Session 2005–06, Volume II.
(3) My thanks for comments to Peter Andrews, Alex Brazier, Roger Clews, Spencer Dale, Paul Fisher, David Walton and Anthony Yates. For comments and background work to Damien Lynch, Richard Harrison, Tim Taylor and Fabrizio Zampolli. And for secretarial support to Katherine Bradbrook and Michelle Wright.
(4) 'Inflation targeting and the IMF', International Monetary Fund, March 2006.

account — ie in simple models — of what central banks do.

Society and/or central bankers are assumed to care about deviations of inflation from a target, and of the level of output from potential, typically represented by a quadratic loss function. That is equivalent to wanting to ensure that inflation will not on average be biased away from the target, and to avoid a volatile inflation rate; and similarly for the 'output gap'.

Given that objective, the determinants of aggregate demand, and a short-run trade-off between output and inflation, the monetary policy maker is assumed to proceed by setting interest rates in the light of the outlook for demand relative to supply and for inflation.

The central bank decides a *nominal* interest rate, which it establishes in the money markets.(1) As the prices of many goods and services are sticky, this has the effect of enabling the central bank to move around the actual short-term *real* rate of interest relative to the 'natural' or 'neutral' real rate(2) that would prevail in the absence of those frictions.

Broadly, another consequence of prices and wages being sticky, together with some inertia in inflation, is that when shocks hit the economy, the central bank cannot get inflation to return to target instantly. So the central bank needs to take account of the infamous long and variable lags in the transmission of monetary policy decisions to the things it cares about.(3) In other words, in today's vernacular the central banker has to be forward looking, in particular about the outlook for inflation. That, essentially, is why some economists refer to central banks as undertaking inflation-*forecast* targeting.(4)

Under this regime, the central bank needs to form judgements on some big things. On the current and prospective pressure of demand on the supply (or productive) capacity of the economy; on the implications for the outlook of any cost shocks (eg oil price rises); and on whether medium to long-term expectations of inflation are well anchored to its (explicit or implicit) target.

Having done that and so formed a view on the outlook for inflation, the central bank may have to decide how quickly to bring inflation back to target, in the light of how much weight it gives to containing volatility in output.(5) It then needs to decide whether it should set policy so as to restrain or stimulate aggregate demand, or to be neutral. And it therefore needs to judge whether the current level of interest rates is, in fact, likely to deliver its desired degree of stimulus or restraint.

Underlying those 'big picture' judgements are, at least implicitly, views on some fundamental economic variables. Notably, on the supply capacity of the economy and its prospective rate of growth; on the rate of unemployment below which inflation is liable to increase; on the natural (or neutral) real interest rate. Those judgements are, in truth, formidably difficult to make, because they need to be regularly updated given structural change in the economy; and because each of the variables is unobservable!

Perhaps understandably, that leads some policymakers(6) to the conclusion that these concepts may be useful as just that — concepts — but not at all in practical decision taking. While not wanting to deny their unobservability, I do not take quite that view. For example, the natural real rate may be unobservable, but there is no ducking the fact that a policymaker needs to form a view on whether its policy stance is stimulating or restraining demand, which amounts to broadly the same thing.

Against that background, I can return to a central bank's objectives. To maintain inflation in line with a target over the medium term. And, typically with less priority, to stabilise the path of output in the face of cyclical shocks; in the UK Government's mandate to the Bank of

(1) A completely new framework for doing so in the United Kingdom was introduced last week (18 May). See 'The Framework for the Bank of England's Operations in the Sterling Money Markets' (the 'Red Book'), May 2006.
(2) Wicksell, K (1898), *Interest and prices*, London, Macmillan, 1936. Translation of 1898 edition.
(3) A classic reference, in the context of the relationship between money and inflation, is Friedman, M (1961), 'The lag effect in monetary policy', *Journal of Political Economy*, Vol. 69, No. 5.
(4) For example, Svensson, L E O (1997), 'Inflation forecast targeting: implementing and monitoring inflation targets', *European Economic Review*, Vol. 41, Issue 6.
(5) See Batini, N and Nelson, E (2001), 'Optimal horizons for inflation targeting', *Journal of Economic Dynamics and Control*, Vol. 25, Issue 6–7.
(6) A recent example in relation to r^* is Weber, A A (2006), 'The role of interest rates in theory and practice — how useful is the concept of the natural real rate of interest for monetary policy?', G L S Shackle Memorial Lecture 2006, Cambridge.

England,[1] that is expressed in terms of, *inter alia*, the MPC avoiding 'undesirable volatility in output'. I shall say something about both, before going on to discuss some issues concerning monetary policy strategy that have featured in recent academic commentary.

Medium-term inflation expectations, forecasts, and models: nominal stuff

In terms of the primary objective of delivering stable inflation, it has helped the United Kingdom to have a clear target. In contrast to many inflation-targeting countries,[2] we have a point target: 2% on the consumer prices index. That leaves no room for debate in our (one person-one vote) committee about what the target is, and that it is symmetric. And there should be no uncertainty among households, firms and participants in financial markets about the steady-state rate of inflation being targeted. In other words, a point target makes communication somewhat more straightforward.

Of course, that is not the same as saying that we can guarantee to deliver inflation outturns consistently in line with the target over an economic cycle. Shocks, and even policy mistakes, will cause inflation to deviate from target. Explaining such deviations matters.

Especially when being reappointed for a further term, MPC members are typically asked by the House of Commons' Treasury Select Committee whether the MPC has made any big mistakes.[3]

In response, we often talk about luck, diligence etc. But I think that the best test — perhaps the only important test — is whether *medium to long-term* inflation expectations have been dislodged from the target.

In the United Kingdom, expectations have generally been in line with our target since the Bank was given operational independence. But as the recent slight tick-up in some measures illustrates, we have to be constantly vigilant. By contrast, an uncomfortable amount of commentary — academic and in the media — proceeds as if that particular battle is won for all time; the 'death of inflation' school of thought.

Indeed, seductively, these days 'victory' tends to be inscribed in to the economic models used by central banks as an input to their forecasts. Reflecting the achievements of this university, our models have a well-defined steady-state equilibrium for the real economy; well-defined steady-state *nominal* properties, typically an inflation rate; and forward-looking rational expectations, that is to say model-consistent expectations. The second of these characteristics means that a nominal target is always achieved in the medium to long run. And the third means that the model's agents know that; ie they know *now* and behave — set wages and prices — accordingly, so that in these mainstream models the target is achieved over cyclical frequencies too.

Typically, nominal things enter via inflation expectations, and they are pinned down in the stylised, model economy by a policy rule of the kind I sketched earlier, expressed in terms of an official interest rate (the price of base money). But just in case it were thought that the 'problem' of models promising the policymaker success stems from the crime of ignoring money quantities, I should make it clear that that is not so. It would not make a fundamental difference in policymakers' modern-macro models if nominal stuff entered via a money quantity, with the policy rule being specified as a money-supply growth rate. So-called velocity shocks to the demand for money would cause deviations from an inflation target in the short run, but everything would ultimately settle down nicely — because that assumption would be built in to the model's long-run properties (in this instance via a demand-for-money equation that was imposed as stable over the long run).

I'm exaggerating a bit. Forward-looking models can be set up in ways where things go wrong for a while. In particular, by allowing agents to learn more or less gradually that the monetary authority really does mean it about achieving its target for inflation (or some other nominal variable).[4] Everything still turns out okay eventually, but the route can be a bit bumpy.

Experiments of that kind can help policymakers to think through, in a disciplined way, what might happen if inflation expectations were to become dislodged. But, so

(1) 'Remit for the Monetary Policy Committee', letter from Chancellor of the Exchequer, the Right Hon. Gordon Brown, to Mervyn King, Governor of the Bank of England, on 22 March 2006. Available at www.bankofengland.co.uk/monetarypolicy/pdf/chancellorletter060322.pdf.
(2) For example Australia, Canada and New Zealand.
(3) For example, 'Treasury Committee Questionnaire ahead of appointment hearing for Mr Paul Tucker', The Monetary Policy Committee of the Bank of England: appointment hearing, First Report of Session 2005–06, Volume II.
(4) Erceg, C J and Levin, A T (2003), 'Imperfect credibility and inflation persistence', *Journal of Monetary Economics*, Vol. 50, Issue 4.

far, they do not do much to help us know what to look for in identifying *whether* inflation expectations are in the process of becoming dislodged. We do not know enough about how households and firms form their expectations — how much forward looking, how much backward looking — to be able to model the process rigorously. That is not part of the 'information set' of policymakers in today's world.

What this underlines is that policymakers may well not be able to rely on their models to help them terribly much when the stakes are highest; ie when our credibility may be fragile. They are tools to help us think. But they don't tell us the answers. Crucially, we have to make *judgements* about whether medium-term inflation expectations are, in fact, securely anchored. We need to resist falling into the trap of thinking that the nominal side is now, and forever, nicely looked after by some miracle of credibility.

Notwithstanding the extent to which analysis of *real* economic variables seems to dominate the pages of most central banks' published analysis, including the Bank of England's, maintaining *real* aggregate demand in line with supply is not a sufficient condition for achieving an inflation target; indeed, it would be consistent with any level of inflation. We absolutely have to attend to indicators of medium-term *nominal* trends. That is why central bankers like me look at measures of inflation expectations from as many sources as we can: bond markets, surveys etc. And it is why the ECB and others, including at the Bank of England, track the monetary aggregates as a cross-check, a potential amber light alerting us to medium-term risks.

Stabilisation policy and the impracticalities of fine tuning: real-side stuff

That brings me to the second element in the conduct of policy: stabilisation of the path of demand and output, in order to keep inflation in line with the target over the cycle, to underline the commitment to medium-term stability, and as something desirable in its own right.

Well-anchored inflation expectations *do* make stabilisation policy 'easier'. When a *credible* central bank cuts its interest rate to offset the adverse effects of a shock to demand, it will not be perceived as trying to raise demand and employment in the short term (say over the next year or so), at the expense of higher inflation down the road. Rather it will be understood as trying to avoid deficient demand: as trying to stimulate demand a bit in the short run in order to bring it back to the economy's supply capacity and so, precisely, to maintain inflation *in line* with its target.

For at least this policymaker, however, there is a risk of commentators overstating our capacity to stabilise demand — understandably perhaps following, in the United Kingdom, more than a decade of fairly steady growth since inflation targeting was introduced.

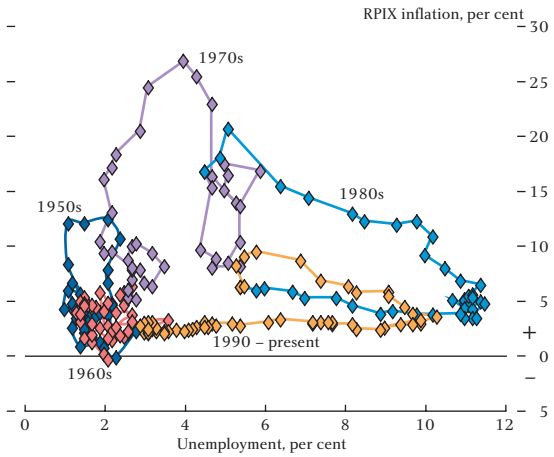
To be clear, I *do* believe that we should be able to put behind us the self-inflicted economy-wide boom and bust that, miserably, characterised the UK economy for a few decades until the early 1990s.(1) All too frequently in the past, aggregate demand was allowed to get out of control, bringing with it, variously, a credit boom, an asset-price bubble and, sooner or later, runaway wage and consumer price inflation. Belatedly, the monetary authority would slam on the brakes, tipping the economy into recession. Inflation would then slow.

But that we no longer neglect the inflationary consequences of excess demand does not mean we can nicely fine tune demand to ensure uninterrupted growth. Why?

I will mention just two reasons. First, we just do not know enough about the underlying structure and properties of the economy. Quite apart from the change in monetary regime, the extent and variety of the structural change underway in the real economy is profound: for example, labour market reform domestically, and the opening up of labour markets across the European continent, which has materially increased inward migration to the United Kingdom; the new technology and the price transparency it brings; China and India. In consequence, in the United Kingdom for the moment we do not really know whether the short-run trade-off between excess (or deficient) demand and inflation has changed; whether the short-run Phillips curve has become flatter (Chart 1).

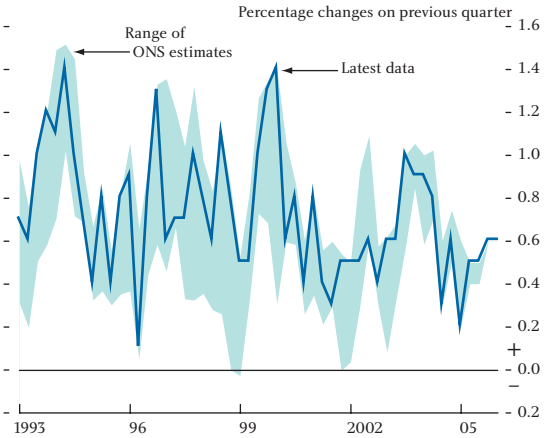
(1) Balls, E and O'Donnell, G (eds), 2001, 'Reforming Britain's economic and financial policy: towards greater stability', HM Treasury, page 10: 'Although there are many reasons for the UK's poor inflation record in recent decades, one key factor was poor institutional arrangements. Monetary policy, if set correctly, should be a stabilising force for the economy. However, serious mistakes were made, which often meant that inflation was higher and more volatile than it would otherwise have been. This, in turn, created substantial economic instability that harmed the long-term performance of the UK economy. Many of these policy mistakes were made because the aims and procedures of monetary policy were not properly defined'.

Chart 1
Unemployment and inflation



Second, the data we use give us an unavoidably imperfect read on what is going on. Not infrequently in my experience we debate the various possible explanations for some puzzle in the data, only to find that a year or so later the data have been revised and, as it turned out, there was no puzzle (Chart 2). For that reason, the Bank of England is putting considerable resources into researching data uncertainty.(1)

Chart 2
Official estimates of GDP growth



Where does that leave us? I should like to say that we can 'rough tune' but not fine tune. Rough tuning *is* important, as we do need to keep aggregate demand and supply broadly in line as a condition for maintaining stable inflation. But that does not mean that we can always smooth out quarter-to-quarter, or even year-to-year, fluctuations in demand and output to the extent some commentary implies. In terms of the political economy of monetary policy making, it is important for the central banking community to get that across and accepted. If we fail in doing so, and the public believes that central banks can deliver more than is realistic, there will at some point down the road be disappointment, conceivably putting in jeopardy the real achievements of monetary policy in delivering price stability.

Of course, these strictures apply most of all to ourselves. We try to discipline ourselves not to claim too much credit for stable growth. And in forecasting, we have to attend to the uncertainties around our projections of the central outlook. Some numbers may serve to underline that. The MPC's projections are published as fan charts. The fan chart standard deviation of output growth at around one year is a little under 1 percentage point; and of inflation at around two years, roughly 0.5 percentage points. This is not a world in which one should get carried away by fine judgements that alter the central projection for demand by 0.1 or 0.2 percentage points. Yet, as the Bank has documented,(2) assuming that credibility is maintained, the effect of a *surprise* change in the official interest rate is judged to be small; maybe less than 0.1 percentage point on the annual rate of inflation two years after a 25 basis point surprise change maintained for one year. Of course, we are not in fact in the business of aiming to make surprise changes in our policy rate. Against a background of credibility, a lot of practical monetary policy making is not about forestalling major lurches in the economy and inflation via large, abrupt changes in the policy rate. Instead, it has to involve careful analysis of the conjuncture, with transparency to the market. But these numbers do perhaps illustrate the importance of our not getting drawn into absurd degrees of detail, and the risk of signalling that we think we can precisely fine tune demand conditions.

How can we maintain and underpin credibility? The following seem to be ingredients. Being very publicly committed to anchoring medium-term inflation expectations in line with a clear target, above all else. Inflation outturns being, on average, in line with the target. And being seen to be committed to the essentially technical job of professional economic analysis of conjunctural conditions and the underlying structure of the economy. Typically moving our policy rate in steps of 25 basis points seems to have been useful in conveying the break with the past. Perhaps because it

(1) For example, Lomax, R (2004), 'Stability and statistics', speech to the North Wales Business Club, *Bank of England Quarterly Bulletin*, Winter, pages 495–501.
(2) Harrison *et al* (2005), *The Bank of England Quarterly Model*, pages 128–32.

conveys that things are 'under control'. The counterpart to that is being understood to be ready to do whatever it is necessary to maintain well-anchored inflation expectations.

Policy strategy, risk management and communication

If the key tasks are anchoring inflation expectations and, with less weight, stabilising demand conditions, how do central banks go about their policy job?

At the Bank of England, in both our published projections and our policy decisions, we emphasise the risks around the 'central outlook'. And although some of the presentation is different, that is on the same page as what former Chairman Greenspan called the 'risk management' approach to policy.

In my experience, it is not sensible to respond to all possible risks, even some that would have a big impact if they crystallised. Take, for example, global imbalances. If they were to unravel abruptly, with a big fall in the dollar against the euro, aggregate demand in the euro area might fall for a while. Depending on what had happened to sterling's bilateral exchange rates, the United Kingdom would not be immune from spillovers, as the euro area is by far our largest trading partner. For some time, therefore, global imbalances have been a real source of risk to the United Kingdom as well as to the global economy. Should I have been voting to cut interest rates to head off those risks? I don't think so. It would not have made sense to try to anticipate the effects of a shock that had not yet occurred and over which we had effectively no influence. A number of external 'tail risks' are rather like that.

How does that fit with 'precautionary' or 'insurance' policy settings. Individual policymakers differ on the usefulness of this concept. I find it quite useful. But on my view of what it means, it has to be subject to some quite stringent conditions in practice.

Remembering that we have a highly imperfect line of sight of what is going on in the economy, assume as a thought experiment that some indicators are flashing the possibility that there has been a *material* shock to demand. For example, imagine that there has been a bit of bad news but that there are signs that consumer confidence may be ebbing away by more than we would have guessed was proportionate. So maybe spending will fall materially. The probability is thought to be low, but tangible. In other words, most likely the outlook is fine, but it might not be. A cut in rates might be warranted in order to guard against the consequences if the risk has, in fact, crystallised. The policymaker could wait for more evidence, but by waiting they risk being too late to avoid some deviation of output from 'potential' and of inflation from target. This is not a free lunch. In keeping with the insurance metaphor, a premium will have to be paid: in the form of accepting a slightly higher probability of inflation rising above target in the near term if the (insured-against) risk has not, in fact, crystallised. In other words, the policymaker faces a trade-off, based on a judgement of probabilities and costs.

But, in my view, there is more to it than that. Communication matters too. If the policymaker takes out the insurance, they need to be clear (with themselves) about the conditions under which it would be withdrawn, ie the cut reversed. And that state-contingent policy analysis needs to be communicated to the market too.

Some economists do not like the idea of 'insurance' policy settings, and ask, reasonably, how they square with the type of objective (loss) function I set out at the beginning of my remarks. Alternatively, it is argued that they are so obviously consistent with a 'standard' loss function that it does not really add anything to talk about 'insurance' or 'precautionary' settings as a way of framing policy analysis and decisions. These are both fair points! Possible responses run as follows. First, maybe we (society) are more averse to fairly bad events than to risks that take us just a little distance from target/potential; eg maybe preferences would be better approximated by a loss function with a 'higher power' than a quadratic.(1) Second, maybe what is going on can be thought of in terms of how heavily or not we discount future deviations from target/potential relative to very near-term deviations; ie a policymaker may accept the price (premium) of risking slightly higher/lower inflation in the nearish term in order to reduce (insure against) the risk of a bigger or more persistent deviation of inflation from target a little down the road.

What the insurance/risk management metaphor does illustrate is that a policymaker has to think beyond the immediate policy decision. Indeed, it would be odd not

(1) For a discussion of some implications of different loss functions, see Vickers, J (1998), 'Inflation targeting in practice: the UK experience', *Bank of England Quarterly Bulletin*, November, pages 368–75.

to. In the great scheme of things, fixing the overnight rate for the next month (in the United Kingdom) — or 45 days or so (in the United States) — seems neither here nor there.

Of course, on both sides of the Atlantic, we have recent examples of policymakers making their strategy clear, albeit in subtly different ways. In the most recent cycle, the Bank of England's rate troughed at 3.5%. Some of us made it clear that, so far as our *individual* decisions were concerned, we expected, other things being equal, to vote for a gradual withdrawal of monetary accommodation if/as demand recovered and the slack in the economy was gradually absorbed.(1) Crucially, those statements were state contingent.

Some policy strategy issues

Against that background, I should like briefly to review, without reaching firm conclusions on, four issues that feature in the recent literature. Whether central banks should publish an expected (optimal) path for their policy rate. Second, whether stabilisation policy is subject to a bias, meaning that a central bank will find it optimal not to deliver on promises and that, in consequence, its policies to offset shocks will be less effective than they could be if it could commit itself. Third, whether stabilisation policy could be more effective if the central bank targeted a path for the price level rather than an inflation rate. And, fourth, how central banks should respond to asset price inflation.

(a) Should central banks publish an expected policy path?

Among others, Lars Svensson(2) and Michael Woodford have argued that central banks should publish the path they expect for the policy rate or the near-term path of inflation they are aiming for. The Norwegian and New Zealand central banks have been publishing policy rate paths for a short while.(3) The Bank of England does not. What do I — let me stress, personally — think about that?

As others have pointed out,(4) managing a scheme for voting by nine members on a path of rates would be pretty complex. Proposals have been made (eg for deriving a median path from individual members' paths),(5) but they seem to entertain the possibility of shifting majorities for different parts of the resulting path (or implied money market curve). That may add an extra complication to explaining policy.

Indeed, more broadly, there would probably be a challenge in the area of communication. A single path for rates would, of course, be a misleading statement of the policymaker's intentions; of its 'reaction function'. The path policy takes will depend, very obviously, on the shocks that hit the economy in the future. But not only on that. Also on whether, even in the absence of new shocks affecting households and firms, the economy evolves on the path the central bank expected, including agents' responses to past policy decisions and shocks. On any changes in view about how the economy works (about the 'model'). And it will depend on whether the central bank's beliefs about agents' inflation expectations are (broadly) accurate. In other words, the outlook for policy is unavoidably state contingent, and those contingencies include the possibility of the policymaker discovering that it had not been as credible as it had assumed. Communicating that state contingency in the form of a series of interest rate paths would be formidably difficult. It is not obvious to me that a fan chart for the interest rate delivers this(6) unless accompanied by a clear explanation of what states of the world would take the central bank's rate to different parts of the fan. So the question boils down to how the policymaker's reaction function can best be conveyed.

At the Bank of England, we have tackled this by publishing as complete an account as we can of our analysis of the economic outlook, including the risks. In the minutes of our meetings, we describe how those risks feature in our policy judgements. And individually, we explain the reasoning behind our decisions and our view of the outlook in Select Committee appearances,

(1) For example, Tucker, P M W, speech at the National Association of Pension Funds Annual Investment Conference, March 2004, *Bank of England Quarterly Bulletin*, Summer 2004, pages 234–40; and 'Bank's market man is ready for rate rises', P M W Tucker interview by D Smith, *The Sunday Times*, 25 April 2004.
(2) Svensson, L E O (2006), 'The instrument-rate projection under inflation targeting: the Norwegian example', presented at Banco de Mexico conference 'Stability and Economic Growth: the role of the Central Bank', Mexico City.
(3) For examples, see Chapter 1 'Monetary policy assessments and strategy', *Norges Bank Inflation Report*, 3/2005, November 2005, and Section 1 'Policy assessment', *Reserve Bank of New Zealand Monetary Policy Statement*, March 2006.
(4) For example, Goodhart, C A E (2001), 'Monetary transmission lags and the formulation of the policy decision on interest rates', *Federal Reserve Bank of St. Louis Review*, (July/August), pages 165–81.
(5) Svensson, L E O (2005), 'Optimal inflation targeting: further developments of inflation targeting', prepared for Central Bank of Chile conference on 'Monetary Policy under Inflation Targeting', Santiago, October 2005, page 8.
(6) For an example of such a fan chart see Chapter 1 'Monetary policy assessments and strategy', *Norges Bank Inflation Report 3/2005*, November 2005.

speeches, etc. The underlying question here is whether a more effective communication policy is based on explaining the underlying analysis or on providing what many might wrongly perceive to be the 'answer' in the form of a path for rates. In a world where attention to our analysis is limited, it may be preferable to keep our 'audience' focused on the MPC's analysis of the outlook for output and inflation.

Sometimes that analysis lends itself naturally to a contingent statement, by individual members, of a possible path for policy. I have already referred to one such example around the end of 2003/beginning of 2004.

In a similar vein, circumstances may arise where we explained the broad path for inflation we were trying to deliver. For example, a shock to the economy might be sufficiently nasty that returning inflation to target on the usual timetable would threaten undesirable volatility in output. We might then want to set policy in a way that accepted deviations from the inflation target for a period, while committing to achieve the target in the medium run. Related to that, our mandate makes specific provision for communication if inflation outturns were to miss our target of 2% by more than 1 percentage point. In those circumstances, the Governor of the Bank would be obliged, as part of the Committee's public accountability, to write an open letter to the Chancellor of the Exchequer explaining why inflation had deviated from target, the Committee's plan for returning to target, and its time horizon for doing so. Such circumstances have not yet arisen, but they illustrate that provision is made for the Committee to explain what commentators would call its strategy.

The debate is certainly interesting, and it should go without question that, like policymakers everywhere, I am very much in learning mode over these issues.

(b) Is there a stabilisation bias?

Inflation targeting has been characterised as 'constrained discretion' in the sense that the central bank makes policy choices, but choices disciplined by a clear objective.(1)

Exploring the implications of discretion, Michael Woodford and Lars Svensson have argued, in a series of papers,(2) that optimal policy suffers from a stabilisation bias, arising from time inconsistency. Any central banker's ears will prick up at this, given the importance of an earlier literature — associated with Kydland and Prescott, Barro, Fischer(3) — in helping to explain the inflation problems of the past and to make the case for central bank independence.

The 'old' problem was about the incentive of a monetary authority to cheat, or renege on promises, by generating surprise inflationary booms in order to secure an increase in output and jobs. This was, indeed, pretty tempting for politicians when they had their hands on the interest rate lever. In a rational world, the result was no permanent increase in jobs but a higher-than-desired steady-state rate of inflation. And the solutions variously offered by the academy included appointing a 'conservative central banker' more averse to inflation than society at large, or writing a 'contract' that incentivises the monetary authority to do the right thing.(4)

In practice, the solution has amounted to a combination of central bank independence, clear goals, and transparency. These real-world central bankers care about ensuring that nominal magnitudes do not distort economic decision taking, and they care about their reputations. But they are not 'conservative' in the sense of being 'inflation nutters'. Rather they are 'dutiful' in the sense of sticking to a clear, symmetric mandate. That, many would argue, has been a necessary condition for achieving credibility.

(1) Bernanke, B S and Mishkin, F S (1997), 'Inflation targeting: a new framework for monetary policy?', *Journal of Economic Perspectives*, Vol. 11, No. 2; and King, M A K (2004), 'The institutions of monetary policy', The Ely Lecture 2004, at the American Economic Association Annual Meeting, San Francisco.

(2) Woodford, M (2003), *Interest and prices: foundations of a theory of monetary policy*, Princeton University Press, Chapter 7; Dennis, R, 'Time-inconsistent monetary policies: recent research', *Federal Reserve Bank of San Francisco Economic Letter*, April 2003, No. 2003–10; and Svensson, L E O and Woodford, M (2005), 'Implementing optimal policy through inflation-forecast targeting', in Bernanke, B and Woodford, M (eds), *The inflation-targeting debate*, University of Chicago Press.

(3) Kydland, F and Prescott, E (1977), 'Rules rather than discretion: the inconsistency of optimal plans', *Journal of Political Economy*, Vol. 85; Barro, R and Gordon, D (1983), 'Rules, discretion and reputation in a model of monetary policy', *Journal of Monetary Economics*, Vol. 12; Fischer, S (1994), 'Modern central banking', in Capie, F, Goodhart, C, Fischer, S and Schnadt, N (eds), *The future of central banking, the Tercentenary Symposium of the Bank of England*.

(4) For example Rogoff, K (1985), 'The optimal degree of commitment to an intermediate monetary target', *Quarterly Journal of Economics*, November, Vol. 100, No. 4; and Walsh, C E (1995), 'Optimal contracts for central bankers', *American Economic Review*, Vol. 85, No. 1.

But now it is argued that a monetary authority does, after all, still have an incentive to cheat. This time, not on its delivery of price stability in line with a target over the medium to long run, but rather in how it stabilises shorter-run fluctuations in demand and inflation in the face of shocks.

As I understand it, broadly the argument runs as follows. Assume that a shock to costs hits the economy; the oil price rise over the past couple of years might be the kind of thing. In the short run, demand and output will be pushed below the economy's 'trend' path, and inflation above the authority's target. In the story, to bring inflation back to target, the central bank raises its policy rate *and* announces that it will keep it higher for a while. Because it is believed, near-term inflation expectations drop back in line with the target. That being so, in order to avoid 'lost' output, it is *now* optimal for the central bank to reduce its policy rate back to where it was, ie *not* to leave it higher. The central bank has therefore not done what it said it would do; it has been time inconsistent. And, reflecting rational/model-consistent expectations, agents allow for this, so that central bank stabilisation policy is not as potent as it could be if credible commitments were feasible.

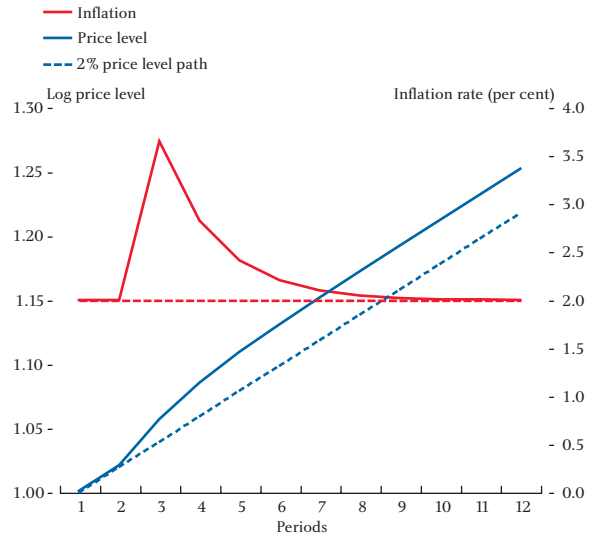
For this practitioner at least, the story does not sound very much like reality. Unlike the inflation problems of the past, it is not obvious to me that we are going about breaking promises about how we conduct cyclical policy. I do not mean that in the trivial sense that we do not publish an intended path for rates, and so there is no promise to break. Rather, I do not believe that we have published analyses of the economic outlook that, notwithstanding the absence of news, we have subsequently deliberately junked — and so abandoned as an input to our policy judgements — when it suited us in order to secure a 'better' path for output. For example, I have mentioned how in late 2003/early 2004, some MPC members explained that, *if* the economy continued to recover, we expected to vote for a gradual withdrawal of monetary accommodation. If the economy had been knocked off course, speaking for myself I would not have had any difficulty in referring back to my earlier statements and explaining how things had changed. It would have been the obvious thing to do. That would not have involved breaking a promise; and I do not think it would have been misunderstood.

Perhaps more important than that, the model world in the stabilisation-bias story seems to be better than reality in one key respect, and therefore to miss something rather central to the policymaker's job. In the face of a major cost (or supply) shock, the big question is whether, as well as a temporary upward impetus to inflation, there will be 'second-round' effects via wage earners trying to recover lost purchasing power. In other words, the big issue is whether *medium-term* inflation expectations will remain anchored; or more graphically, whether the central bank will 'lose control'. I think we can see that in the statements of central banks from a whole host of countries over the past year or so. The statements amounted to saying: *'if* it looks as though second-round effects are occurring, and creeping into rising medium-term inflation expectations, then I shall have to — and believe me, I shall — tighten policy'. If the central banker's commitment to do so is believed — ie if it is credible — then it does not have to tighten policy for that reason. It is a state-contingent policy stance. And the central bank behaves time consistently.

Unless we are passing each other in the night, a possible explanation for the difference between my practitioner's view and the time-consistency problem in the model economy is that the latter *assumes* model-consistent expectations. In the model economy, the monetary authority's ability to deliver, and its will to stick to, its inflation target over the medium run is never in any doubt. Whereas what it feels like, at least to me, is that that kind of credibility needs to be earned and re-earned, over and over again. That does not make us 'inflation nutters': the target is symmetric. But maintaining well-anchored medium-term inflation expectations is not guaranteed. And, therefore, credibility is not to be taken for granted in the way we seek to stabilise the path of the economy in the face of shocks. At its broadest, in a world where medium to long-term inflation expectations are anchored principally by virtue of the central bank conducting policy consistent with the declared regime, the policymaker has little incentive to 'cheat' on stabilisation policy. That is because developing a reputation for being time inconsistent on that part of its task would risk a perception that it would be time inconsistent on achieving the inflation target over the medium run. In other words, it would risk undermining the credibility of the regime.

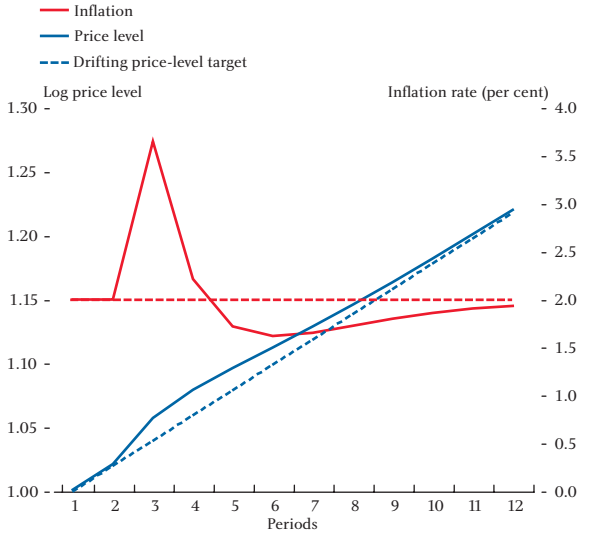
A potential area for research is whether a 'stabilisation bias' problem would reappear in models that combine central bank discretion with persistent deviations of medium-term expectations from target stemming from

Chart 3
Inflation targeting



Source: Illustrations based on Bank of England estimates.

Chart 4
Price-level targeting



Source: Illustrations based on Bank of England estimates.

imperfect or gradual learning by households and firms about the authority's long-term objectives and its commitment to them.

(c) Would price-level targeting make stabilisation policy more effective?

It is occasionally argued that stabilisation policy would be more effective if central banks targeted the price level rather than a rate of inflation (Charts 3 and 4). That need not mean a flat price level. It might mean that the central bank committed to deliver a path for the price level with a positive rate of inflation on average. The difference from today's inflation targeting would be that bygones would not be allowed to be bygones. A period of overshooting would be followed by a period of undershooting, and *vice versa*.(1)

Assuming complete credibility, this would mean that following an adverse demand shock, households and firms would expect sufficient policy stimulus to plug the gap left by deficient demand and, on top of that, to generate a little excess demand in order to raise inflation above its average and so bring the price level back to its targeted path. The consequent rise in near-term inflation expectations would, it is argued, make the job of offsetting the initial adverse shock somewhat easier.

I wonder, though, whether price-level targeting might, in fact, endanger credibility by the extra complication it would bring to the formation of inflation expectations. When asked about what rate of inflation we are trying to deliver over the long run or cyclical horizons, the MPC's answer is virtually always the same: 2% on the CPI (potentially departing from that only on rare occasions when, after a major supply/cost shock, we wanted to get inflation back to target more gradually than usual). With price-level targeting, the *de facto* near-term target would regularly vary according to (recent) inflation outturns and the time horizon for offsetting them.

That might confuse households and firms about the long-term objective, making it more difficult for the central bank to maintain credibility. By repeating an unchanging and simple message about the inflation rate we are aiming at (2%), we may make it easier for households to learn about our aims.

(d) How should central banks respond to asset prices?

Others argue that whether the central bank targets consumer price inflation or the price level, they should also target asset prices. On this question, I subscribe to much of the current orthodoxy.(2)

(1) A short or a long horizon could be set for 'correcting' deviations from the targeted path for the price level. See King, M A (1999), 'Challenges for monetary policy: new and old', Symposium on 'New Challenges for Monetary Policy', Federal Reserve Bank of Kansas City at Jackson Hole, Wyoming.

(2) For a variety of positions, see Cecchetti, S, Genberg, H and Wadhwani, S (2002), 'Asset prices in a flexible inflation targeting framework', *NBER Working Paper no. 8970*; Bernanke, B and Gertler, M (2001), 'Should central banks respond to movements in asset prices?', *American Economic Review*, Vol. 91, No. 2; Issing, O (2004), 'Financial integration, asset prices and monetary policy'; and Posen, A (2006), 'Why central banks should not burst bubbles', *Institute of International Economics Working Paper 01/2006*.

Of course, changes in asset prices feed into policymaking as they are an important influence on demand conditions, through households' wealth, firms' cost of capital, and the price (exchange rate) at which we trade with other economies.

But I do not believe we should use interest rates to target asset prices alongside consumer price inflation. In the first place, we just do not know enough about the determination of asset prices — especially of risk premia — to have much of an idea about what price to target. Big moves in asset prices *do* occasionally occur because of changes in the underlying economic fundamentals. We could not be relied upon to distinguish between those benign changes and bubbles. But even if we could, I don't see how in practice we could use our single instrument (the overnight interest rate) to *target* both consumer price inflation and asset prices — especially when one remembers that there are lots of different asset prices and that questions of disequilibria about them may run in different directions.

Having said that, there is no denying that asset prices can be a serious complication for monetary policy. And I think I would want to register just a slight qualification to a strong version of the proposition that the central bank should simply — as if it could be simple — 'mop up' after a bubble has burst. Policymakers need to take care that the measures they take to offset the impact on aggregate demand of one type of imbalance unravelling do not themselves create or exacerbate imbalances elsewhere in the economy, including in other asset markets. In other words, policymakers need to guard against one imbalance leading to another.

That view is, I believe, quite consistent with inflation targeting. The simple set-up I described in my introductory remarks had two relevant features. First, the policymaker's objective (or loss) function was set as a quadratic in inflation and output. And as I described, that can be unpacked as caring about both systematic biases from the target and the volatility of inflation.

Second, the policymaker cares not just about today (or tomorrow) but about the future.

Putting these two features of the objective function together, the policymaker places some weight on the prospect of unusual volatility in inflation down the road. This is not just hypothetical. In 2002–03, some of us on the MPC voted to maintain an unchanged policy rate rather than cut partly on the grounds that, by stoking the embers under household debt and house prices, too great a risk would be taken with *future* output and, most important, inflation variability.(1) Speaking for myself, that was directed at avoiding policy settings that, on balance, could have increased uncertainty about demand conditions and inflation in the future, and complicated the operation of policy down the road, not on some spurious aspiration of steering asset prices along some (unknowable) equilibrium path.(2)

Maybe that would be one way, consistent with focusing on a single objective, to construe the thought-provoking papers that have come out of the Bank for International Settlements in recent years.(3) Certainly this is an area where policymakers still have lots to learn.

Summary

It is next to certain that my views on many of the issues covered in these remarks will continue to develop as the MPC confronts new challenges. It would be hard to be serious about policymaking without learning.

But for the time being, two key threads run through what I have said. The first is the absolutely vital task of anchoring medium to long-term inflation expectations in line with a clear target. That just cannot be taken for granted. The second is the importance of clear and clean communications about objectives. On that front, we should not kid ourselves that households and firms are studying our every utterance or examining in detail the economy in which they live and work. That points, I think, to keeping things as straightforward as possible, without glossing over uncertainties and risks.

The two threads are intertwined. We have a better chance of keeping inflation expectations anchored to the target if the target is simple to communicate; and if we do not over elaborate, or slip in to being overly ambitious about, our conduct of cyclical policy.

(1) For example, the MPC *Minutes* February 2002, December 2002 and February 2003.
(2) So this view is not quite the same as that set out in Kohn, D (2006), 'Monetary policy and asset prices', remarks at 'Monetary policy: a journey from theory to practice', a ECB colloquium held in honour of O Issing.
(3) For example, Borio, C and Lowe, P (2002), 'Asset price, financial and monetary stability: exploring the nexus', *BIS Working Paper no. 114*.

Annex
A common model for monetary policy

Policymakers are often characterised as aiming to minimise an objective of the following kind:

$$E_t\left\{\sum_{t=0}^{\infty}\beta^t\left[(\pi_t-\pi^T)^2+\lambda(y_t)^2\right]\right\},$$

where π denotes inflation; superscript T refers to 'target'; y is a measure of the percentage deviation of the level of real output from its natural rate (the rate that would obtain if prices were flexible); β is a discount rate applied to the future; λ is the weight given to stabilising output relative to stabilising inflation; and E_t is the expectations operator.

Both the inflation and output parts of the objective function can be broken down. For example, for an undiscounted quadratic loss function for inflation, one can obtain:

$$E\left\{\sum_{t=0}^{\infty}\left[(\pi_t-\pi^T)^2\right]\right\}=\sum_{t=0}^{\infty}\left[Var(\pi_t)+(bias(\pi_t^e))^2\right]$$

meaning that the policymaker wants to avoid inflation being expected to diverge from target on average (a bias) and also wants to minimise expected future volatility of inflation.

Policy seeks to minimise this objective subject to how the structure of the economy affects inflation and the output gap. That consists of:

(1) a Phillips curve:

$$\pi_t=\alpha_1\pi_{t-1}+\alpha_2E_t\pi_{t+1}+\alpha_3y_t+\varepsilon_{\pi,t},$$

where the mean-zero shock term $\varepsilon_{\pi,t}$ is sometimes described as a 'cost push' shock;

and (2) an equation for aggregate demand:

$$y_t=\gamma_1y_{t-1}+\gamma_2E_ty_{t+1}+\gamma_3(i_{t-1}-E_{t-1}\pi_t)+\varepsilon_{y,t},$$

where i is the central bank instrument, the short-term nominal interest rate; and $\varepsilon_{y,t}$ is a mean-zero demand shock that could be, for example, a shock to household preferences over consumption.

The stylised representations of demand and the inflation process are typically derived from studying price-setting by firms and households, who are taken to try to maximise profits and utility respectively. There is uncertainty, reflected in the literature, about the relative importance of the forward and backward-looking terms in both equations; and about whether the expectations denoted by the operator E are model-consistent or not.

Central bank policy is often discussed with reference to the following kind of equation:

$$i_t=r^*+\pi^T+\delta_1(\pi_t-\pi^T)+\delta_2(y_t),\quad \delta_1>1,$$

where r^* denotes the natural real rate of interest, the real rate of interest that would obtain if prices were flexible and there were no shocks in the system. For some model economies within the class above, a simple instrument rule that more or less approximates the optimal rule that would result from maximising the objective of policy could be written like this.

In practice, uncertainty about the structure of the economy (variable and uncertain lags in the transmission mechanism for example) and the need for a forward-looking dimension in monetary policy mean that inflation-forecast based rules provide for alternative stylised descriptions of central bank policy, for example:

$$i_t = \delta_1 i_{t-1} + (1-\delta_1)\ [r_t^* + \pi^T + \delta_2\ (E_t\pi_{t+n} - \pi^T) + \delta_3(y_t)],$$

where the lagged nominal interest rate term allows for potential interest rate smoothing by central banks.

Cost pressures and the UK inflation outlook

In this speech,[1] Kate Barker,[2] member of the Bank's Monetary Policy Committee, discusses the impact on UK monetary policy of rising global prices (for energy and metals in particular) and higher export price inflation in the United Kingdom's trading partners. She argues that the outlook for the United Kingdom may be that output remains a little below trend in 2006–07, implying a risk of CPI inflation below target in two years' time. But in the short term there are still upward price pressures from energy and import prices, and it is too early to conclude that there will be no upward impact on nominal wages from higher inflation.

It is always a great pleasure to be back speaking to a CBI audience, and especially in the West Midlands which, as I grew up in Stoke, still feels like home despite my long years of exile in the South East.

In my remarks this evening, I will want to set out the thinking behind my votes on base rates in recent MPC meetings, and to look at some of the key questions about the United Kingdom's economic prospects. This is in part a response to recent City commentary on the fact that, although concerned about downside risks to growth, I did not vote for a rate cut at the MPC's February meeting. The focus will be on one of the topics which is right at the core of the issues that the MPC discusses when reaching our decision month by month — the cost pressures which firms in the United Kingdom are facing now, how these are likely to develop over the next couple of years, and how the inflation rate may respond to these pressures. Recent rises, and continuing volatility, in the UK gas price, the sustained high level of oil prices and sharply higher prices for key base metals means that this topic is probably also on the minds of many of you.

Cost pressures in the global economy

The projection underlying the central case in the MPC's February *Inflation Report*, in line with most forecasters, was for world growth to continue over the next two years at the pretty robust rate seen over the past two. There are risks to this central case, of which the most significant are probably: the enduring concern about whether and how the United States' current account deficit (estimated at over 6% of GDP in 2005) will unwind, and whether the fall in long-term real interest rates to unusually low levels in major economies might start to reverse, with the risk of provoking falls in asset prices. But on the whole recent data have been encouraging, and despite a slowdown in the fourth quarter of last year the euro area seems set to grow more strongly, improving the United Kingdom's export prospects.

Strong world growth is not just upside news for the United Kingdom through the effect on output, but may also have implications for inflation — as the continued strength of world demand could lead to a tightening of the balance of global demand and supply. This is a difficult question to address. Even estimates for world output are fraught with uncertainty. As the weight of more recently industrialised countries in world GDP and industrial production has increased, the question of how to value this output becomes more significant. To some extent this is an issue of the correct exchange rate to use. Generally comparisons are made using purchasing power parity (PPP) exchange rates — the exchange rate which would equalise the price of a similar basket of goods in each country. For countries such as China with very different price structures and consumption patterns from the developed world, PPP exchange rates estimates can cover a wide range. However, the IMF estimate that the combined share of China and India in world GDP has risen from 6% in 1980 to 19% in 2004.

(1) Delivered at the CBI West Midlands Economic Dinner, Birmingham Botanical Gardens, Birmingham on 21 March 2006. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2006/speech270.pdf.

(2) I would like to thank Charlotta Groth and Miles Parker for their great help in preparing this speech; and Peter Andrews, Charlie Bean, Andrew Holder, Sally Reid, Marilyne Tolle, David Walton and Andrew Wardlow for helpful comments. The views expressed are my own and do not necessarily reflect those of the Bank of England or other members of the Monetary Policy Committee.

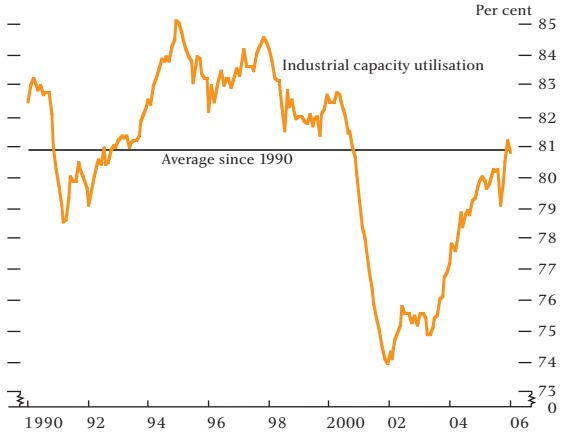
There is even less certainty about the development of the global capacity to supply, although rapid increases in capacity in Asia might suggest that supply is likely to be keeping pace with demand. But other indicators suggest that there could be some upward inflation pressures. The increased scale of world activity has been putting upward pressure on energy and raw material prices. At the end of 2005, the level of world industrial production was about one quarter higher than five years previously. Annual oil consumption growth seems likely to run at rather over one million barrels per day over the next few years, having averaged around one million barrels per day in 1999 to 2003. In 2006, this is expected to be met by rising non-OPEC supply, given the recovery in the United States from the hurricanes in particular, and according to the futures market, crude oil prices are expected to remain broadly around current levels. Beyond this year, however, some of the rise in demand will probably need to be met in part by rising OPEC supply, implying that there will be only a small recovery in the margin of OPEC spare capacity.(1) Expectations are therefore for a period in which oil prices are likely to be volatile and vulnerable to political uncertainties in producing countries, to supply disruption or demand changes caused by weather, or to the changed judgements about how quickly new supply can be brought on stream.

Metals are much less significant to overall price pressures than is energy. Nevertheless some sectors will have been affected by the fact that the index of base metal prices has more than doubled since the end of 2003. For the main constituents of this index, aluminium, and particularly copper which was affected by production issues, stocks declined in 2004 and much of 2005. Some estimates suggest there is little spare production capacity at present in copper, nickel or zinc.(2)

Steel prices declined in 2005 due to high stock levels and higher steel output in China. Stock levels are lower at the start of 2006, and demand is projected to grow by around 5% again this year, with China expected to account for 60%–70% of the increase.(3)

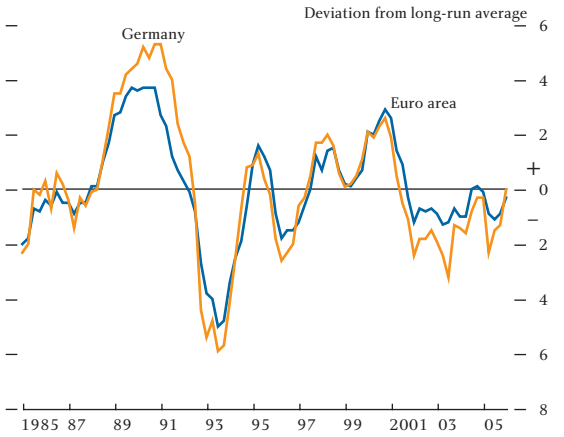
Overall, while the outlook for energy and metals prices may contain some upside risk, a repetition of recent steep rises seems unlikely and inflation pressure from this source should therefore ease. The chief uncertainty in the short term is how far these price rises have been passed on into the final prices of goods (and to a lesser extent services). Further price pressures may also emerge given the signs of tightening capacity in the older industrialised countries — in the United States, industrial capacity utilisation has picked up, and is now running just above its average since 1990 (Chart 1). Unemployment has been declining, and at 4.8% in February is well below the peak of over 6% in 2003. In the euro area, capacity utilisation is also judged to be close to the long-term average, with utilisation having picked up markedly in Germany (Chart 2). Unemployment in the euro area has also declined, to 8.3% from 8.8% at the end of 2004.

Chart 1
Industrial capacity utilisation in the United States



Source: US Federal Reserve.

Chart 2
Industrial capacity utilisation in the euro area and Germany



Source: European Commission.

The pace of price increase for exports from the United Kingdom's main trading partners picked up in 2004/05

(1) These comments draw in part on data in Davies (2006).
(2) For example, Goldman Sachs, *Metal Watch*, 6 March 2006.
(3) Estimates from the International Iron and Steel Institute.

to average around 2.2% annually. This trend is expected to ease back over the forecast period — but the above discussion suggests there is potential for upside risk to this scenario. The United Kingdom's inflation forecast is quite sensitive to this projection. For example, if export price inflation in the United Kingdom's main trading partners declines more gradually over the forecast period towards its long-term trend inflation rate, this might add around a quarter of a percentage point to the inflation rate in early 2008 (although these mechanical estimates should not be taken too literally).

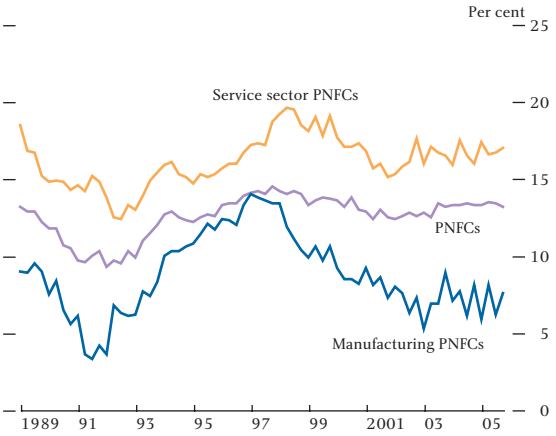
Response of UK inflation to cost pressures

The MPC is concerned with the question of how price-setters and wage-bargainers are likely to respond to these upward cost pressures. The behaviour of firms is likely to have altered since the move to inflation targeting in 1992, followed by the Bank's independence in 1997 and the subsequent relative stability of economic growth and success in achieving the inflation target. Inflation expectations in the economy, particularly since 1997, have so far been more firmly anchored around the inflation target. Prior to inflation targeting, UK inflation expectations were not well anchored.(1)

However, while inflation expectations can be observed in the financial markets through the behaviour of index-linked bonds, and for employees (perhaps rather less well) through surveys such as GfK and the Bank/NOP survey, for price-setters this is not the case. Nor is there any recent survey of firms' price-setting behaviour in the United Kingdom, which might shed light on whether this had changed — the most recent having been carried out in 1995.(2) Firms' expectations are mainly observed through their behaviour, which has been affected over the past decade by other factors in addition to the changes in the monetary regime, especially changes in the UK competition regime, and for many businesses the impact of stronger global competition.

If firms were generally less able or willing to pass on cost increases in recent years due to these factors, this might be expected to have resulted in a reduction in margins during periods of rising input prices. However, present ONS data suggests that while both services and manufacturing saw deterioration in their net rates of return from the late 1990s until around 2003, since then there has been a period of broad stability (Chart 3), at least up to the third quarter of 2005.

Chart 3
Net rates of return of UK private non-financial companies (PNFCs)



The response of wages is also important. On the CPI measure, inflation peaked at 2.4% in the third quarter of 2005, from a low of 1.3% a year earlier. RPIX inflation also rose at the same time, although much less sharply. According to the Bank's database, settlements rose very little over the same period, and ONS data suggest that average earnings growth declined modestly (although the newer average weekly earnings series was higher in the third quarter of 2005 than a year earlier, subsequently falling back a little). Overall, pressure on consumer discretionary spending from rising energy costs does not seem, so far, to have translated into higher pay.

UK growth projections

Against the background of robust global growth, how strong is the UK economy likely to be? Present evidence suggests that the UK economy is a little below capacity. Surveys of capacity utilisation (from the CBI and the BCC) have fallen back since 2004, but generally remain around their long-term average. However, the rise in unemployment in the fourth quarter of 2005 from 4.8% to 5.1%, falling employment in the same quarter and indications of easing skill shortages all suggest that there is some modest slack in the labour market. With inflation a little below target despite the continued contribution of higher energy prices, growth probably needs to move somewhat above trend in the near term to prevent inflation being below target in about 18–24 months' time. And that is what the latest *Inflation Report* projections indicated.

(1) Nelson (2000).
(2) Hall, Walsh and Yates (2000).

The projection for growth was initially greeted with some scepticism from City economists — with several comments echoing the view that the MPC 'expects a strong return of the consumer, but other than Christmas there is no indication of that'.(1) I have some sympathy with this view, although of course there is always a wide range of uncertainty about any forecast. But my own central projection would indeed be a little lower, chiefly reflecting more caution about the UK consumer.

The growth rate of consumer spending through 2005 was 1.7%, down from 3.9% in 2004, mainly reflecting slower growth of real post-tax labour income. In 2006, labour income may well pick up only modestly, reflecting slightly stronger upward pay pressure but a subdued employment outlook. Real incomes will be muted at least in the first half of the year as inflation continues to be boosted by energy prices — including the recently announced increases in the price of domestic gas, and the upward effect from higher industrial gas prices.

Expectations of a sustained rise in consumption growth rest in part on the recent strength of asset prices. The housing market has certainly been surprisingly strong over recent months, and at present most indicators suggest that this will continue. But while stronger than 2004–05, price rises are likely to be rather below the heady days of 2001–03, when annual increases averaged over 15% (although predictions here are highly uncertain). Both house prices and equities may have been driven up recently in part by the recent further decline in real long-term interest rates. Real ten-year forward rates fell from 1.65% at the end of 2004 to 1.04% around the middle of this month. While this is also very unpredictable, it nevertheless seems unlikely that these interest rates will decline significantly further.

Generally the factors driving consumption now seem rather less strong than in 2001–04, when real labour income rose by an average of 3.1% annually, and house prices, at least until mid-2004, were rising rapidly. In addition, some indications of increased concerns over high unsecured debt levels, and continued publicity around possible pension shortfalls may lead to an increase in the savings rate. Recent evidence suggests that the strength of consumption in the fourth quarter of 2005 may have faded a little. Retail sales fell sharply in January, with only a modest bounceback in February. Private new car registrations remain weak, although this may be a little misleading as consumers seek better value by purchasing 'nearly-new' cars which have been briefly in other uses such as the hire car market. And a range of survey indicators suggest that consumer services are also lacklustre. However, this downbeat picture has to be set against quite strong data in early 2006 for manufacturing output and business services output surveys.

While government spending is expected to continue to rise over the forecast period, slower consumption growth would imply that exports and investment growth need to improve if overall growth is to move decisively above trend. Export prospects are certainly brighter given the strength of global demand and the improved prospects for the euro area, although recent history suggests it is uncertain how successful UK exporters will prove to be in retaining their market share. But investment intentions are rather weak, and the present vintage of ONS estimates indicates that investment has risen less quickly over the past few years than would have been expected.

It is occasionally suggested that the desirability of continuing with the balance of growth more towards investment and exports (as it has been since late 2004) is a factor which could affect monetary policy decisions. However, as with other proposals for changing our focus, it is important to be realistic about what the MPC can achieve. It is widely recognised that monetary policy cannot affect the supply capacity of the economy (except to the extent that a more stable economy may boost supply growth at the margin). Other proposed policy goals, such as the expenditure structure of growth, or the level of some asset price, are however not in theory clearly unachievable. But the danger is that seeking to attain these goals could risk diverting policy so far from the proper task of achieving the inflation target, that the inflation target itself would become less credible.

Summary and conclusions

The key conclusions about the outlook which I would draw from the above remarks are as follows (recognising the many uncertainties around all these projections):

- The past two years have seen a number of significant inflation pressures from energy and commodity prices. It seems unlikely that these will continue to rise at so strong a pace, although the strength of the world economy suggests there may be some upside risks. Further, there is some

(1) George Buckley, Deutsche Bank — quoted on Dow Jones newswire, 22 February 2006.

evidence of a tighter balance between supply and demand in some of our major trading partners, which, together with uncertainty about how much of the energy and raw material price rises has fed through, means it is possible that the United Kingdom will continue to experience a stronger pace of import price inflation than the average since 1997. However, if inflation pressures do increase abroad then policy responses would be expected which could slow global demand during 2007.

- With indications of a soft start to the year for the consumer, I continue to think that the most likely outcome is for a slightly slower pace of UK growth in 2006 than the MPC's February central projection. Of course, the MPC as a whole believed that there was downside risk to this central projection. In fact, over the 20 forecast rounds since I joined the MPC, we have identified a downside risk to the central projection for growth on 14 occasions (and never identified an upside risk). However, analysis of the MPC's forecasting record from February 1998 to May 2003, a slightly different period, concluded that the mean projection, which includes any downward or upward risk, underpredicted GDP growth at the two-year horizon by an average of 0.3%.[1] So perhaps this suggests a tendency to be a little too cautious.

This all adds up to a finely balanced judgement for interest rates. Taking a forward-looking approach, if global inflation subsides in 2007 and UK output remains a little below trend, I believe there could be a greater risk of CPI inflation being below target in around two years' time than in the MPC's forecast. In the short run, the timing of the recently announced rises in utility bills will probably keep CPI inflation a little above target over coming months, and there may be more upward pressure from imported goods prices. But these upward pressures are then likely to drop out of the index in around 18 months' time.

But the short-run upward price pressures create an upside risk. I would consider that the base rate at present is probably around a broadly neutral level or slightly accommodative. Reducing the rate to a more stimulative level may risk sparking some second-round effects on wages. It is encouraging that these have so far not been much in evidence, and that inflation, excluding energy, has been subdued. Yet it is too early to conclude that this lack of pay pressure will endure, given that the immediate prospect is for a period of sustained slower real consumer income growth and above target inflation. Further, while inflation expectations have been stable in financial markets, and in most consumer surveys, yesterday's Bank of England/NOP poll for individuals' inflation expectations showed a rise which adds a little weight to the case for caution. In coming months, I will be looking particularly at global pricing pressures, at UK wages and at consumer demand, to see to what extent my concerns are being realised. These worries, which imply less growth and more inflation, are of course a little less Panglossian than is the present central projection.

(1) Elder *et al* (2005).

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The UK current account deficit and all that

In this speech, Stephen Nickell,[1] *member of the Bank's Monetary Policy Committee, discusses the recent history of the UK current account deficit. Over the past 20 years, the average annual deficit has been around 2% of GDP and shows no signs of diminishing. Indeed, the trade deficits continues to worsen and only substantial offsetting net income flows have contained the current account deficit within bounds. To understand what is going on, we need to look at the net asset position. UK foreign assets are enormous, around four times GDP. UK foreign liabilities are fractionally bigger using official statistics. But if we correct for the fact that direct investment assets and liabilities are measured at book value rather than market value, the UK net asset position remains positive. More importantly, UK assets are biased towards equity type assets and liabilities towards debt type assets. Since the returns on the former are typically greater than the returns on the latter, this explains the positive net income position. The risks to this situation are detailed in the text.*

Introduction

When talking to a variety of audiences about the state of the UK economy, it is almost inevitable that one of the older participants brings up the question of the balance of payments. In particular they recall that back in the 1960s, the balance of payments used to be accorded front page headlines. By contrast, today, it is barely mentioned at the back of the business section. However, a related issue, the purchase of UK firms by foreign companies is currently making waves. As Hamish McRae remarks, 'Are we selling the farm to cover the dissolute son's losses on the gambling tables of London?' (*The Independent*, 15 February 2006).

In what follows, I shall try and address some of these issues. I first consider the structure of the current account and place it into a historical perspective. I then focus on the stock position, analysing the composition of UK assets and liabilities and how this tends to generate a favourable net income position for the United Kingdom. Finally, I analyse the sustainability of the present situation.[2]

The balance of payments in 2005

The balance of payments is concerned with the flows of goods, services and payments into and out of the country. To see how it all works, it is best to get down to detail. Start with the current account, defined as follows:

current account balance = trade balance in goods + trade

balance in services + net income flows + current transfers

Next, we must see what each of these categories means.

Trade balance in goods (services) = value of goods (services) exports – value of goods (services) imports.

Net income flow = flow of income (eg interest payments, dividends etc) generated by foreign assets held by domestic residents – flow of income generated by domestic assets held by foreign residents.

Table A
The current account in 2005

£ billions

	Credit (+ items)	Debit (– items)	Balance
Goods trade	210.2	275.8	-65.6
Services trade	105.7	87.0	18.7
Income flows	184.5	157.1	27.4
Current transfers	15.9	28.3	-12.4
Current account (total)	516.3	548.2	-31.9

(1) This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2006/speech271.pdf. I am most grateful to Chris Shadforth for his invaluable assistance and to Kate Barker, Charlie Bean and David Walton for helpful comments on an earlier draft.
(2) Much of this is not new. Reading and Richards (2005) have recently brought some of this material to the attention of a wider public.

Current transfers = taxes, social contributions received from non-residents + net social security payments + net transfers with international origins – foreign aid payments + other items.

In Table A, we set out the picture for 2005. A number of points arise from this breakdown which is fairly typical of recent years. First, goods imports exceed goods exports by a significant amount (£65.6 billion). In fact, goods imports have exceeded goods exports in every year bar five since 1946. But, as a proportion of GDP, this deficit on goods trade has generally been greater in the past two decades than previously, despite the United Kingdom being a net exporter of oil over most of this period. Furthermore, it continues to rise. Second, services exports, which are now around 50% of goods exports, substantially exceed services imports to the tune of £18.7 billion. Again, this is typical in the sense that services exports have exceeded services imports in every year bar two since 1951. As a percentage of GDP, this surplus has been relatively stable for 30 years.

The income flows in 2005 reveal that UK residents received a flow of income generated by foreign assets considerably in excess of the income flow generated by UK assets held by foreign residents (£27.4 billion). This 'net income position' tends to be a little more variable than the trade surpluses and deficits, although in recent years it has generally been positive. However, it was negative as recently as 1999 and was significantly negative in the early 1990s (over ½% of GDP in 1990–91). Finally, the balance of current transfers is significantly negative (-£12.4 billion) and this is typical of recent decades when aid payments and net EC contributions have been important features. As a proportion of GDP, this element of the current account has been relatively stable over the past 30 years.

All these elements add up to a current account deficit of £31.9 billion, around 2½% of GDP. This is somewhat above the average current account deficit over the past 20 years (1985–2004), and a great deal above the average deficit in the previous 30 (1955–84), which was close to zero.

So what does it mean to have a current account deficit of £31.9 billion? Essentially foreign residents have added a flow of income to their total holdings of UK assets which exceeds the total flow of income which UK residents have added to their total holdings of foreign assets by £31.9 billion. So foreigners have, in 2005, added £31.9 billion more to their pile of UK assets than UK residents have added to their pile of foreign assets. In fact, both foreign residents and UK residents have added huge amounts to their respective piles, in excess of £700 billion, but the foreign residents have added somewhat more. To look at this in more detail, we present, in Table B, a picture of the capital and financial account for 2005. In order to understand this, note first that the capital account consists of numerous odds and ends including land purchases and sales associated with embassies, the transfers of migrants, and EU regional development fund payments. It is very small relative to the other elements. In the financial account, direct investment refers to the purchase by the residents of one country of a significant part (exceeding 10%) of an enterprise in another country. So the credit column refers to money spent by foreign residents on direct investment in UK enterprises and the debit column to money spent by UK residents on direct investment in foreign enterprises. So when Banco Santander purchased Abbey, this represented a large sum in the direct investment credit column in 2004 and when Vodafone purchased Mannesmann, this represented an even larger sum in the direct investment debit column in 2000.

Portfolio investment refers to the purchase by residents of one country of equity and debt securities issued in another country. So in the credit column appear the net purchases by foreign residents of UK equities and debt securities. In the debit column we see the net purchases of foreign equity and debt securities by UK residents. Finally, other investment refers to bank deposits made by residents of one country in banks in another country or to loans made by residents in one country to residents in another. So in the credit column we find net increases in deposits made by foreign residents in UK banks or net increases in loans made by foreign residents to UK residents. In the debit column, we simply find the reverse.

Turning to Table B, the first striking point is that the totals under both debit and credit columns are

Table B
The capital and financial account in 2005

£ billions

	Credit	Debit	Balance
Capital account	4.2	1.9	2.3
Direct investment	90.5	55.6	34.9
Portfolio investment	131.1	161.2	-30.1
Other investment	523.7	500.5	23.1
Other items		3.1	-3.1
Total	**749.5**	**722.4**	**27.1**
Errors and omissions			4.8
Grand total			**31.9**

enormous, around 60% of UK GDP. This is a function of the fact that the UK financial sector is highly integrated with the world economy and plays an important intermediary role in a high proportion of the world's financial transactions. Thus for example, if a UK bank receives £10 billion in deposits from foreign residents and then lends this £10 billion to other foreign residents, the first transaction contributes £10 billion to the credit column and the second transaction contributes £10 billion to the debit column, both in the other investment category. Or, for example, if the bank takes the £10 billion of deposits from foreign residents, lends this to a UK firm which then uses it to buy a foreign company for £10 billion, then this money will appear in the credit column under other investment and in the debit column under direct investment. Because these types of transactions are so commonplace, we see huge totals in both credit and debit columns which tend to differ by proportionately very small amounts. Second, given the relative sizes of the different types of transaction in each column, it is no surprise that the total stocks of foreign assets held by domestic residents consist mostly of 'other investments', with portfolio investments and direct investments coming second and third in the rankings.

Finally, we may note the errors and omissions entry with a balance of £4.8 billion. As the name indicates, this is the result of transactions or elements of transactions that are not picked up by the ONS.

Having seen how the various cross-border transactions add up in 2005, it is worth putting the current account numbers into some historical perspective.

The current account: some history

In Table C, we show the different elements of the UK current account as percentages of GDP in five-year averages back to 1955 as well as annual data for the past decade. A number of features of these data are worth remarking on. Starting with goods trade, we see how there is typically a deficit with the exception of the recession period of 1980–84. During this period imports were particularly low and the United Kingdom became a serious net exporter of oil following the development of the North Sea oil fields. Aside from this exceptional period, from the 1970s the deficit on goods trade has been substantial, rising to over 4% of GDP in the past five-year period and over 5% in 2005. By contrast, from the 1970s, trade in services has generated a steady surplus averaging around 1.4% of GDP. The big

Table C
The UK current account, 1955–2005

Per cent of GDP

	Goods trade	Services trade	Net income flow	Current transfers	Current account
1955–59	-0.3	0.4	0.8	0.0	0.9
1960–64	-0.9	0.1	0.9	-0.1	-0.1
1965–69	-0.9	0.4	0.8	-0.3	0.1
1970–74	-2.5	1.1	1.0	-0.3	-0.7
1975–79	-1.9	2.0	0.1	-0.7	-0.4
1980–84	0.0	1.4	-0.2	-0.5	0.6
1985–89	-3.3	1.3	0.1	-0.8	-2.7
1990–94	-2.2	0.9	-0.1	-0.7	-2.1
1995–99	-2.2	1.5	0.4	-0.8	-1.1
2000–04	-4.3	1.5	1.7	-0.9	-2.0
1995	-1.7	1.2	0.3	-1.1	-1.3
1996	-1.8	1.4	0.1	-0.6	-1.0
1997	-1.5	1.6	0.4	-0.7	-0.2
1998	-2.5	1.6	1.4	-1.0	-0.5
1999	-3.2	1.5	-0.2	-0.8	-2.7
2000	-3.5	1.4	0.5	-1.0	-2.6
2001	-4.1	1.4	1.1	-0.7	-2.2
2002	-4.5	1.5	2.3	-0.8	-1.6
2003	-4.3	1.5	2.3	-0.9	-1.4
2004	-5.2	1.8	2.3	-0.9	-2.0
2005	-5.4	1.5	2.3	-1.0	-2.6

jump in the absolute sizes of the trade deficits (goods) and surpluses (services) after the 1960s was probably associated with membership of the European Community in the early 1970s which induced a significant opening of the UK economy to trade of all kinds. This allowed the apparent comparative advantage of the United Kingdom in the production of services relative to goods to come to the fore.

The changes in net income flows are a little more erratic, the most notable feature being the dramatic increase in these flows in the 21st century. Why this happened we shall discuss in subsequent sections. It is clear, however, that without this increase, the current account deficit in the 21st century would have been exceptionally high. Current transfers, by contrast, have been relatively stable since the mid-1970s.

Turning to the current account as a whole, the key fact is that prior to 1985, the current account switched back and forth between surplus and deficit and averaged close to zero. Since 1985, the United Kingdom has seen a consistent deficit averaging around 2% of GDP. In 2005 it rose to 2½% of GDP. The important point here is whether or not such a continuing current account deficit is sustainable. It has been going on for 20 years but does it mean we in the United Kingdom are 'living beyond our means' and that it will end in tears?

As we have seen in the previous section, a current account deficit of 2% of GDP means that over the course of the year, foreign residents added to their holdings of UK assets by more than UK residents added to their holdings of foreign assets, the difference being

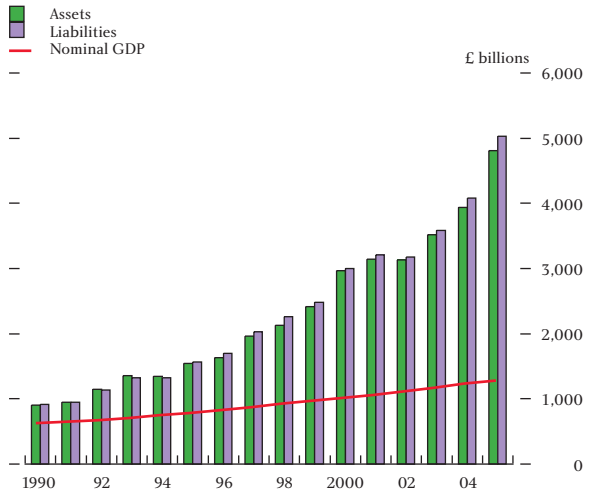
2% of UK GDP. Over 20 years, foreign residents added to their holdings of UK assets to the tune of 40% of UK GDP more than UK residents added to their holdings of foreign assets. So the holdings of UK assets by foreigners must apparently be growing steadily relative to the holdings of foreign assets by UK residents. We would then expect the total income (interest, dividends etc) generated by the pile of UK assets owned by foreigners to be growing faster than the income generated by the pile of foreign assets owned by UK residents. The latter minus the former is the net income flow which should therefore be falling steadily. But a glance at the third column of Table C shows that far from falling, this net income flow has risen dramatically in recent years. Furthermore, according to the official statistics, despite foreign residents adding 2% of GDP per year more to their pile of UK assets than UK residents have to their pile of foreign assets in the past 20 years, the UK assets of foreign residents have risen relative to the foreign assets of UK residents by only about 20% of UK GDP over this period.

So what is going on here? Two things. First, the size of the piles of assets is influenced not only by the flows of assets which are added to them but also by the changes in the market value of the existing assets as real asset prices change.(1) Second, returns per pound of assets differ widely across different assets, so the income flow generated by different piles of assets can differ significantly even if the piles are of the same size. What this all means is that in order to investigate questions of sustainability, we must look more closely at the asset position of the UK economy rather than simply focusing on income flows. This is known by the ONS as the international investment position, but I shall simply call it the net asset position.

The UK net asset position

In Chart 1, we present the values of the gross foreign assets of UK residents and their gross foreign liabilities, which are, of course, the UK assets owned by foreign residents. First, we see that both foreign assets and foreign liabilities have grown dramatically in the past 15 years, much more rapidly than nominal GDP. By 2005, they had reached nearly £5,000 billion, around four times UK GDP. Relative to GDP, the size of these stocks of foreign assets and liabilities is far higher in the United Kingdom than in any other country.

Chart 1
UK gross external assets and liabilities



A second point to note is how small the net asset position (assets less liabilities) is relative to the size of the stocks. Since 1995, this net asset position has been negative, averaging around 8% of GDP. It jumps around a fair bit, generally because of movements in the exchange rate. For example, if all assets are in foreign currency and all liabilities are in sterling,(2) since both are around 400% of GDP, a 2% appreciation of sterling would worsen the net asset position by 8% of GDP. So it is not surprising that revaluations of assets and liabilities have a much bigger impact on year-to-year fluctuations in the UK net asset position than the differential additions to assets and liabilities emerging from the current account. Nevertheless, it is true that the UK net asset position was positive to the tune of 13.6% of GDP in 1980–84, but after 20 years of current account deficits averaging 2% of GDP, the UK net asset position averaged -8.6% of GDP in 2000–05.

So, in the light of this, why has the UK net income position improved so dramatically in recent years? A clue to this puzzle is provided by dividing the UK net asset position into its asset components, which are set out in Chart 2. What stands out is the surge in the positive UK net asset position in direct investment and the almost equivalent move in the opposite direction of other investment. Since, in these data, direct investment is measured at book value, generally lower than market value, this shows clearly how UK residents have been purchasing foreign enterprises at a faster rate than foreign residents have been buying UK enterprises, particularly since the late 1990s. This picture is shown

(1) In fact the errors and omissions in the balance of payments are counted by the ONS as part of the revaluation of the net asset position rather than as part of the income flows into each pile of assets.
(2) In practice this is not the case. UK residents may hold some foreign assets denominated in sterling and foreign residents may hold some UK assets denominated in foreign currency.

Chart 2
UK net external positions by component

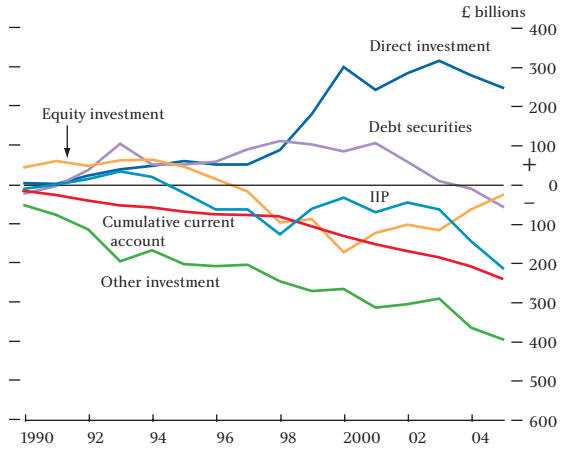


Chart 3
Direct investment

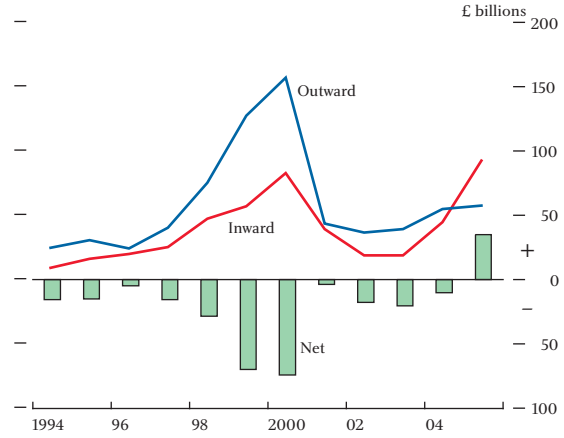
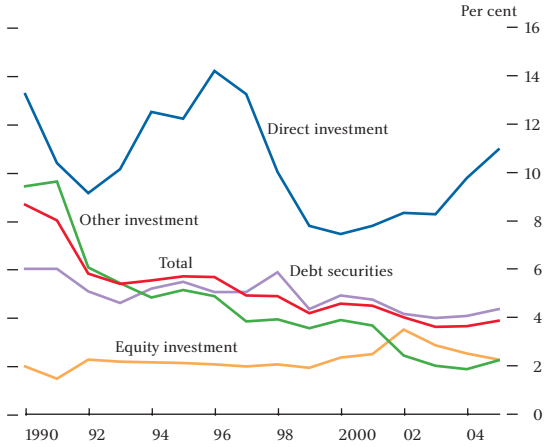
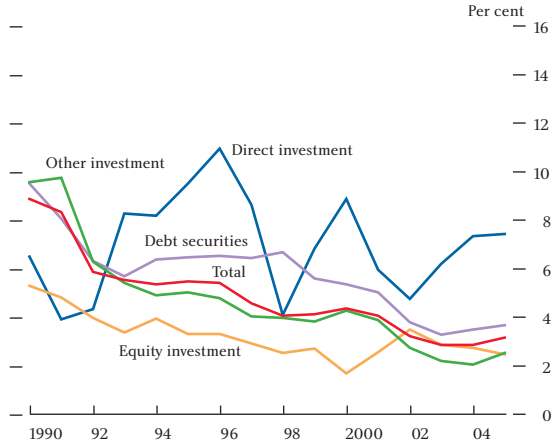


Chart 4
Implied rates of return

Assets



Liabilities



more clearly in Chart 3, where we see that in every year in the past decade except for 2005, outward direct investment by UK residents has exceeded inward direct investment. Indeed, the purchase of Mannesmann by Vodafone and of Atlantic Richfield by BP Amoco in 2000 represented more outward investment by UK companies than the entire total of inward direct investment by foreign companies in the three years 2001–03. However, it is true that for the first time in many years, inward direct investment in the United Kingdom has significantly exceeded outward direct investment in the past year (2005) and this has provoked a heavy volume of comment.

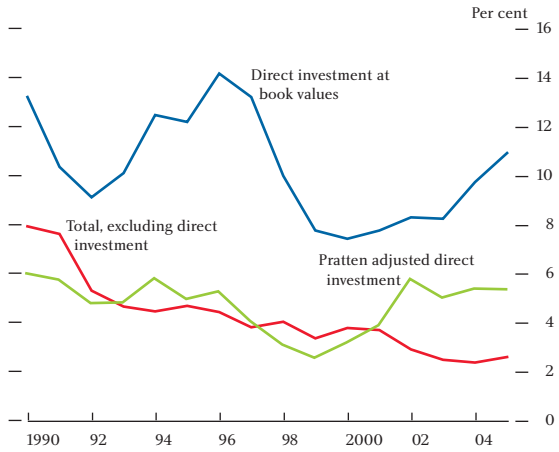
Looking again at Chart 2, we see that since the late 1990s, the United Kingdom has had a strongly positive net asset position in direct investment with negative positions in all other assets. Has this anything to do with the dramatic improvement in the net income position over the same period? The answer to this question appears to be yes. If we look at the income generated by each group of assets and liabilities and normalise on the stock of assets, we can generate implied (nominal) rates of return. These we show in Chart 4. What stands out is, first, that nominal rates of return are generally falling as inflation and nominal interest rates fall. Second, we see that rates of return on direct investment are generally higher than the other rates of return. One obvious reason for this is that direct investment is measured at book value which is typically below market value. A second possibility is that direct investment is more risky than other investments and the higher average returns are, in part, compensating for this.

Since stocks of direct investment are not measured at market value, is it possible to make some corrections to these data to get closer to the desired market value measures? Pratten (1996) has undertaken the most extensive investigation of this issue. In 1991, Pratten collected data on 167 companies which accounted for 77% of non-bank outward direct investment and a further 173 overseas companies accounting for 51% of non-bank inward direct investment. Analysis of these

data led Pratten to conclude that market:book value ratios were 2.05 for outward investment and 1.25 for inward investment. However, in order to accommodate potential biases, Pratten suggests that more cautious estimates of market:book ratios should be used, namely 1.75 for outward investment and 1.50 for inward investment. Extending forward Pratten's analysis by using changes in stock market indices as a proxy for changes in market value and adjusting outward direct investment for exchange rate movements, we find, using Pratten's cautious estimates, that rates of return on the estimated market values of direct investment are much closer to the rates of return on the other assets (see Elliott and Wong Min (2004), and Burnett and Manning (2003), for further details). In Chart 5, we show the original and adjusted rates of return on direct investment and the comparison rate of return on all other assets (equities, debt securities, other investments). Then, in Chart 6, we show the 'Pratten adjusted' net asset position, both in total and divided into direct investment and all other assets.

Chart 5
Implied rates of return on adjusted series

Assets



Liabilities

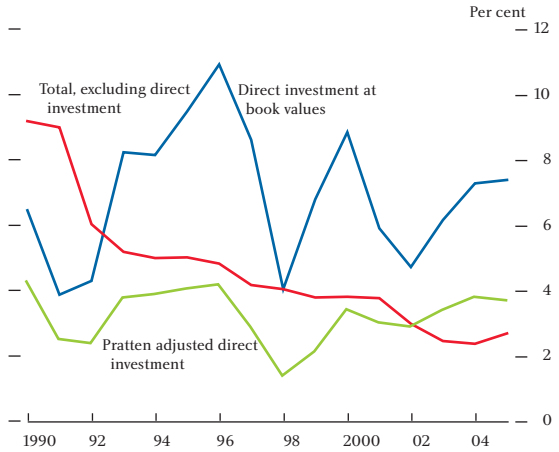
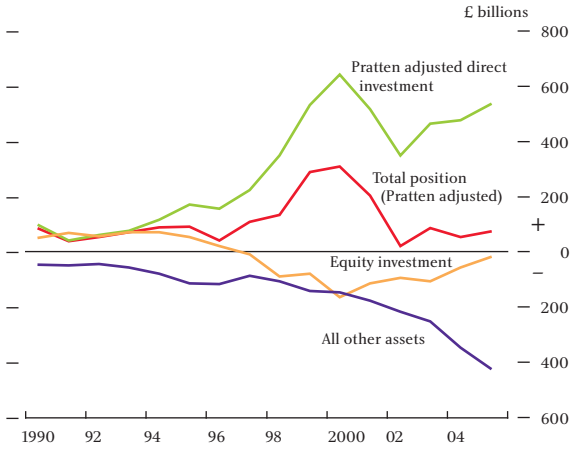


Chart 6
UK net external positions by component using Pratten adjustment



Looking first at the net asset position, we see that once we make the market:book adjustment to direct investment, the overall net asset position remains positive and is much the same today as it was in 1990. Since the late 1990s, the United Kingdom has developed a strong positive position in direct investment offset by a large negative position in the remaining assets, most of which are in the other investments category. Looking back at Chart 5, we see that while the implied return on all assets excluding direct investment has declined since the late 1990s, the implied return on direct investment has risen since the same date. This combination of the development of a significant positive position on direct investment and a sharp rise in the return on direct investment relative to other assets is the key factor underlying the dramatic improvement in the UK net income position in the 21st century.

Is the present position sustainable?

First, let us summarise the present situation. The annual current account deficit is now around 2½% of GDP, somewhat above the average deficit over the past 20 years. The overall trade deficit has averaged around 2.8% of GDP in recent years but is currently (2005) around 3.9% of GDP. This large deficit has been reinforced by a deficit on current transfers of around 1% of GDP. However, since 2000, the average annual net income flow has been close to 2% of GDP, providing a significant offset to the trade deficit. Indeed, currently (2005), the net income flow is running at 2.3% of GDP. So the basic position is that the United Kingdom now has a very large trade deficit, a significant portion of which is offset by a substantial positive net income position.

The sustainability of this situation depends on three factors. First, is the trade deficit likely to continue to worsen? Second, is the net asset position likely to remain close to zero, despite a continuing current account deficit? Third, will this small positive or negative net asset position continue to be associated with a substantial positive net income position? Concerning the first question, it is plain from Table C that since the appreciation of sterling in 1996/97, the trade deficit has risen steadily. Given that domestic demand growth, and hence import growth, was weak in 2005, we might expect a further worsening of the trade deficit in the short run as domestic demand growth recovers. But a continued worsening of the trade deficit in the long run is more uncertain. Furthermore, even if it does worsen, this is not necessarily a threat to sustainability. The key issue in this context is the asset position. This takes us to the second question which relates to the overall net asset position. This is now a small difference between two enormous stocks. As a consequence, changes in the net asset position tend to be dominated by revaluations of the stocks as exchange rates and stock markets move up and down. These changes have tended to offset the impact of the cumulated current account deficits since 1990 (Chart 6). Can this be expected to continue? Looking at Chart 2 or Chart 6 it is plain that since 1990, the net portfolio of the United Kingdom is strongly positive in equity type investments (direct investment, equity investment) and strongly negative in debt type investments (debt securities, other investments).(1) Historically, average capital gains on the former exceed those on the latter although they are more variable. If this continues and the balance of the net portfolio remains weighted in favour of equity type assets, we can expect that on average over long periods, revaluations of stocks of assets and liabilities will probably continue to offset a current account deficit at its present level, unless there is a significant and permanent real appreciation of sterling. This latter seems unlikely at the present juncture.

Turning to the third question, can we expect the substantial positive net income position to continue? This situation also depends crucially on the fact that while the overall net asset position is close to zero, the net external position in direct investment is strongly positive. On top of this, the total returns on this class of asset have been higher than any other class. Indeed recently, with very low long-term interest rates on fixed-interest securities, this gap has got bigger.

There are two overall threats to this state of affairs. First, the return generated by equity type assets may fall significantly relative to that generated by debt type assets. This is certainly possible. As the work of Mehra and Prescott (1985) makes clear, the average difference between equity and debt returns within each decade has varied wildly from one decade to another throughout the 20th century, although it does tend to remain positive. A second threat is the possibility that the net external position in direct investment will reverse. Given the speed with which much of the existing positive position developed (ie over ten years) and given the small reversal of this position in 2005, it is conceivable that this situation could completely reverse. However, the adjusted positive position in direct investment is now of the order of £500 billion. To turn this into a negative direct investment position of £200 billion, say, would, at current prices, require foreign residents to purchase all the top UK companies in every market sector except banking, oil and mining. This would include BAE, Rolls-Royce, Diageo, BT, Tesco, Unilever, National Grid, Marks and Spencer, Reckitt, BAA, Aviva, B Sky B, Vodafone, Glaxo Smith Kline, Astra Zeneca, BAT as well as over 35 other major companies. Despite the current attraction of UK companies to foreign residents, the notion that UK residents would cease foreign direct investment while foreign residents bought even a significant proportion of the above-mentioned companies seems somewhat improbable.

We may summarise this discussion of sustainability as follows. We have now reached a position where the stocks of UK assets and liabilities are enormous, at four times GDP, and relative to these stocks, the gap between them is tiny. Furthermore, the asset side is overweight in equity type investment and underweight in debt type investment relative to the liabilities side. If the historical pattern of returns on these two different types of investments continues, then it is probable that the overall net asset position will not worsen dramatically even if the current account deficit remains at existing levels. Furthermore, it is also probable that the net income position will continue to be significantly positive. Risks to this favourable prognosis are first, the trade deficit will continue to worsen by enough to drag down the current account despite a favourable net income flow. This may eventually undermine the

(1) Not dissimilar to a large bank.

favourable adjusted net asset position although this would probably take a considerable time. Second, the returns on equity type investments worsen significantly relative to the returns on debt type investments. Third, the flows of foreign direct investments into the United Kingdom significantly exceed UK direct investments abroad for a long period. Fourth, there is a significant real appreciation of sterling which may generate revaluations of the stocks leading to a large fall in UK assets relative to liabilities.

Conclusions

The UK current account deficit in 2005 was, at £31.9 billion, around 2½% of GDP, half a percentage point above the average deficit of the past 20 years. This means that foreign residents have added £31.9 billion more to their pile of UK assets than UK residents added to their pile of foreign assets. These piles of assets are now huge (around four times UK GDP) and the sums added to them each year are also enormous (around 60% of UK GDP). Furthermore, relative to the height of the piles, the difference in their size is tiny.

A significant feature of these piles of assets is that the pile of foreign assets held by UK residents is weighted much more towards equity type assets (direct investment and equity securities) than the UK assets held by foreign residents. Historically, equity type assets have had higher average returns than debt type assets. This has led to two outcomes favourable to the United Kingdom. First, the income generated by the foreign assets owned by UK residents exceeds that generated by UK assets owned by foreign residents by over 2% of GDP in recent years. Second, despite the continuing current account deficit of around 2% of GDP for the past 20 years, the difference between UK assets and UK liabilities remains only modestly negative compared to the size of each of the stocks. Furthermore, if the stocks are adjusted to market value, UK assets continue to exceed UK liabilities.

So long as average returns on equity type assets continue to exceed average returns on debt type assets, the current position is probably sustainable. Risks include first, a continuing and rapid increase in the trade deficit which might eventually undermine the favourable adjusted net asset position. This would probably take a long time. Second, a significant fall in the long-term returns on equity relative to returns on debt. Third, UK assets held by foreign residents become more weighted towards equity type investments, perhaps by a massive purchase of UK companies by foreign concerns. Finally, a large and permanent real appreciation of sterling which would significantly reduce UK assets relative to UK liabilities. At present, this seems unlikely.

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A shift in the balance of risks

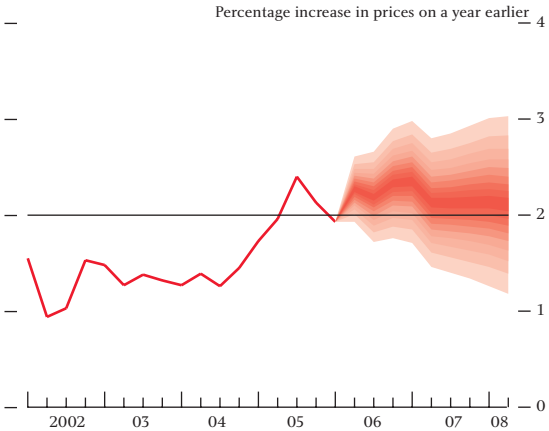
In this speech,[1] *David Walton, member of the Monetary Policy Committee, explains why he dissented from the majority view at the MPC meeting of 3–4 May to vote for a 25 basis points interest rate increase. He notes that, on unchanged interest rates, the Committee's central projection for inflation in the May* Inflation Report *was above the Government's 2% target throughout the next two years. He judges that the balance of risks to this inflation projection is to the upside. In part, this is because he sees some modest upside risk to GDP growth this year. But, even on the Committee's central growth projection, he sees some upside risks to inflation stemming from a lack of spare capacity, higher import prices and an increase in inflation expectations.*

For the past nine months, the Monetary Policy Committee of the Bank of England has left interest rates unchanged at 4.5%. But, as the minutes revealed yesterday, at the most recent MPC meeting on 3–4 May, I dissented from the majority view to vote for a 25 basis points interest rate increase. I would like briefly to explain the reasons for my vote.

The Committee's latest projections for consumer price inflation were published in last week's *Inflation Report*. When conditioned on unchanged interest rates at 4½%, the Committee's central projection was for inflation to rise above the Government's 2% target in the near term and then to remain slightly above target throughout the next two years (Chart 1). While there is no mechanical link between these projections and policy decisions, I judge that the balance of risks to this central projection for inflation lie a little to the upside; hence my vote for higher rates.

What are these risks? First, I believe that there is a modest upside risk to the Committee's central projection for GDP growth, and hence inflation. In the central projection, GDP growth picks up a little in the second quarter and then remains close to its long-run average throughout the forecast period. Growth could easily be a bit stronger than this in the rest of 2006. After a period of weakness during 2005, growth in the UK economy has been running close to trend in the past couple of quarters. But there are indications from a broad range of business surveys that the pace of output growth has now increased to an above-trend rate.

Chart 1
May 2006 *Inflation Report* CPI inflation projection based on constant nominal interest rates at 4.5%



Note: The fan chart depicts the probability of various outcomes for CPI inflation in the future. For a full description, see the footnote to Chart 2 on page iii of the May 2006 *Inflation Report*.

Looking at the expenditure components of GDP, there is still great uncertainty about the underlying strength of household spending. The Committee, though, does not expect consumer spending growth to be particularly strong in coming quarters. In the Committee's central projection, consumer spending grows a little below its post-war average rate of increase during the next couple of years. There are risks in both directions. Households' real disposable incomes will be squeezed by higher energy prices and a continued rise in the effective tax rate but support for spending should come from improving employment intentions, past rises in equity prices and the upturn in the housing market seen in recent months.

(1) Given at a lunch with business people in Bracknell on 18 May 2006 organised by the Bank of England's Central Southern Agency. The speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2006/speech272.pdf.

I see upside risks to growth in two areas: exports and investment. The world economy continues to grow at a robust rate and, of particular importance from a UK perspective, there are now indications of much greater momentum in economic activity in the euro area. This is reflected in improved export sentiment in UK business surveys.

These surveys have also signalled a notable strengthening in investment intentions recently after several quarters of weak readings. Given healthy corporate cash flow and the historically low cost of capital, it would be surprising if UK companies continued to stand apart from the strengthening trend in capital spending that is evident worldwide.

Second, I see a small upside risk to inflation stemming from a little less spare capacity in the economy currently than implied by the Committee's central projection. The UK economy has had to absorb a sizable shock from higher energy prices since the end of 2003 and it is quite possible that this has depressed temporarily the growth of potential output.(1) Labour productivity growth ground to a virtual halt in the year to 2005 Q3. While this may mostly have been cyclical, it could also have reflected a slower pace of capital accumulation and a drop in measured total factor productivity growth if some capacity had been scrapped. Consistent with this, there has not been much net change in capacity utilisation over the past couple of years according to business surveys, despite below-average recorded GDP growth.

The labour market has loosened — the unemployment rate has risen by 0.5 percentage points since last summer — and wage inflation has remained subdued, but this is not conclusive evidence of cyclical weakness. In the face of higher oil prices which raise firms' costs, the real consumption wage (ie the post-tax wage paid to workers deflated by consumer prices) must be lower than it would otherwise have been in the absence of the oil shock, if firms are to maintain employment. Although wage inflation has remained stable, and growth in the real consumption wage has eased (Chart 2), this has not prevented a rise in the growth of the real product wage (ie the full cost of labour to firms divided by the price firms get for their output).(2) This suggests that some of the rise in unemployment might have been related to structural factors.

Chart 2
Growth in real wages

Note: Real production wage uses GDP deflator at basic prices. Real consumption wage uses National Accounts household consumption deflator (including non-profit institutions serving households).

A third risk relates to commodity and import prices. In framing its projections, the Committee takes the path for oil prices given by the futures market, which is currently fairly flat. The outlook is highly uncertain but in the face of continued strong global growth, and periodic worries about supply, the risks to oil prices are probably still to the upside. And there are big uncertainties too about the future path of gas prices.

After several years in which the level of UK import prices had been broadly stable, import price inflation has turned positive over the past 18 months. This mirrors trends in export price inflation in the major industrialised economies, as well as China, and it is not just a reflection of higher energy prices. In making its forecasts the Committee assumed a fairly sharp deceleration in non-energy export price inflation in the major economies, and hence in UK import price inflation. I am concerned that this may not materialise to the extent assumed in the central projection, without a slowdown in the pace of global activity first.

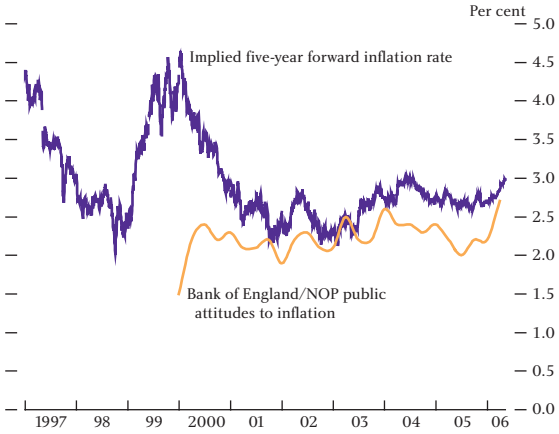
(1) For a detailed analysis of the oil shock and its implications for monetary policy, see 'Has oil lost the capacity to shock?', *Bank of England Quarterly Bulletin*, Spring 2006, pages 105–14.

(2) The extent to which the real consumption wage must fall depends on the size of the oil price change, the shares of oil and labour in gross output and the degree of complementarity between factors of production. Following a doubling in oil prices, estimates of the required fall in the real consumption wage to maintain employment range from 1% to 2½%. The required fall in the real consumption wage depends on how easily producers can compensate for higher energy prices by substituting away from energy. The smallest fall in the real wage would be generated if energy use could be adjusted flexibly so as to keep the energy share of gross revenue unchanged. The largest fall in the real wage would be implied if instead the quantity of energy inputs had to be used in a fixed proportion to the output produced. For further details, see reference in footnote 1 above.

The Monetary Policy Committee has little influence over any of these external price pressures but they could nevertheless have an important bearing on the chances of meeting the inflation target.

A fourth concern relates to the stability of inflation expectations. These have drifted upwards a little this year according to various surveys of households' expectations. There has also been a rise of about 30 basis points over the past six months or so in five-year forward breakeven inflation rates from the gilts market (Chart 3). While these movements are not dramatic, they cannot be dismissed either. With growth moving above trend and a risk of higher imported inflation, there is an increased likelihood of a further shift upwards in inflation expectations.

Chart 3
Inflation expectations



Fifth, although difficult to measure with any precision, I judge that the stance of monetary policy is currently somewhat accommodative. This is suggested by asset price developments, including the renewed pickup in house price inflation since last autumn, rapid broad money growth, and a strengthening in the growth of nominal demand. For the reasons that I have already given, I do not believe that an accommodative policy stance is appropriate at the current time.

I readily accept that there are other risks that could cause growth to disappoint and inflation to undershoot the target. These arguments were advanced by some of my colleagues on the Committee and are summarised in the latest minutes. But for me, in weighing these various arguments, the balance of risks has shifted a little too much to the upside on inflation for comfort. And that, I believe, justifies a small tightening in monetary policy.

What do we now know about currency unions?

By Michael Artis, FBA, Professor of Economics, University of Manchester, Professorial Fellow in the European University Institute, and George Fellow, Bank of England.

The paper presents the text of an inaugural lecture given at the Bank of England in December 2005 in memory of John Flemming. It provides a personal view of the lessons that can be drawn about currency unions from the experience of the European Monetary Union. It argues that business cycle concurrence is a less important criterion for participation than was once believed. Most important is the integration of financial markets and the shrinking of financial premia that individual countries face: this opens the way for countries to share risk, thereby enhancing welfare.

Introduction

Ladies and gentlemen. The founders of this lecture series have bestowed on me a very great honour in asking me to give the inaugural address. John Flemming was an economist of enormous range and talent.(1) Yet he was one of those people of great accomplishment who never denigrates the work of others or pass gratuitous judgement. This was one of his most endearing characteristics. He also had a finely balanced sense of humour; he usually enjoyed his own jokes (always a good sign!), smiling in a gentle way when he delivered them. John did his profession, and his country, great service not only in the work he did for the Bank and afterwards for the EBRD and in publishing, but also by offering his services as Treasurer or Editor to associations like the British Academy and the Royal Economic Society. He did these things out of a desire to be useful rather than as a stepping stone to some higher office. In fact, although he was offered the Drummond Chair in Political Economy at Oxford, he turned this down to work for the Bank of England. The resultant commuting trips from Oxford to London produced John's book on *Inflation* with its intuitive explanation of how the focus of expectations of inflation can progress from the level to the rate of change; and from the rate of change to the rate of change of the rate of change. John's bent was analytical rather than empirical, though analytical with a point — empirical or policy-related — rather than for its own sake. Relative to the topic on which I have chosen to speak tonight I do not think John is on record with any comment. He was, apparently, a champion of exchange rate targeting if not especially of the policy of shadowing the D-mark or subsequently the entry of sterling into the Exchange Rate Mechanism. Still, it is just the kind of thing that John would have written a pithy comment about; had he lived a little longer he might well have been tempted to join in the fashion for 'drawing lessons' about currency unions from our recent and ongoing experience of a new one — that of the euro area or euro zone. I do not know what he would have said had he joined in this fashion, but I am sure it would have been simultaneously enlightening and entertaining. I can only try to emulate that example.

What do we now know about currency unions?

While what I will say is provoked by our experience of the Economic and Monetary Union (EMU), I do not propose that this should be interpreted in a narrow way. For example, I find the eagerness with which the European Union's New Member States aspire to join the euro area, despite some distinctly weak credentials as judged by traditional theory, notable. Reflecting on this helps to bring one to a different view of currency union than before — as I hope to suggest. And, it is also the case that some new thinking on currency unions has emerged which seems to owe only a little to experience and much more to pure reflection. Treating our experience of the euro area as an 'experiment' from which to draw lessons has reminded me also of the fact that, before the introduction of the euro itself, there was an 'experiment before the experiment', a trial called

(1) I am indebted to Charles Goodhart for some of the following revelations about John's life and work.

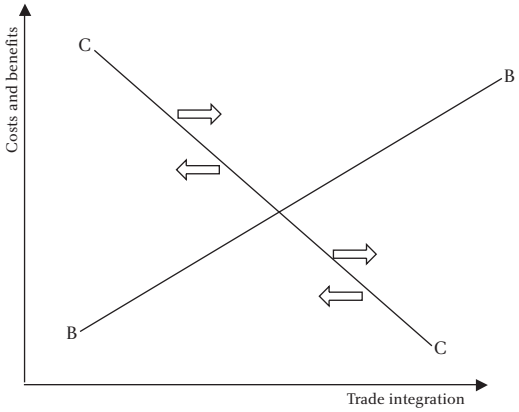
'Ecco L'Euro' which featured the premature introduction of the euro. I shall have a few words to say about that towards the end of this lecture.

It is standard to start with a rehearsal of the traditional theory of optimal currency areas and I will follow that path. One of the things that I shall suggest is that the standard theory can be expressed in a framework which can accommodate a number of non-standard propositions, so that — whatever one may ultimately judge to be the remaining core of truth in the traditional theory — it is at least useful as a vessel for conveying the impact of some new propositions upon the core of the traditional theory.

As is well known, the core of traditional optimal currency area theory was articulated by Mundell (1961) and elaborated by, among others, McKinnon (1963) and Kenen (1969). The initiating idea is that money, as a network good, is the more useful the more widely used it is. From this point of view the world would seem to be the obvious optimal domain of a currency. The qualification promoted by Mundell was that a currency offered a country a means of conducting a distinctive stabilisation policy based on using its own monetary policy to offset asymmetric shocks.(1) With a separate currency there comes an exchange rate against other currencies. It was envisaged that the exchange market would participate constructively in a similar stabilisation endeavour, with the exchange rate fluctuating around its equilibrium in countercyclical fashion. Early discussion of exchange rate dynamics showed that 'Keynesians' (like Meade (1955)) and 'monetarists' (like Friedman (1953)) shared a degree of agreement that the foreign exchange market might be trusted to hunt for, and speculate upon, its equilibrium. This component of the traditional optimum currency area (OCA) argument is sufficiently quintessential as to deserve the title of the 'OCA null'.

The flexible framework in which these ideas — and yet others of relevance — can be demonstrated uses one of Paul Krugman's diagrams. This one comes from his paper 'Lessons from Massachusetts' (Krugman (1993)). The diagram (Chart 1) pictures the elements of a cost-benefit analysis for a country contemplating joining a currency union with a partner or a group of partner countries.

Chart 1
Optimum currency area theory as a cost-benefit exercise



The vertical axis plots the costs or benefits of entry, suitably scaled. The horizontal axis plots the degree of trade integration of the country concerned with its potential currency union partners. Since the benefits of having a single currency are identified with the associated reduction in foreign exchange transaction costs, it seems clear that the higher level of trade the greater the benefit of the union. When the European Commission came to address this issue in its famous report 'One market, one money' (1990), it obtained data directly from banks on the margins charged for foreign exchange transactions in order to quantify this effect. Reasonably enough, it appeared that the more efficient a country's banking system, the lower the transactions cost and the less the benefit of going to the common currency. (For the United Kingdom, as a country with a relatively efficient banking system, the gains implied were of the order of 0.1%–0.2% of GDP.) Other gains can be suggested — in transparency and hence in competitive pressure, for example. These, too, might be suggested to be a positive function of the amount of trade. The upshot is that the benefits (BB) schedule slopes up from left to right.

The stabilisation benefits that result for a country from retaining its own monetary policy and flexible exchange rate entail a 'cost schedule' (CC) that can be depicted in the diagram for a country contemplating joining a monetary union. The costs of going to a common currency are thought of as the loss of benefit of having an individual currency and the stabilisation benefits involved — higher, the greater the incidence of

(1) Another much simpler idea is that money offers the benefit of seignorage to the issuer and where formal taxes are hard to collect, this can be a compelling motive for several money-issuers to arise.

asymmetric shocks requiring a distinctive monetary policy (and lower in the opposite case) and lower to the extent that alternative policies or institutional features are available (for example, a flexible fiscal policy or flexible labour markets) that reduce the need for stabilisation policy. The cost schedule may also slope down from right to left if McKinnon's speculation is true. McKinnon (1963) argued that the more integrated an economy is, the larger is likely to be the fraction of the consumption basket made up by imported or exportable goods and the less the leverage of nominal exchange rate changes over the real rate, as unions and price-setters would match such changes with domestic wage and price changes.

The resultant diagram shows a crossover of the benefit (BB) schedule and the cost (CC) schedule, at a critical level of integration. To the right of this critical level, benefits exceed costs and the country should accede to the currency union. To the left, costs exceed benefits and the country should not accede. As drawn, we are just concerned with current measures, but the cost-benefit framework makes it natural to think in terms of discounted measures. In this case it would be natural to assume that a country would join a union when the discounted benefit exceeds the cost. But, as Cottarelli and Escolano (2004) point out, this might not be the best criterion. It might be that by waiting a country could come by a higher benefit/cost ratio and, in general, choosing a date for entry which *maximises* the discounted benefit/cost ratio seems preferable.

I want to appeal to this framework to motivate four questions that I hope to explore with you.

- First of all, there is the issue of business cycle cross-correlations. The traditional theory suggests that a high degree of business cycle convergence (thus, high business cycle cross-correlations) is conducive to a positive currency union decision. In the diagram, a higher degree of convergence pushes the CC schedule to the left and inward. Yet we know that several members of the euro area — Finland and Ireland are prominent examples — had only weak business cycle convergence with the core countries in the Union when they joined. The question is: could such countries expect that membership of the Union would, in and of itself, produce a higher degree of convergence? In other words, is the position of the CC schedule endogenous to the entry decision? Some people have thought so. What do we now know about this?

- A second issue that is raised in this framework pertains to another possible source of endogeneity. Trade can be expected to increase as a result of entry into the Union; the reduction in transactions costs can be analysed as analogous to a cut in tariff rates and as a decline to zero in the volatility of the 'legacy exchange rate'. The question is: will this be a small effect, as the suggested models imply, or will it be much larger? Some research — including HM Treasury (2003) — has thrown up very large effects. If such estimates are correct, this too could be a source of endogeneity of the entry decision: after entry, the growth of trade could be such as to indicate the optimality of an entry decision not indicated before entry. (In the diagram, the position of the country moves rapidly to the right after joining, making it more likely that it will exceed the critical value of trade integration.) But this is a fast-moving field. After a wave of studies indicating large effects of entry upon trade, there has recently been a wave of studies indicating *much smaller* effects.

- A third issue is raised by the evident keenness of the New Member States to join the euro zone despite what traditional theory would indicate to be indifferent credentials. One rationale for their behaviour is that the 'OCA null' fails in their case — so that, so far from complementing the stabilising actions of the monetary authorities, the foreign exchange market acts to exacerbate shocks and to frustrate the authorities' attempt to stabilise the economy. In the event that this is the case, the CC schedule should be depicted as having moved sharply in towards the origin: there is no worthwhile stabilisation opportunity afforded to the country in isolation from the union and hence no loss of benefit, no cost, from joining the Union. In fact the cost of isolation is the higher interest rate that the market requires as insurance against the volatility of the market, and this can be avoided by joining the Union. Of course, this is not just an issue for the New Member States; it is potentially one, also, for countries like the United Kingdom, Sweden and Denmark, not to mention perhaps Canada, New Zealand and Australia. There are a number of recent studies available that attempt to deal with this very important issue.

- The fourth issue relates to the stabilisation objective and the financial integration of the Union. Although the traditional theory by default suggests that the stabilisation objective is one for output, economic theory indicates that the objective is properly one for consumption. In a financially integrated area, agents are able to offset the effect of output shocks on consumption by holding diversified portfolios of assets and in this way spreading risk. It may seem strange that the presence of a fluctuating exchange rate is enough substantially to prevent financial integration, but the evidence suggests that it is. To that extent, it is the financial integration effects of the Union that are the most important dimension to consider. To the extent that financial integration follows currency union, the benefits are considerable. In terms of the diagram, the CC schedule is again pushed inward to the left making the Union option a more attractive one.

These are the four issues where I think the accretion of knowledge as a result of the EMU experiment, or simply as the result of more recent reflection, is most salient. But I will finish this lecture by noting another experiment in currency union. Called 'Ecco L'Euro', this is the occasion in which the Italian Comunes of Pontassieve and Fiesole experimented with the premature introduction of the euro. As I took part in this trial, I thought it would be instructive to include a brief account of it.

Does membership of a monetary union promote business cycle convergence?

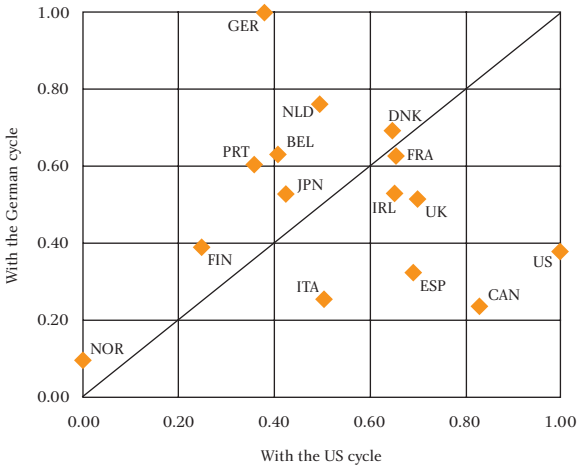
Has EMU brought about a closer convergence of the constituent economies' business cycles? From one point of view, this is a daft question, for the following reason. A stylised minimal length of a business cycle is five years; while EMU has been in existence for six years so we have one-and-a-fifth observations! But to get around this we can bundle together some pre-EMU years with the EMU years on the assumption that late-EMU is 'like' EMU and use this time period in which to examine the issue. We shall see what happens when we do that.

First, we may consider on what basis it is that convergence or non-convergence might be expected. Two avenues for a convergence effect have been considered in the literature. One is the expectation that a growth of international trade would promote a convergence in exposure to shocks and hence in business cycles. Another is the idea that policy is administered with error and the reduction of asymmetric policy error exemplified in the adoption of a common monetary policy should reduce asymmetric shocks in the propagation of business cycles. Against these presumptions however, it can be argued, first that EMU might promote specialisation and hence favour asymmetric shocks; and, second, that gross policy errors aside, individual country policy rules may have produced a greater similarity of final outcome (business cycles) in the face of idiosyncratic shocks than will be revealed under a 'one size fits all' policy. *A priori* reasoning seems inadequate and can only produce ambiguous conclusions. It is not even possible to regard the experience of other monetary unions as a clear guide. For example, while it remains the case that intranational business cycle correlations are generally much higher for the United States than they are for the ensemble of European countries, there are some striking instances of low, even negative, business cycle cross-correlations even in the US experience.

Let us go back to the idea of bundling together some pre-EMU experience with the EMU period. In Artis and Zhang (1997), we took data from the OECD's trade cycle data base and plotted the country cross-correlations of these cyclical deviates against Germany against the corresponding cross-correlations *vis-à-vis* the United States. We compared an initial period with a later ('ERM') period. Comparing the two periods we found that, whereas in the first period there was a relatively wide dispersion of observations suggestive of a loose world cycle, in the second period countries that were members, or apprentice members, of the ERM exhibited a relatively higher correlation *vis-à-vis* Germany than the United States. Perhaps, by implication, we would find this trend continued in data for the full EMU period. The paper is still widely — but misleadingly — quoted to that effect.

Charts 2–4 use later, revised OECD trade cycle data. The initial move to a closer correlation with Germany than with the United States (comparing Charts 2 and 3) appears, as in our earlier data set, for most countries, especially those associated with the ERM. (Japan appears as an 'honorary member' of the ERM, itself a warning against a too strong identification with the ERM.) But in the EMU ('post-ERM') period shown in Chart 4, this differentiation falls away. Germany is now highly correlated with the United States and it makes no sense to distinguish a European cycle effect.

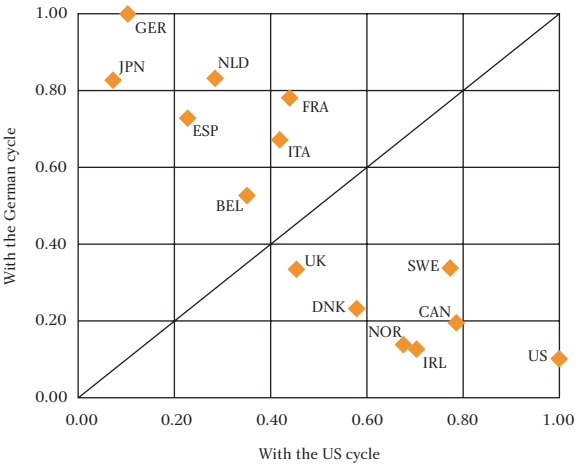
Chart 2
Pre-ERM business cycle affiliations



Business cycle cross-correlations with the United States and Germany, pre-ERM period 1961:1–1979:3 (OECD trade cycle database).

Country abbreviations are: BEL, Belgium; CAN, Canada; DNK, Denmark; FIN, Finland; FRA, France; GER, Germany; IRL, Ireland; ITA, Italy; JPN, Japan; NLD, Netherlands; NOR, Norway; PRT, Portugal; ESP, Spain; SWE, Sweden; UK, United Kingdom; and US, United States.

Chart 3
ERM business cycle affiliations



Business cycle cross-correlations with the United States and Germany, ERM period 1979:4–1993:12 (OECD trade cycle database).

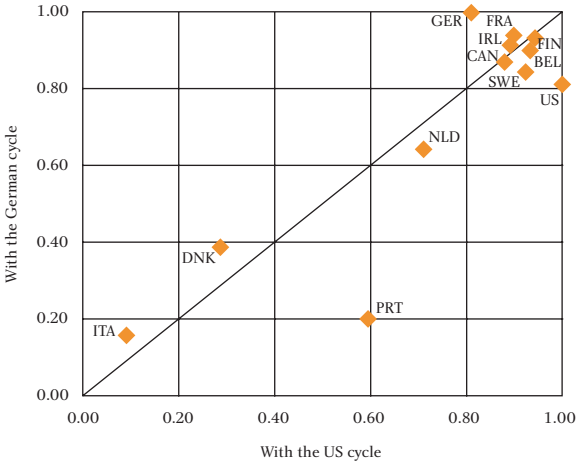
Finland and Portugal are not visible because the negative correlations are not shown.

See note to Chart 2 for country abbreviations.

In principle it might still be possible that there is a 'Europeanisation' effect in the data which is masked by the global impact of the 2000–01 shock; but if so, this effect will only be apparent when some other shocks come along that serve to identify a European cycle distinct from a North American or World cycle.

This rather negative conclusion implied by the data has received confirmation in a handful of other recent studies: examples are Artis (2003), Camacho *et al*

Chart 4
Post-ERM business cycle affiliations



Business cycle cross-correlations with the United States and Germany, post-ERM period 1994:1–2000:12 (OECD trade cycle database).

Spain, Japan, Norway and the United Kingdom are not visible because the negative correlations are not shown.

See note to Chart 2 for country abbreviations.

(2005), and Bovi (2004). These studies use different data and a variety of techniques, implying a degree of robustness in the underlying findings.(1) My conclusion from all this is that we still do not know whether — let alone over what time span — currency union creates business cycle convergence. But since currency unions are endogenous, we might hazard that they naturally arise where there is not only a high level of trade already but also a high level of business cycle convergence. (It has often been noted that the core countries of EMU did little to analyse the optimality of the move to EMU — all the exercises in this direction seem to have come from countries like the United Kingdom, Sweden, Finland, Poland and the Czech Republic. It is as if the core countries 'knew' that they did not need to perform these exercises.)

Do currency unions create trade?

It is implicit in our framework that monetary union, by cutting transactions costs (and perhaps by reducing volatility) will create some trade. But the orders of magnitude involved are relatively small; in particular, there does not seem to be reliable evidence that volatile exchange rates deter trade. The profession's sceptical reaction to Andrew Rose's early estimates of very large trade effects (Frankel and Rose (1997), (1998); Rose (2000)) was therefore not surprising. Rose deployed panel data estimation, with currency union entering as a dummy variable and (bilateral) trade as the *explicandum*.

(1) Bovi's contribution is of particular interest because it deploys a measure of group-wise synchronisation where the existing literature uses only bilateral measures.

The panels involved a large cross-section, but a rather weak time dimension. The order of magnitude of the effect initially detected was of the order of 300%. But these estimates were unduly dependent upon monetary unions between small 'postage stamp' countries and larger neighbours and upon developing economy experience. More modest later estimates (eg Persson (2001)) continued to be compatible with a large effect, however.

For developed countries the most pertinent example appeared to be that of the break-up of the exchange rate union between the Republic of Ireland and the United Kingdom; Thom and Walsh (2001) claimed to find no great decline in Anglo-Irish trade as a result of the Republic joining the euro area. The most influential adaptation of the Rose approach, however, came with the paper by Micco *et al* (2003) which focused on Europe and used data which overlapped with the euro period. Micco and his colleagues also found large effects from the introduction of the euro on trade, even if not quite so large as some of Rose's earliest estimates. HM Treasury (2003) updated and replicated the Micco study, reporting a potential increase in trade for the United Kingdom following entry into the euro zone of 50% in total. Since trade creation is usually associated with some growth multiplier, the output growth implications of this finding were significant.

Since the Treasury's work there has emerged a number of studies critical of the design of the Micco *et al* study, including: Bun and Klaassen (2004); Gomes *et al* (2004); de Nardis and Vicarelli (2003); Baldwin (2005); and Berger and Nitsch (2005). The common feature of the critical line pursued in these studies is that EMU itself is endogenous to the process of integration, more so among the core economies of Europe than among the peripheral countries. This might suggest that any dating is largely arbitrary. More constructively, some of these studies suggest that the counterfactual — what trade would have been but for the euro — can be reconstructed or related to a measure of integration. Econometric analysis is not likely to be reliable in settling this matter. Rather, what we have to say is that the critics appear to have a good point. And, HM Treasury's cautious evaluation of its own findings stands on firm ground.

A final observation is that we now know more about the scale of the 'border effect'. It appears that trade between pairs of Canadian cities is up to 20 times larger than between similarly distanced pairs of cities, one of which is Canadian and one American. It may be a 'border effect' that Rose has picked up in his very large estimates of the currency union effect. Currency is only one element in what goes to make a border effect, but it may be the most important. Financial experience suggests that it could easily be so, as we discuss below.

How well does the 'OCA null' hold?

We earlier identified the 'OCA null' as the proposition that the exchange rate moves in the 'correct' way to dampen shocks and thus to complement a stabilising monetary policy. A number of observers (eg Frankel (2003) and Buiter (2000)) have questioned whether this is the case, the former for developing and emerging economies, the latter for the United Kingdom. A canonical model for the exploration of the issues is a structural VAR incorporating (at least) output, prices, interest rates and the exchange rate. Such a model usually requires the imposition of zero restrictions on the impact of certain shocks (a more agnostic approach simply imposes sign restrictions, as in Farrant and Peersman (2004) and Peersman (2005)) and seeks to identify whether the exchange rate responds in the 'right way' to the various shocks and in particular to discover whether the exchange rate tends to 'chase its own tail', responding simply to shocks arising in the foreign exchange market (as was the verdict of an early study in this genre by Canzoneri *et al* (1996)). Specifications have varied, one strand selecting the real exchange rate for analysis and relating this to measures of *relative* output, *relative* prices and *relative* interest rates. This is inferior, it seems to me, to the specification in Artis and Ehrmann (2006) where the nominal, not the real, rate is the centre of attention and variables are studied in absolute, not relative form. The reason for this preference is that it is variation in the nominal rate which joining a monetary union entails the loss of. The use of the relative forms of output, prices etc obscures who does the adjusting; appears to make it a matter of indifference that transmission mechanisms differ between countries; and biases the results in the sense that the formulation already implies that only asymmetric shocks will be identified, whereas an important question is precisely that of the relative frequency of symmetric versus asymmetric shocks.

The general run of results shows some differences between the modelling approaches and/or between large and small countries. Approaches that follow Clarida and

Gali (1994) — such as Peersman (2005) and Farrant and Peersman (2004) — tend to find evidence in favour of the OCA null, while the others find a larger role for nominal shocks (though Farrant and Peersman (2004) find a large role for nominal shocks, suggesting that the exchange rate may be a source of shocks rather than a shock-absorber). There is some suggestion in the studies to date that smaller countries exhibit less tendency to confirm the OCA null. For instance, the paper by Borghijs and Kuijs (2004) examines the experience of the Central and Eastern European countries using a variant of the SVAR approach and concludes that 'the results cast doubt on the usefulness of the exchange rate as a shock-absorber; the exchange rate appears on average to have served as much or more as an unhelpful propagator of LM shocks than as a useful absorber of IS shocks', adding that 'they suggest that the costs of losing exchange rate flexibility in the CEECs are limited, if even positive'.

It is not clear that the same scepticism should apply to exchange rate flexibility in larger economies, for which there are relatively few comparable studies. In my paper with Michael Ehrmann (Artis and Ehrmann (2006)), we concluded that the United Kingdom was an indifferent candidate for European Monetary Union as nominal shocks played a large role in determining the exchange rate, though the evidence suggested that UK monetary policy was effective and the exchange rate, though not responding to the right signals, did not appear to be capable of damaging the real economy. At the same time, most shocks were diagnosed as asymmetric shocks. In the period since 1997, there have been intermittent criticisms that a high exchange rate has unduly dampened economic activity. Cobham (2002), for example, provides a sustained account of monetary policy concerns about the exchange rate in this period. One is invited to draw the conclusion that the exchange rate has been buoyed up by unreasonably bullish sentiment and that it has done harm. By contrast, in the Treasury's EuroReport, the exchange rate was given credit for having done the right thing — namely appreciating in the face of an inflationary shock.

There is an argument in the literature that exchange rate pass-through is now so low that exchange rate changes cannot be expected to have direct impact on relative prices. Hence, one possible conclusion is that as exchange rate movements appear to have little effect, monetary union is an easier step (Engel (2002)). Obstfeld (2002) argues that this line of argument is premature. In a world of globalised business it may very well be that there is a high degree of pricing to market so that prices in the shops are immune to exchange rate changes. But intermediate goods prices do change and the consequence of an alteration in the exchange rate may very well be a redirection of the sourcing of the supply of the good in question. Thus the activity effects of a change in the exchange rate may stay much the same as in earlier accounts when relative consumer prices changed. Furthermore, those activity effects will likely have price effects too, somewhere down the line.

What is the bottom line to this discussion? The OCA null has been held in question and for many countries — predominantly smaller countries with poorly developed domestic capital markets and those with no reputation and little experience of operating in a world of highly mobile capital flows — that questioning is appropriate. They lose little or nothing in joining a monetary union therefore, as they are unable to operate an effective stabilisation policy. Indeed there may be some clear gains: the real rate of interest will be lower in the union as the premium for operating an independent monetary policy disappears and it may even be the case that some of these countries are well placed in terms of business cycle convergence to benefit from stabilisation policy at union level that they have not been able to implement for themselves.

As an addendum at this point I note some evidence from a study I carried out into the business cycle convergence of the New Member States (Artis *et al* (2005)). Table A shows the cross-correlations of cyclical deviates of industrial production in the CEECs *vis-à-vis* the euro area and selected member countries of the area. Only Hungary, and, to an extent, Poland display high correlations; some are even negative.(1)

Table A
Cross-correlations of business cycle deviates; industrial production, band-pass filtered 1993–2002. Central and Eastern European countries

	CZE	SVK	POL	HUN	SVN	EST	LVA	LIT
D	0.17	0.23	0.66	**0.92**	0.67	0.45	0.03	-0.04
A	-0.09	0.28	0.57	**0.82**	0.34	0.12	-0.18	-0.39
I	0.27	0.48	0.66	**0.70**	0.57	0.41	0.00	0.05
EURO	0.16	0.32	0.67	**0.91**	0.65	0.40	-0.02	-0.04

Source: Artis *et al* (2005); figures in bold are statistically significant.

Country abbreviations are: CZE, Czech Republic; EST, Estonia; HUN, Hungary; LVA, Latvia; LIT, Lithuania; POL, Poland; SVK, Slovakia; and SVN, Slovenia.

(1) As explained in the source from which these data are drawn industrial production cross-correlations are generally higher than those involving GDP (see Artis *et al* (2005)).

Financial integration

One of the enduring 'puzzles' of international economics has been the persistence and size of what has become known as the 'home bias' in portfolio allocation. Investors invest far less than they 'should' in international assets, diversify overseas far less and correspondingly insure themselves against risk by holding overseas assets to a much lesser extent than they 'should'. This bias can help to account for the widespread violation of the expectation that, as a result of consumption risk-spreading internationally, growth rates of consumption across nations should display less variation than growth rates of output do. And the bias can also help explain why countries often 'fail' the Feldstein-Horioka 'test' and behave as though their investment opportunities were constrained by domestic savings.(1) Karen Lewis (1999) provides a comprehensive account of this bias and its ramifications.

In previous work it has never been clear that the exchange rate and exchange rate risk should play more than a supporting role in accounting for this bias. After all, there are plenty of other candidates — differences in commercial law, transport regulations, weights and measures etc. McKinnon (2004) makes particular mention of the fact that the exchange rate and exchange rate risk have not generally been given the predominating role in the list of obstacles that might lead to a home bias.

The advent of EMU seems to have dented the home bias paradigm considerably. The evidence from the bond markets shows that interest rate differentials between euro-area government bonds are negligible, whereas prior to the advent of the euro, those differentials were sometimes large. It is (almost) as if the previous country plus exchange rate premium has been shown to be almost all down to an exchange rate premium. Blanchard and Giavazzi (2002) show that while there has been an increase in the spread of current account deficits and surpluses throughout the OECD, the examples of Greece and Portugal seem to indicate that within the euro area, the constraint on current account deficits no longer holds at all. Table B is drawn from their paper and shows that estimates of the coefficient in a regression of the investment ratio on the savings ratio are lower for euro-area countries (whether or not Portugal and Greece are excluded, as in the column 'Euro area minus').(2) For such countries entry into the euro would seem to take place against a background in which the BB schedule in Chart 1 is lifted upwards. But there is more to it than this.

Table B
Feldstein-Horioka coefficients, 1975–2001

	OECD	OECD minus	EU	Euro area	Euro area minus
1975–2001	0.58	0.51	0.47	0.35	0.39
1975–90	0.56	0.55	0.50	0.41	0.49
1991–2001	0.57	0.38	0.36	0.14	0.26

Source: Blanchard and Giavazzi (2002).

The heart of the traditional OCA argument is that the possession of an 'own currency' allows monetary policy to perform a stabilisation function. By default aimed at output in this story, theory suggests that it is really consumption which is the proper object of stabilisation. Now consumption can be smoothed relative to output either through a fiscal channel (as tax rates and government spending respond to changes in the level of activity) or through private channels. The late Oved Yosha, with various colleagues (as in Asdrubali *et al* (1996)), did much to delineate these channels and to operationalise the quantification of different routes through which the public and private sectors can smooth consumption. When these routes are quantified it is standard to find (eg Crucini and Hess (2000)) that there is a large difference between the amount of risk-sharing that takes place between the regions of a country and that between countries. The former is much larger than the latter, reflecting the operation of a home bias once again (Tables C and D, drawn from a study of the United Kingdom by Labhard and Sawicki (2006) underline this strongly). Hence the extent to which a currency union automatically reduces the home bias is of the greatest importance. In the limit, it could imply that upon joining a currency union, a country will find itself better able to stabilise consumption. Hence the apparatus of output stabilisation through monetary and fiscal policy is no longer necessary. The CC schedule in Chart 1 thus vanishes towards the origin. Indeed, it can be hazarded that this effect could 'turn

(1) In their 1980 article Feldstein and Horioka ran a cross-section regression of the investment/GDP ratio on savings (similarly scaled by GDP) as a test for the mobility of capital. They argued that in the presence of perfect capital markets there should essentially be no connection between domestic savings and domestic investment, though their results pointed to a high correlation coefficient. Various arguments have been deployed since to explain why the test may itself be flawed but its intuitive simplicity continues to attract replications.
(2) The column 'OECD minus' drops a heterogenous group of countries which the authors felt might not conform to the paradigm of an advanced developed economy.

OCA upside down' in the sense that the financial integration of the currency union could be seen by agents as permitting a degree of specialisation in output at the national level that would have appeared unwise before. With specialisation would come *more* asymmetric shocks and less business cycle convergence. In short, where traditional theory would look to business cycle convergence to sustain a currency union, under the new approach currency union could even lead to less business cycle convergence.

Table C
Risk-sharing across UK regions

Per cent[a]

	Capital markets	Fiscal transfer	Intertemporal	Total smoothed	Total unsmoothed
1975–99	47	-4	37	79	21
1975–87	47	-8	43	82	18
1988–99	51	–	25	76	24

Source: Labhard and Sawicki (2006).

(a) The final two columns report the proportion of income shocks that are smoothed (or otherwise) in their impact on consumption. The first three columns distinguish the channels through which smoothing takes place, based on regression evidence.

Table D
International risk-sharing: the United Kingdom and the OECD

Per cent[a]

	Factor income	Depreciation	Transfers	Savings	Total smoothed	Total unsmoothed
1971–99	–	-1	-1	6	5	95
1971–87	1	–	-1	6	5	95
1988–99	–	-3	-1	6	5	95

Source: Labhard and Sawicki (2006).

(a) The final two columns report the proportion of income shocks that are smoothed (or otherwise) in their impact on consumption. The first four columns distinguish the channels through which smoothing takes place, based on national accounts data.

That the most recent developments in currency union theory should lead in this direction is paradoxical in another way too. Early discussions of the feasibility of currency union stressed that the fiscal channel was necessary to promote risk-sharing between regions of a country. American observers were prone to comment that, because of their federal income tax and expenditure system, '40 cents in the dollar' of a primary income shock would be automatically offset. As the EMU had then, and still has, no prospect of a central budget function of sufficient size, the corresponding figure for the EMU is very close to zero. However, later work has done much to clarify concepts and the stylised '40 cents in the dollar' has become according to Melitz (2004), '12–15 cents in the dollar'. Moreover in these early debates the role of the private sector was entirely overlooked. It is clear that within the euro area, risk-sharing through private channels has not yet reached the levels that are experienced in the United States (pre-euro studies show that risk-sharing is considerably less in Europe) and it is clear that some institutional and cultural changes are necessary to complete the process of diminishing the home bias. We all know that retail banking in the euro zone is still subject to national protectionist policies, for example, and there are many other shortfalls. Nevertheless, the advent of the euro has imparted momentum towards change in the relevant areas.

Broad conclusions

We have learnt several important things about the way that currency unions work and develop. The contribution of traditional theory is still important, but with respect to the four issues I put on the table at the start of this lecture:

- It is probably wrong to expect much by way of induced business cycle convergence.
- It is probably wrong to think of the euro *per se* as spurring a vast increase in trade. Trade within the EU and especially within the euro zone and its core members is (and would have been) growing fast anyway.
- For some countries, including some prospective members of the euro area, the benefits to be derived from currency union membership are huge. Any qualification deriving from a lack of business cycle convergence is probably of second order importance.
- The financial aspects of currency union membership have been underplayed in the past, whereas their implications appear in fact to be highly significant. Indeed they are arguably the most significant factor that we now know about and didn't before.

Ecco L'Euro

By way of concluding, I promised to comment on another experiment in currency union, namely the project 'Ecco L'Euro'. This experiment was mounted in the Comunes of Fiesole and Pontassieve, near Florence. The idea of the experiment was to spread information about the euro by a real-time simulation. The permission of the Banca d'Italia was obtained for the circulation within these Comunes of 'euro symbols' which could be accepted as legal tender by various enterprises within the Comunes. The exchange rate of

the lira to the euro symbol was fixed at a convenient 2000:1 (cf the actual rate of 1936.27:1). Shops were encouraged to adopt dual pricing. The experiment was monitored by a scientific committee based in the European University Institute, and monitoring involved *inter alia* the circulation and processing of questionnaires.

Here are some of the results of this interesting venture:

1. The experiment demonstrated the network nature of money. The geographical and temporal limitations of the legal tender status of the euro symbols meant that few people used the symbols, although many held them.

2. This might seem also like an instance of Gresham's Law: soaring prices of the euro symbols in collectors' shops in Florence and Rome gave the impression that the lira was a weak currency. The true model, though, is more like one for a special philatelic sale.

3. The problem of lack of use of the new currency was targeted by the introduction of a 'points card'. When a transaction was executed in the new currency the retailer would stamp a square on the card. When filled, the card could be exchanged for a watch (big card) or a tiepin (small card). The theory of money is concerned with motives for holding money — including the transactions motive since money has to be held before it is used. Here we have the 'watch' (or 'tiepin') motive for holding (using) money!

4. The questionnaires established that rounding was quite often in the downward direction. But in this experiment people could always use either currency and prices were quoted in both. In the event — ie, when the real new currency was introduced, Italians experienced an upwards blip in the price level associated with the introduction of the new currency in apparent violation of monetary neutrality.(1)

5. Our questionnaires established that in some cases (mostly, those of older people) the experiment had caused confusion even with the convenient exchange rate. Subsequently Dzuida and Mastrobuoni (2005) argued that the confusion amounted to a real change, which can be modelled as increasing the monopoly power of retailers.

6. The Comunes added seigniorage (identified as the difference between the face value and the production cost of the symbols) to their coffers in the order of LIT 20,000 per inhabitant. But this was more than offset by other promotional expenses associated with the project (including the cost of the watches and tiepins).

7. It might be argued that a temporally limited experiment cannot really stand in for the real thing — simply because it is not the real thing and is known not to be so. Even so the value of positive lessons learnt from the experiment was perhaps disappointingly small, but notably very small in relation to the 'PR' success of the project as a whole.

(1) In fact the blip was experienced in other euro-area countries too. Eurostat gave an estimate of 0.2% as the size of the blip in the euro-area HCPI associated with the introduction of the physical new currency.

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Bank of England speeches

Speeches made by Bank personnel since publication of the previous *Bulletin* are listed below.

Are Europeans lazy? Or Americans crazy?
Remarks delivered by Stephen Nickell at the Annual Conference of the Fondazione Rodolfo DeBenedetti at Portovenere, La Spezia on 27 May 2006 (this makes reference to the 'Patterns of work across the OECD' paper below).
www.bankofengland.co.uk/publications/speeches/2006/speech275.pdf.

Patterns of work across the OECD.
Joint paper by Guilia Faggio of the Centre for Economic Performance, London School of Economics and Stephen Nickell on 27 May 2006. www.bankofengland.co.uk/publications/speeches/2006/speech276.pdf.

Reflections on operating inflation targeting.
Paper delivered by Paul Tucker at the Graduate School of Business of the University of Chicago on 25 May 2006.
www.bankofengland.co.uk/publications/speeches/2006/speech274.pdf. Reproduced on pages 212–24 of this *Bulletin*.

Uncertainty, the implementation of monetary policy, and the management of risk.
Speech by Paul Tucker to the Association of Corporate Treasurers in Newport on 19 May 2006.
www.bankofengland.co.uk/publications/speeches/2006/speech273.pdf. Reproduced on pages 202–11 of this *Bulletin*.

A shift in the balance of risks.
Speech by David Walton at a lunch organised by the Bank of England's Central Southern Agency on 18 May 2006.
www.bankofengland.co.uk/publications/speeches/2006/speech272.pdf. Reproduced on pages 240–42 of this *Bulletin*.

The UK current account deficit and all that.
Paper by Stephen Nickell delivered on 25 April 2006. www.bankofengland.co.uk/publications/speeches/2006/speech271.pdf.
Reproduced on pages 231–39 of this *Bulletin*.

Speech by Kate Barker.
At a CBI West Midlands 2006 Economic Dinner in Birmingham on 21 March 2006.
www.bankofengland.co.uk/publications/speeches/2006/speech270.pdf. Reproduced on pages 225–30 of this *Bulletin*.

The Budget of 1981 was over the top.
Speech by Stephen Nickell delivered at an Institute of Economic Affairs panel discussion in London on 16 March 2006.
www.bankofengland.co.uk/publications/speeches/2006/speech269.pdf.

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 website at www.bankofengland.co.uk/publications/quarterlybulletin/index.htm.

Articles and speeches (indicated S)

Spring 2005 (continued)
Why monetary stability matters to Merseyside (S)
Monetary policy in an uncertain world (S)
Why has inflation been so low since 1999? (S)
The housing market and the wider economy (S)

Summer 2005
The impact of government spending on demand pressure
How important is housing market activity for durables spending?
The inflation-targeting framework from an historical perspective
Monetary policy news and market reaction to the *Inflation Report* and MPC *Minutes*
Addendum to *Report on modelling and forecasting at the Bank of England*
Public attitudes to inflation
Chief Economist Workshop April 2005: exchange rate regimes and capital flows
Implementing monetary policy: reforms to the Bank of England's operations in the money market
A review of the work of the London Foreign Exchange Joint Standing Committee in 2004
Monetary policy: practice ahead of theory
The Mais Lecture 2005: speech by the Governor (S)
Inflation targeting in practice: models, forecasts and hunches (S)
Monetary policy, stability and structural change (S)
How much spare capacity is there in the UK economy?
Communicating monetary policy in practice (S)
Monetary policy in the United Kingdom — the framework and current issues (S)
A matter of no small interest: real short-term interest rates and inflation since the 1990s (S)

Autumn 2005
Assessing the MPC's fan charts
Long-run evidence on money growth and inflation
The determination of UK corporate capital gearing
Publication of narrow money data: the implications of money market reform
The Governor's speech at Salts Mill, Bradford (S)
The Governor's speech at the Mansion House (S)
Monetary policy making: fact and fiction (S)

Winter 2005
Introducing the Agents' scores
Do financial markets react to Bank of England communication?
Financial stability, monetary stability and public policy
Share prices and the value of workers
Stabilising short-term interest rates
The Governor's speech to the CBI North East annual dinner (S)
UK monetary policy: the international context (S)
Economic stability and the business climate (S)
Challenging times for monetary policy (S)
Monetary policy challenges facing a new MPC member (S)

Spring 2006
New information from inflation swaps and index-linked bonds
The distribution of assets, income and liabilities across UK households: results from the 2005 NMG Research survey
Understanding the term structure of swap spreads
The information content of aggregate data on financial futures positions
The forward market for oil
The Governor's speech in Ashford, Kent (S)
Reform of the International Monetary Fund (S)
Global financial imbalances (S)
Monetary policy, demand and inflation (S)
Has oil lost the capacity to shock? (S)

Summer 2006
House prices and consumer spending
Investing in inventories
Cost-benefit analysis of monetary and financial statistics
Public attitudes to inflation
The Centre for Central Banking Studies
A review of the work of the London Foreign Exchange Joint Standing Committee in 2005
Uncertainty, the implementation of monetary policy, and the management of risk (S)
Reflections on operating inflation targeting (S)
Cost pressures and the UK inflation outlook (S)
The UK current account deficit and all that (S)
A shift in the balance of risks (S)
What do we now know about currency unions? (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 website www.bankofengland.co.uk/publications/index.htm.

Working papers

An up-to-date list of working papers is maintained on the Bank of England's website at www.bankofengland.co.uk/publications/workingpapers/index.htm, where abstracts of all papers may be found. Papers published since January 1997 are available in full, in portable document format (PDF).

No.	Title	Author
274	The substitution of bank for non-bank corporate finance: evidence for the United Kingdom *(September 2005)*	Ursel Baumann Glenn Hoggarth Darren Pain
275	Wealth and consumption: an assessment of the international evidence *(October 2005)*	Vincent Labhard Gabriel Sterne Chris Young
276	Corporate expenditures and pension contributions: evidence from UK company accounts *(October 2005)*	Philip Bunn Kamakshya Trivedi
277	When is mortgage indebtedness a financial burden to British households? A dynamic probit approach *(October 2005)*	Orla May Merxe Tudela
278	Misperceptions and monetary policy in a New Keynesian model *(October 2005)*	Jarkko Jääskelä Jack McKeown
279	Monetary policy and private sector misperceptions about the natural level of output *(October 2005)*	Jarkko Jääskelä Jack McKeown
280	A quality-adjusted labour input series for the United Kingdom (1975–2002) *(October 2005)*	Venetia Bell Pablo Burriel-Llombart Jerry Jones
281	Monetary policy and data uncertainty *(November 2005)*	Jarkko Jääskelä Tony Yates
282	Stress tests of UK banks using a VAR approach *(November 2005)*	Glenn Hoggarth Steffen Sorensen Lea Zicchino
283	Measuring investors' risk appetite *(November 2005)*	Prasanna Gai Nicholas Vause
284	Modelling manufacturing inventories *(December 2005)*	John D Tsoukalas
285	The New Keynesian Phillips Curve in the United States and the euro area: aggregation bias, stability and robustness *(December 2005)*	Bergljot Barkbu Vincenzo Cassino Aileen Gosselin-Lotz Laura Piscitelli
286	Modelling the cross-border use of collateral in payment systems *(January 2006)*	Mark J Manning Matthew Willison
287	Assessing central counterparty margin coverage on futures contracts using GARCH models *(January 2006)*	Raymond Knott Marco Polenghi
288	The price puzzle: fact or artefact? *(January 2006)*	Efrem Castelnuovo Paolo Surico
289	Defined benefit company pensions and corporate valuations: simulation and empirical evidence from the United Kingdom *(March 2006)*	Kamakshya Trivedi Garry Young
290	UK monetary regimes and macroeconomic stylised facts *(March 2006)*	Luca Benati
291	Affine term structure models for the foreign exchange risk premium *(March 2006)*	Luca Benati

292	Switching costs in the market for personal current accounts: some evidence for the United Kingdom *(March 2006)*	Céline Gondat-Larralde Erlend Nier
293	Resolving banking crises — an analysis of policy options *(March 2006)*	Misa Tanaka Glenn Hoggarth
294	How does the down-payment constraint affect the UK housing market? *(March 2006)*	Andrew Benito
295	Productivity growth, adjustment costs and variable factor utilisation: the UK case *(April 2006)*	Charlotta Groth Soledad Nuñez Sylaja Srinivasan
296	Sterling implications of a US current account reversal *(June 2006)*	Morten Spange Pawel Zabczyk
297	Optimal monetary policy in a regime-switching economy: the response to abrupt shifts in exchange rate dynamics *(June 2006)*	Fabrizio Zampolli
298	Optimal monetary policy in Markov-switching models with rational expectations agents *(June 2006)*	Andrew P Blake Fabrizio Zampolli
299	Optimal discretionary policy in rational expectations models with regime switching *(June 2006)*	Richhild Moessner

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 website at www.bankofengland.co.uk/publications/other/externalmpcpapers/index.htm. 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
14	National Accounts revisions and output gap estimates in a model of monetary policy with data uncertainty *(May 2005)*	Lavan Mahadeva Alex Muscatelli
15	Do financial markets react to Bank of England communication? *(December 2005)*	Rachel Reeves Michael Sawicki

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.

Bankstats is published monthly on the internet but paper copies are available on a twice-yearly basis. Publication dates for the paper copies, for the January and July editions, are Wednesday 1 February 2006 and Tuesday 1 August 2006 respectively. The price per annum in the United Kingdom is £40, or £20 per copy. As a result of user feedback, which valued on-line availability over the traditional hard copy, the July edition will be the last to be made available in paper format. *Bankstats* continues to be made available on a monthly basis free of charge from the Bank's website at www.bankofengland.co.uk/statistics/ms/current/index.htm.

Further details are available from: Mark Thompson, Monetary and Financial Statistics Division, Bank of England: telephone 020 7601 4014; fax 020 7601 3208; email mark.thompson@bankofengland.co.uk.

The following articles have been published in recent issues of *Monetary and Financial Statistics*. They can also be found on the Bank of England's website at www.bankofengland.co.uk/statistics/ms/articles.htm.

Title	Author	Month of issue	Page numbers
Seasonal adjustment of UK monetary aggregates: direct versus indirect approach	Mhairi Burnett	February 2006	1–3
Suspense items — allocations within aggregate banks' data	Sue Docker	February 2006	4–5
The treatment of securitisations and loan transfers when seasonally adjusting using X-12-ARIMA	Martin Daines	March 2006	6–7
Update of new effective interest rates data	Rob Spillet Michelle Rowe	March 2006	8–10
A work programme in financial statistics	Nick Davey	April 2006	11–15
Proposed changes to industrial analysis of bank deposits from and lending to UK residents: consultation with users	Duncan Weldon	May 2006	16–17

Financial Stability Report

The *Financial Stability Review* is published twice a year. 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 website at www.bankofengland.co.uk/publications/fsr/index.htm.

Payment Systems Oversight Report

The *Payment Systems Oversight Report* provides an account of how the Bank is discharging its responsibility for oversight of UK payment systems. Published annually, the *Oversight Report* sets out the Bank's assessment of key systems against the benchmark standards for payment system risk management provided by the internationally adopted Core Principles for Systemically Important Payment Systems, as well as current issues and priorities in reducing systemic risk in payment systems. Copies are available on the Bank's website at www.bankofengland.co.uk/publications/psor/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 Information and Enquiries Group, Bank of England, Threadneedle Street, London, EC2R 8AH and on the Bank's website at www.bankofengland.co.uk/publications/practicalissues/index.htm.

Handbooks in central banking

The series of *Handbooks in central banking* provide concise, balanced and accessible overviews of key central banking topics. The *Handbooks* have been developed from study materials, research and training carried out by the Bank's Centre for Central Banking Studies (CCBS). The *Handbooks* are therefore targeted primarily at central bankers, but are likely to be of interest to all those interested in the various technical and analytical aspects of central banking. The series also includes *Lecture* and *Research* publications, which are aimed at the more specialist reader. All the *Handbooks* are available via the Bank's website at www.bankofengland.co.uk/education/ccbs/handbooks/index.htm.

The framework for the Bank of England's operations in the sterling money markets (the 'Red Book')

The 'Red Book' describes the Bank of England's framework for its operations in the sterling money markets, which is designed to implement the interest rate decisions of the Monetary Policy Committee (MPC) while meeting the liquidity needs, and so contributing to the stability of, the banking system as a whole. It also sets out the Bank's specific objectives for the framework, and how it delivers those objectives. The framework was introduced in May 2006.

The Bank of England Quarterly Model

The Bank of England Quarterly Model, published in January 2005, contains details of the new macroeconomic model developed for use in preparing the Monetary Policy Committee's quarterly economic projections, together with a commentary on the motivation for the new model and the economic modelling approaches underlying it. The price of the book is £10.

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.

Summary pages of the *Bulletin* from February 1994, giving a brief description of each of the articles, are available on the Bank's website at www.bankofengland.co.uk/publications/quarterlybulletin/index.htm. Individual articles from May 1994 are also available at the same address.

The *Bulletin* is also available from National Archive Publishing Company: enquiries from customers in Japan and North and South America should be addressed to ProQuest Information and Learning, 300 North Zeeb Road, Ann Arbor, Michigan 48106, United States of America; customers from all other countries should apply to The Quorum, Barnwell Road, Cambridge, CB5 8SW, telephone 01223 215512.

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. It is also available at www.bankofengland.co.uk/publications/quarterlybulletin/contentsandindex.htm.

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. The *Inflation Report* is available at www.bankofengland.co.uk/publications/inflationreport/index.htm.

The *Report* starts with an overview of economic developments; this is followed by five sections:

- analysis of money and asset prices;
- analysis of demand;
- analysis of output and supply;
- analysis of costs and prices; and
- assessment of the medium-term inflation prospects and risks.

Publication dates

Copies of the *Quarterly Bulletin* and *Inflation Report* can be bought separately, or as a combined package for a discounted rate. Current prices are shown overleaf. Publication dates for 2006 are as follows:

Quarterly Bulletin		*Inflation Report*	
Spring	13 March	February	15 February
Summer	19 June	May	10 May
Autumn	25 September	August	9 August
Winter	11 December	November	15 November

Quarterly Bulletin and *Inflation Report* subscription details

Copies of the *Quarterly Bulletin* and *Inflation Report* can be bought separately, or as a **combined** package for a discounted rate. Subscriptions for a full year are also available at a discount. The prices are set out below:

Destination	2006					
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	Annual	Single	Annual	Single	Annual	Single
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