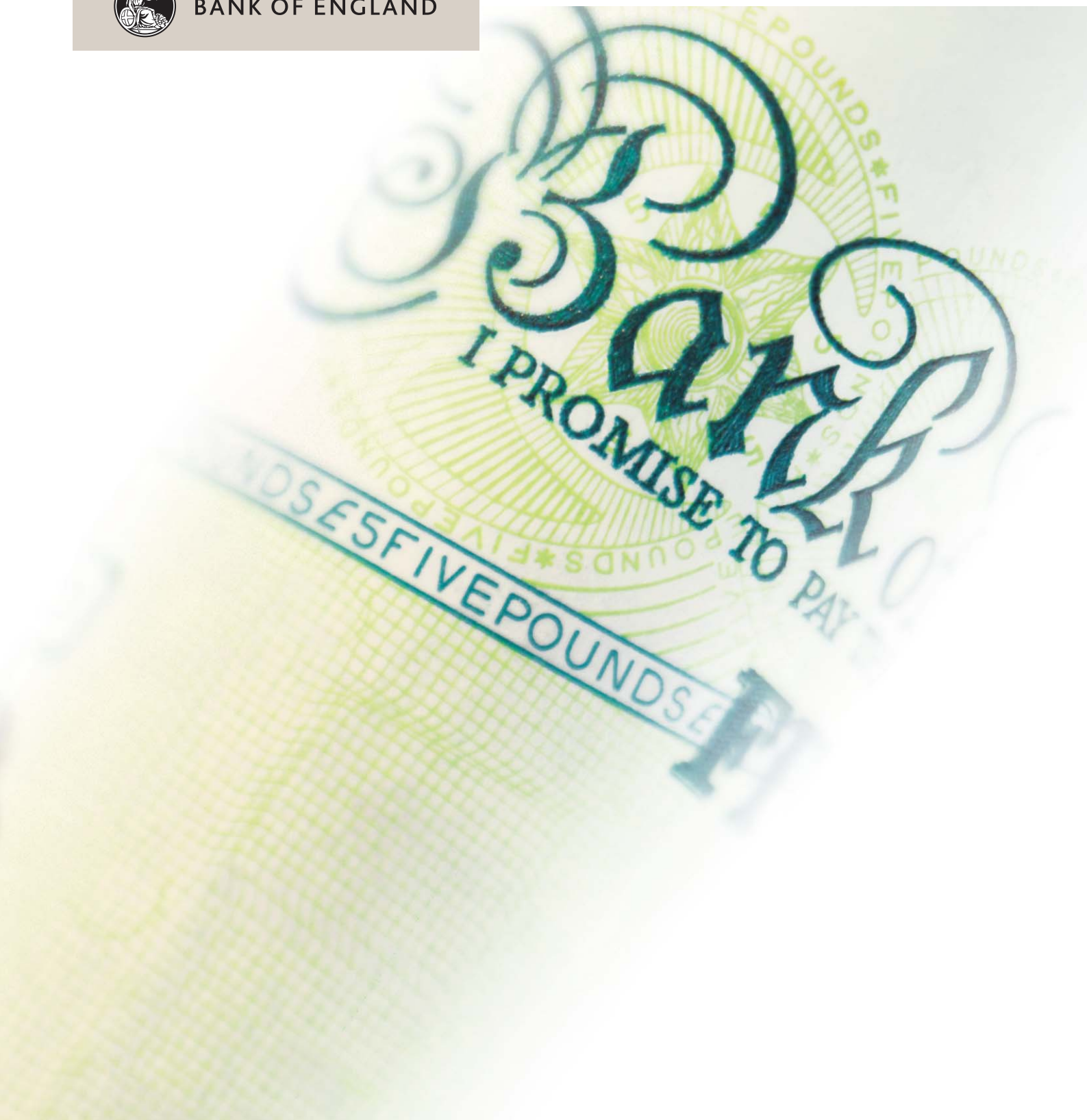
Quarterly Bulletin

2008 Q2 | Volume 48 No. 2

BANK OF ENGLAND



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Foreword

This edition of the *Quarterly Bulletin* begins with the regular *Markets and operations* report, reviewing recent developments in capital markets and the Bank's official operations. Market sentiment improved somewhat following measures by a number of central banks to provide liquidity against a wider range of assets than before. But conditions in money markets remained stressed. Alongside the dislocation in credit markets and constraints on credit supply, energy prices accelerated. Ultimately both factors will act as a drag on household and corporate spending. But in the near term, higher energy costs also add to inflationary pressures. In turn, market participants raised their expectations of future policy rates reflecting the heightened risk to inflation.

The Monetary Policy Committee (MPC) has noted the risk that the present and prospective period of above-target inflation will lead to a lasting increase in medium-term inflation expectations, thus raising the pressures on inflation in the future. The MPC therefore monitors surveys of inflation expectations closely and James Benford and Ronnie Driver discuss the results of recent Bank/GfK NOP surveys of public attitudes to inflation. These indicate that households' perceptions of inflation over the past year, and their expectations for inflation over the next year, have both risen markedly. The article draws on the results of some additional questions in the February 2008 survey to shed light on the drivers of the rise in households' inflation expectations. The rise appears to be partly associated with recent macroeconomic data, which have led forecasters, including the MPC, to revise up their near-term inflation projections. But increases in households' perceptions of current inflation also appear to have played a role, particularly the rises in the prices of energy, petrol and food.

A potential source of information about longer-run inflation expectations is market interest rates. Mike Joyce, Steffen Sorensen and Olaf Weeken describe recent advances in the extraction of such information from market interest rates. Applying those techniques to analyse the recent upward trend in long-term inflation forward rates implied by conventional and index-linked bonds, they find that little of this upward trend can be attributed to higher expected inflation. This accords with market intelligence, which suggests that market participants' expectations of longer-term inflation have not increased much. That contrasts with the pickup seen in the measures of near-term inflation expectations derived from household surveys.

In forming its view of the prospects for inflation, the MPC must judge the degree to which businesses are likely to pass on recent sharp cost increases into consumer prices. Clare Macallan and Miles Parker find that past experience suggests that weakness in demand attenuates the extent to which businesses are able to pass on such cost increases. That supports the assumption in the May *Inflation Report* that profit margins will contract somewhat as the amount of spare capacity increases.

The ability of the United Kingdom to withstand shocks, such as the rise in energy prices, will depend, in part, on whether the period of stability over the past fifteen years was the result of structural changes and a better policy framework, or merely the product of good luck. To foster an understanding of the sources of that macroeconomic stability, the Bank hosted a conference on the topic in September 2007. Garry Young summarises some of the explanations discussed there. Disentangling the causes of changes in macroeconomic performance turns out not to be straightforward and consequently remains controversial. But there is broad agreement that improvements in monetary policy making made some contribution to the greater macroeconomic stability — here and elsewhere — by anchoring inflation expectations. But an important lesson from the conference was that the anchoring of inflation expectations cannot be taken for granted — it depends on the continuing vigilance of central banks.

This edition of the *Quarterly Bulletin* also includes a review of the work of the London Foreign Exchange Joint Standing Committee in 2007. 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.

Charles Bean
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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.

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The contents page, with links to the articles in PDF, is available at
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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). All data, apart from financial markets data, are seasonally adjusted.

Recent economic and financial developments

Markets and operations

This article reviews developments in global financial markets since the 2008 Q1 *Quarterly Bulletin* up to the end of May 2008. The article also reviews the Bank's official operations during this period.

Global financial markets(1)

Overview

Further marked-to-market losses on structured credit and leveraged loan exposures combined with reintermediation of financial flows maintained the pressure on banks' balance sheets over recent months. This prompted banks to reduce further their willingness to extend credit to households and firms as well as other non-bank financial intermediaries.(2)

Tighter financing conditions for some non-bank financial institutions contributed to a further wave of deleveraging. This was particularly pronounced in mid-March when liquidity problems faced by the US investment bank Bear Stearns highlighted the potential vulnerability of financial sector balance sheets and prompted the US Federal Reserve to co-ordinate a rescue of the firm.

Towards the end of the review period, market sentiment generally improved, in part reflecting measures by a number of central banks to provide liquidity against a wider range of assets than previously. Equity markets recovered a little and corporate credit spreads narrowed slightly. Financial sector counterparty credit risk also appeared to subside as banks sought to raise fresh capital.

However, conditions in global money markets remained somewhat stressed. In particular, the cost of unsecured bank funding remained elevated and forward spreads indicated this would persist for some time. Contacts reported continued limited appetite among banks to lend to each other for periods longer than one month. Instead, banks were opting to hold more liquid assets and to conserve balance sheet capacity, partly as a buffer against corporates drawing on committed lending facilities. This was seen as more likely if macroeconomic conditions deteriorated and, in this eventuality, corporate defaults could rise rapidly, putting further strain on credit markets.

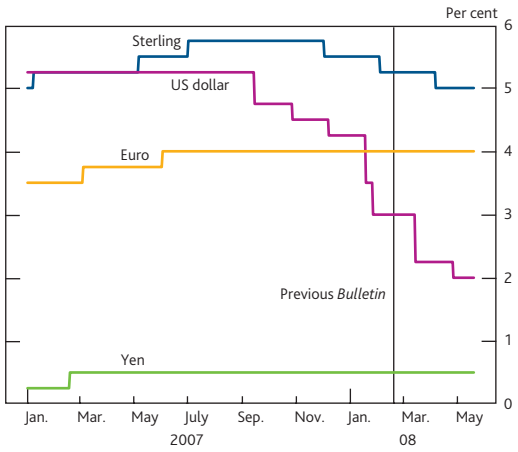
Alongside the dislocation in credit markets and constraints on credit supply, energy prices rose sharply. Ultimately these factors will act as a drag on economic activity. But in the near term, higher energy costs have added to perceived inflationary pressures. In turn, market participants revised upwards their expectations for future policy rates.(3)

Recent developments in international capital markets

Short-term interest rates

Since the previous *Bulletin*, the US Federal Open Market Committee (FOMC) reduced its target rate by 100 basis points to 2% (75 basis points in March and 25 basis points in April) to support economic activity in the United States. The UK Monetary Policy Committee (MPC) reduced Bank Rate by 25 basis points to 5% while the ECB and the Bank of Japan maintained policy rates at 4% and 0.5% respectively (**Chart 1**).

Chart 1 International official policy rates

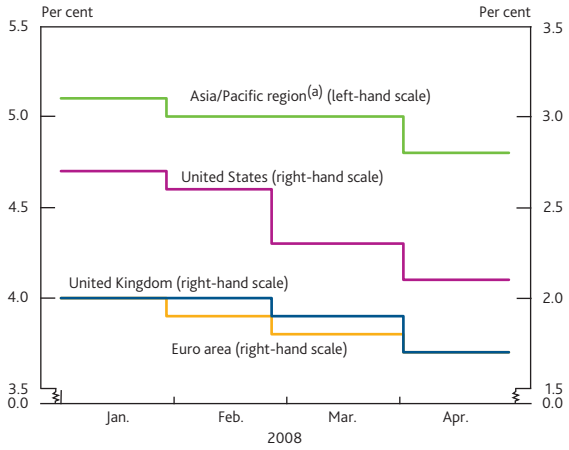


Source: Bloomberg.

These changes occurred against the backdrop of some further expected weakening in economic activity in the major economies, as the ongoing stress in bank credit markets and previous rises in commodity prices acted as a constraint on spending. Consensus forecasts for GDP growth in 2009 for both industrial and emerging economies were revised down further compared with projections made earlier in the year, although the latter remained relatively robust (**Chart 2**).

(1) This article focuses on global capital market developments. The period under review is 22 February (the data cut-off for the previous *Quarterly Bulletin*) to 23 May.
(2) Previously discussed in the April 2008 Bank of England *Financial Stability Report*.
(3) See the Bank of England *Inflation Report*, May 2008.

Chart 2 Expected real GDP growth for 2009

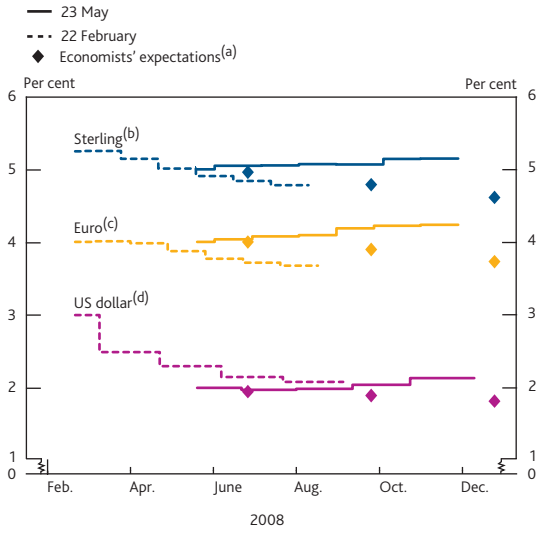


Source: Consensus Economics Inc.

(a) Comprises 16 countries.

Despite the perceived weaker global macroeconomic outlook, market expectations of the future path of official interest rates were revised upwards for sterling and the euro although they were little changed for the dollar (**Chart 3**).

Chart 3 International forward implied policy rates and economists' expectations



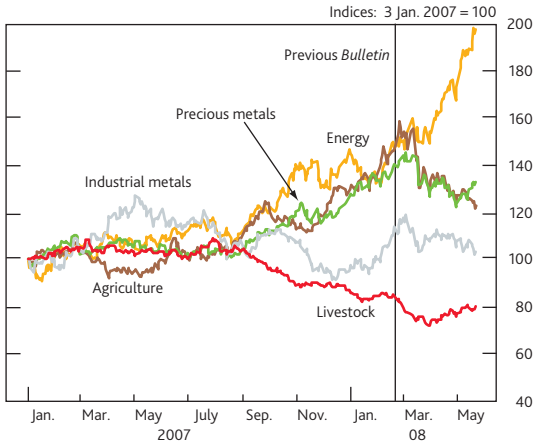
Sources: Reuters and Bank calculations.

(a) Derived from the Reuters poll of economists' expectations taken before 15 May.
(b) Derived from sterling overnight index average (SONIA) swaps.
(c) Derived from euro overnight index average (EONIA) swaps.
(d) Derived from overnight swaps that settle on the Fed funds effective rate.

In part, the shift up in near-term expectations for policy rates reflected concerns about the upside risks to inflation associated mainly with commodity price pressures (**Chart 4**). In particular, the cost of oil and other energy commodities increased significantly (the price of Brent crude reached an all-time high of $135.14 on 22 May), although some commodity prices had fallen somewhat from highs reached earlier in the year.

Market contacts suggested that the recent strength in oil prices was linked to robust global demand and some supply-side capacity constraints. Speculative activity was not widely thought by contacts to have been the primary cause of upward price pressures in energy markets, although it is possible that it played some role in the short run.

Chart 4 Selected commodity total return indices in SDR(a) terms(b)



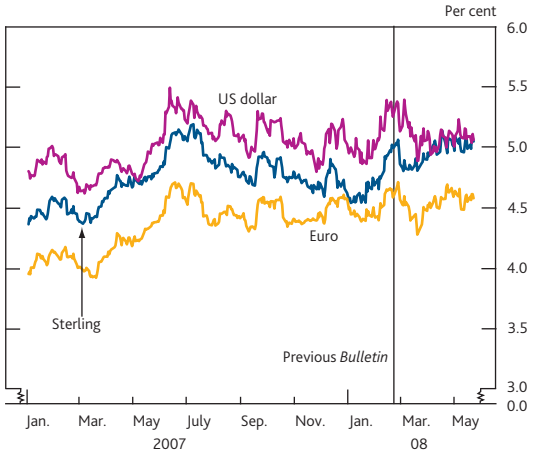
Sources: Bloomberg and Bank calculations.

(a) Special Drawing Rights (SDR). These are based on a basket of currencies consisting of the euro, sterling, the US dollar and yen.
(b) The US dollar value of the SDR is calculated as the sum of specific amounts of the four other currencies in the SDR basket valued in US dollars, based on exchange rates quoted at noon each day in the London market. This exchange rate is used to convert the selected commodity prices.

Long-term interest rates

At longer horizons, sterling and euro nominal forward interest rates changed little, while dollar rates were slightly lower (**Chart 5**). US dollar forward rates were volatile over the period, especially in mid-March, which contacts attributed to a 'flight to liquidity' associated with heightened market nervousness surrounding the near failure of US investment bank Bear Stearns.

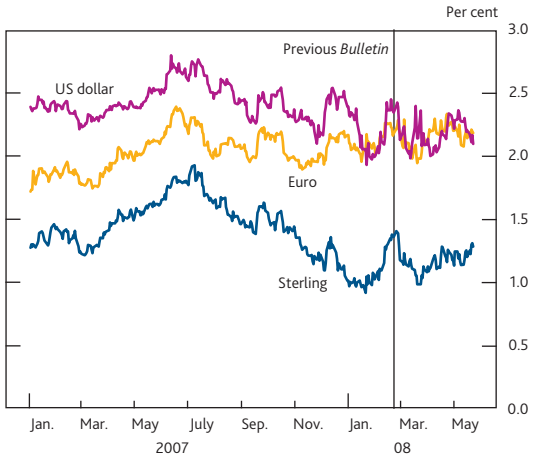
Chart 5 International five-year nominal interest rates five years forward(a)



(a) Derived from the Bank's government liability curves.

International long-term real forward rates fell slightly in sterling and dollar, but were broadly unchanged in euro (**Chart 6**). Consistent with this, given little change in nominal

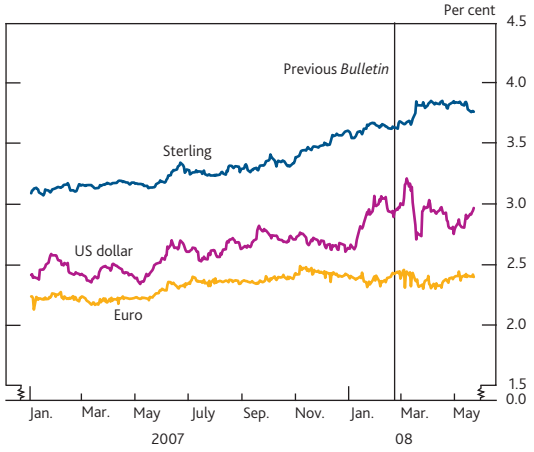
Chart 6 International five-year real interest rates five years forward[a]



(a) Sterling and US dollar rates derived from the Bank's government liability curves. Euro rates derived from inflation swap rates. Sterling rates referenced to RPI, US dollar rates referenced to CPI and euro rates referenced to HICP.

forwards, implied sterling forward inflation rates rose (**Chart 7**). This continued a gradual drift higher in implied sterling inflation forwards since mid-2005.

Chart 7 International implied five-year inflation rates five years forward[a]

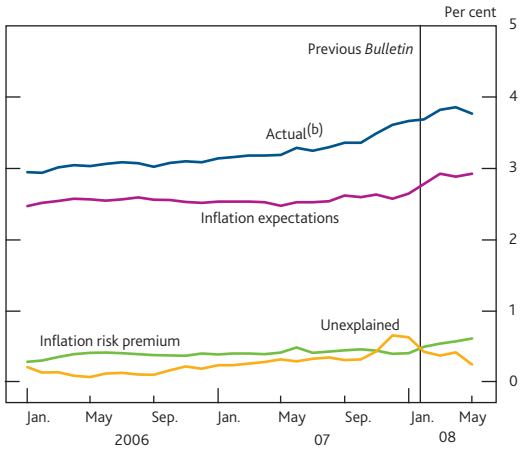


(a) Sterling and US dollar rates derived from the Bank's government liability curves. Euro rates derived from inflation swap rates. Sterling rates referenced to RPI, US dollar rates referenced to CPI and euro rates referenced to HICP.

A model-based decomposition of long-term sterling forward inflation rates indicated that inflation expectations may have picked up a little over recent months. But the level of long-term implied (RPI) inflation expectations remained broadly in line with the MPC's inflation target[1] (**Chart 8**). And nominal forward rates at five to ten years have been stable. Had there been a sharp rise in inflation expectations one might have expected these to rise. The model-implied compensation required by investors for bearing uncertainty about future inflation (the risk premia) also increased, perhaps reflecting greater volatility in recent inflation outturns.

While contacts reported some increase in inflation risk premia, they saw limited evidence of long-run inflation expectations having shifted higher. Contacts instead noted that the activity

Chart 8 Decomposition of sterling five-year inflation rates, five years forward[a]



Source: Bank calculations.

(a) The method for decomposing inflation forward rates is described in the box on pages 14–15 of the 2008 Q1 *Bank of England Quarterly Bulletin*.
(b) Five-year inflation starting five years forward, derived from the Bank's government liability curve.

of hedge funds has had a significant impact on sterling forward inflation rates since the start of 2008, which was manifested in a sharp increase in inflation rates implied by gilts relative to rates implied by inflation swaps (**Chart 9**).

Chart 9 Sterling long-term inflation forward rates

Sources: Citigroup, HM Treasury, YouGov and Bank calculations.

(a) RPI inflation forward rates derived from inflation swap rates.
(b) RPI inflation forward rates derived from the Bank's government liability curve.

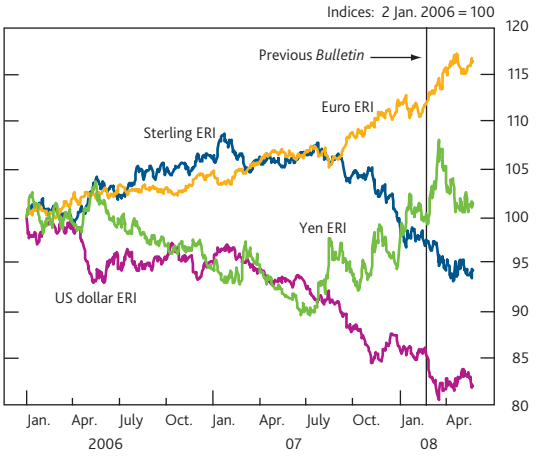
Specifically, some hedge funds had taken positions anticipating falls in sterling breakeven inflation. But the need to raise funds to meet trade losses or margin calls, forced many to unwind these positions. Contacts also continued to cite pension fund demand, combined with limited supply of inflation-linked securities, as having influenced measured sterling inflation forward rates.

(1) See Joyce, M, Sorensen, S and Weeken, O (2008), 'Recent advances in extracting policy-relevant information from market interest rates', on pages 157–66 of this *Bulletin*, and also the box 'A model-based decomposition of sterling government yield curves', on pages 14–15 of the 2008 Q1 *Bulletin*.

Foreign exchange

More generally, uncertainty about the macroeconomic outlook in different countries, and in particular the potential effects of the recent shocks to credit supply and commodity prices, may also have led investors to demand higher risk premia on assets denominated in certain currencies. In particular, other things being equal, higher risk premia could explain the continued depreciation in sterling and US dollar effective exchange rate indices (ERIs), the main counterparts of which were a further appreciation in the value of the euro and the yen (**Chart 10**). This could also reflect investor worries about the impact of the turmoil in financial markets on returns on sterling and US dollar-denominated assets compared with other currencies.

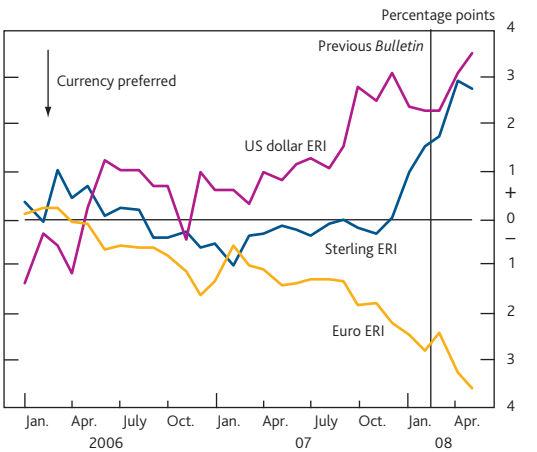
Chart 10 Exchange rate indices since January 2006



Sources: Bank of England and Bloomberg.

Estimates of foreign currency risk premia, based on combining information on interest rate differentials and surveys of forecasts for exchange rates, indicated that dollar and sterling risk premia had risen since Summer 2007 (**Chart 11**).

Chart 11 Three to 24-month risk premia estimates for exchange rate indices(a)



Sources: Bloomberg, Consensus Economics Inc. and Bank calculations.

(a) Risk premia estimate the expected rate of return required by foreign investors to invest in a domestic risk-free asset, over the foreign risk-free rate of return. A positive risk premium implies that the currency is expected to appreciate relative to the path implied by the interest rate differential.

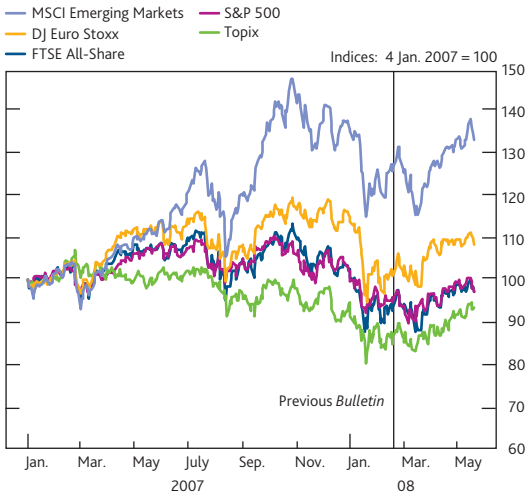
It is also possible that market participants have revised down their estimates of the long-run equilibrium of sterling and dollar exchange rates.

Equities

Despite the increase in sterling and dollar risk premia, the UK and US equity markets rose broadly in line with other international equity markets over recent months (**Chart 12**). Specifically, after falling in mid-March around the time of problems at US investment bank Bear Stearns, international equity prices gradually recovered. The main equity indices ended the period at levels broadly comparable with those at the start of the year, although below their averages in 2007.

However, the aggregate indices mask divergent trends. Specifically, while oil and gas stocks rose strongly over recent months, the equity prices of financial firms remained lower than levels at the turn of the year (**Chart 13**).

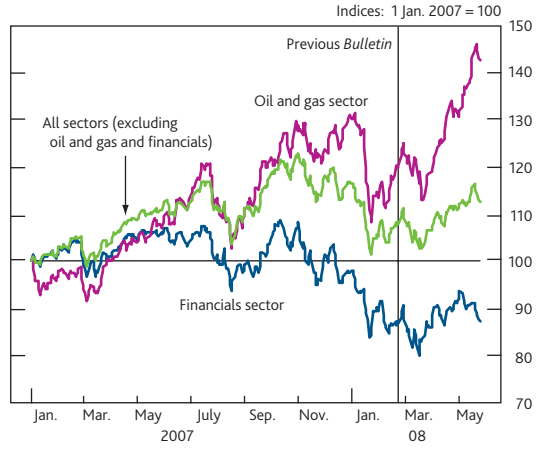
Chart 12 International equity indices (in US dollars)(a)



Sources: Bank of England and Bloomberg.

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

Chart 13 Global sectoral equity prices(a)

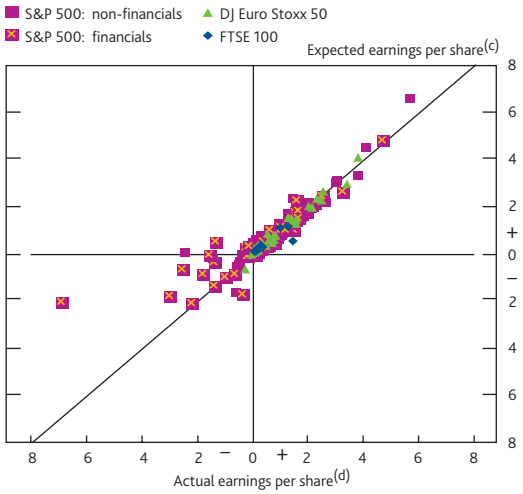


Sources: Thomson Datastream and Bank calculations.

(a) 'All sectors' is the Datastream world equity index excluding its oil and gas and financials indices.

The recovery in equity prices since mid-March was, according to contacts, supported by a lack of widespread and significant earnings surprises. Indeed, for most companies that report on a quarterly frequency, the most recent results were broadly in line with analysts' expectations (**Chart 14**). However, there were some significant negative earnings surprises, the majority of which related to financial institutions.

Chart 14 Expected versus actual net earnings by corporates(a)(b)



Source: Bloomberg.

(a) The data are for the most recent quarterly results from corporates that report on a quarterly cycle only.
(b) Corporates on the 45° line have reported results in line with expectations, above this line indicates results below expectations.
(c) Expected earnings are the mean of Bloomberg surveys of equity analysts' forecasts in local currency.
(d) Actual earnings are earnings per share as reported by the firms in local currency.

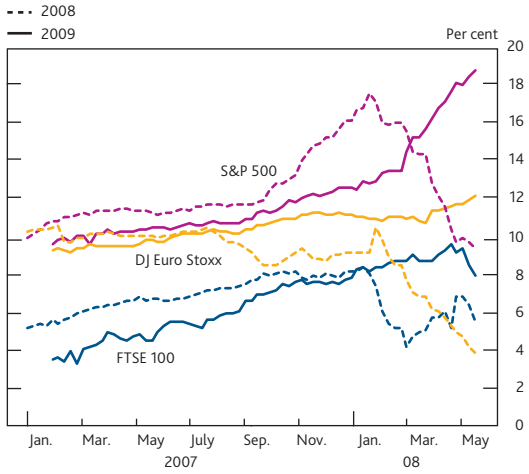
Looking ahead, analysts' expectations for company nominal earnings growth over the next few years remained relatively robust, despite lower real GDP growth forecasts (**Chart 2**). Forecasts for earnings growth in 2008 fell sharply compared with earlier in the year for the S&P and Euro Stoxx, but growth was expected to pick up in 2009 (**Chart 15**).

Corporate credit

The recent pickup in equity prices was accompanied by some improvement in corporate credit conditions. Corporate bond spreads continued to widen over the first half of March, but have since narrowed somewhat (**Chart 16**). Similarly, since mid-March, leveraged loan prices have recovered slightly (**Chart 17**) and spreads on asset-backed securities narrowed further.

According to a model-based decomposition, a significant proportion of the recent narrowing in US dollar-denominated *high-yield* corporate bond spreads was accounted for by non-credit risk factors (the residual in **Chart 18**).(1) This possibly reflected, for example, better liquidity conditions, which had reportedly worsened significantly in the second half of last year. In contrast, non-credit risk factors were a

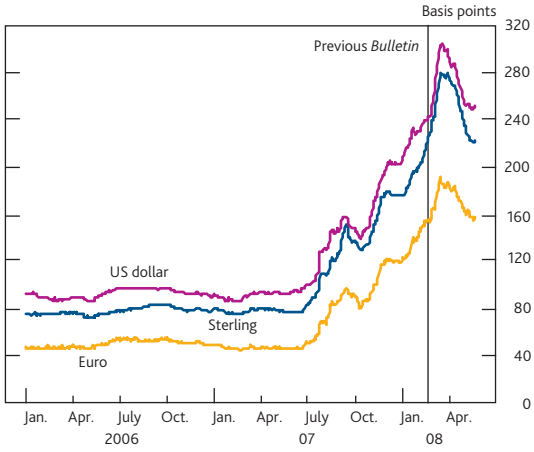
Chart 15 IBES earnings per share growth forecasts for 2008 and 2009(a)(b)



Source: Thomson Datastream.

(a) Institutional Brokers' Estimate System (IBES) uses Consensus forecasts of earnings per share growth by sell-side analysts.
(b) 2008 forecasts capture analysts' forecasts relating to banks' annual results that have a year end between start-June 2008 and end-May 2009, with 2009 forecasts capturing the period between June 2009 and May 2010.

Chart 16 Investment-grade corporate bond spreads(a)



Source: Merrill Lynch.

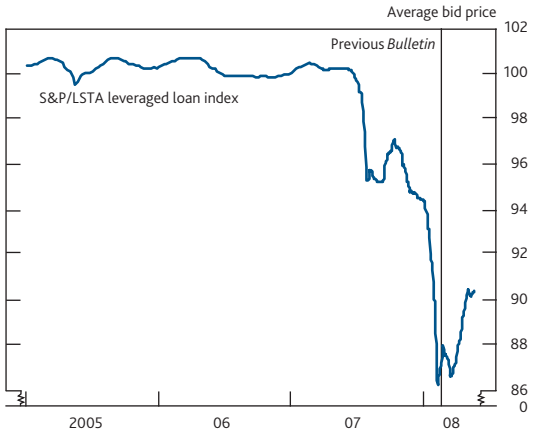
(a) Option-adjusted spreads over government bond yields.

negligible component of the recent narrowing in US dollar-denominated *investment-grade* corporate bond spreads.

Compensation for corporate credit risk (both for expected defaults and recovery rates, as well as uncertainty around them) fell slightly for investment-grade and high-yield firms. To some extent this could have reflected some reassessment of the prospects for widespread corporate defaults — information from indices of credit default swaps suggested that implied default correlation fell sharply over recent months (**Chart 19**).(2)

(1) For details of the model, see Webber, L and Churm, R (2007), 'Decomposing corporate bond spreads', *Bank of England Quarterly Bulletin*, Vol. 47, No. 4, pages 533–41.
(2) For more discussion of credit correlation see Belsham, T, Vause, N and Wells, S (2005), 'Credit correlation: interpretation and risks', Bank of England *Financial Stability Review*, December, pages 103–15.

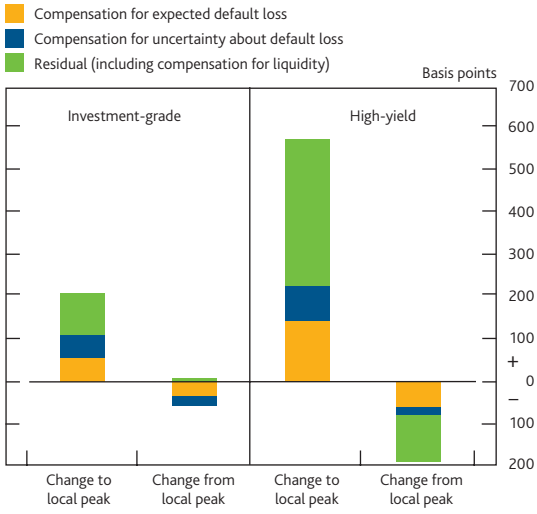
Chart 17 Price of US leveraged loans[a]



Source: Reuters Loan Pricing Corporation.

(a) The S&P/LSTA leveraged loan index consists of market prices for US-denominated senior secured term loans, acquisition loans (post drawdown) and bridge loans with a minimum term of one year at inception, minimum spread of Libor + 125 basis points initially and a minimum facility size of $50 million.

Chart 18 Decomposition of changes in US dollar corporate bond spreads between end-June 2007 and May 2008[a][b]



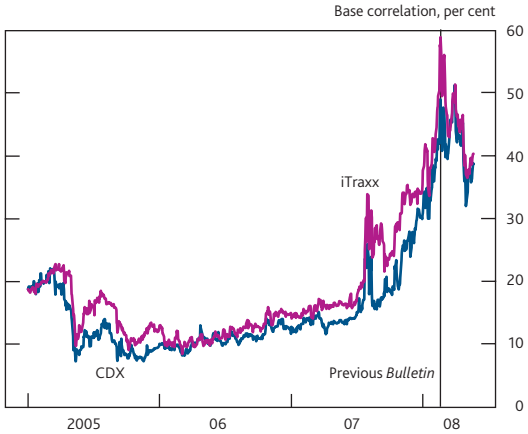
Sources: Bloomberg, Merrill Lynch, Thomson Datastream and Bank calculations.

(a) For details of the method underlying the decomposition, see Webber, L and Churm, R (2007), 'Decomposing corporate bond spreads', *Bank of England Quarterly Bulletin*, Vol. 47, No. 4, pages 533–41.
(b) The local peak for investment-grade spreads was on 20 March 2008 and for high-yield spreads the local peak was on 17 March 2008.

However, according to contacts, the credit correlation market has relatively few participants and the market can be prone to bouts of illiquidity. Indeed, the sharp increase in correlation in 2007/08 reportedly reflected unwinds of structured credit products[1] and heightened concerns about counterparty credit risk. These concerns subsided towards the end of the review period.

Moreover, while actual corporate default rates have remained low over recent years, rating agencies expected an increase in default rates given the uncertain macroeconomic backdrop. Moody's baseline forecast was that speculative-grade default rates may reach around 5% by mid-2009, although this would

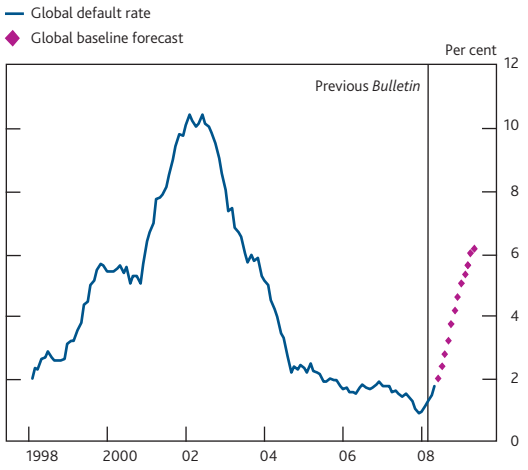
Chart 19 Implied default correlation[a]



Source: JPMorgan Chase & Co.

(a) Default correlation implied from a standard CDO pricing model given observed tranche spreads.

Chart 20 Moody's speculative-grade default rates and forecast



Source: Moody's Investors Service.

be well below the levels during the previous spike in default rates (**Chart 20**).

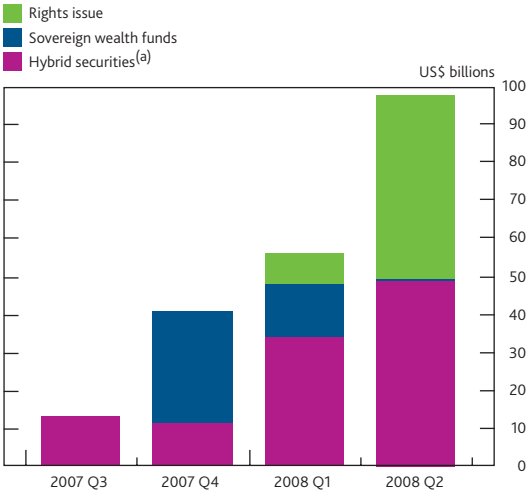
Bank long-term debt and capital markets

Increased appetite for financial sector credit assets by some 'real money' investors (long-term investors such as asset managers, pension funds and insurance companies) was one factor that supported efforts by banks to rebuild their balance sheets and to extend the maturity profile of their debt. This occurred against a backdrop of additional write-downs on banks' structured credit portfolios.

The recent round of capital issuance was the latest stage in recapitalisation efforts by banking sectors globally (**Chart 21**).

(1) For example, contacts highlight unwinds of collateralised synthetic obligations (CSOs), leveraged super-senior (LSS) and constant proportion debt obligations (CPDOs) earlier in the year.

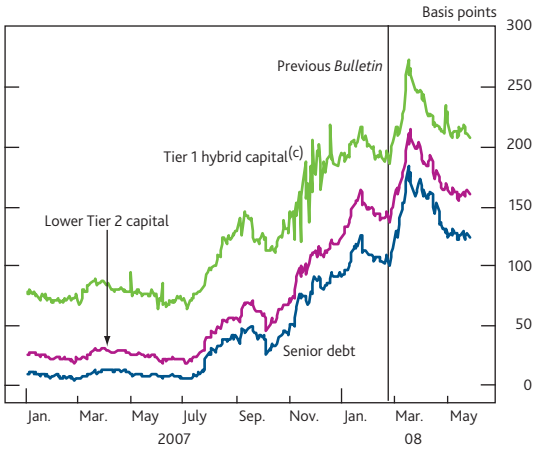
Chart 21 Major banks' Tier 1 capital raising by type since September 2007



Sources: Dealogic, company releases and Bank calculations.

(a) Fixed-rate debt instruments with equity-like features.

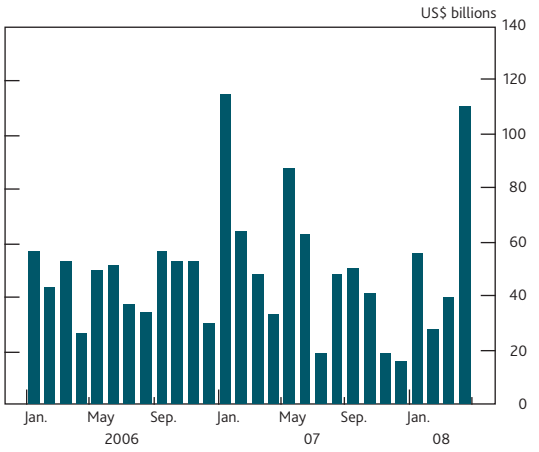
Chart 22 Spreads on banks' debt and other capital instruments(a)(b)



Source: JPMorgan Chase & Co.

(a) US dollar-denominated instruments issued by a range of banks globally at all maturities.
(b) Spreads over interest rate swaps.
(c) Fixed-rate debt instruments with equity-like features.

Chart 23 Senior debt issuance by banks(a)



Source: Dealogic.

(a) Refers to global issuance of securities by banks. Covers transactions of at least $0.5 billion and with an original maturity of more than one year.

In 2007 Q4, international banks raised capital — largely to offset large marked-to-market write-downs on credit assets — primarily through off-market private placements of mandatory convertible securities to sovereign wealth funds.(1) The focus of capital raising shifted in 2008 Q1 to market-based public issuance of so-called hybrid capital securities by most major banks. Hybrid capital securities are essentially debt instruments that contain some features of equity (for example, coupon suspension and principal write-down). And in 2008 Q2, banks — particularly in the United Kingdom — sought to raise new common equity through rights issues.

Commensurate with this — and following the resolution of Bear Stearns together with central bank actions — some of investors' near-term concerns about default are likely to have receded and credit spreads across the entire capital structure of banks narrowed (**Chart 22**). In turn, contacts reported that the lower costs of capital encouraged many banks to issue long-term debt (**Chart 23**).

Global money markets

Despite an apparent improvement in credit and equity markets, which supported banks obtaining longer-term funding, conditions in shorter-term money markets remained strained.

The difficulties were mostly at lending horizons of one month and beyond, as at shorter dates central banks were generally successful at keeping secured and unsecured rates (particularly for overnight rates, eg **Table A**) stable and close to policy rates.

In contrast, while the spreads between term Libors (the most widely used benchmark for interbank rates) and equivalent-maturity overnight index swap (OIS) rates (which reflect expected future overnight rates) have narrowed from recent highs, they remained abnormally high and considerably above pre-August 2007 levels (**Chart 24**).

Going forward, derivatives prices suggested that the Libor-OIS spread should narrow, perhaps indicative of a gradual recovery in conditions. But a narrowing has been priced in to derivatives markets for some time without materialising, suggesting that the shock to money markets may have been more persistent than market participants had previously expected.

(1) Due to differences in company law, corporates in the United States are not required to give shareholders first rights to new equity capital. This allows US firms to issue new equity capital to (typically institutional) investors, rather than undertaking a rights issue. A rights issue is a lengthy process of asking existing shareholders to provide the new funds, which entails significantly greater execution risk for the firm. However, as it is usually underwritten by a major bank or group of banks, the associated due diligence process can be useful to ensure that the balance sheet is valued appropriately.

Table A Spread of overnight unsecured and secured rates to policy rates

Unsecured

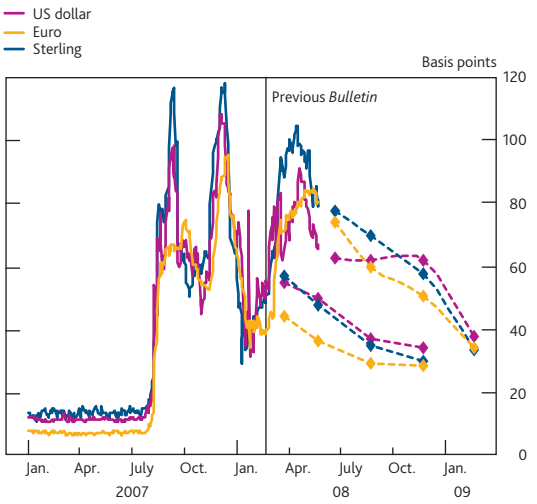
	Sterling	US dollar	Euro
2 January 2007–31 July 2007			
Mean	7.2	0.5	4.7
Standard deviation	13.2	3.1	7.6
Maximum	97.1[a]	16.0	15.0
Minimum	-2.3	-8.0	-32.0
1 August 2007–18 September 2007[b]			
Mean	15.7	-17.8	0.5
Standard deviation	15.5	22.0	22.6
Maximum	74.0	17.0	58.8
Minimum	1.0	-71.0	-46.2
19 September 2007–23 May 2008			
Mean	2.7	-1.7	0.1
Standard deviation	5.4	14.0	11.1
Maximum	28.0	37.0	29.3
Minimum	-17.0	-119.0	-38.2

Secured

	Sterling	US dollar	Euro
2 January 2007–31 July 2007			
Mean	4.8	-8.5	5.2
Standard deviation	15.1	9.0	5.9
Maximum	108.3[a]	3.0	14.0
Minimum	-13.0	-77.5	-35.0
1 August 2007–18 September 2007[b]			
Mean	20.8	-45.7	5.8
Standard deviation	20.4	77.6	14.5
Maximum	91.7	35.0	52.0
Minimum	1.2	-287.5	-26.0
19 September 2007–23 May 2008			
Mean	4.2	-32.3	3.3
Standard deviation	5.2	46.2	6.9
Maximum	20.7	35.0	37.0
Minimum	-14.2	-230.0	-20.0

(a) Sterling overnight market rates were impacted by the 28 June 2007 open market operation which was not fully subscribed. For a further discussion about this period, see *Bank of England Quarterly Bulletin* Vol. 47, No. 3, pages 356–57.
(b) The announcement of a liquidity support facility to Northern Rock on 14 September provided a disturbance to sterling money markets. Following this the Bank offered, on 18 September, additional reserves in an exceptional fine-tuning open market operation.

Chart 24 Three-month Libor rates relative to expected policy rates[a]

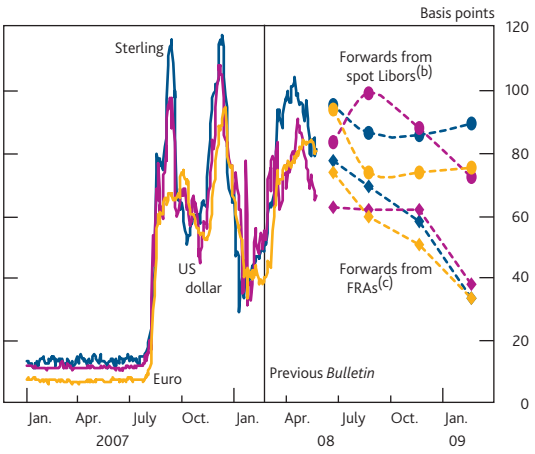


Sources: Bloomberg, British Bankers' Association and Bank calculations.

(a) Spread of three-month Libor to three month overnight index swap rates. Dashed lines show implied forward spreads derived from forward-rate agreements as at 22 February and 23 May.

Alternative measures of forward Libor-OIS spreads pointed to a slightly different outlook. In particular, an unusually large wedge emerged between forward spreads implied by traded derivatives (forward rate agreements) settling on Libor and those calculated by backing out forward rates ('bootstrapping') from spot Libor rates of different maturities (**Chart 25**).

Chart 25 Three-month Libor rates relative to expected policy rates[a]



Sources: Bloomberg, British Bankers' Association and Bank calculations.

(a) Spread of three-month Libor to three-month overnight index swap rates. Forward spreads derived using data as at 23 May.
(b) The circles are implied forward spreads using forward Libors derived from spot Libor rates.
(c) The diamonds are implied forward spreads using forward Libors derived from forward rate agreements (FRAs).

The wedge suggested that banks wishing to borrow for longer maturities were not benefiting from the expected fall in Libor fixings (as shown in **Chart 24**). While implied forward spreads from spot Libors suggested an even slower recovery in unsecured money markets than those from forward rate agreements, almost all contacts thought the quicker improvement implied by the latter was more likely.

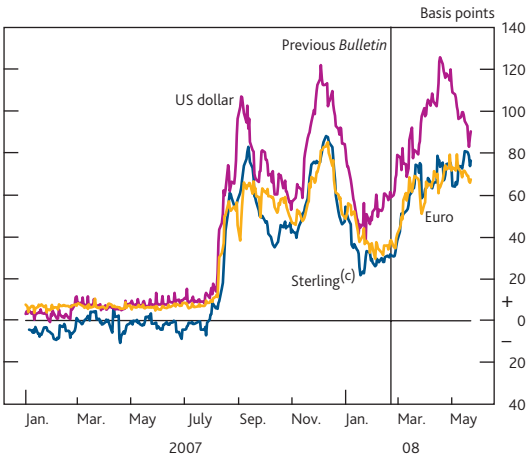
In principle, this wedge presented profitable opportunities for banks able to borrow at Libor. For example, at the end of the review period, a bank could have borrowed three-month sterling funds and, at the same time, entered into a derivative contract to lock in a borrowing rate for Libor in three months' time. It could have lent the proceeds at six-month Libor for a profit of around 17 basis points. The persistence of the wedge between forward rates from derivatives and those inferred from longer-maturity Libor rates suggested that a return of as much as 60 basis points was not sufficient to compensate a bank for using its balance sheet in such a manner and was indicative of ongoing balance sheet constraints.

Difficulties in raising unsecured term funding have also been apparent in other measures of interbank funding (Libor is calculated as a truncated average of quotes submitted by a

(1) See the box, 'An indicative decomposition of Libor spreads', pages 498–99 of the 2007 Q4 *Quarterly Bulletin*.

panel of highly rated banks).[1] For example, the cost of obtaining funding via foreign exchange swaps has risen relative to expected policy rates (**Chart 26**). This rise has been particularly pronounced in US dollar which, according to market contacts, reflects some European banks' ongoing needs to fund US dollar-denominated assets and committed credit lines.

Chart 26 Three-month Libor rates (implied by foreign exchange forward rates)[a] relative to expected policy rates[b]



Sources: Bloomberg, British Bankers' Association, Reuters and Bank calculations.

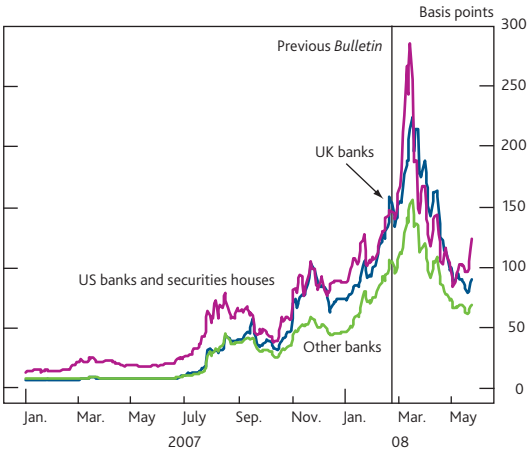
(a) Under covered interest parity (CIP), interest rate differentials between currencies should be perfectly reflected in foreign exchange spot and forward rates, formally: $(1 + r_d) = F/S\ (1 + r_f)$ where
r_d = domestic country interest rate
F = foreign exchange forward rate
S = foreign exchange spot rate
r_f = foreign country interest rate
Assuming CIP holds, then the foreign exchange forward-implied domestic cash rate should equal the prevailing domestic cash (Libor) rate. As long as the base currency is funded in unsecured markets, the foreign exchange forward-implied rate should include a comparable risk premium to the domestic cash (Libor) rates. The implied Libor rates are calculated using domestic currencies of Libor panel banks (sterling, US dollar, euro, Canadian dollar, Swiss franc and Japanese yen). Using unsecured rates such as Libor, in combination with foreign exchange forward rates, is broadly consistent with market practice.
(b) Spread of three-month Libor (implied by foreign exchange forward rates) to three-month overnight interest swap rates.
(c) Uses a five-day moving average to account for the additional volatility associated with obtaining the majority of sterling foreign exchange forward rates via US dollar markets.

To help ease pressures on the banking system, central banks introduced additional measures.[1] These measures have typically involved supplying cash or other liquid assets for longer periods and against a wider range of assets. For example, the Bank of England launched a Special Liquidity Scheme (SLS) in April. This is discussed in the box on page 142.

Some, but not all, of the supplementary financing measures were implemented as part of a co-ordinated package of central bank measures (announced on both 12 December 2007 and 11 March 2008). Partly reflecting this, interbank spreads were highly correlated across currencies.

One explanation for the continued elevation of international Libor-OIS spreads could be counterparty credit concerns. But the premia on banks' credit default swaps (CDS) fell markedly through April, which suggests that credit concerns have receded (**Chart 27**). Consistent with this, an indicative decomposition of Libor-OIS spreads into credit and non-credit factors, suggests that the proportion of the spread attributed to non-credit factors has risen since March (**Chart 28**).

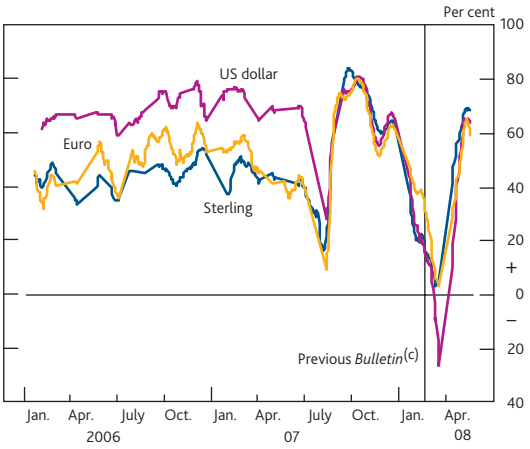
Chart 27 Major international banks' credit default swap premia[a]



Source: Markit Group Limited.

(a) Unweighted averages of five-year premia.

Chart 28 Decomposition of the sterling twelve-month Libor-OIS spread: non-credit premia as a proportion of the spread[a][b]



Sources: Bloomberg, British Bankers' Association, Markit Group Limited and Bank calculations.

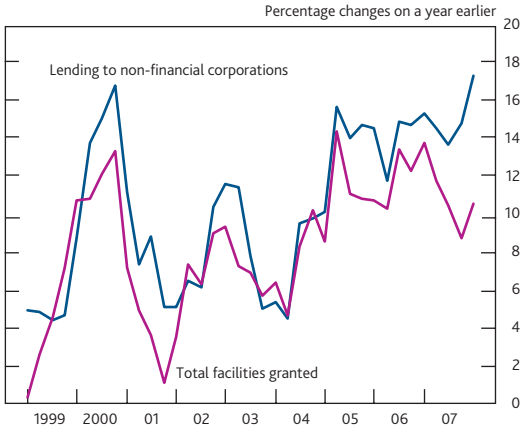
(a) Fifteen-day moving average.
(b) The method for decomposing Libor-OIS spreads is described in detail on pages 498–99 of the 2007 Q4 *Bank of England Quarterly Bulletin*.
(c) The decomposition implies that US dollar non-credit premia was negative in March. That may be because credit premia, inferred using prices of credit default swaps (CDS), may have been overestimated, in part due to illiquidity in CDS markets. Particular caution should be exercised when interpreting decomposition results for this period.

An alternative explanation, frequently cited by market contacts, is that banks are reluctant to lend to each other because they wish to conserve balance sheet capacity. One reason for this reluctance could be that a number of banks have publicly committed themselves to building up capital buffers, and reducing interbank exposures is one way of achieving this. Indeed, some banks have not only been trying to replenish capital eroded by marked-to-market losses, but have also publicly targeted higher capital ratios relative to assets.

(1) See Box 6, pages 58–60 of the *Financial Stability Report*, April 2008. Since publication of the *FSR*, the Federal Reserve has increased the size of its Term Auction Facility from $50 billion to $75 billion, and the ECB has increased the size of its dollar swap facility from $15 billion to $25 billion.

Contacts reported that banks were also preserving liquidity where they could, owing to the ongoing risk of forced balance sheet expansion. That may result from further reintermediation of activities previously moved off balance sheet, and/or corporates drawing on committed credit facilities, which may be more likely if macroeconomic conditions deteriorate materially. Indeed, capacity utilisation of these facilities has already increased (**Chart 29**). Looking ahead, the results from the Bank of England's most recent quarterly *Credit Conditions Survey* suggested lenders expected to reduce corporate credit lines in the three months to June.

Chart 29 UK banks' lending and facilities granted to UK corporates[a]



(a) Non seasonally adjusted.

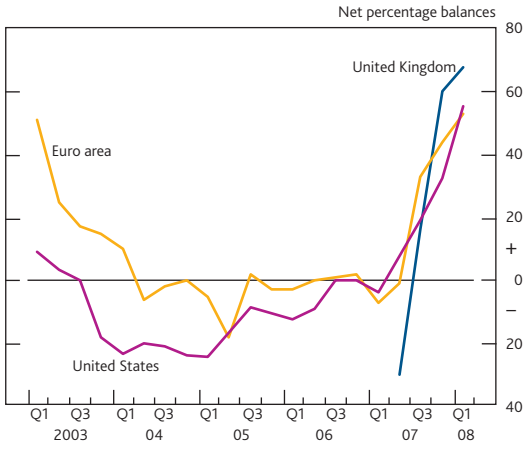
In a bid to reposition their credit portfolios, banks have also tightened credit conditions to borrowers (**Chart 30**). In part this reflected perceptions of increased risk attached to such loans. But it may also have indicated a reduced willingness to lend given ongoing constraints on their balance sheets. Some banks have also reportedly withdrawn certain products in a bid to constrain loan demand. For example, in the United Kingdom most banks have reduced the range of mortgages they offer.

Another explanation for ongoing strains in term money markets could be a change in behaviour of non-bank investors, in particular money market funds, which provide some of the wholesale funding to banks.

Money market fund investors can withdraw their investment at short notice. Given this redemption risk, money funds may have become more risk-averse, prompting them to reduce, and/or shorten the maturity, of lending to banks. In turn, this may have accounted for some of the increased difficulties faced by banks in raising term funding.

Through the period of stressed conditions, money market funds' assets have generally grown given they were seen as a low-risk, liquid haven. The total assets of US domestic money market funds, which are the largest such funds in gross terms,

Chart 30 Survey evidence on cost of bank credit for corporates[a][b]

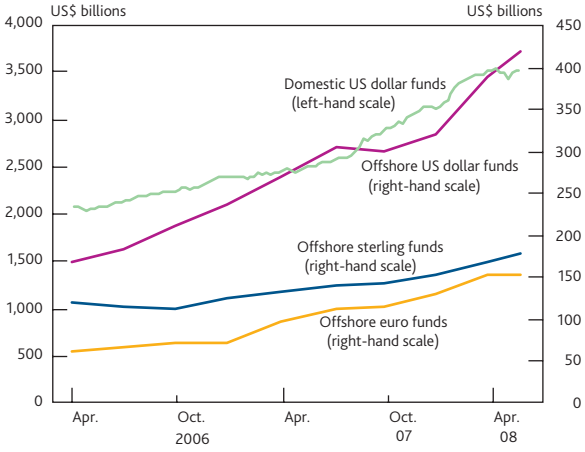


Sources: Bank of England *Credit Conditions Survey*, *ECB Bank Lending Survey* and *Federal Reserve Senior Loan Officer Opinion Survey on Bank Lending Practices*.

(a) Net percentage balances are calculated by weighting together the responses of those lenders who answered the survey questions on the change in the cost of credit. Data points refer to changes in conditions since the previous survey.
(b) The questions in the ECB and Federal Reserve surveys ask how credit standards on lending to large and large and medium corporates has changed, with a positive balance indicating a tightening. The Bank of England question asks how spreads on loans to large PNFCs have changed, and is reported on an inverse scale so a positive balance indicates a widening in spreads.

grew by 37% between July 2007 and May 2008. Over a similar period, offshore sterling, US dollar and euro funds increased, respectively, by 28%, 37% and 36% (**Chart 31**).

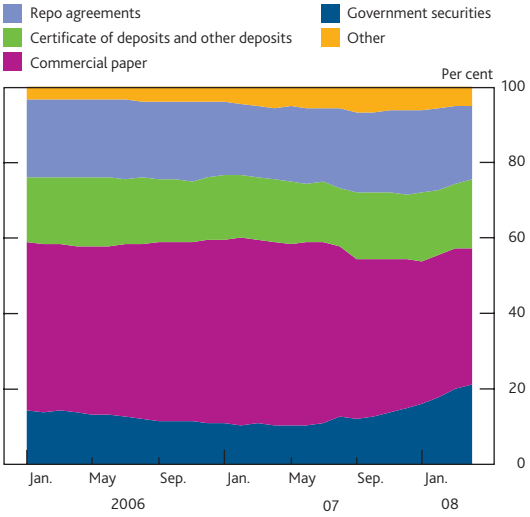
Chart 31 Money market funds' total assets



Sources: Bloomberg and iMoneyNet.

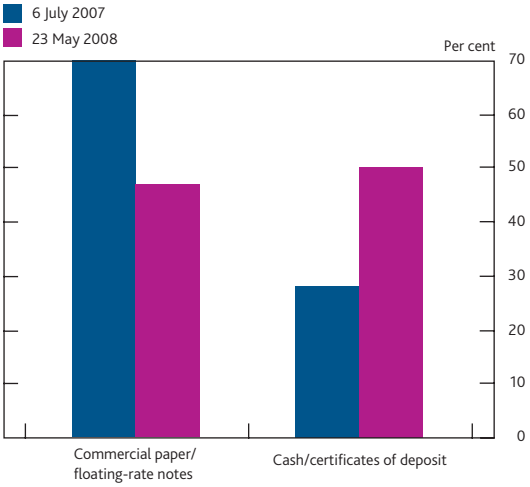
It is possible that some of the net inflows to money funds came from investors divesting from bank deposits. At the same time, money funds themselves have shifted towards non-bank lending. The holdings of government security by domestic US dollar funds — whose assets under management are around ten times higher than US dollar offshore funds — have increased from 10% to 21% over the past year (**Chart 32**). Such a shift has been less evident in offshore money funds, with contacts noting that similar amounts of lending was being provided to banks, albeit increasingly via

Chart 32 Composition of US domestic money market funds' assets



Source: Haver Analytics.

Chart 33 Changes in average portfolio composition of assets held by sterling money market funds



Source: iMoneyNet.

certificates of deposit and term deposits rather than commercial paper and floating-rate notes (**Chart 33**).

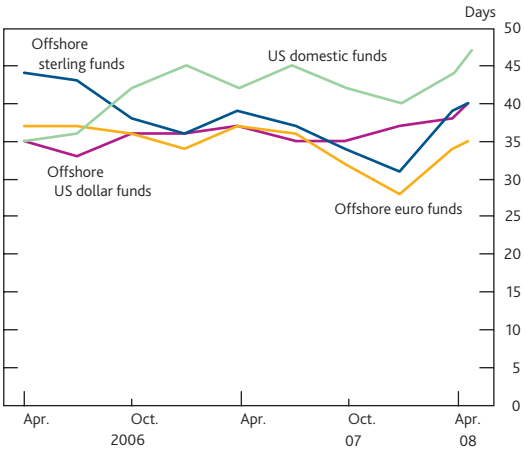
There is also less evidence that money funds have shortened the maturity of their assets. The weighted average maturities of offshore money funds' assets have generally recovered from the lows around the 2007 year end (**Chart 34**). Indeed, some funds have indicated a willingness to take longer-dated paper, but detected some reluctance among certain banks to issue such securities given the relative higher cost compared to short-dated paper, particularly when compared with prior to August 2007.

Developments in market structure

Municipal bond credit default swaps index

An index based on a basket of credit default swaps (CDS) for US municipalities began trading on 6 May. This index — known as the Municipal Bond CDX index (MCDX) — is the first standardised tradable credit index for which municipal CDS are the underlying referenced assets. The structure of the MCDX is similar to the CDX index for credit default swaps on investment-grade corporates.

Chart 34 Money market funds: weighted average maturities of assets



Source: iMoneyNet.

The MCDX will allow existing investors in municipal bonds to hedge better their portfolios. In particular it will allow long and short credit positions to be readily transacted. Moreover, the index may attract new investors to the US municipal securities market by providing a simple product that provides exposure to a diversified portfolio.

Foreign exchange settlement risk

In May 2008 the BIS Committee on Payment and Settlement Systems (CPSS) published a report analysing the progress made in reducing the systemic risk arising from the settlement of foreign exchange trades over the past ten years. The report concludes that while significant progress has been made, some potential FX settlement risk still remains and therefore further action is needed. The CPSS recommends a number of specific actions including for providers of payment versus payment settlement services to extend their currencies and counterparties. The recent announcement by CLS Bank that the Israeli shekel and Mexican peso will become eligible settlement currencies, with effect of 26 May, and that the Bank of China (Hong Kong) will become their 59th settlement member could be considered as a positive step forward.

Bank of England official operations

The Bank's balance sheet is managed in accordance with its policy purposes. These relate to the implementation of monetary policy; management of the Bank's foreign exchange reserves; provision of payment services for the UK financial system and the wider economy; provision of banking services to other central banks; and management of the Bank's free capital and Cash Ratio Deposits from financial institutions.

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

£ billions

Liabilities	7 May	6 Feb.	Assets	7 May	6 Feb.
Banknote issue	42	41	Short-term sterling reverse repo	20	6
Reserves account balances	31	23	Long-term sterling reverse repo	37	32
Standing facility deposits	0	0	Ways and Means advance	0	7
Other sterling deposits, cash ratio deposits and the Bank of England's capital and reserves	13	14	Standing facility assets	0	0
Foreign currency denominated liabilities	15	18	Other sterling-denominated assets	27	30
			Foreign currency denominated assets	17	21
Total[c]	**101**	**96**	**Total**[c]	**101**	**96**

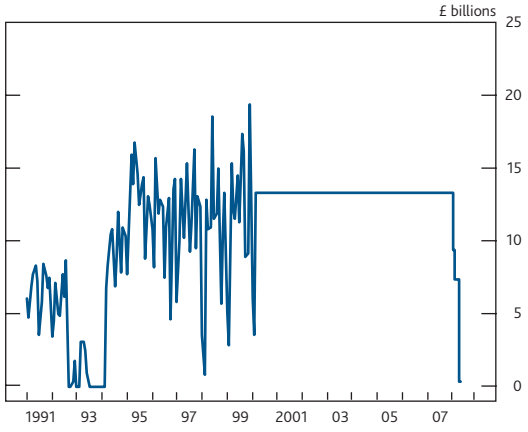
(a) The Bank Charter Act 1844 requires the Bank of England to separate the note issue function from its other activities. Accordingly, the Bank has two balance sheets: for Issue Department and Banking Department. See 'Components of the Bank of England's balance sheet' (2003), *Bank of England Quarterly 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 2006 *Annual Report*, pages 36–37.
(c) Figures may not sum to totals due to rounding.

Balance sheet

For the period under review the size of the Bank's liabilities increased, mainly on account of the increase in aggregate reserves balances (**Table B**).

Balance sheet developments over the review period largely reflected changes in composition rather than of aggregate size. This included a reduction in the Ways and Means balance. The latter flow reflected a further repayment by HM Treasury of the Ways and Means facility, the UK central government's overdraft facility at the Bank. On 17 April 2008, HM Treasury repaid £7 billion of this facility. This followed repayments totalling £6 billion in January 2008, which were described on page 20 of the 2008 Q1 *Bulletin* (**Chart 36**). These repayments provide the Bank with additional flexibility in managing its balance sheet. The immediate impact of the repayment was to increase the stock of short-term repo OMOs on the Bank's balance sheet. In the longer term, the Bank will replace the claim on the government with holdings of bonds that may be routinely utilised to adjust the net supply of reserves to the banking system, for example by repoing them for cash.

Chart 36 Ways and Means facility: outstanding balance



Sources: BrokerTec and Bank calculations.

Sterling monetary framework

This section reviews three full maintenance periods between 7 February and 7 May.

Reserves targets

The Bank's operations in the sterling money markets aim to keep overnight market interest rates in line with Bank Rate. They do so by ensuring a net supply of reserves sufficient for the banking system, in aggregate, to meet chosen targets for average reserves balances held at the Bank of England over a maintenance period running from one MPC decision date until the next.

Each month, ahead of the start of a reserves maintenance period, reserves banks in the United Kingdom have the opportunity to set new reserves targets, and the Bank undertakes to supply the reserves that banks in aggregate need to meet those targets. Thus the monthly resetting of reserves targets provides an opportunity for banks individually, and the banking system as a whole, to obtain extra liquidity from the Bank in the light, *inter alia*, of their evaluation of the likelihood of payment shocks.

In the first maintenance period under review, reserves banks in aggregate chose targets of £21.1 billion. In the March–April maintenance period, this fell slightly to £20.0 billion before increasing in the subsequent maintenance period to £23.5 billion.

Reserves target ceilings

When it introduced the current framework for sterling monetary operations in 2006, the Bank placed ceilings on the reserves targets individual institutions could choose, in order to ensure that reserves targets could be broadly distributed between reserves banks.[1] These ceilings have been the higher

(1) See *The Framework for the Bank of England's Operations in the Sterling Money Markets* (the 'Red Book') available at www.bankofengland.co.uk/markets/money/publications/redbookjan08.pdf.

of £1 billion and 2% of the relevant bank's sterling eligible liabilities as calculated for the calculation of cash ratio deposits.(1)

In view of the increase in the reserves targets set by reserves scheme members and the possibility of future increases, the Bank, with effect from the maintenance period starting on 8 May, increased the reserves target ceiling for each reserves scheme member to the higher of £2.5 billion and 5% of its sterling eligible liabilities. Aggregate reserves targets rose from £23.5 billion to £24.7 billion in the May maintenance period. Since August 2007, aggregate reserves targets have risen by 49% (**Chart 37** and **Chart 38**).

Chart 37 Aggregate reserves targets

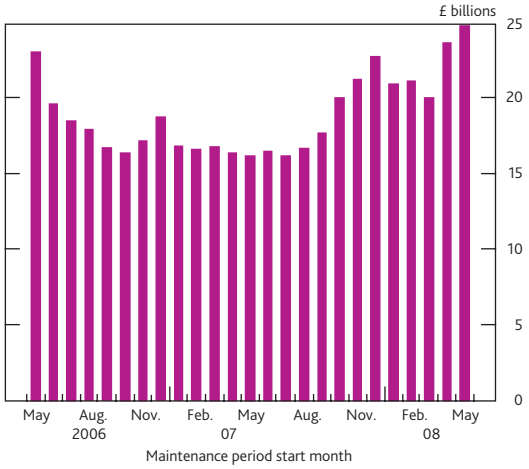
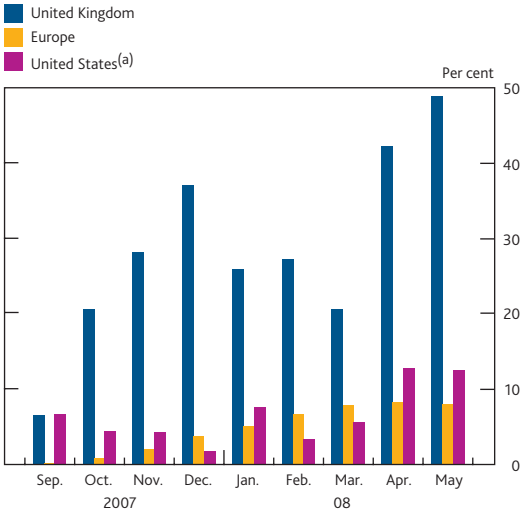


Chart 38 Cumulative increase in aggregate reserves targets since August 2007



Sources: Bank of England, Board of Governors of the Federal Reserve System and European Central Bank.

(a) Required reserves less vault cash used to satisfy reserves plus required clearing balances.

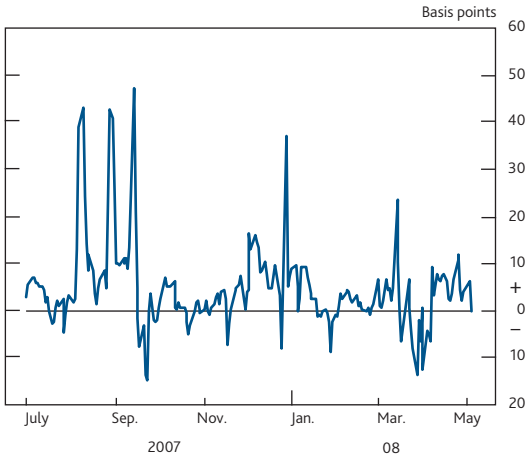
Reserves target ranges

Reserves balances are remunerated at Bank Rate within a range around each bank's individual reserves target. As explained in previous *Bulletins*, remunerating reserves within a range about point targets helps to stabilise market interest rates.(2) Between the introduction of the Bank's reformed framework for its money market operations, in May 2006, and September 2007, this range was set at ±1%. Since then, ranges have been widened and throughout the current review period, the Bank maintained the range at ±30%. This was done in response to feedback from counterparties that a wider range provided useful additional flexibility in market conditions that have continued to be quite difficult compared with before the turmoil.

Short-dated interest rates

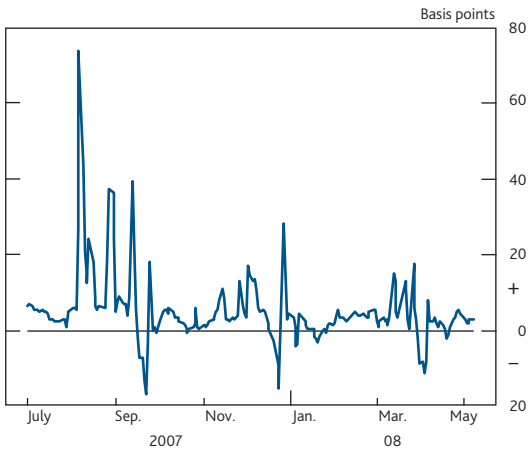
During the February–March maintenance period, market interest rates were generally stable and close to Bank Rate (**Chart 39** and **Chart 40**).

Chart 39 Spread to Bank Rate of secured sterling overnight interest rate



Sources: BrokerTec and Bank calculations.

Chart 40 Spread to Bank Rate of unsecured sterling overnight interest rate



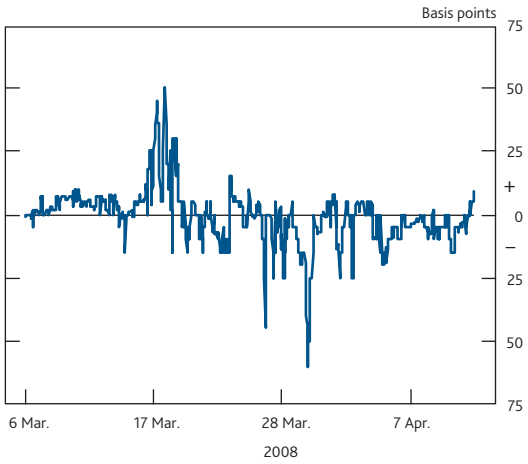
Sources: Wholesale Market Brokers' Association and Bank calculations.

(1) See *The Framework for the Bank of England's Operations in the Sterling Money Markets* (the 'Red Book') available at www.bankofengland.co.uk/markets/money/publications/redbookjan08.pdf.
(2) See Mac Gorain, S (2005), 'Stabilising short-term interest rates', *Bank of England Quarterly Bulletin*, Winter, pages 462–70.

During March there was a period of renewed pressure in international money markets, particularly in the period surrounding the announcement of the acquisition of Bear Stearns. In sterling, short-dated market interest rates were unusually high relative to Bank Rate and the Bank undertook, on 17 March, an exceptional fine-tuning OMO. The Bank offered, in a three-day repo, additional reserves of £5 billion, equivalent to 25% of the aggregate reserves target. The fine-tuning OMO was oversubscribed, so the additional reserves offered were all supplied.

Following the extraordinary fine-tuning OMO, secured sterling overnight rates fell back (**Chart 41**). But conditions remained strained and the Bank decided that the additional reserves supplied in the exceptional fine-tuning OMO should be re-offered in the scheduled OMO on 20 March and in the weekly OMOs for the remainder of the March–April maintenance period. These additional reserves were all supplied. The ±30% ranges around reserves targets left sufficient flexibility for the additional reserves to be remunerated, as illustrated in **Chart 42**.

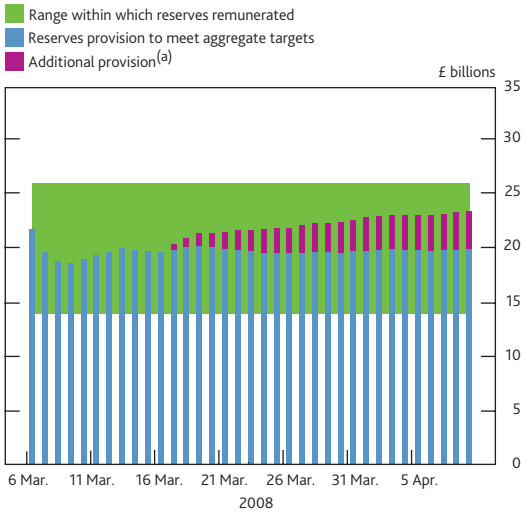
Chart 41 Spread to Bank Rate of intraday secured sterling overnight interest rate



Sources: BrokerTec and Bank calculations.

Since the Bank provided additional reserves during the maintenance period, there were consequently more reserves in the system than reserves banks had chosen to meet their individual targets. That appears to have exerted some downward pressure on market interest rates, which tended to be a little below Bank Rate for the remainder of the maintenance period. The remuneration of these additional reserves at Bank Rate might have been expected to act against this downward pressure. Individual reserves banks could have borrowed reserves in the market at below Bank Rate and placed the funds on their reserves account, which would likely draw market rates back towards Bank Rate. However, in view of the wide ranges within which reserves balances would be remunerated and the relatively small spread by which rates, on average, deviated from Bank Rate, there may have been insufficient incentives for reserves banks in aggregate to undertake such a trade in sufficient quantity.

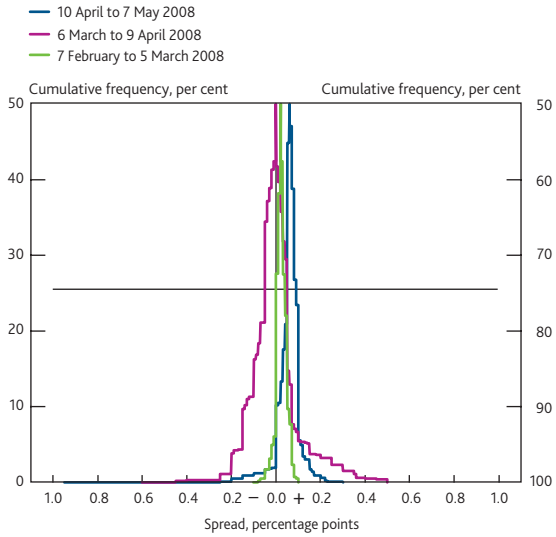
Chart 42 Cumulative average reserves provision in March–April maintenance period



(a) Additional 25% of aggregate reserves targets provided on 17 March and resupplied for the remainder of the maintenance period.

In April, market interest rates stabilised close to Bank Rate (**Chart 39** and **Chart 40**). Reflecting this, the distribution of the spread of secured market interest rates to Bank Rate in the April–May maintenance period was narrower than that in the March–April period (**Chart 43**).

Chart 43 Folded cumulative distribution(a) of spread of sterling secured overnight interest rate (trade weighted) to Bank Rate

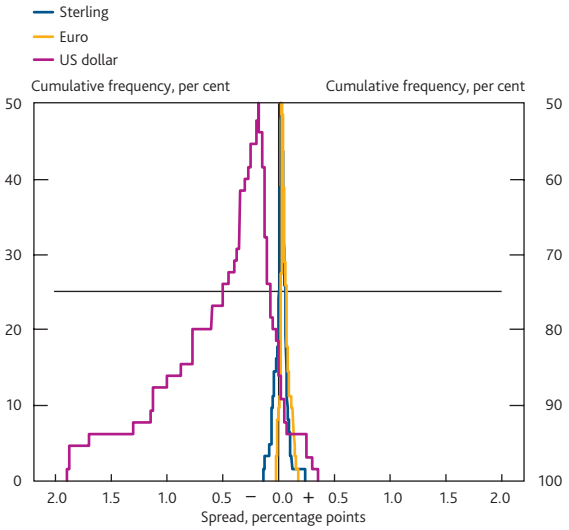


Sources: BrokerTec and Bank calculations.

(a) Distribution of the spread between overnight interest rate at end-of-day and the official interest rate. The distributions are folded at the median so that cumulative probabilities for values above (below) the median are indicated by the right-hand (left-hand) scale.

For the February, March and April maintenance periods combined, sterling secured and unsecured overnight market interest rates tended to be as close to policy rates as

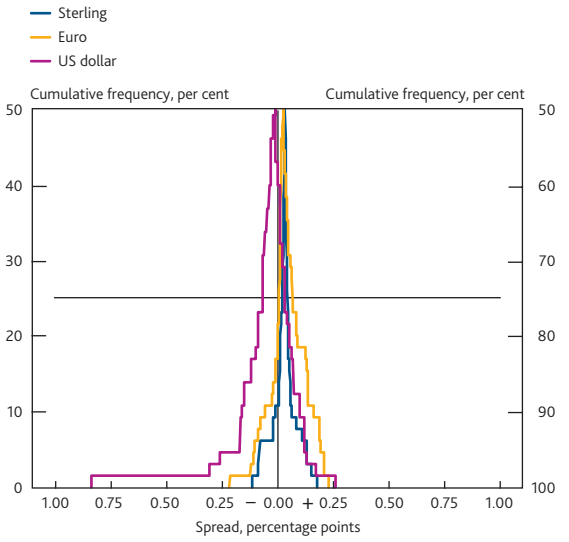
Chart 44 Folded cumulative distribution[a] of spread of international secured overnight interest rates to official interest rates[b]



Sources: ICAP and Bank calculations.

(a) Distribution of the spread between overnight interest rate at end-of-day and the official interest rate. The distributions are folded at the median so that cumulative probabilities for values above (below) the median are indicated by the right-hand (left-hand) scale.
(b) Chart shows the distribution for period 7 February–7 May 2008. Differences in the median level of the spread of secured rates to official rates are due to differences in the way official operations are conducted.

Chart 45 Folded cumulative distribution[a] of spread of international unsecured overnight interest rates to official interest rates[b]



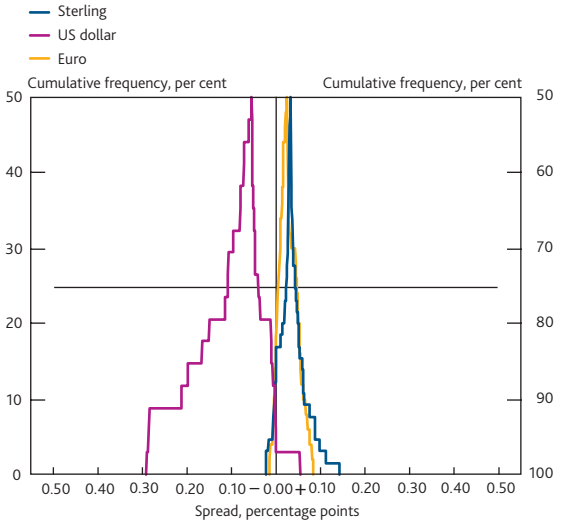
Sources: Wholesale Market Brokers' Association and Bank calculations.

(a) Distribution of the spread between overnight interest rate at end-of-day and the official interest rate. The distributions are folded at the median so that cumulative probabilities for values above (below) the median are indicated by the right-hand (left-hand) scale.
(b) Chart shows the distribution for period 7 February–7 May 2008.

comparable euro and dollar overnight rates (**Chart 44** and **Chart 45**). In dollars, the appropriate distribution against which to compare sterling and euro secured overnight rates is the unsecured overnight rate, since this is the rate explicitly targeted by policy.

In sterling and euros, the spreads of one and two-week overnight index swap (OIS) rates to policy rates have remained

Chart 46 Folded cumulative distribution[a] of spread of international one-week overnight interest rate swaps to official interest rates[b][c]



Sources: Bloomberg and Bank calculations.

(a) Distribution of the spread between one-week overnight interest swap rates at end-of-day and the official interest rate. The distributions are folded at the median so that cumulative probabilities for values above (below) the median are indicated by the right-hand (left-hand) scale.
(b) Chart shows the distribution for period 7 February–7 May 2008.
(c) When the one-week periods to which the rates apply span a Monetary Policy Committee decision date, expected changes in Bank Rate can influence the level of these rates. To provide a clearer read on risk premia in these rates, these periods have been removed.

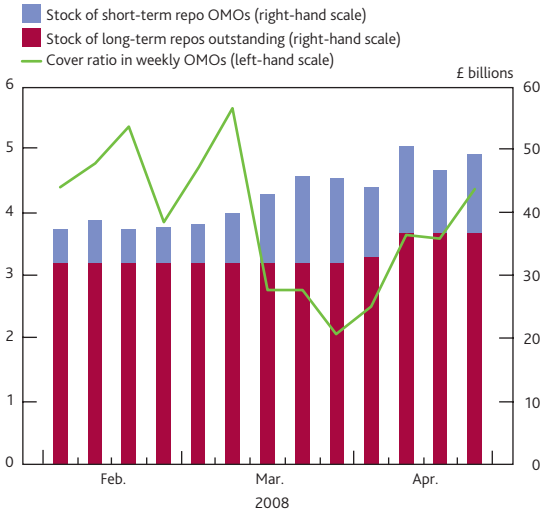
relatively small and stable during the current review period (**Chart 46**). These OIS rates reflect the expected future unsecured overnight rate. As described in the box on pages 144–45, the spread to policy rates of one and two-week cash rates have been somewhat wider. This reflected the ongoing pressures in bank funding markets outlined on pages 132–36.

Open market operations

On 11 March, as part of co-ordinated central bank announcements to address liquidity pressures in funding markets, the Bank announced that it would maintain its expanded three-month long-term repo OMOs in its scheduled operations on 18 March and 15 April. The wider range of high-quality collateral was the same as that accepted in the December and January expanded operations. In both operations, there was a minimum-bid rate at the three-month maturity based on the three-month overnight index swap (OIS) rate. The maximum total size of a counterparty's bids, across all maturities offered in the long-term repo OMO, was not permitted to be greater than 20% of the total size of the OMO (from 10% in the December and January operations).

In its long-term repo OMO on 18 March, the Bank offered £10 billion at the three-month maturity. In the light of the results of March's operation, the Bank offered £15 billion in the long-term repo OMO on 15 April, bringing the total stock of long-term repo OMOs outstanding to £36.7 billion, of which £25 billion was provided for in the expanded operations (**Chart 47**).

Chart 47 Liquidity provided in OMOs and short-term OMO cover ratio



All of the long-term repo OMOs held in the review period were fully covered (**Table C**). Perhaps reflecting the wider range of eligible collateral, the range of successful bid rates in the three-month operations in March and April was wider than in the February operation. But the range of bids accepted in the three-month maturity was greater than in other maturities in the February operation too, despite this OMO being offered against the same collateral as is eligible in the Bank's regular OMOs.

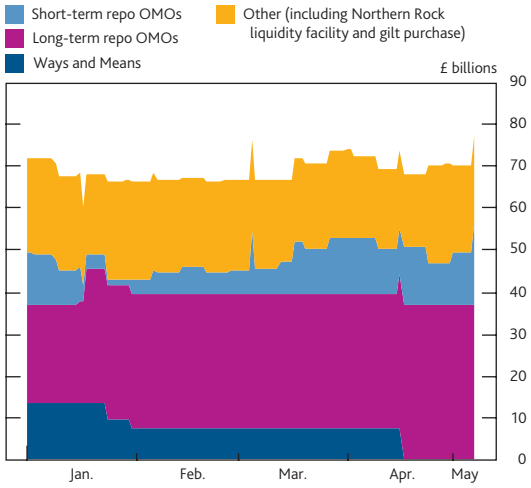
Table C Long-term repo operations

	Three-month	Six-month	Nine-month	Twelve-month
19 February 2008				
On offer (£ millions)	1,600	750	400	150
Cover	1.34	2.48	2.90	4.27
Weighted average rate[a]	5.139	5.024	4.915	4.800
Highest accepted rate[a]	5.500	5.030	4.915	4.800
Lowest accepted rate[a]	5.010	5.000	4.915	4.800
Tail[b]	12.90	2.44	0.00	0.00
18 March 2008				
On offer (£ millions)	10,000[c]	750	400	200
Cover	1.69	5.13	3.93	6.13
Weighted average rate[a]	5.614	4.965	4.850	4.750
Highest accepted rate[a]	6.050	5.000	4.850	4.750
Lowest accepted rate[a]	5.210	4.960	4.850	4.750
Tail[b]	40.44	0.53	0.00	0.00
15 April 2008				
On offer (£ millions)	15,000	750	400	200
Cover	1.01	4.46	3.98	5.23
Weighted average rate[a]	5.253	4.845	4.755	4.660
Highest accepted rate[a]	5.835	4.845	4.755	4.660
Lowest accepted rate[a]	4.910	4.845	4.755	4.660
Tail[b]	34.27	0.00	0.00	0.00

(a) Per cent.
(b) The yield tail measures, in basis points, the difference between the weighted average accepted rate and the lowest accepted rate.
(c) March and April long-term repos were held against an expanded range of high-quality collateral.

The Bank aims to provide reserves sufficient for banks to meet their aggregate reserves targets over the maintenance period as a whole. The size of short-term repo OMOs therefore reflects the size of aggregate reserves targets, the provision of reserves through other operations and other flows (autonomous factors) across the Bank's balance sheet. So, in the absence of offsetting factors, the increase in the stock of long-term repo OMOs outstanding would have required smaller short-term repo OMOs. However, the repayment of the Ways and Means facility described on page 137 offset this flow, resulting in an increase in the size of the weekly OMO in the first half of April (**Chart 47**). Reflecting chiefly the higher aggregate reserves targets set by reserves banks over the review period, the amounts supplied in the Bank's weekly OMOs generally rose over the review period as a whole (**Chart 48**).

Chart 48 Breakdown of sterling market transactions



Bond-purchase OMOs

As well as conducting short and long-term repo OMOs the Bank, in January 2008, began to provide reserves for longer periods through bond-purchase OMOs.[1] In February, March and April the Bank conducted OMOs via the outright purchases of bonds, in accordance with screen announcements made on 2 January and 1 April. The February and April bond-purchase OMOs were fully covered at all maturities (**Table D**). The March OMO was uncovered in the short and medium sectors, and the spreads between the highest accepted price and the lowest accepted price were higher in these sectors relative to the long sector. Feedback from counterparties indicated that one possible reason for these sectors of the operation being uncovered was a relative lack of liquidity in the gilt market on the day of the operation, perhaps related to the month and quarter end.

(1) See box on pages 22–23 of the 2008 Q1 *Bulletin*.

Special Liquidity Scheme

On 21 April, the Bank announced the launch of the Special Liquidity Scheme (SLS) to allow banks to swap temporarily their high-quality, but currently illiquid, mortgage-backed and other securities for UK Treasury bills. The scheme's aim was to improve the liquidity position of the banking system and increase confidence in financial markets.

The main features of the scheme are as follows:

- The asset swaps will be for long terms. Each swap will be for a period of one year and may be renewed for a total of up to three years.
- The risk of losses on the securities remains with the banks.
- It is designed to provide financing for legacy illiquid assets existing at the end of 2007.

The range of securities that participants can offer as collateral in long-term swaps with the Bank is little different from that eligible for the Bank's three-month extended collateral long-term open market operations (OMOs) introduced in December.

In return for providing the Bank with adequate securities, scheme members may draw down UK Treasury bills against this collateral. Banks pay a fee based on the spread between the three-month Libor and the rate for borrowing against government bonds, subject to a floor of 20 basis points. The Treasury bills created as part of the scheme are no different from other Treasury bills issued by the UK Debt Management Office. Banks in receipt of the bills have the option to continue to hold them, to use them in the Bank's regular OMOs or as intraday liquidity collateral for the Bank's Real-Time Gross Settlements system or to exchange them for cash with market counterparties, in either a repo transaction or a cash sale.

The major UK banks have agreed to participate in the scheme. Each participating institution must use the scheme for a minimum amount. Drawdowns under the scheme can be undertaken for a period of six months from 21 April 2008. Final usage will depend on market conditions. Discussion with the banks ahead of launch suggested that initial use of the scheme would be around £50 billion. The Bank will publish the total outstanding value of the bills lent under the scheme after the end of the drawdown period.

Feedback on the scheme from market contacts suggested that it has achieved its objective of improving the liquidity position of, and hence confidence in, the UK banking system.

Special Liquidity Scheme

On 21 April, the Bank announced the launch of the Special Liquidity Scheme (SLS) to allow banks to swap temporarily their high-quality mortgage-backed and other securities for UK Treasury bills. The SLS has no direct impact on the supply of reserves. It is described in the box above.

Foreign currency reserves

The Bank's foreign currency reserves now comprise around £2 billion equivalent of assets. These are currently funded by two, $2 billion three-year issues, under the Bank's programme of annual bond issuance which commenced in March 2007.

The second issue under the debt issuance programme was announced on 29 February and executed on 10 March. The $2 billion three-year transaction, which was marketed via Barclays Capital, Deutsche Bank, HSBC and JPMorgan priced 30 basis points below Libor. The issue was successful, attracting a broad order book, with orders totalling $2.9 billion. It sold to investors in Europe, Middle East and Africa (50%), Asia (37%) and the Americas (13%). As with the first issue in the programme, central banks and official institutions were the predominant buyers (74%), with bonds also being sold to asset managers (17%), insurance and pension funds (5%) and banks (4%).

The Bank's reserves are planned to have reached a steady-state level of around £3 billion equivalent by mid-2009.

Facilitating the provision of payment services

In May, the Bank ceased to be a direct member of TARGET. Prior to this, to facilitate UK participation in TARGET, euro-denominated assets had been lent out each day by the Bank to generate the intraday liquidity. These assets were funded by a series of Euro Notes of which the final one, for €3 billion nominal, is due to mature on 27 January 2009.

Capital portfolio

The Bank holds an investment portfolio that is approximately the same size as its capital and reserves (net of equity holdings, eg in the BIS and ECB, and the Bank's physical assets) together with aggregate cash ratio deposits. The Bank's 'free' capital and cash ratio deposits are invested in a portfolio of sterling-denominated securities. Securities purchased by the Bank for this portfolio are normally held to maturity; nevertheless, sales may be made from time to time, reflecting for example, risk management, liquidity management or changes in investment policy.

The bond portfolio currently includes around £2 billion of gilts and £1 billion of other debt securities. Purchases are generally made each month with purchase details announced in advance on the Bank's wire service pages. Over the current review period, gilt purchases were made in accordance with the announcement on 25 March: £20 million each in March and April.

Table D Issue Department gilt-purchase OMO

	Amount purchased (£ millions)	Sector cover ratio	Weighted average accepted price	Highest accepted price	Lowest accepted price	Tail[a]
25 February 2008						
Short		2.62				
UKT 5.25% 07/06/12	69.00		103.221	103.234	103.206	0.013
UKT 8% 27/09/13	114.99		116.938	116.960	116.900	0.022
Medium		3.69				
UKT 5% 07/03/18	61.90		102.380	102.380	102.380	0.000
UKT 8% 07/06/21	61.66		131.123	131.220	131.070	0.097
Long		2.81				
UKT 5% 07/03/25	45.93		103.216	103.280	103.210	0.064
UKT 6% 07/12/28	45.92		116.721	116.760	116.670	0.039
Total purchased[b]	399.40					
31 March 2008						
Short		0.43				
UKT 4.75% 07/09/15	78.24		103.995	104.100	103.890	0.105
UKT 8% 07/12/15	0.00		0.000	0.000	0.000	0.000
Medium		0.92				
UKT 4% 07/09/16	114.03		98.890	99.500	98.500	0.610
Long		5.08				
UKT 5% 07/03/25	45.94		104.788	104.820	104.750	0.032
UKT 6% 07/12/28	45.89		118.543	118.590	118.530	0.047
Total purchased[b]	284.10					
28 April 2008						
Short		3.82				
UKT 4.75% 07/09/15	69.03		100.976	101.000	100.900	0.024
UKT 8% 07/12/15	114.90		120.797	120.849	120.750	0.052
Medium		2.30				
UKT 4% 07/09/16	123.92		95.788	95.950	95.649	0.162
Long		3.53				
UKT 5% 07/03/25	45.93		102.032	102.050	102.030	0.018
UKT 6% 07/12/28	45.99		115.560	115.570	115.560	0.010
Total purchased[b]	399.77					

(a) The tail measures the difference between the highest accepted price and the weighted average accepted price.
(b) Figures may not sum to total due to rounding.

Term money market rates

The Bank's operations in the sterling money market aim to keep overnight market interest rates in line with Bank Rate, so that there is a flat money market yield curve, consistent with Bank Rate, out to the next Monetary Policy Committee (MPC) decision date.

In principle, if the MPC sets expectations for the overnight risk-free rate to be in line with Bank Rate, then risk-free rates longer than overnight but shorter than the next MPC decision date should also be expected to be in line with Bank Rate.

In practice, however, even if the Bank is successful in keeping the risk-free overnight rate in line with Bank Rate, the observable market yield curve cannot be expected to be flat around Bank Rate for two main reasons:

i. There is no market rate exactly equivalent to Bank Rate and therefore no term rates with which to observe the term structure of Bank Rate. This is because there are additional factors captured in market rates. These can include liquidity risk premia, credit risk premia embedded in unsecured market rates, and changes in the demand for government bond collateral influencing secured market rates.

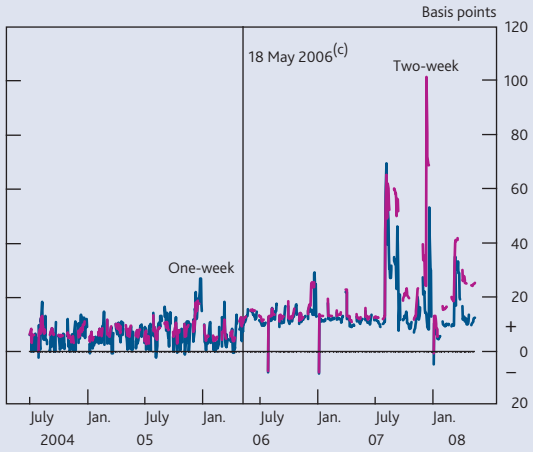
ii. Any volatility in market overnight rates may introduce term premia into observable market rates beyond overnight. This is because, if overnight market rates are even slightly volatile, a bank may require additional compensation (a term premium) for bearing the uncertainty associated with lending longer than overnight.

Between the launch of the Bank's current sterling monetary framework in May 2006 and the recent period of stressed conditions that began in August 2007, these risk premia were fairly stable. Unsecured one and two-week interbank cash rates averaged around 13 basis points(1) above Bank Rate (**Chart A**). This compares with an average unsecured overnight rates spread of around 6 basis points over the same period, suggesting one and two-week cash rates typically contained around 7 basis points of risk premia.

A similar pattern emerges in secured (GC repo) rates, although the average spreads are significantly narrower reflecting minimal credit risk in secured lending (**Chart B**). But although secured rates abstract from credit risk premia, they may still be affected by liquidity conditions in both cash and government bond (ie collateral) markets.

Perhaps, the clearest read on the expected future risk-free overnight market rate is obtained by looking at rates from swaps that settle on the unsecured overnight rate (OIS rates).

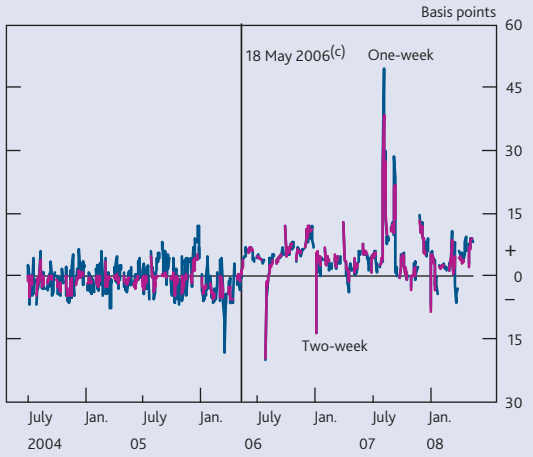
Chart A Spread to Bank Rate of one and two-week unsecured sterling market interest rates(a)(b)



Sources: Bloomberg and Bank calculations.

(a) Uses overnight cash rates of one and two-week maturities.
(b) When the one or two-week periods to which the rates apply span a Monetary Policy Committee decision date, expected changes in Bank Rate can influence the level of these rates. To provide a clearer read on risk premia in these rates, these periods have been removed.
(c) Launch of the Bank's current sterling monetary framework.

Chart B Spread to Bank Rate of one and two-week secured sterling market interest rates(a)(b)



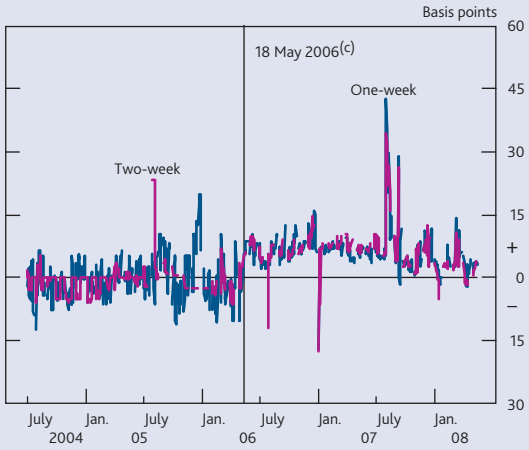
Sources: Bloomberg, British Bankers' Association and Bank calculations.

(a) Uses BBA repo rates.
(b) When the one or two-week periods to which the rates apply span a Monetary Policy Committee decision date, expected changes in Bank Rate can influence the level of these rates. To provide a clearer read on risk premia in these rates, these periods have been removed.
(c) Launch of the Bank's current sterling monetary framework.

Credit risk in overnight transactions is small compared to longer-maturity deals, so the credit premia within OIS is also small. And as OIS are derivative instruments (there is no exchange of cash at the inception of the trade), the liquidity premia are also small relative to equivalent-maturity cash transactions.

Reflecting this, one and two-week sterling OIS rates averaged around 7 basis points above Bank Rate between May 2006 and August 2007 (**Chart C**). These spreads are just 1 basis point above the average spread of the unsecured overnight rate,

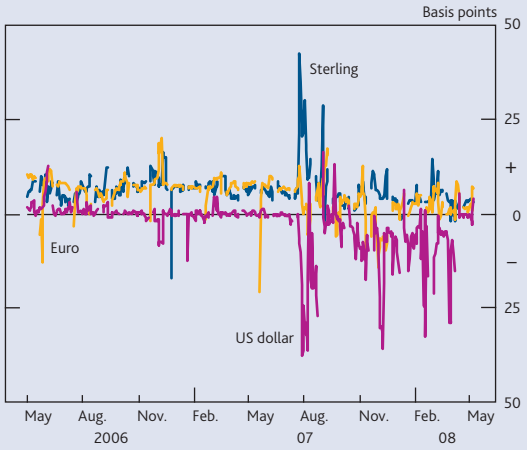
Chart C Spread to Bank Rate of one and two-week sterling overnight interest rate swaps[a][b]



Sources: Bloomberg and Bank calculations.

(a) Uses overnight index swap (OIS) rates of one and two-week maturities.
(b) When the one or two-week periods to which the rates apply span a Monetary Policy Committee decision date, expected changes in Bank Rate can influence the level of these rates. To provide a clearer read on risk premia in these rates, these periods have been removed.
(c) Launch of the Bank's current sterling monetary framework.

Chart D Spread to policy rate of one-week overnight interest rate swaps[a][b]



Sources: Bloomberg and Bank calculations.

(a) Uses overnight interest swap rates of one-week maturity.
(b) Where rates span a policy decision date, they have been removed to abstract from any impact that a change in interest rate expectations would likely have on the money market yield curve slope.

consistent with a fairly flat profile for expectations of the future unsecured overnight rate.

This relative stability in term OIS rates since the launch of the Bank's current sterling monetary framework meant that the main outliers were caused by calendar effects (particularly year ends) and, in the case of the secured rates, a shortage of government bond collateral for a day in July 2006.(2)

During August and September 2007, term spreads widened and were more volatile, but have since narrowed. But since the start of 2008, one and two-week OIS rates have generally been close to or below their pre-August 2007 levels. Cash rates, however, have remained elevated reflecting the ongoing strains in bank funding markets.

Comparing the spread to Bank Rate of sterling one-week OIS rates with equivalent measures in other currencies shows that sterling spreads have typically been similar to those observed in euro, and slightly higher than dollar (**Chart D**). This pattern has generally persisted through the period of stressed conditions, despite a rise in volatility across currencies since August 2007.

(1) All charts and calculations in this box exclude periods where the term of the rates span a monetary policy decision date so that the term rates should not be influenced by expected changes in the policy rate.
(2) For more details, see the box entitled 'Idiosyncratic volatility in the overnight gilt repo market', on page 286 of the 2006 Q3 *Bulletin*.

Research and analysis

Public attitudes to inflation and interest rates

By James Benford of the Bank's Monetary Assessment and Strategy Division and Ronnie Driver of the Bank's Inflation Report and Bulletin Division.

A key upside risk to the medium-term outlook for inflation stems from the possibility that a further period of above-target inflation could lead to persistently elevated inflation expectations. According to the Bank/GfK NOP survey, households' expectations for inflation over the next year have risen markedly. This article focuses on the factors which may have driven the increase, drawing on the results of some additional questions included in the February 2008 survey. It concludes that while the latest increases in households' inflation expectations could be consistent with recent macroeconomic data, increases in households' perceptions of current inflation may also have played some role. The article also summarises the public's attitudes to interest rates and the conduct of monetary policy.

Introduction

The monetary policy objectives of the Bank of England are to maintain price stability and subject to that, to support the Government's economic policy, including its objectives for growth and employment. As part of its price stability objective, the Bank of England is tasked with achieving an inflation target of 2%, as measured by the annual change in the consumer prices index (CPI).

Monetary policy is likely to be most effective if people understand and support this goal. To that end, the Bank uses a variety of methods to raise public awareness of its monetary policy objective. For example, the Monetary Policy Committee (MPC) explains its interest rate decisions in the minutes of its monthly meetings, supplemented each quarter by the publication of the *Inflation Report*. In addition, MPC members explain their decisions in appearances before parliamentary committees and in speeches, media interviews and regional visits. The Bank also promotes the objective of price stability through its range of educational material for schools and the general public.

It is easier for monetary policy to achieve its objective of price stability if households and businesses believe that policymakers will do so — ie that inflation expectations remain close to the target in the medium term. Inflation expectations play a key role in a number of household and business decisions. First, inflation expectations are important for wage negotiations. Employees care about their real purchasing power — the quantity of goods and services that they can buy. If inflation is expected to be higher, employees may bargain for higher nominal wage growth to maintain their standard of living. Second, inflation expectations play a key role in households' saving decisions. For a given level of nominal interest rates, higher expected inflation implies a lower expected real rate of return on saving. That would tend to make spending today more attractive relative to saving. Finally, businesses need to make a judgement on the likely path of the prices of other goods that they may be competing with, so that they can judge the likely demand for their product. If they expect the prices of other goods to be higher, that may prompt them to raise their own output prices.

A key risk for monetary policy makers is that inflation expectations move persistently away from the 2% inflation target. If that occurred, and those expectations became built into future wages and prices, there is a risk that inflation would remain away from the target for longer. Assessing that risk is difficult, not least because inflation expectations cannot be observed directly. But a number of measures — such as surveys of households, businesses and economists, as well as those derived from the prices of financial market instruments that are linked to inflation — can act as a guide.(1) One survey the MPC looks at is the Bank/GfK NOP *Inflation Attitudes Survey*. This article discusses the latest results from this survey in more detail. The first section discusses the latest trends in households' inflation perceptions and expectations.

(1) For a further discussion of recent movements in a wide range of measures of inflation expectations, see the box on pages 36–37 of the February 2008 *Inflation Report*, and page 36 of the May 2008 *Inflation Report*.

The second section summarises the public's attitudes to interest rates and the conduct of monetary policy.

The Bank/GfK NOP survey

The Bank/GfK NOP survey, which was commissioned by the Bank in 1999, assesses the general public's perceptions of inflation over the past year, expectations for inflation over the next year, views on interest rates and knowledge of the monetary policy framework. The survey is conducted every February, May, August and November, and usually samples around 2,000 individuals. Every February, however, the survey is more comprehensive, asking a longer list of questions to around 4,000 people.

Interpreting the results of the questions on inflation perceptions and expectations is not straightforward. First, the Bank/GfK NOP survey does not ask about people's views on a specific measure of inflation. Rather, it asks about the evolution of prices of 'goods and services'. This is designed to reflect a concept of inflation the general public are likely to be familiar with, rather than any specific measure of inflation (such as the CPI inflation rate). As a result, it is not clear which official measure of inflation, if any, should correspond most closely to the survey responses.(1)

Second, the Bank/GfK NOP survey asks respondents for their expectations of inflation over the next year. Given the lags inherent in the transmission mechanism of monetary policy, there will be times when CPI inflation moves away from the target in the near term. For example, the MPC's projection, presented in the May 2008 *Inflation Report*, was for CPI inflation to rise further during the remainder of 2008, before subsequently falling back to settle around the 2% target in the medium term. As a result, an increase in this short-term measure of inflation expectations does not necessarily imply an increase in medium-term inflation expectations. But if higher near-term inflation expectations were to feed through into higher wages and prices, that would pose an upside risk to the inflation outlook in the medium term.

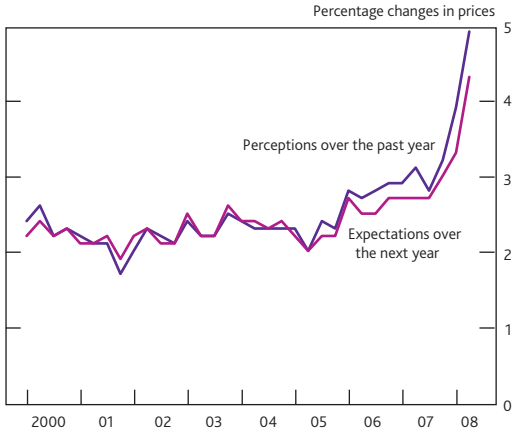
Recent trends in public attitudes to inflation

Over the past year, the general public's perceptions of current inflation and their expectations of inflation over the next year have both increased materially. In May 2008, the median individual's perception of the current level of inflation was 4.9%, the highest rate since the survey began in November 1999 (**Chart 1**).(2) The median respondent's expectation for annual inflation in a year's time was 4.3%, also a series high.

These increases in the median measures of perceptions and expectations were accompanied by a significant change in the distribution of responses across households. Compared to November 2005, just before the Bank/GfK NOP measure of inflation expectations began to rise, the proportion of respondents who expected inflation to be above 5% in the year ahead rose from 10% to around 35% (**Chart 2**).

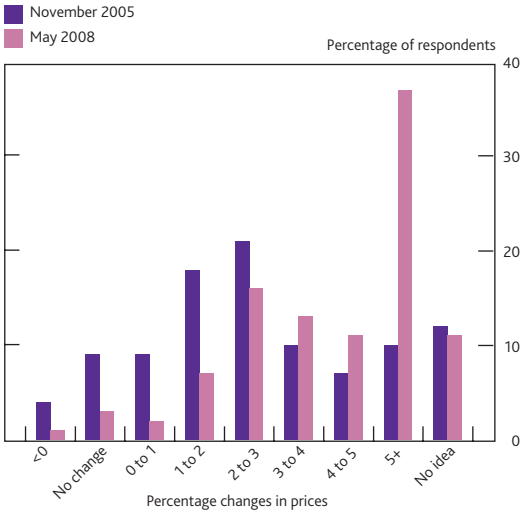
As already discussed, this rise in near-term inflation expectations does not, by itself, provide sufficient evidence to judge whether inflation expectations will remain persistently above target in the medium term. Assessing that risk requires an understanding of what has driven the rise in near-term

Chart 1 Bank/GfK NOP median perceptions of current inflation and expectations for inflation one year ahead



Source: Bank/GfK NOP survey.

Chart 2 Distribution of households' inflation expectations one year ahead in Bank/GfK NOP survey



Source: Bank/GfK NOP survey.

(1) Measures of inflation expectations derived from financial market instruments are explicitly linked to RPI inflation. But given the time-varying wedge between RPI and CPI inflation, and the fact that market-based measures are influenced by changes in risk premia and idiosyncratic market factors, these are also difficult to interpret. The article by Joyce, Sorensen and Weeken on pages 157–66 of this *Bulletin*, discusses ways of extracting policy-relevant information from financial market instruments.

(2) For a discussion of how these median measures are estimated, see the box on page 209 of the 2007 Q2 *Quarterly Bulletin*.

Additional questions in the February 2008 Bank/GfK NOP survey

Every quarter, the Bank/GfK NOP survey asks respondents how they perceive the prices of goods and services to have changed over the past twelve months, and how they expect prices in the shops generally to change over the next twelve months. But these questions on their own do not indicate how respondents formed these perceptions and expectations. To gain insight into these issues, the Bank posed additional questions to some of the respondents in the February 2008 survey. After asking respondents about their perceptions of inflation over the past year, interviewers asked:

How important were the following things in getting to that answer?

- Your personal experience of the change in the price of food and drink.
- Your personal experience of the change in the price of clothing and footwear.
- Your personal experience of the change in the price of transport, including the cost of petrol/diesel.
- Your personal experience of the change in the price of household energy (eg gas, electricity, coal).
- Your personal experience of the change in the cost of housing (eg mortgage payments, rents).
- Reports on inflation in the media.
- Other factors.

After asking about respondents' inflation expectations over the next year, interviewers asked:

How important were the following things in getting to that answer?

- How prices have changed in the shops in your most recent visits (ie the past one to six months).
- How prices have changed in the shops over the longer term (ie the past twelve months or more).
- The current level of interest rates.
- The current strength of the British economy.
- The inflation target set by the Government.
- Reports on the inflation outlook in the media.
- Other factors.

In both questions, respondents were asked whether each factor was very important, fairly important, not very important or not important at all. They could also respond 'don't know'.

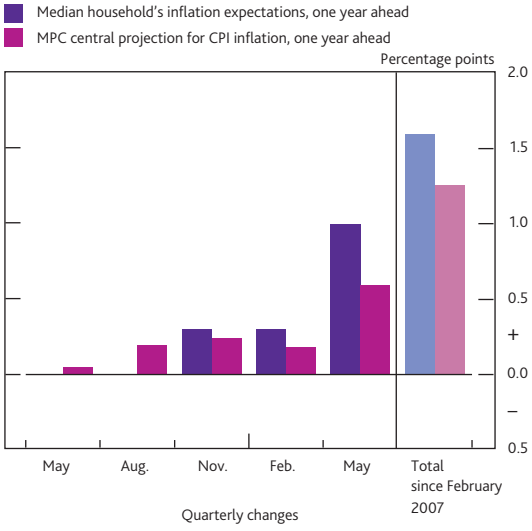
inflation expectations. To that end, the next section examines how households' inflation expectations are formed, drawing on the results of some additional questions included in the February 2008 survey (see the box above).

What drives households' inflation expectations?

There are many factors that could shape households' inflation expectations. If households are forward looking, understand the transmission mechanism of monetary policy and believe that the monetary policy framework is credible, then their medium-term inflation expectations should be equal to the inflation target. But, as discussed earlier, owing to the lags inherent in the transmission mechanism of monetary policy, inflation can deviate from the target in the near term, sometimes quite markedly. If monetary policy remains credible, such that households believe inflation will be at target in the medium term, forward-looking households' near-term inflation expectations could increase, without necessarily posing longer-term risks to the inflation outlook. But if expectations remain elevated for a prolonged period, that could pose upside risks to inflation in the medium term.

Over the period when households' inflation expectations have been rising, both the MPC and external professional forecasters have also been revising up their one year ahead inflation projections. As a result, it may be unsurprising that households' near-term inflation expectations have picked up. For example, between February 2007 and May 2008, the MPC's central projection for CPI inflation one year ahead increased by over 1 percentage point, while the households' measure rose by 1.5 percentage points (**Chart 3**).

Chart 3 Revisions to the inflation outlook one year ahead



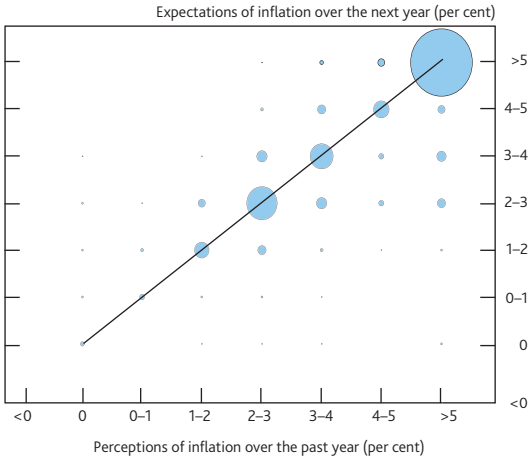
Sources: Bank of England and Bank/GfK NOP survey.

The rise in households' inflation expectations in the most recent quarter was somewhat larger than the rise in the MPC's

central projection for inflation. There are various reasons why that may be so. For example, the MPC's central projection is for a specific measure of inflation (CPI), whereas households are asked about prices of goods and services in general.

Alternatively, the greater rise in households' inflation expectations may relate to the elevated level of perceptions of current inflation. If households form their inflation expectations in a backward-looking way, high perceptions of current inflation might be expected to push up on their inflation expectations. According to the Bank/GfK NOP survey, the median household's inflation perceptions and expectations began to rise at the same time (**Chart 1**). And analysing the individual survey responses over the past year confirms that there is a close link between the two. **Chart 4** plots each respondent's perceptions of current inflation against their expectations for inflation over the next year, with the width of each bubble corresponding to the proportion of respondents holding that view. The largest bubbles lie on the 45° line, with around half of the survey respondents since May 2007 reporting that they expected inflation over the next twelve months to be the same as they perceived it to have been over the past twelve months. If rates of inflation increase further, as the MPC expects, then inflation perceptions may themselves pick up further.

Chart 4 Individual views of inflation perceptions and expectations, May 2007 to May 2008[a]



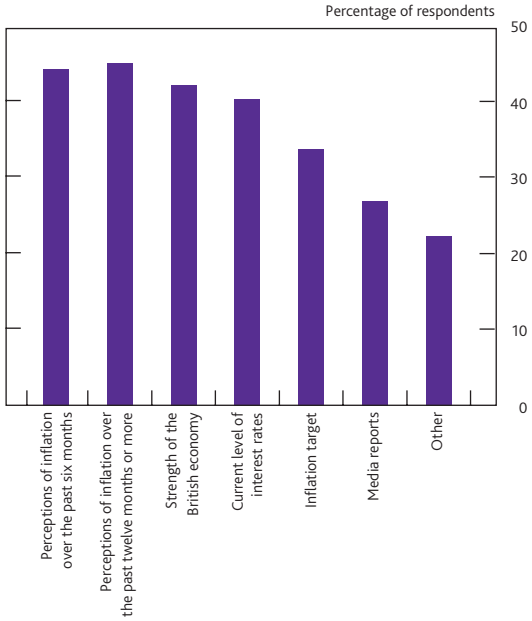
Sources: Bank/GfK NOP survey and Bank calculations.

(a) Respondents who answered either question 'No idea' are excluded. The width of each bubble represents the proportion of respondents holding that view. As respondents are asked to select from inflation ranges that typically cover 1 percentage point, some bubbles may be partly obscured.

In practice it may be that some people are forward looking, while others are more backward looking or use rules of thumb to form their inflation expectations. In order to interpret the changes in measures of inflation expectations correctly, it is important for the MPC to understand whether, on balance, households are more forward looking or backward looking. Furthermore, it is also important to know how this balance may change in light of economic developments. For example, Brazier *et al* (2006) present a model in which the proportion of people who use backward-looking rules of thumb to form their inflation expectations rises when actual inflation moves away from the target. They find that such a change in the way people form their expectations can lead to an increase in the volatility of inflation.

One of the additional questions posed in the February 2008 survey asked respondents what factors were most important in forming their expectations. The results suggested that households' inflation expectations over the next year were influenced by a number of factors (**Chart 5**). Some households put weight on factors such as the strength of the British economy, the level of interest rates and the inflation target. But almost half of the respondents reported that their past perceptions of inflation, both in recent periods and over a longer term, played a 'very important' role in forming their inflation expectations. This result suggests that, in order to understand changes in households' inflation expectations, it is important to understand what drives changes in households' perceptions of current inflation.

Chart 5 Factors cited as 'very important' in forming households' inflation expectations over the next year[a]



Source: Bank/GfK NOP survey.

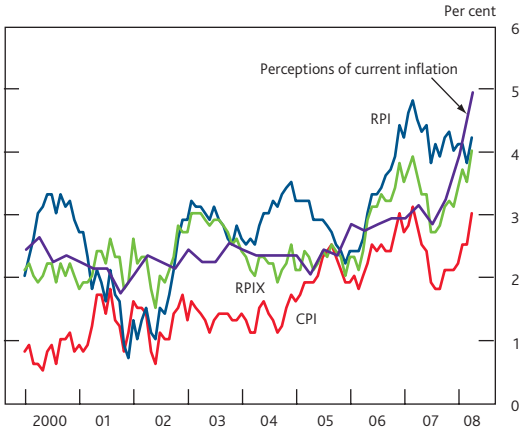
(a) Based on an additional question asked in the February 2008 survey. Respondents could select more than one option.

What drives households' perceptions of current inflation?

When aggregated, movements in households' perceptions of current inflation ought to be related to movements in the official inflation data. Since February 2007 official measures of inflation have moved in different ways (**Chart 6**). For example,

both CPI and RPIX inflation fell during the middle of 2007, but have since picked up again, while RPI inflation fell in the first half of 2007 and has since remained broadly constant. These differences partly reflect the way these measures of inflation are calculated, and partly the composition of the indices.(1) By contrast, households' inflation perceptions have picked up over this period, from 2.9% in February 2007 to 4.9% in May 2008.

Chart 6 Inflation perceptions and annual CPI, RPI and RPIX inflation rates



Sources: Bank/GfK NOP survey and ONS.

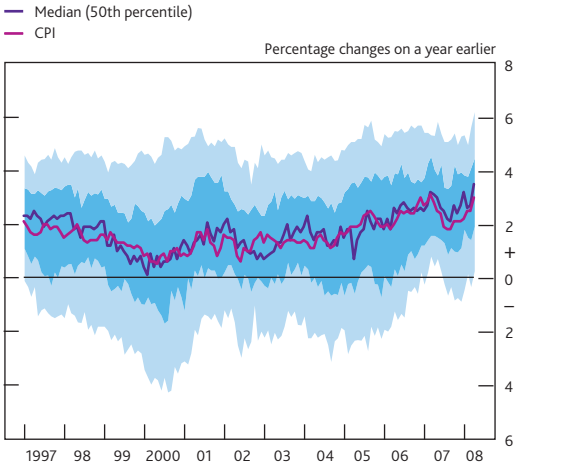
This section discusses three factors that might account for the divergence between official measures of inflation and households' perceptions of current inflation: differences in households' experiences of inflation; recent price changes, particularly for frequently purchased items; and discussions in the media.

(a) Differences in households' experiences of inflation

Different households are likely to experience different rates of inflation. That partly reflects the fact that the inflation rates of different items vary considerably (**Chart 7**). For example, petrol prices have risen by around 20% over the past year, while the price of audio-visual equipment has fallen by around 15% over the same period. Furthermore, expenditure patterns will differ markedly from household to household, for example with factors such as age, income and household size. Combined with the dispersion in individual inflation rates, that is likely to mean that households can experience markedly different inflation rates.

The aggregate RPI, RPIX and CPI data are based on the changes in the price of a basket of goods and services, designed to reflect the expenditure pattern of the representative household. By contrast, the Bank/GfK NOP estimate of inflation perceptions is a median measure. As a result, changes in the survey measure of perceptions of current inflation might not necessarily relate directly to changes in the official inflation data.

Chart 7 Distribution(a) of price changes of subcomponents of the CPI



(a) The limits of the dark band in the chart are the 35th and 65th percentiles of that distribution. The pair of lighter bands include a further 30% of the items in the basket, so that the entire coloured region includes 60% of the items in the basket.

(b) Recent price changes

It is possible that, when reporting their perceptions of current inflation, households put more weight on those price changes that they have observed recently. In that case, three-monthly (as opposed to annual) inflation rates may be more useful in explaining households' perceptions of inflation. One way to assess this is to use a simple regression technique to estimate the relationship between recent price changes and survey measures of inflation perceptions. These regressions take the form:

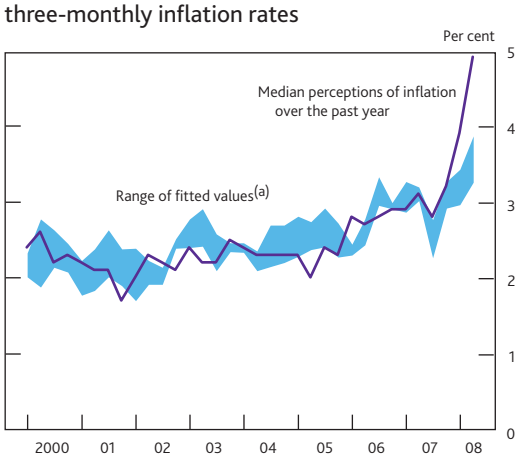
$$\pi_t^p = \alpha + \beta_1 \pi_t + \beta_2 \pi_{t-1} + \beta_3 \pi_{t-2} + \beta_4 \pi_{t-3} + \varepsilon_t \qquad (1)$$

where π_t^p is the Bank/GfK NOP median inflation perception over the past year at time t, α is a constant, π_t is a seasonally adjusted measure of three-month changes in prices at time t, and ε_t is an error term. The swathe in **Chart 8** shows the range of fitted values from three such regressions, which use the three-month change in CPI, RPI and RPIX to try to explain changes in households' inflation perceptions.(2) The results show that recent inflation rates can explain some, but not all, of the pickup in inflation perceptions, suggesting that other factors are also playing a role.(3)

One explanation may be that households place more weight on the price changes of certain, more frequently purchased goods and services. For example, Driver and Windram (2007)

(1) For example, the CPI index is not directly influenced by changes in house prices, and the RPI index includes the effect of mortgage interest payments. Information on how the official measures of inflation rates are calculated can be found at www.statistics.gov.uk/downloads/theme_economy/CPI_Technical_Manual.pdf.
(2) The right-hand side variables in equation **(1)** are based on the three-month change in CPI, RPI and RPIX inflation in the month before the Bank/GfK NOP survey was taken.
(3) These three-monthly inflation rates can also explain more of the recent pickup in inflation perceptions than the equivalent annual inflation rates.

Chart 8 Explaining Bank/GfK NOP perceptions with three-monthly inflation rates

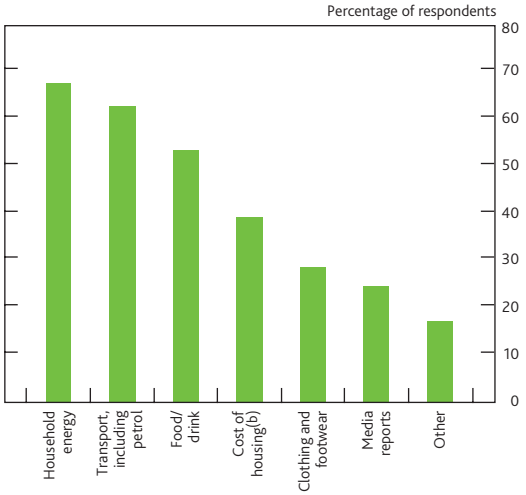


Sources: Bank/GfK NOP survey and Bank calculations.

(a) The swathe shows the difference between the maximum and minimum fitted values from three regressions (of median perceptions of current inflation on current and past lags of three-monthly changes in CPI, RPI and RPIX) at each point in time.

showed how the Bank/GfK NOP measure of perceptions of current inflation was better correlated with food and energy price inflation than with the aggregate CPI measure. And the responses to one of the additional questions in the February 2008 survey confirmed that food, transport and energy prices were particularly important in determining households' perceptions of current inflation (**Chart 9**).

Chart 9 Factors cited as 'very important' in forming households' perceptions of inflation over the past year(a)



Source: Bank/GfK NOP survey.

(a) Based on an additional question asked in the February 2008 survey. Respondents could select more than one option.
(b) For example, mortgage payments or rents.

In recent months there have been significant increases in oil, wholesale gas and food prices — the inflation rates of these goods have been significantly above their historical averages (**Table A**). As a result, the particularly rapid inflation rates of these goods may have had a disproportionate impact on households' perceptions of current inflation.

Table A Food, fuel, household energy and CPI inflation

Per cent

	Annual change		Three-monthly change(a)	
	Apr. 2008	Average since 2003	Apr. 2008	Average since 2003
CPI inflation	3.0	1.9	1.4	0.5
Foods and non-alcoholic drinks (10.6%)(b)	6.6	2.3	2.1	0.7
Fuels and lubricants (3.2%)(b)	18.7	6.3	1.6	1.9
Electricity, gas and other fuels (3.1%)(b)	8.3	10.4	13.9	2.8

Sources: ONS and Bank calculations.

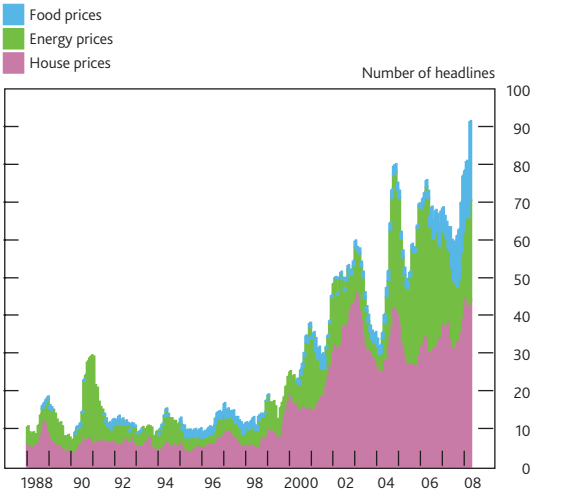
(a) Based on CPI indices which have been seasonally adjusted by Bank staff.
(b) The figures in parentheses show the 2008 weights in the CPI basket.

(c) Discussions in the media

Around a quarter of respondents to the February 2008 survey cited media reports as being a 'very important' factor influencing their perceptions of current inflation (**Chart 9**). Increased media coverage could, by encouraging the spread of information, lead to a better understanding of inflation, and better anchored expectations (Carroll (2001)). But rising media coverage of recent and prospective changes in inflation could also have contributed to the rise in households' perceptions of current inflation.

Over the past year there has been an increase in the number of articles discussing energy, food and house prices (**Chart 10**). These prices were all cited by some households as being 'very important' in forming their perceptions of current inflation. This increase in the number of news stories about the inflation rates of these individual items could explain part of the rise in aggregate inflation perceptions.

Chart 10 Media discussions of price changes(a)

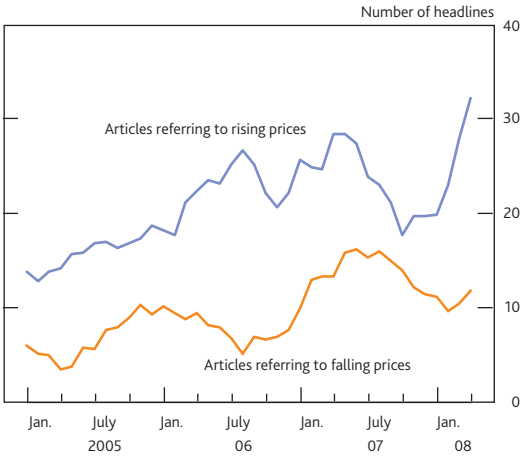


Source: © 2007 Factiva, Inc. All rights reserved.

(a) Six-month moving average. Based on searches designed to count the number of headlines referring to food, energy and house prices, but where possible exclude headlines referring to non-UK inflation. Newspapers included in the search are the *Daily Express*, the *Daily Mail*, the *Daily Mirror*, the *Daily Star*, *The Daily Telegraph*, the *Financial Times*, *The Guardian*, *The Independent*, *The Independent on Sunday*, *The Mail on Sunday*, the *News of the World*, *The Observer*, *The People*, *The Sun*, the *Sunday Mirror*, *The Sunday Telegraph*, *The Sunday Times* and *The Times*.

One drawback of this type of analysis is that looking at the total number of stories does not distinguish between articles that refer to prices rising as opposed to falling. **Chart 11** shows that, excluding articles discussing house prices, the number of articles referring to rising prices fell back in the early part of 2007, before picking up again towards the end of 2007 and into 2008. That pattern is similar to the profile for CPI and RPIX inflation over that period. By contrast the number of articles referring to falling prices is little changed compared to a year ago. So it remains plausible that media discussions of rising prices have continued to influence households' perceptions of current inflation, at least to a degree.

Chart 11 Media discussions of rising and falling prices(a)



Source: © 2007 Factiva, Inc. All rights reserved.

(a) Six-month moving average. Excludes articles referring to house prices. The sample of newspapers used is listed in footnote (a) of **Chart 10**.

Conclusion on inflation expectations

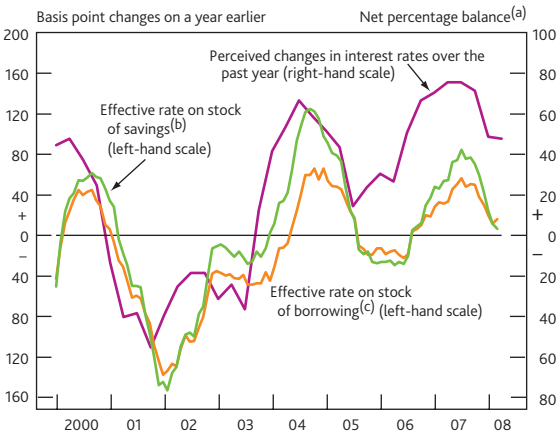
The Bank/GfK NOP measure of households' inflation expectations rose to a series high in May 2008. This increase in inflation expectations could be consistent with recent macroeconomic data, which have prompted the MPC and other forecasters to revise up their expectations of inflation one year ahead. However, there is evidence to suggest that a significant proportion of households appear to form inflation expectations on a backward-looking basis — around half of the respondents over the past year reported inflation expectations that were in the same range as their perceptions of current inflation. Since 2007, reported perceptions of current inflation have increased by more than can be explained by movements in the official headline inflation measures. This may reflect differences in individual households' inflation experiences, households putting greater weight on more recent price changes (eg the increases in household energy costs), or an increase in media reporting on food and energy price inflation.

Households' perceptions of current inflation and expectations of inflation one year ahead are also likely to affect their attitudes to interest rates and satisfaction with the Bank. The remainder of this article considers these in turn.

Attitudes to interest rates

The Bank/GfK NOP survey assesses the extent to which households are aware of changes in interest rates, by asking 'how would you say interest rates on things such as mortgages, bank loans and savings have changed over the past twelve months?'. Historically, the net balance of respondents who reported that they had perceived interest rates to have risen over the past year has moved in a similar way to the annual changes in the effective (average) borrowing and savings rates facing households. For example, the net balance picked up during 2006; remained little changed in 2007; and subsequently fell back, to lower levels in February and May 2008 (**Chart 12**). That suggests that households have a reasonably good understanding of how interest rates have changed over the past year.

Chart 12 Interest rate perceptions and movements in household interest rates

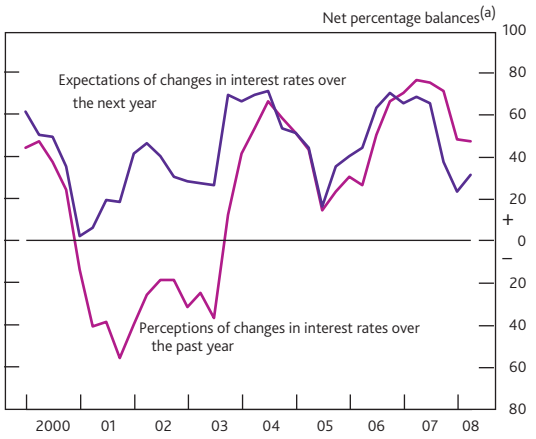


Sources: Bank of England and Bank/GfK NOP survey.

(a) The net balance is constructed by subtracting the percentage who thought rates had gone down from the percentage who thought they had gone up.
(b) Weights together the household time and sight deposit effective stock rates by the outstanding balances.
(c) Weights together the household secured and unsecured borrowing effective stock rates by the outstanding balances.

The survey also asks respondents how they expected interest rates on mortgages, bank loans and savings to change over the next year. On balance, households have never predicted a fall in interest rates. But previous Bank analysis (Driver and Windram (2007)) has suggested that households are nonetheless reasonable judges of future turning points in interest rates. Between February 2007 and February 2008 there was a large fall in the net balance of households expecting interest rates to rise (**Chart 13**). That is consistent with financial market participants' expectations for official interest rates, which were also revised down over that period. However, the net balance expecting rates to increase over the next year picked up again in May 2008. That may reflect the increase in the general public's inflation expectations.

Chart 13 Perceptions and expectations of changes in interest rates



Source: Bank/GfK NOP survey.

(a) The net percentage balances are constructed by subtracting the percentage who thought rates had gone/would go down from the percentage who thought they had gone/would go up.

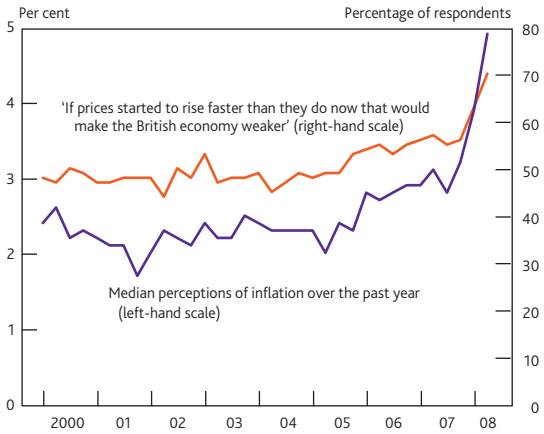
The survey also asks respondents what path for interest rates they think would be best for the British economy (*Question 7*) and for themselves personally (*Question 8*). Over the past year there has been a marked increase in the proportion of respondents who believe that it would be best for the economy if interest rates were lower. The results to *Question 8* also suggest that the majority of respondents who expressed a view thought that it would be best for them personally if rates were lower.

Question 10 asks respondents if they would prefer higher interest rates to try to keep inflation down or lower rates and higher inflation, and is now only posed in the February surveys. In February 2008, the proportion of respondents who preferred higher rates fell to 52%, the lowest rate since May 2000. But there was also a significant rise in the proportion of respondents who replied that they had 'no idea'. That may reflect heightened uncertainty among some households about how the recent developments in financial and energy markets are likely to affect the economic outcomes they care most about — such as prices, employment and output growth.

Attitudes to monetary policy and satisfaction with the Bank

The Bank/GfK NOP survey includes a series of questions assessing the general public's understanding of the inflation-targeting regime. For example, *Question 3* asks whether Britain's economy would be stronger or weaker as a result of higher inflation. Since 2005, the proportion of respondents who thought that higher inflation would make the economy weaker started to increase, reaching 70% in May 2008, up from an average of around 55% during 2007 (**Chart 14**). The relationship between perceptions of inflation

Chart 14 Households' views on the impact of higher inflation on the British economy

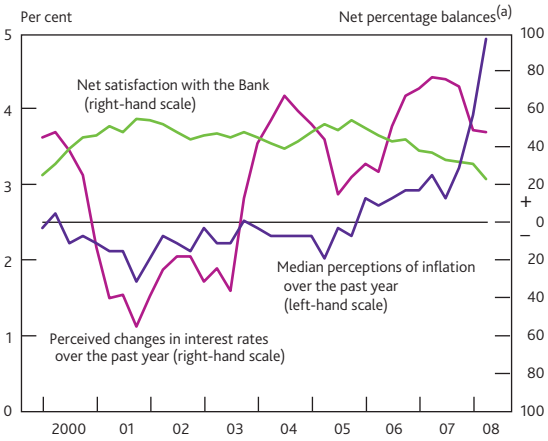


Source: Bank/GfK NOP survey.

over the past year and the perceived impact of a higher inflation rate on the British economy (shown in **Chart 14**) suggests that households may think that a given increase in inflation has a larger effect when their perceptions of current inflation are elevated. Alternatively, households might find it easier to identify with the costs of higher inflation when they have just experienced a higher inflation rate.

Question 14 asks whether participants are satisfied with the way the Bank of England is doing its job to set interest rates in order to control inflation. Over the past few years, the majority of respondents have been satisfied with the Bank. But since 2005, the net balance of respondents satisfied with the Bank has been falling gradually, and is now at its lowest level since February 2000 (**Chart 15**).

Chart 15 Public satisfaction with the Bank of England

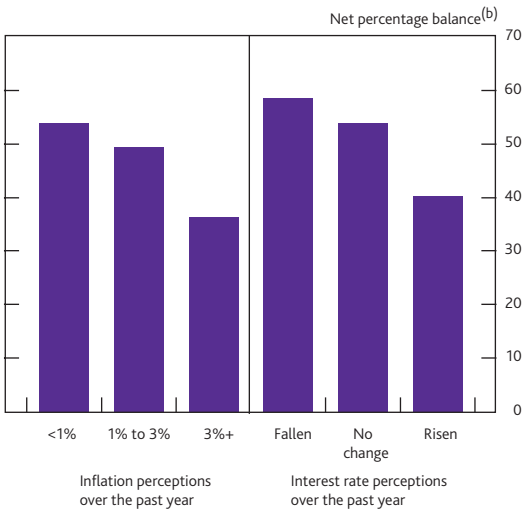


Source: Bank/GfK NOP survey.

(a) The net percentage balances are constructed by subtracting the percentage who thought rates had gone down from the percentage who thought they had gone up, and by subtracting the percentage who were fairly or very dissatisfied with the Bank from the percentage who were fairly or very satisfied.

There are several possible explanations for the fall in the satisfaction balance. Historically, those households who have reported higher perceptions of inflation or perceived rises in

Chart 16 Public satisfaction with the Bank of England by inflation and interest rate perceptions[a]



Sources: Bank/GfK NOP survey and Bank calculations.

(a) Data based on the individual responses to the Bank/GfK NOP survey in February 2001, 2002 and every quarter since February 2003.
(b) The net percentage balance is constructed by subtracting the percentage who were fairly or very dissatisfied with the Bank from the percentage who were fairly or very satisfied.

interest rates, have been, on average, less satisfied with the Bank (**Chart 16**). Interestingly, respondents who perceive inflation to be less than 1% reported the highest level of satisfaction with the Bank, suggesting that households are more concerned about high inflation than about low inflation. So the fall in the net satisfaction balance since 2005 may at least in part reflect the pickup in interest rate and inflation perceptions over that period. But concerns about the economic and financial outlook may also have played a role.

Conclusion

The results of the Bank/GfK NOP surveys show that households' inflation expectations have risen significantly since February 2007. So long as people still expect the MPC to meet the 2% CPI target over the medium term then the monetary policy implications of higher short-term inflation expectations are limited. But if any of the recent increase in inflation expectations were built into higher wages and prices, inflation could persist above the target for longer.

The latest rise in households' inflation expectations could be consistent with recent macroeconomic data, which have prompted economic forecasters, including the MPC, to revise up their near-term inflation projections. However, there is some evidence to suggest that a significant proportion of households appear to form inflation expectations on a backward-looking basis. Households' perceptions of current inflation have also picked up sharply over the past year, and by more than can be explained by movements in the official headline inflation measures alone. That divergence may be partly explained by differences in individual households' experiences of inflation, the price rises of particular, frequently purchased items such as food and energy, and an increase in media discussions of rising prices.

The net percentage balance of respondents reporting higher interest rates over the past year fell. That was consistent with the profile of annual changes in the household effective borrowing and savings rates. Between February 2007 and February 2008, the net balance expecting higher interest rates over the next year fell sharply. But in the May 2008 survey the net balance bounced back slightly. Nonetheless, the majority of respondents thought that it would be best for the economy if interest rates were lower.

Although the majority of respondents continued to report that they were satisfied with how the Bank of England is setting interest rates to meet the inflation target, the net balance who were satisfied declined further over the past year. Part of that decline may reflect higher households' inflation perceptions over that period, although some part of it may reflect concerns about the near-term economic outlook.

References

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Recent advances in extracting policy-relevant information from market interest rates

By Michael Joyce, Steffen Sorensen and Olaf Weeken of the Bank's Monetary Instruments and Markets Division.

Market interest rates form an important part of the transmission mechanism of monetary policy. They also contain information about market expectations of future policy rates as well as attitudes to, and perceptions of, risk. Extracting and interpreting this policy-relevant information is not straightforward, however. This article describes recent advances in this field and how they can be used to shed light on the downward trend in long-term real forward interest rates and the upward trend in long-term inflation forward rates, both developments that have attracted the attention of policymakers.

Introduction

The Bank of England's Monetary Policy Committee (MPC) sets Bank Rate, and influences interest rates determined by financial markets through its effect on expectations about the likely future path of policy rates.

These market interest rates play an important part in how monetary policy is transmitted to the economy. This is because the expenditure decisions of households and businesses reflect the full spectrum of market interest rates at different horizons.(1) Market interest rates also contain useful information for policymakers. This includes financial market participants' expectations of future policy rates as well as their attitudes to, and perceptions of, risk. In turn, these embody expectations of the outlook for the economy, as well as perceptions of how policymakers will react to economic developments.

Forward interest rates — the interest rates available now, at which people can borrow or lend in the future — are one representation of market interest rates. Nominal forward rates can be estimated from conventional government bonds and real forward rates can be estimated from index-linked government bonds. The difference between nominal and real forward rates is given by so-called inflation forward rates (the box on page 165 explains the concept of forward rates and their estimation in more detail). The full spectrum of forward rates at different horizons, at a given point in time, is described by the so-called term structure of forward rates. **Charts 1–3** plot the term structures of UK nominal, real and RPI inflation forward rates since 1996. These charts show that over this period the level and the shape of these term structures have varied considerably, with particularly large changes occurring around May 1997 when the Bank of England was granted operational independence and the MPC was founded.

More recently, two features at longer horizons have attracted the attention of policymakers. For greater clarity, these features are illustrated in **Chart 4**, which slices through **Charts 1–3** at the ten-year horizon. The chart shows that since October 2003 the ten-year RPI inflation forward rate has risen to its highest level since the MPC was founded. And the ten-year real forward rate is close to its lowest level since UK index-linked bonds were first issued in 1981. The initial fall in long-term UK real forward rates was mirrored by similar falls in the United States and the euro area.(2) But movements in UK real forward rates since the start of 2006 have been less in line with international developments.

For policymakers these developments pose a number of questions. Does the fall in real forward rates reflect a fall in the 'equilibrium' real risk-free rate, perhaps reflecting a perception of weaker long-term growth prospects? Does the rise in inflation forward rates reflect a de-anchoring of inflation expectations away from the inflation target? Do both features reflect changes in attitudes to and/or perceptions about risk? Or do they reflect institutional factors specific to the UK bond market?

(1) See Monetary Policy Committee (1999) for a discussion of the transmission mechanism and Clews (2002) on the links between asset prices and monetary policy.
(2) Greenspan (2005) described the fall in international nominal and real long-term interest rates during 2004 and 2005 as a 'conundrum' because it accompanied rising US policy rates.

Chart 1 UK nominal forward rates

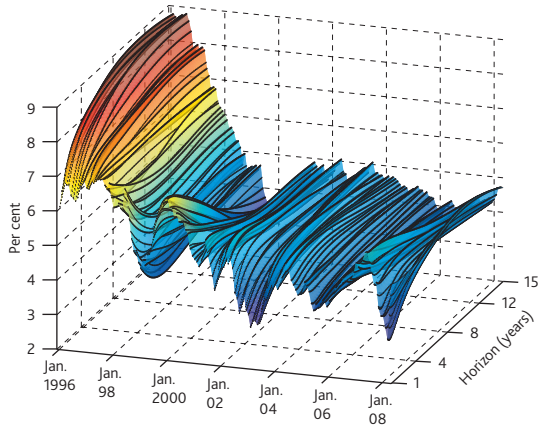


Chart 2 UK real forward rates

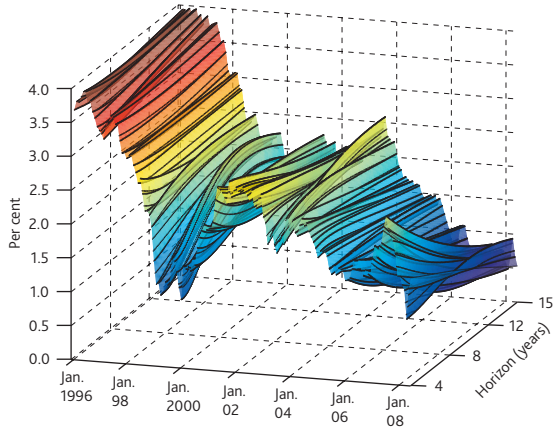
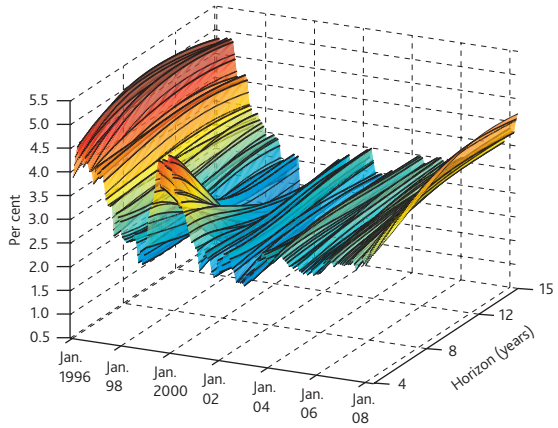


Chart 3 UK RPI inflation forward rates

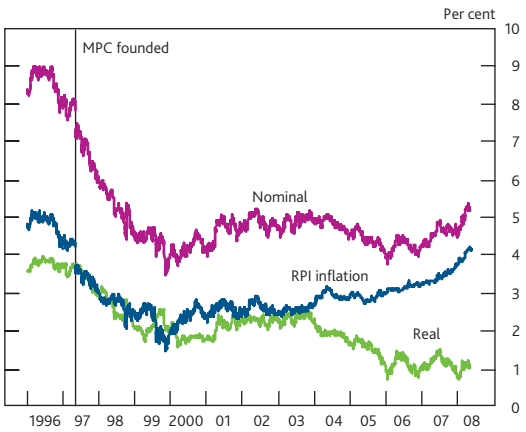


Notes: The level of nominal, real and inflation forward rates is colour coded. This ranges from dark red for periods of high forward rates to dark blue for periods of low forward rates. The shortest horizon for real and inflation forward rates available consistently over the sample is four years, reflecting the lack of index-linked bonds at short maturities.

Source: Bank calculations.

This article describes recent advances in extracting such policy-relevant information from market interest rates. It sets out how term premia are explained by economic theory and shows how both theoretical and empirical models can be applied to understanding the recent behaviour of the UK forward term structures.

Chart 4 UK ten-year forward rates



Source: Bank calculations.

Forward rates versus expected future rates

To begin with, it is important to understand how the forward rates shown in **Charts 1–4** are related to expectations of future interest rates and inflation. To describe this relationship in a tractable manner, much of this article assumes: that government bonds are default-free assets; that investors have no *a priori* preferences for investing in short-term or long-term bonds; and that financial markets operate efficiently and without frictions. The last two assumptions imply that investors do not face any restrictions when deciding whether to hold a long-term bond to maturity or whether to invest in a series of short-term bonds with the same total maturity as the long-term bond. The possible implications of such frictions are returned to later in the article.

Given this setting, a common starting point is to assume that investors require no compensation for risk. This would be the case if investors were not exposed to risk (ie if returns on their investments were certain) or if investors did not mind being exposed to risk (ie if they were 'risk-neutral'). Under these conditions, investors would be indifferent between holding a long-term bond to maturity and investing in a corresponding sequence of short-term bonds. The absence of compensation for risk means that the forward interest rates implied by this sequence of short-term bonds would only reflect investors' expectations about future interest rates. In such a case, the fall in real forward rates would solely reflect expectations of lower real risk-free rates. And the rise in inflation forward rates would solely reflect a rise in inflation expectations.

In reality, of course, investors face uncertain investment returns and tend to dislike being exposed to risk (ie they are 'risk-averse'). Under these conditions, investors are not indifferent between holding a long-term bond to maturity and investing in a corresponding series of short-term bonds. To make them indifferent would require some compensation for bearing risk. This compensation — a so-called risk premium — will drive a wedge between the forward rates shown in

Charts 1–4 and expectations of future policy rates, real risk-free interest rates and inflation rates.

There is a substantial literature which suggests that such risk premia can be large enough to matter, particularly when considering forward interest rates at longer horizons.(1) The presence of potentially large risk premia that may vary over time makes it important to understand the economic determinants of risk premia.

The economic determinants of risk premia

In general terms, a risk premium is the difference between the expected return from a risky asset and the return guaranteed by a corresponding risk-free asset. Risk premia will be related to how uncertain people are about asset returns and the economic outlook more generally. This will influence how exposed to risk people feel. They will also be related to how much people care about exposure to risk. These two factors should have a bearing on whether risk premia will be small or large in absolute terms. But the presence of risk and people caring about it does not imply that a risky asset would necessarily command a higher expected return than a risk-free asset. In other words, risk premia could be negative as well as positive. Indeed, one of the main insights from economic theory is that the sign of risk premia should depend on how asset returns tend to behave under different economic conditions.

Risk premia in the C-CAPM

One of the most popular models, the so-called consumption capital asset pricing model (C-CAPM), derives this insight from the premise that people want to smooth consumption over time. They do this by forgoing consumption and investing in assets during 'good times', when they do not value extra consumption very much, and by selling assets and using the proceeds to support consumption during 'bad times', when they value extra consumption more highly. Assets that deliver low returns during bad times are less useful in smoothing consumption than assets that deliver high returns during bad times. So investors require extra compensation (ie a positive risk premium) from assets with the former characteristics, and accept less compensation (ie a negative risk premium) from assets with the latter characteristics.

In addition to how exposed people are to consumption volatility and how much they care about smoothing consumption, the C-CAPM thus also links risk premia to how useful assets are in helping people to smooth consumption. What does this imply for the type of risk premia that may be present in the forward rates shown in **Charts 1–4**?

Risk premia on index-linked bonds

First, consider real forward rates derived from index-linked government bonds. If held to maturity, the real return on such a bond is certain, as the regular interest payments of the coupons and the final payment of the principal are both adjusted for inflation.(2) But if sold before maturity, the real return is uncertain as the price of the bond will fluctuate with economic conditions. It turns out that whether index-linked bonds carry a positive or a negative risk premium depends on whether people expect the effects of economic disturbances to diminish gradually or whether they expect the effects to increase. In other words, the sign of the risk premium depends on whether people expect bad times to be followed by better times or whether bad times are expected to be followed by even worse times.

Consider the case where bad times (when extra consumption would be valued highly) are expected to be followed by better times (when extra consumption would be valued less). In this case people would want to borrow to bring consumption forward. Such an increase in demand for borrowing would drive up real interest rates with a corresponding fall in the price of index-linked bonds. And these falls will be larger for long-dated index-linked bonds, as more of their cash flows accrue in the future and are thus more heavily discounted. In other words, the longer dated index-linked bonds are, the less useful they would be in helping to smooth consumption. Index-linked bonds would thus carry a positive risk premium, which would be larger the longer dated the bond.

In contrast, if times are expected to get worse before they get better, people would want to save even during bad times. Such an increase in the supply of savings would drive down real interest rates with a corresponding increase in the price of index-linked bonds. These increases would be largest for longer-dated bonds, which would thus be more useful in helping to smooth consumption. Index-linked bonds would thus carry a negative risk premium, which would be more negative the longer dated the bond.(3)

In reality, of course, people's expectations about the persistence of the effects of economic disturbances are likely to change over time. If, for example, in the past people had expected bad times to be followed by better times, but in recent years had expected times to get worse before they get better, the risk premium on index-linked bonds could have changed from positive to negative. This would be consistent with lower real forward rates, even if expectations of future real risk-free rates had remained unchanged.

(1) For a textbook review of empirical studies of risk premia in the term structure of interest rates, see Cuthbertson and Nitzsche (2005).
(2) In practice, index-linked bonds do not deliver a certain real return even if held to maturity because of indexation lags (see Deacon, Derry and Mirfendereski (2004)).
(3) See den Haan (1995) for a more formal discussion of the relationship between real term premia and the persistence of changes in the growth rate of so-called marginal utility.

Risk premia on conventional bonds

Second, consider nominal forward rates derived from conventional bonds. People investing in conventional government bonds will want to take account of the fact that inflation erodes real returns. So part of the difference between nominal and real forward rates will reflect the required compensation for what people expect inflation to be. However, because inflation is uncertain, part of the difference will also reflect a premium for inflation risk. From the previous discussion it follows that whether the inflation risk premium is positive or negative should depend on how useful conventional bonds are relative to index-linked bonds in helping to smooth consumption. It turns out that this is closely linked to the source of economic disturbances.

Suppose that people believed that economic disturbances only affected the amount of output the economy can supply. An example of such a supply disturbance would be an unexpected slowdown in total factor productivity — a measure of how efficiently output can be produced. Such a supply disturbance would reduce output and also lead to higher inflation for a period. So in this case high inflation would erode real returns on conventional bonds when times are already bad. In other words, relative to index-linked bonds, conventional bonds would not be very useful to help people smooth consumption and the inflation risk premium would thus be positive.

In contrast, suppose that people believed that economic disturbances only affected demand. An example of such a demand disturbance would be people becoming more pessimistic about their income prospects. This would tend to reduce spending and output growth and lower inflation. So in this case lower inflation would raise real returns on conventional bonds during bad times. In other words, relative to index-linked bonds, conventional bonds would be more useful in helping people to smooth consumption and the inflation risk premium would thus be negative.(1)

In reality, of course, people do not believe that economic disturbances affect only supply or only demand. Instead, their expectations about the type of disturbance that is most likely to occur in the future will change over time. If, for example, in the past people had expected the most likely disturbances to originate from demand, but in recent years expected them to originate from supply, the inflation risk premium could have changed from negative to positive. This would be consistent with higher forward inflation rates even if inflation expectations had remained unchanged.

Risk premia and term premia

One insight from the preceding section is that the horizon — or term — of the bond has a bearing on the size of the risk premium. As a result, the risk premium on index-linked bonds is also known as a *real term premium*. The same is true for conventional bonds, where the risk premium — which includes the compensation for inflation risk — is known as a *nominal term premium*.

Analysing the term structure in macroeconomic models

Much of the early literature on term premia — and on risk premia in general — focused on simple models that abstract from the fact that consumption goods need to be produced and that people have to work to be able to consume. In these models income arrives like fruit falling from a tree. The simplicity of these so-called endowment models makes them well suited to analysing the role of people's preferences — ie how much people care about smoothing consumption — in determining term premia.(2)

However, the models' simplicity means that they are not well suited to analysing the *interaction* between the macroeconomy and term premia. For example, rather than borrowing during bad times, people may try to smooth consumption by working more. Whether, and at what terms, they are able to do so will be influenced by how costly it is for businesses to adjust the amount of labour they employ. If such labour adjustment costs or other rigidities in the economy make it more difficult for people to smooth consumption in this way, it will effectively expose them to more risk than would otherwise be the case. In other words, term premia and the structure of the economy are not independent of each other.

It has only been in the past ten to fifteen years that advances in computational methods and increased processing power have enabled researchers to analyse term premia in models that allow for some of the interactions described above.(3) These so-called general equilibrium models reduce the complex interactions between households, businesses and policymakers observed in real life to a tractable, stylised description of an economy and have long been used to analyse many other aspects of the economy.

An application

These models can be applied to help think through some of the questions raised in the introduction.

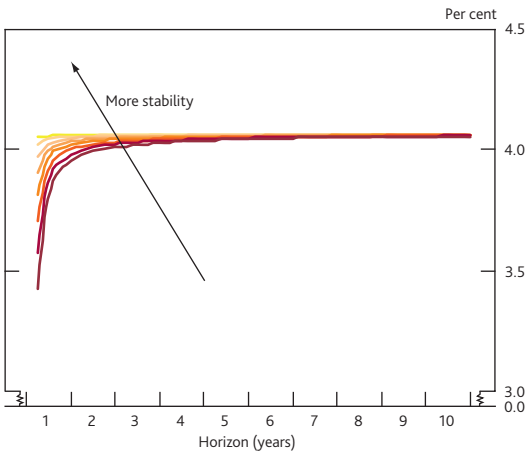
For example, the prolonged stability of output and inflation prior to the onset of the recent turbulence in financial markets — the so-called 'Great Moderation' — was cited at the time as

(1) See De Paoli *et al* (2007) for further discussion and simulation results. See also Campbell, Sunderam and Viceira (2008) and references therein.
(2) See Campbell (1999) for a survey of the implications of different types of preferences for risk premia. See Wachter (2006) for recent work on the implications of so-called habit formation for time variation in term premia.
(3) Jermann (1998) is an early paper considering the effect of capital adjustment costs on risk premia in a so-called real business cycle model. De Paoli *et al* (2007) consider capital adjustment costs and price adjustment costs in a so-called New Keynesian model. Rudebusch and Swanson (2007) consider a similar model, adding labour adjustment costs as well as adjustment costs to wages.

a candidate explanation for the fall in real forward rates that has attracted policymakers' attention.(1) In principle, greater economic stability should correspond to a reduction in uncertainty so that people should have felt less exposed to risk. So, the 'Great Moderation' would have been consistent with lower real term premia. However, in addition to reducing real term premia, a reduction in economic uncertainty should also have reduced people's incentives to invest in a risk-free asset to 'save for a rainy day'. Such a reduction in the supply of these so-called precautionary savings should in turn have led to an *increase* in the real risk-free rate both at the time and going forward. With real risk-free rates and real term premia moving in opposite directions, what would the likely effect of an increase in economic stability on real forward rates have been?

This can be illustrated by simulating models like the ones described above, under different degrees of economic stability.(2) **Chart 5** plots the average term structure of real forward rates for each set of simulations. The fainter lines correspond to the average term structure of real forward rates obtained from simulations that assume a high degree of economic stability. The darker lines correspond to the average term structure of real forward rates obtained from simulations with a low degree of economic stability. **Chart 5** shows that a low degree of economic stability is associated with a low level of the term structure of real forward rates, as the precautionary savings effect reduces real forward rates at all horizons. The effect is more pronounced at shorter horizons as people put more weight on economic uncertainty now relative to economic uncertainty in the future. As the degree of economic stability increases, the real forward curve shifts upwards. In the extreme, stability is so great that all uncertainty is effectively removed. This also removes the incentive for precautionary savings and the term structure of real forward rates is flat.

Chart 5 Illustrative relationship between economic uncertainty and the term structure of real forward rates(a)

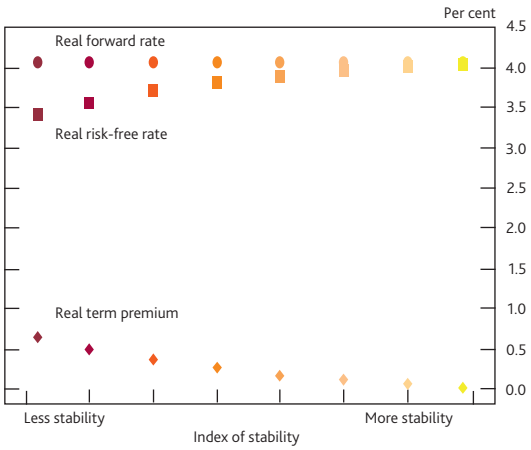


Source: Bank calculations.

(a) Each line shows the average term structure of real forward rates corresponding to one simulation of the model. The term structure is shown for annualised quarterly rates, starting from the real risk-free rate out to forward rates with a ten-year horizon.

Chart 6 slices through **Chart 5** to highlight the developments of the real risk-free rate and the real term premium that make up the real forward rate at the ten-year horizon. It shows that the stability of the ten-year real forward rate reflects offsetting movements in the real term premium and the real risk-free rate.

Chart 6 Illustrative relationship between economic uncertainty and ten-year real forward rates(a)



Source: Bank calculations.

(a) The term premium is defined as the difference between the real forward rate at the ten-year horizon and the real risk-free rate.

The result that greater economic stability tends to be accompanied by an increase, rather than a fall in real forward rates is robust across common specifications of preferences and for different economic disturbances.(3) So this analysis casts some doubt on the 'Great Moderation' as the sole explanation for low real forward rates.

Theory versus data

The discussion above shows that general equilibrium models provide a structured way for thinking through the fundamental linkages between the macroeconomy and the term structure of interest rates. However, these models have to date found it difficult to account quantitatively for movements in the term structure of interest rates. In particular, these models are unable to match the size and variability of term premia suggested by empirical studies.(4) One possibility is that the assumptions on which these models rest do not hold in the real world. For example, the models described usually make quite restrictive assumptions about the preferences of

(1) In the United Kingdom, this decline in inflation and output growth volatility is believed to have begun in the early 1990s. In the United States it is usually dated from around 1984. See Young (2008) for further details and Kohn (2005) for a discussion in the context of long-term interest rates.
(2) The simulations are based on the model described in De Paoli *et al* (2007). Perceptions of greater stability are proxied by reducing the variance of the disturbance to the economy.
(3) Haubrich (1999) and den Haan (1995) show mathematically that as long as shocks to the level of consumption are not permanent, the results shown here hold for standard specifications of preferences, ie 'power utility'.
(4) To the extent that general equilibrium models can match the size of term premia, it comes at the expense of counterfactually large variability in other economic variables such as consumption or wages. See Rudebusch and Swanson (2007) for further detail.

economic agents and assume that the financial markets they operate in are not subject to any frictions.

Empirical models of the term structure

Given the difficulties that general equilibrium models have in matching the size and variability of term premia, there can be advantages in also using approaches that impose less economic structure and rely more closely on the data.

One widely used approach is to model interest rates using so-called affine term structure models.(1) There are many variants of these models, but all are based on three main assumptions: first, that bond prices are set in such a way as to eliminate arbitrage opportunities, so that there are no risk-free profits to be made by trading combinations of bonds; second, that bond prices are driven by a small set of 'factors'; and third, that risk preferences are related to these factors.

The key difference to general equilibrium models is the last assumption, which means that affine models do not explicitly specify the underlying preferences of economic agents. Instead, these models posit a specific relationship between preferences and the factors in the model. These factors may be observed macroeconomic variables such as output or the unemployment rate, or unobservable variables extracted from the data as part of the model estimation, so-called 'latent factors'. The affine terminology stems from the fact that these models have the convenient property that their structure implies that interest rates themselves are a linear (ie affine) function of the factors.

The first assumption of no arbitrage is also made in the general equilibrium models just discussed and ensures that affine models price risk consistently for all bonds along the term structure. In turn this means that affine models can, for example, decompose nominal interest rates at any horizon into expectations about future policy rates and nominal term premia.(2) Expected policy rates in these models can be thought of as being generated as the forecasts from a regression, which includes the lagged values of the interest rate factors, where the coefficients in the regression have been restricted to be consistent with the assumption of no arbitrage. Nominal term premia estimates are derived from the difference between expected policy rates and fitted nominal forward rates.

Because of their simpler structure, affine models can be estimated using conventional econometric techniques. And because they embody fewer theoretical restrictions, and are therefore more flexible, they are able to match the term structure data much more closely than general equilibrium models do. The flipside of having less economic structure, however, is that affine models offer only a limited amount of economic interpretation. While the models can provide a decomposition of forward interest rates at any future horizon into expected policy rates and term premia, they do not generally allow movements in short rate expectations or term premia to be attributed to specific changes in the structure of the economy.(3) Affine models are therefore best viewed as complementary to general equilibrium models, rather than as an alternative to them.

An affine model-based decomposition of UK forward rates

Some recent research at the Bank has applied this affine modelling approach to understanding the UK nominal and real term structures.(4) In the model (which is used below) nominal and real interest rates are explained by four factors: RPI inflation and three latent factors. By modelling real and nominal interest rates jointly, the model ensures that investors price nominal and real bonds consistently, so that for example the real interest rates priced into index-linked bonds are the same as the real interest rates priced into nominal bonds. This means that risk is not only priced consistently along the term structure but also across the nominal and real term structures. As a result, it is possible to use the model to decompose expected future policy rates into inflation expectations and expectations of real risk-free interest rates and to decompose nominal term premia into real term premia and inflation risk premia.

Inflation expectations in this model can be thought of as being generated as the forecast from a regression of inflation on lags of the latent factors and inflation, where the coefficients are estimated subject to the restriction of no arbitrage. But because of the model's structure and the fact that it is estimated over a relatively short sample period (from October 1992 to May 2008), one potential problem is that the factors driving interest rates may be estimated to revert to their long-run values too quickly, so that long-horizon expectations exhibit insufficient variation. To help alleviate this problem, the model also incorporates Consensus survey expectations of inflation five to ten years ahead. The estimation method treats the survey measures as a noisy

(1) Strictly, the models described here are termed 'essentially affine' following Duffee (2002). Such models have been applied widely in academia and by central banks. Applications by central bank economists include Kim and Wright (2005) at the Federal Reserve Board and Hördahl, Tristani and Vestin (2007) at the European Central Bank.

(2) There will also be a 'convexity effect', which reflects the non-linear relationship between bond prices and interest rates. These effects are ignored here, as they are small at the horizons considered.

(3) Some affine models incorporate more economic structure and therefore permit more economic interpretation. In macro-factor models, for example, interest rate movements can be attributed to the included macroeconomic variables (see Ang and Piazzesi (2003) for the seminal paper in this area; for a more recent example see Kaminska (2008), who incorporates demand, supply and monetary policy disturbances into an affine model). Models based solely on macroeconomic factors tend to fit the term structure less well than latent factor models, however, particularly at longer horizons.

(4) See Joyce, Lildholdt and Sorensen (2008). This research builds on earlier work by Lildholdt, Panigirtzoglou and Peacock (2007), who apply a similar framework to model nominal interest rates, and Joyce, Kaminska and Lildholdt (2008), who use a similar approach to model real interest rates.

signal of expectations, putting greater or lesser weight on the surveys according to how closely they match the behaviour of the nominal and real interest rate data. So although the model-implied inflation expectations will equal the survey on average, the model does not constrain the two to be equal period by period.

Developments in long-term forward rates in 1997

Charts 7, 8 and **9** show the decomposition from this model of the ten-year nominal, real and inflation forward rates shown in **Chart 4**.(1) This decomposition sheds some further light on developments in forward rates around the time the MPC was founded in May 1997. For example, the model attributes the fall in the nominal forward rate to a fall in the nominal term premium and to a lesser extent to a lower expected future policy rate (**Chart 7**). **Chart 9** shows that the fall in the inflation forward rate can similarly be accounted for by both a fall in inflation expectations and a fall in the inflation risk premium. This is consistent with the view that the change in the monetary policy framework helped anchor people's expectations of inflation in the medium term and reduced uncertainty about future inflation.(2) In contrast, **Chart 8** shows that the fall in the real forward rate is predominantly attributed to a fall in the real term premium, with expectations of the real risk-free rate little changed.

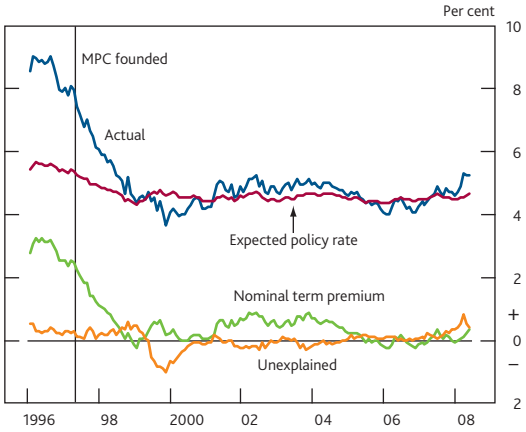
Developments in long-term forward rates since 2003

The model also provides some interesting insights into the concurrent fall in the real forward rate and the rise in the inflation forward rate since 2003, shown in **Chart 4**. The small and stable unexplained component in **Chart 7** shows that overall the model fits the long-horizon nominal forward rate well over this period. The model suggests little change in the expected future policy rate and attributes movements in the nominal forward rate predominantly to changes in the nominal term premium. **Chart 8** and **Chart 9** help to disentangle these movements.

Chart 8 shows that the model attributes a large part of the fall in the real forward rate since 2003 to a fall in the real term premium. In particular, the estimates suggest that the real term premium switched sign around the start of this period and then became increasingly negative. This might imply that investors in index-linked bonds at this time were prepared to pay a premium for the insurance-like characteristics of these bonds. As discussed earlier, this could in principle reflect changes in investors' expectations about the persistence of the effects of economic disturbances. However, the absolute increase in the unexplained component since about 2005 also indicates that more recently the model has found it more difficult to explain movements in the real forward rate.

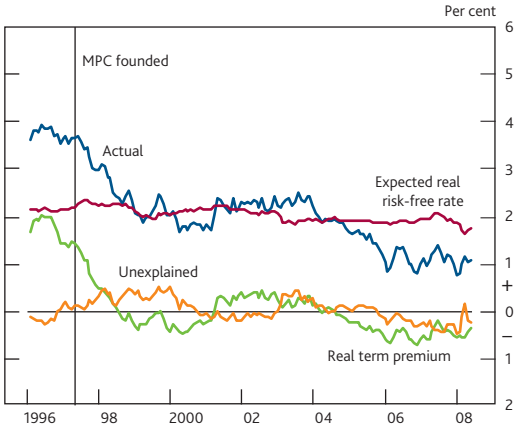
A similar development is apparent in **Chart 9**. Most of the increase in the inflation forward rate since 2003 is attributed to the unexplained component, which becomes positive after

Chart 7 Model-based decomposition of UK ten-year nominal forward rate



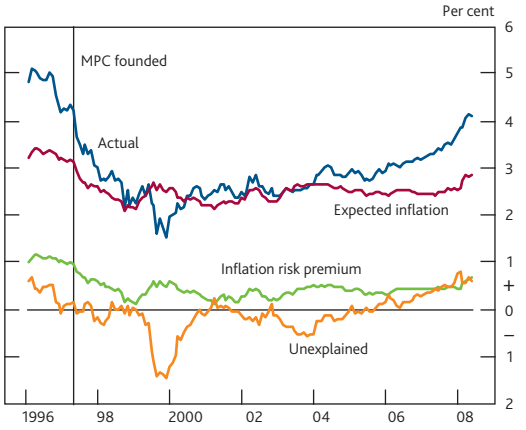
Source: Bank calculations.

Chart 8 Model-based decomposition of UK ten-year real forward rate



Source: Bank calculations.

Chart 9 Model-based decomposition of UK ten-year RPI inflation forward rate



Source: Bank calculations.

(1) The model is estimated using monthly data. So in contrast to **Chart 4**, which shows daily data, **Charts 7–9** show end-month data.
(2) See King (2007) for a further discussion.

2005. Since the start of this year, however, the model estimates do show some evidence of a pickup in long-term RPI inflation expectations and the inflation risk premium. However, despite this increase the level of RPI expectations implied by the model is still broadly consistent with CPI inflation being close to 2.0%, after allowing for the estimated long-run wedge between RPI and CPI inflation.

The model's inability to account fully for movements in real and inflation forward rates since 2003, while at the same time describing nominal forward rates well, could indicate the influence of factors that are specific to the market for index-linked bonds that the model does not adequately capture. In this context, it is worth noting that Bank of England market intelligence attributes lower real forward rates at longer horizons predominantly to the limited supply of long-term index-linked bonds in the face of exceptionally strong institutional demand for such assets. This demand may reflect several regulatory and accounting changes over the past few years that have encouraged pension funds to seek to match their liabilities more closely with inflation-linked assets.(1) If this development lies behind the model's failure to explain long-term real forward rates, it could also potentially account for part of the rise in long-term inflation forward rates over the same period (see also the discussion in the 'Markets and operations' article in this *Bulletin*). This would suggest that the pickup in longer-horizon inflation forward rates since 2003 was not primarily driven by higher expected inflation. This seems to accord with other market intelligence, which provides little indication that market participants' expectations of long-term inflation have picked up in recent years.

Conclusions and directions for future research

This article has reviewed recent advances in extracting and interpreting policy-relevant information from the term structures of forward rates and how they can be used to shed light on the downward trend in long-term real forward rates and the upward trend in long-term RPI inflation forward rates since 2003, both developments that have attracted the attention of policymakers.

The theoretical results suggest that the fall in long-term real forward rates over this period is not easy to reconcile with the prolonged macroeconomic stability prior to the onset of the more recent financial market turbulence. Moreover, over this period, the empirical affine model finds it difficult to account fully for the fall in long-term real forward rates. This is also mirrored in the model's inability to account fully for the rise in long-term inflation forward rates over broadly the same period, although estimated long-term inflation expectations have increased somewhat since the start of 2008. The affine model results are broadly consistent with market intelligence, which suggests that to date long-term inflation expectations appear to remain well anchored. However, the apparent stability of market-based measures of long-term inflation expectations contrasts with the increase in survey-based measures of short-term inflation expectations discussed in another article in this *Bulletin*.(2)

The difficulties accounting for and explaining some of the more recent movements in the term structure of forward interest rates and inflation rates pose challenges for future research. One aspect of this is to try to bring the theoretical and empirical approaches to modelling the term structure closer together. This could in principle be done by introducing more structure into empirical models, or by making the general equilibrium models match the data more closely. One reason perhaps that this has yet to be achieved convincingly is that most models of the term structure, like those described here, abstract from what can be broadly described as financial market imperfections. These may include the so-called 'search for yield' that is said to have increased investors' demand for risky assets in order to meet nominal return aspirations, or strong demand for index-linked bonds from particular investor groups such as pension funds. The affine term structure models described here may be picking up some of these effects indirectly. But an understanding of how to characterise such behaviour by different groups of investors more formally and how it impacts on financial prices is not yet well developed.

(1) These issues are discussed further in McGrath and Windle (2006).
(2) For a discussion of short-term inflation expectations see Benford and Driver (2008).

Interest rate concepts and measurement

This box explains some of the terminology used in this article in more detail and how the forward interest rates shown in **Charts 1–4** are estimated.

Concepts

A bond is a promise by the issuer (borrower) to pay interest (coupons) to the investor (lender) until the bond's maturity date, at which point the investor receives the final coupon payment and the principal (the bond's face value). Bonds issued by the UK government are known as gilt-edged securities or gilts.

The *yield to maturity* of a bond is a measure of a bond's implied average interest rate, if it is held to maturity. Though commonly used, this measure has the disadvantage that it is calculated assuming that all coupon payments are reinvested at this same average interest rate. This will not usually be the case unless future interest rates are constant.

The *spot yield* or *spot interest rate* is the same as the yield to maturity in the special case of a bond that does not pay coupons, a so-called 'zero-coupon' bond. It is therefore not affected by any assumptions about the size or timing of coupon payments or the rate at which they can be reinvested.

Forward yields or *forward interest rates* are the interest rates between different horizons in the future implied by current spot rates. Spot rates are averages of forward rates. So any particular forward rate can be derived from the two spot interest rates whose maturities span the period of the forward rate. For example, if the two-year spot rate is 10% and the one-year spot interest rate is 5% then the one-year forward rate relating to the second year is roughly 15%.(1)

The terms *yield curve* and *term structure of interest rates* are often used interchangeably. The term structure of forward rates or the forward yield curve shows implied interest rates at different future horizons on a given date.

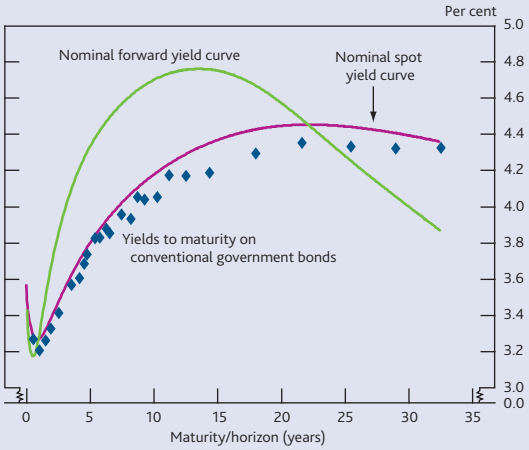
Measurement

The UK government issues nominal bonds (*conventional gilts*) and real bonds (*index-linked gilts*). Most UK government bonds pay coupons semi-annually. Real bonds are indexed to the retail prices index (RPI) and differ from nominal bonds in that both their coupon payments and principal are adjusted in line with inflation. Conventional and index-linked gilts are issued for a limited set of maturities, and the range of outstanding maturities changes through time, reflecting the pattern of new bond issuance and outstanding bonds approaching their maturity date.

In order to produce a yield curve, a method is needed that disentangles the interest payment on coupon-paying bonds to form hypothetical zero-coupon bonds and at the same time 'fills in the gaps' to give a continuous curve at any point in time. The Bank of England achieves this by estimating nominal and real yield curves using a smoothed 'cubic spline' method. This method results in yield curves that show greater flexibility at shorter maturities and less at longer maturities.(2)

As an example, **Chart A** shows the estimated UK government nominal spot and forward yield curves on 30 May 2003 together with the yields to maturity on the outstanding (coupon-paying) government bonds used to construct them.(3) The yields to maturity on most bonds lie slightly below the spot curve, reflecting the fact that the spot curve was upward sloping at this time. Given the way yields to maturity are constructed on coupon-paying bonds, yields in this case tend to be lower than spot rates because they are effectively weighted averages of the lower spot rates at intervening maturities (the opposite relationship would hold if the yield curve was downward sloping). This brings out the point that a curve based on yields to maturity can sometimes give a different and potentially misleading picture. The differences between the forward and spot curves also emphasises the importance of being clear about which measure of long-term interest rates is being used.

Chart A UK government nominal spot and forward yield curves on 30 May 2003



Source: Bank calculations.

A similar method is used to construct real spot and forward curves, though this is a slightly more complicated procedure, as the method needs to allow for the fact that index-linked bonds are not perfectly indexed for inflation because of so-called indexation lags. Inflation spot and forward curves are then derived as the difference between the equivalent nominal and real curves.

(1) More precisely, assuming discrete annual compounding, this can be calculated as 15.24% from the expression $[(1 + 0.1)^2/(1 + 0.05)] - 1$.
(2) This is referred to as a variable roughness penalty method. See Anderson and Sleath (2001). More details on the Bank of England's yield curve estimates are contained on the Bank's website at www.bankofengland.co.uk/statistics/yieldcurve/index.htm.
(3) The curve is also estimated from general collateral repo rates, which are not shown, as these instruments are closer to zero-coupon bonds.

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How do mark-ups vary with demand?

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The Monetary Policy Committee's (MPC's) objective is to deliver price stability. In order to achieve that goal, it is necessary to understand how inflation reacts to economic events. In the long run, inflation is determined by monetary policy. But over a shorter time horizon, one important determinant of changes in inflation is the gap between the prices charged by businesses and the costs that they face: that 'mark-up' will influence how changes in demand relative to supply feed through into consumer price inflation. The evidence presented in this article suggests that mark-ups vary positively with excess demand. That will increase the sensitivity of inflation to changes in excess demand. But it could also increase the efficacy of monetary policy, since the level of excess demand is in part determined by the level of Bank Rate set by the MPC.

Introduction: why do we care about the mark-up?

In the United Kingdom, the Monetary Policy Committee's (MPC's) monetary policy objective is to deliver price stability, which is defined by the Government's 2% inflation target for the consumer prices index (CPI). That does not mean that the MPC seeks to keep inflation at precisely 2% every month: any attempt to do so would require large changes in interest rates and so would inject unnecessary uncertainty into the economy. Instead, the Committee aims to set Bank Rate such that when inflation is moved away from its 2% target by a disturbance (or 'shock'), it returns to target within a reasonable time period.

As this discussion makes clear, knowing how inflation is affected by shocks is critical to the Committee achieving their goal of price stability. And in order to understand the dynamics of inflation after a disturbance, it is important to understand how prices move in reaction to economic events. Businesses that have some degree of market power typically set price as a mark-up over marginal cost, with the aim of maximising profits. So crucial to understanding how prices move following a disturbance in the economy are the dynamics of the mark-up, and in particular how it responds to movements in aggregate demand and supply. For example, a key judgement in the May 2008 *Inflation Report* was the extent to which consumer-facing companies pass higher energy and import costs on into higher prices, or absorb them by pushing down on labour costs or accepting lower profits at a time of slowing demand and rising spare capacity.

Economic theory is ambiguous about how the mark-up reacts to movements in demand and supply; that is an empirical question. This article brings together some recent findings on the behaviour of the mark-up, focusing on how it varies with movements in demand relative to supply capacity, referred to in this article as 'excess demand'. The first section defines the mark-up and explains how it is related to the profit margin. The next section explains why theory cannot say how mark-ups respond to changes in excess demand. The third section analyses what the empirical evidence says about that response, drawing on data for both the economy as a whole and for individual industries. The final section draws together the results from this analysis and discusses the implications for monetary policy.

The mark-up and the profit margin: similar but different

The terms 'mark-up' and 'profit margin' are often used in the same context but they are not the same. The 'mark-up' is the gap between the price that a business charges and its marginal cost (the additional cost of producing an extra unit of output). That gap is likely to be lower for businesses which face greater competition: in more competitive markets businesses are more likely to undercut the prices charged by their rivals and that limits their ability to set price above marginal cost. That is not to say that changes in competitiveness are the only factor that drive changes in the mark-up; rather, if there is a disturbance to the economy then the degree of competition will determine the level at which the mark-up will eventually settle.

The 'profit margin' is usually understood to be the ratio of profits (or 'gross operating surplus') to gross output. The annex to this article discusses the relationship between that profit margin and the mark-up. Businesses often talk about raising and lowering their profit margins, and rarely make mention of their mark-up. But it is the mark-up, not the profit margin, which is the variable that each business has in mind when setting its price: given its expectations about costs, a business can, and does, alter its mark-up but it cannot directly control its profit margin. That will instead be determined by demand for the business's output, given its choice of mark-up. So it is the response of the mark-up which determines how changes in excess demand affect businesses' price decisions and not the profit margin. That means that understanding movements in the mark-up is important for understanding the dynamics of inflation and so maintaining price stability.

But measuring the mark-up is tricky: it cannot be directly observed so instead must be estimated; and any estimate will depend on how businesses are assumed to combine inputs (such as capital and labour) to produce output. In contrast, it is straightforward to calculate profit margins. And, as shown in the annex, if the profit margin increases when excess demand increases then the mark-up, in general, will rise too. That means that profit margins can serve as a useful cross-check when policymakers are trying to assess movements in mark-ups: using the reaction of profit margins to changes in excess demand to deduce the likely response of the mark-up limits the criticism that movements in the estimated mark-up reflect mismeasurement.

The response of mark-ups to changes in excess demand: what does theory say?

Economic theory is unable to say unambiguously how mark-ups and profit margins respond to changes in excess demand. That is for (at least) two reasons. First, for any given change in excess demand, the mark-up will be affected by how quickly wages and other costs adjust relative to the speed at which prices change. For an intuitive example, consider the case of an increase in excess demand. If prices adjust slowly but wages are flexible, then the mark-up will fall: in order to supply the extra output demanded businesses must employ more labour; that necessitates higher wages, raising marginal costs; and since prices respond more slowly than wages, costs rise faster than prices, reducing the mark-up. Theory cannot predict whether wages or prices will respond quickest to a change in excess demand and so cannot say how the mark-up will respond to that change.

Second, the level of mark-up that businesses would ideally like to set at the current time — their 'desired' mark-up — may depend on what they think will happen to excess demand going forward. That is because, for a given current mark-up, changes in the level of future excess demand will affect a business's total level of profits over time. There are various theories about how businesses will set their current mark-up given their expectations about excess demand. Some of these, such as the 'customer-market' model of Phelps and Winter (1970) predict that businesses' desired mark-ups will rise when current excess demand is high relative to future excess demand. In that model, a business's current choice of mark-up affects its level of profits, both today and in all future periods, via market share: the higher the mark-up and thus the price that the business charges, the more its customers will switch to rivals offering lower prices and so the lower its future profits will be. But by setting a higher mark-up today, the business will reap greater profits now. So there is a trade-off: a higher mark-up today increases current profits but depresses future profits. Should the business raise its mark-up? That depends on whether it expects excess demand to increase or decrease over the coming periods. If excess demand is expected to fall going forwards, then a given loss of market share will result in fewer lost sales and so the fall in future profits will be smaller than the rise in current profits; if excess demand is expected to rise, then the opposite will be true. That means that businesses will want to raise their mark-up when current excess demand is high relative to future expected excess demand, so mark-ups will be positively correlated with excess demand.

In contrast, other models predict that businesses will reduce their mark-ups when they expect excess demand to fall. For example, in the 'implicit collusion' model of Rotemberg and Woodford (1992), businesses (implicitly) collude over prices rather than set prices independently. That collusion is supported by the threat of lowering prices: if a business undercuts its competitors, then its profits will rise temporarily as it gains sales but fall in the longer run as the other businesses retaliate and cut prices too. The expectation that future demand will be lower than current demand increases each business's incentive not to collude: the temporary rise in profits from increased sales will be greater than the fall in future profits. So in order to keep the collusive agreement going, businesses must lower the current collusive price. That means that businesses' collusive, or desired, mark-up will fall when current demand is high relative to future demand, which implies that mark-ups are negatively correlated with excess demand.

So economic theory is ambiguous about how mark-ups respond to changes in excess demand. That means that it is necessary to examine the empirical evidence on the behaviour of mark-ups. The next section of the article draws on data for the United Kingdom, looking first at the mark-up across the economy as a whole and then studying data for individual industries.

Empirical evidence on the response of mark-ups to changes in excess demand

The economy-wide mark-up

Monetary policy makers focus on how key variables — such as the mark-up — behave across the economy as a whole. So this section examines how the 'aggregate' mark-up changes in response to changes in excess demand.

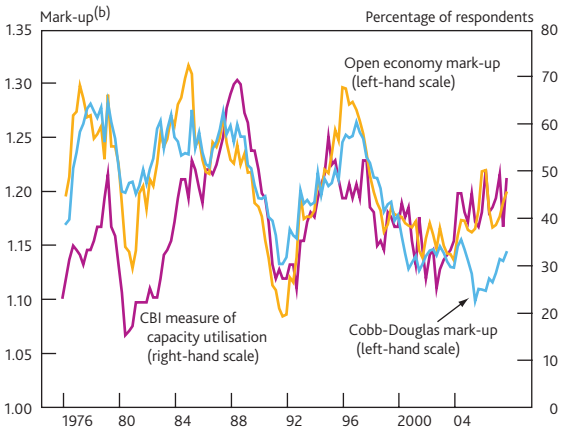
As noted in the annex, one method of estimating the mark-up is to make an assumption about how businesses combine inputs to produce output — their 'production function'. A simple starting case is the Cobb-Douglas function; given that assumption, the aggregate mark-up will be inversely proportional to the aggregate labour share, the ratio of total compensation paid to workers to the value of output produced. But that production function is likely to be too simple a representation of how businesses produce output. So this article also considers estimates of the mark-up implied by two more realistic production functions. The 'labour hoarding' version captures a feature of employment data: businesses are sometimes slow to reduce the number of workers they employ when demand begins to fall. The 'open economy' production function reflects the fact that businesses in the United Kingdom use some imported goods, such as energy and raw materials, to produce output.

Charts 1 and **2** plot the estimated mark-up for the private sector based on these three production functions, over the period 1976 Q2–2007 Q4. Also plotted in the charts is an indicator of excess demand from the *CBI Quarterly Industrial Trends* (*QIT*) survey: the percentage of businesses in the manufacturing sector reporting that their output is above capacity. This variable is often referred to as 'capacity utilisation'.(1) There are, of course, other indicators of excess demand, some of which are used later in the article. But the general picture presented in **Charts 1** and **2** is similar if any of these alternatives are used in place of capacity utilisation.

Chart 1 suggests that the measures of the mark-up derived from the Cobb-Douglas and open economy production functions fall when excess demand falls and rise when it strengthens. But interpreting the evidence in **Chart 2** for the mark-up derived from the production function adjusted for labour hoarding is less straightforward: that measure appears to trough a little before capacity utilisation does, such that it starts to rise while excess demand is still falling, especially in the first half of the sample period.

Table A examines the relationships between the measures of the mark-up and capacity utilisation more formally. It shows that the estimates of the mark-up based on the Cobb-Douglas and open economy production functions are positively correlated with the contemporaneous survey estimate of

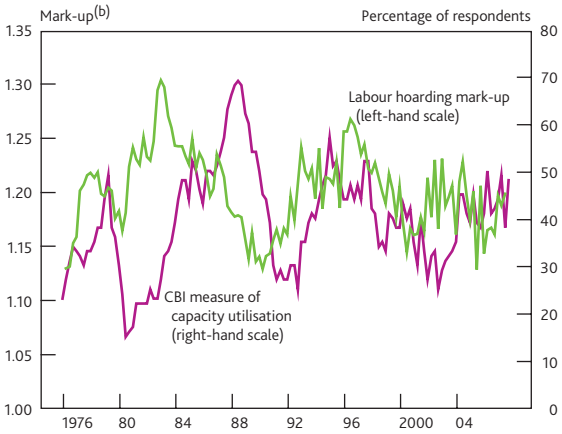
Chart 1 Estimates of the mark-up based on the Cobb-Douglas and open economy production functions and capacity utilisation(a)



Sources: Bank of England, CBI, ONS and authors' calculations.

(a) For full details of how these estimates of the mark-up are constructed, see Macallan, Millard and Parker (2008).
(b) Ratio of price to marginal cost.

Chart 2 Estimate of the mark-up based on the labour hoarding production function and capacity utilisation(a)



Sources: Bank of England, CBI, ONS and authors' calculations.

(a) See footnote (a) to **Chart 1**.
(b) See footnote (b) to **Chart 1**.

Table A Correlations of the estimated aggregate mark-ups based on different production functions with capacity utilisation(a)

	1976 Q2–2007 Q3	Since 1992
Cobb-Douglas	0.28**	0.43**
Labour hoarding	-0.09	0.30*
Open economy	0.44**	0.70**

Note: * denotes significant at the 5% level; and ** denotes also significant at the 1% level.

Sources: Bank of England, CBI, ONS and authors' calculations.

(a) See footnote (a) to **Chart 1**.

(1) This measure is the percentage of businesses responding 'no' to *Question 4* in the survey. It would be preferable to have an estimate of the level of capacity utilisation in the economy as a whole. But such a measure is not available for much of the sample period, since surveys of the services industries have a shorter back run than the *CBI QIT* survey. However, for the period when service sector data are available, there is quite a close correlation between capacity utilisation in the two sectors.

capacity utilisation. Against this, the measure that allows for labour hoarding appears to move in the opposite direction to changes in excess demand, although the correlation is not significant at the 10% level.

Given that there is some evidence to suggest that the mark-up varies positively with changes in excess demand, it is interesting to investigate whether these correlations have changed over time. In particular, did the relationship between the mark-up and demand alter after 1992? In that year, the United Kingdom adopted inflation targeting. Furthermore, between 1992 and the end of the sample period there were no recessions in the United Kingdom and the volatility of output was greatly reduced. So businesses were operating in a different economic environment and that might have caused them to change the way in which they set prices relative to costs.

The second column of **Table A** provides some insight into this issue. It shows that, for the period from 1992 to 2007 Q3, all three measures of the mark-up were positively correlated with capacity utilisation, a result which contrasts with those for the whole sample. So the evidence suggests that mark-ups are now more likely to respond positively to changes in excess demand than they were prior to 1992. That finding is broadly consistent with existing empirical evidence for the United Kingdom. For example, Haskel *et al* (1995) found a positive correlation between mark-ups in the manufacturing sector and excess demand.(1)

Industry-level mark-ups and profit margins

So far, the article has investigated how the aggregate mark-up varies with changes in excess demand. But it is also instructive to examine whether there are any differences in the way mark-ups respond to excess demand in different industries; if such differences exist then the behaviour of the mark-up across the economy as a whole will depend on how shocks to the economy affect individual industries and sectors. For example, a slowdown led by the financial and consumer sectors could have a very different effect on the aggregate mark-up than one led by a downturn in the construction sector.

Small (1997) has investigated mark-ups and profit margins at the industry level. Using a slightly different method to that outlined in the annex, he calculated mark-ups for six broad industries within the services sector and ten, more narrowly defined, industries within manufacturing from 1968 to 1991. These estimated mark-ups were positively correlated with indicators of excess demand such as capacity utilisation, and to a similar extent in all 16 industries.

Small's (1997) analysis can be extended using data from the Bank of England industry data set (BEID).(2) This data set divides the market sector of the economy into 31 industries, including both manufacturing and service sector industries. The data are annual and cover the period from 1970 to 2003. Using the BEID, the relationship between mark-ups and excess demand can be studied in finer detail than Small's (1997) study; and the analysis can be extended to investigate how mark-ups have changed since 1992, a period not covered by Small's (1997) sample.

Table B shows how mark-ups vary on average across industries in response to changes in three different indicators of aggregate excess demand. A range of indicators is used because excess demand cannot be directly observed and so must be estimated. One common method for doing that is to take data on actual output, or labour input, and use statistical techniques to remove 'trend' or 'normal' variation. The three indicators in **Table B** reflect that method: the deviation of log private sector output from its trend, as estimated by a statistical method called the Hodrick-Prescott filter; and the deviation of log private sector hours from its trend, which is either assumed to be linear or measured by a Hodrick-Prescott filter.(3)

Table B Estimates of the response of mark-ups on average across industries to changes in excess demand

Excess demand indicator	Average market sector industry response of mark-ups to changes in excess demand indicator[a]
Hodrick-Prescott filtered GDP	0.013**
Linearly detrended hours	0.038**
Hodrick-Prescott filtered hours	0.048**

Note: ** denotes significant at the 1% level.

Sources: Bank of England and authors' calculations.

(a) Absolute change in mark-ups on average across the market sector industries in response to a 1 percentage point change in the indicator of excess demand.

What can these indicators say about the relationship between mark-ups and excess demand? A positive number in **Table B** suggests that mark-ups, on average across industries, vary positively with excess demand. So the BEID data support Small's (1997) findings: mark-ups in the 31 market sector industries on average respond in the same direction as changes in excess demand.

Unfortunately, the BEID does not contain sufficient years of data to examine how mark-ups respond to excess demand in each industry separately. But it is possible to examine how profit margins react at this level of detail. That is useful because, as noted in the annex, under fairly general conditions changes in excess demand will cause the mark-up and the

(1) These results are somewhat at odds with evidence for the United States, the country studied in most of the existing literature. For example, Rotemberg and Woodford (1999) find that estimates of the mark-up calculated from the more realistic production functions move in the opposite direction to excess demand.
(2) For a detailed description of the BEID, see Oulton and Srinivasan (2005).
(3) The indicator of excess demand used in the charts above, capacity utilisation as measured by the *CBI QIT* survey, cannot be used here because the method used to estimate the results in **Table B** requires more years of data than are available.

profit margin in any particular industry to move in the same direction. The BEID data suggest that profit margins are, in general, positively correlated with various indicators of excess demand, although there are only a few industries in which the correlation is particularly high (**Table C**). That appears to be because, at the industry level, profit margins have sometimes been subject to sudden changes caused by sector-specific events and these movements tend to dominate any other variation in profit margins.

Table C Market sector industries in which the correlation between gross profit margins and capacity utilisation is significant at the 10% level[(a)]

Industry	Correlation coefficient
Non-metallic mineral products	0.68**
Basic metals and metal goods	0.65**
Paper, printing and publishing	0.60**
Chemicals and pharmaceuticals	0.60**
Agriculture	0.55**
Food, drink and tobacco	0.45*
Vehicles	0.41*
Retailing	0.39*
Business services	0.39*
Hotels and catering	0.34
Mechanical engineering	0.34
Water supply	0.32
Communications	0.32

Note: * denotes also significant at the 5% level; and ** denotes also significant at the 1% level.

Sources: Bank of England, CBI and authors' calculations.

(a) Capacity utilisation is the CBI measure used in **Charts 1** and **2**, averaged over the year.

The result that profit margins respond in the same direction as excess demand is also supported by business-level evidence. Using annual company accounts data for the period from 1972 to 1992, Small (1997) finds that profit margins calculated at this level of disaggregation vary positively with a variety of excess demand indicators.

Implications for monetary policy

The evidence presented above suggests that the mark-up in the United Kingdom is positively correlated with excess demand, both at the aggregate and at the industry level, consistent with the 'customer-market' model outlined above. That means that, other things being equal, mark-ups will tend to add to inflationary pressures when demand is growing more strongly than supply, and put downward pressure on inflation as the amount of spare capacity increases. The MPC seeks to achieve its inflation target in part by changing Bank Rate to influence the level of demand in the economy. So the relationship between mark-ups and excess demand is an important part of the transmission mechanism of monetary policy.

The results also suggest that the effect of an increase in input costs on consumer prices will depend on the state of the economy: if costs rise at a time when demand is relatively weak then businesses will seek to maintain sales by dampening the impact of those cost increases on their prices — that is, by reducing their mark-ups; and that reduction in mark-ups will delay the full pass-through of the rise in costs into inflation. That is consistent with the central projection in the May 2008 *Inflation Report* which assumes that businesses' profit margins and mark-ups will contract as the amount of spare capacity in the UK economy increases. But that contraction only partially offsets the impact of the sharp rises in energy and import costs on inflation.

Conclusion

This article has examined how mark-ups and profit margins vary with excess demand. Understanding those movements is crucial to understanding how inflation responds to changes in economic disturbances and so helps the Monetary Policy Committee to achieve their goal of price stability. Since theory does not make clear predictions about how the mark-up varies with excess demand, answering this question becomes an empirical matter.

The evidence presented in this article, consistent with previous work, suggests that the mark-up in the United Kingdom is positively correlated with excess demand, both at the aggregate and at the industry level. Furthermore, the correlation between the aggregate mark-up and capacity utilisation appears to have strengthened since 1992, which could suggest that the mark-up has become more responsive to changes in excess demand over the past fifteen years. These results support the assumption in the May 2008 *Inflation Report* that businesses' profit margins contract somewhat as the amount of spare capacity increases and as businesses' non-wage costs rise.

That mark-ups vary positively with excess demand also implies that either prices respond to economic events faster than do wages and/or that businesses' desired mark-ups also vary positively with excess demand. Trying to distinguish between these alternatives could be a useful avenue for future work. Indeed, the Bank has recently carried out a survey of the price-setting behaviour of around 700 companies partly in order to obtain an answer to this question. The results from this survey, including a comparison to a similar survey conducted in the mid-1990s, will be published in due course.

Annex
Understanding the aggregate mark-up and the aggregate profit margin

The aggregate mark-up

The term 'mark-up' is typically used to refer to the gap between the price that a business charges, P, and its marginal cost, MC (the additional cost when output is increased by one unit). The mark-up cannot be calculated from this definition, since marginal costs are unobservable. But it can be shown that, for a profit-maximising business, the mark-up will be given by:

$$\text{Mark-up, } m = \frac{P}{MC} = \frac{\varepsilon_{yh}}{s} \qquad \textbf{(A1)}$$

That is, the mark-up, m, is equal to the elasticity of output with respect to labour input, ε_{yh} (which reflects how much extra output can be produced when the business hires an additional unit of labour), divided by the labour share, s (the amount of nominal GDP that accrues to workers in the form of compensation). This relationship will hold in the economy as a whole, as well as for an individual business.

An economy-wide labour share can be easily estimated using data in the National Accounts. But calculating the elasticity of output is trickier: the formula used in that calculation will change depending on what one assumes about the 'representative' business's production function — that is, how inputs are combined to produce output. One of the simplest assumptions to make is that businesses have a 'Cobb-Douglas' production function:

$$y = Ah^{\alpha}k^{(1-\alpha)} \qquad \textbf{(A2)}$$

Here, h is the business's labour input in hours and k its capital input; A represents its level of technology; and α is a fixed parameter which reflects the proportions in which the business combines labour and capital to produce its output, y. One property of the Cobb-Douglas production function is that the elasticity of output with respect to labour input (ε_{yh}) is a constant (α). And that means that the mark-up will be proportional to the inverse of the labour share.

In practice, the Cobb-Douglas production function is likely to be too simple a representation of how businesses produce output. For example, it assumes that businesses always employ just enough labour in order to produce their desired level of output. But businesses may hoard labour — that is, they do not fire workers immediately when demand for their output falls, probably because the fall in demand could prove temporary and it is costly to hire and fire workers. Furthermore, the United Kingdom is an open economy and so businesses will usually import goods, such as energy and raw materials, in order to produce output. The production function can be adapted so that it allows for these alternative assumptions.

Using alternative production functions does not mean that equation **(A1)** cannot be used to estimate the mark-up. But with different assumptions, the mark-up will no longer be proportional to the inverse of the labour share.

The aggregate profit margin

The term 'profit margin' is used to denote the ratio of profits (or 'gross operating surplus') to some other variable. One common choice for that other variable is the capital stock; that measure of the profit margin is also termed the 'rate of return on capital'. But since it is difficult to obtain reliable capital stock data, this article focuses instead on the ratio of total profits to gross output, a measure sometimes termed the 'gross profit share'. So if the business above, which sells its output, y, at price P, pays a wage of W to each unit of labour input and uses another composite intermediate input, x, which costs q per unit, then its gross profit margin will be:

$$\frac{Py - Wh - qx}{Py} \qquad \textbf{(A3)}$$

The relationship between the mark-up and the profit margin

How does the mark-up relate to the profit margin? It can be shown that:

$$\text{Gross profit margin} = \frac{Py - Wh - qx}{Py} = 1 + r\frac{k}{y} - \frac{1}{m} \qquad \textbf{(A4)}$$

Equation **(A4)** highlights a key relationship between the mark-up and the profit margin: the response of the profit margin to a change in demand will depend on how the opportunity cost of capital (r), the capital to output ratio ($\frac{k}{y}$) and the mark-up react to that change in demand. Data show that capital remains relatively fixed over the cycle, so the capital to output ratio is unlikely to increase when demand rises; the data also suggest that there is little correlation between the cost of capital and excess demand. That means that the only way that the gross profit margin can rise when demand rises is if its third determinant, the mark-up, also rises with demand.

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On the sources of macroeconomic stability

By Garry Young of the Bank's Monetary Assessment and Strategy Division.

In September 2007, the Bank of England hosted an international conference on the sources of macroeconomic stability. This article summarises some of the ideas and debates that were raised at the conference. It focuses particularly on the role of monetary policy in fostering macroeconomic stability and draws out some of the implications for policy and research. These issues are relevant to the current economic situation. The UK economy is likely to be better able to withstand the turbulence it is currently experiencing if the previous prolonged period of stability was caused by sustainable structural change and an improved policy framework.

Introduction

The volatility of output and inflation has varied substantially across countries and over time. While the global economy was very turbulent in the 1970s, macroeconomic volatility declined sharply in the following years in what has been termed the 'Great Moderation'. This decline took place to different extents in different countries. In the United States, for example, the Great Moderation is usually dated from around 1984.

Macroeconomic conditions in the United Kingdom became more stable after 1992. But monetary policy makers have been at pains to stress that a continuation of such 'nice' (Non-Inflationary Consistently Expansionary) economic conditions could not be taken for granted.(1) Indeed, the major economies are currently experiencing a set of shocks that may mean that the Great Moderation period is eventually judged to be one of only temporary respite from a more normal level of macroeconomic volatility. Whether this is the case or not depends on its causes. If the Great Moderation was caused by sustainable changes in the structure of the global economy and an improved policy framework then it is likely to be more enduring than if it was simply a lucky period of smaller or offsetting economic shocks.

To facilitate greater understanding of the sources of macroeconomic stability, the Bank hosted an international conference on the topic in September 2007.(2) The participants included many of those who have contributed to the academic literature on this issue. Disentangling the causes of changes in macroeconomic performance is not straightforward and remains controversial: there is not yet any clear consensus on what caused the reduction in both output and inflation volatility in a wide range of countries around the end of the 20th century.

This article summarises some of the explanations of the Great Moderation discussed at the conference, sets them in the context of the wider academic literature and notes some directions for future research. The first section of the article sets out some of the key facts of the Great Moderation; the second section reviews some of the possible causes that have been suggested; and the final section concludes.

Macroeconomic stability

In order to set the scene, this section outlines some of the facts that underlie the debate about the causes of greater macroeconomic stability, focusing mainly on the unusually stable conditions achieved in the United Kingdom from the end of 1992 until the beginning of the recent financial market turbulence in the middle of 2007.

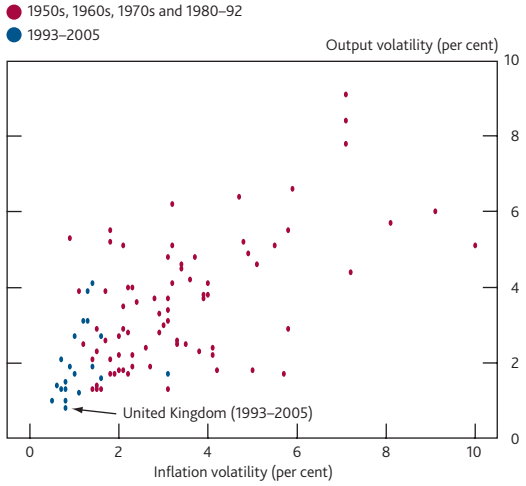
Macroeconomic evidence

One of the main characteristics of the Great Moderation period is that inflation in most advanced economies was low and stable. Indeed, in the United Kingdom, inflation was more stable than could reasonably have been predicted. In the ten years after the Monetary Policy Committee (MPC) was established in May 1997, inflation deviated by more than 1 percentage point from its target in only one month, whereas calculations made at the start of this period had suggested that this would happen almost as often as not (Bean (1998)).(3) Moreover, low and stable inflation appears to have been achieved at negligible cost in terms of lost output, consistent with the consensus view that there is no long-run trade-off between output and inflation. For a range of countries, the

(1) See, for example, the Governor's speech at the East Midlands Development Agency/Bank of England dinner, October 2003 (King (2003)).
(2) The conference programme and links to papers and slides is available at www.bankofengland.co.uk/publications/events/gsconfsep07/programme.htm.
(3) Economic performance over the ten years since the Monetary Policy Committee was established is described in Bank of England (2007).

combinations of inflation and output growth *volatility* achieved in the period from 1993 to 2005 were generally more favourable than had been the case throughout the rest of the post-war period (**Chart 1**).(1) In the United Kingdom, inflation and output volatility fell sharply from around 1992 (**Chart 2**). The box on pages 176–77 shows that there was no obvious change in the relative volatility of the different components of demand over this period — most fell broadly in line with the volatility of output.

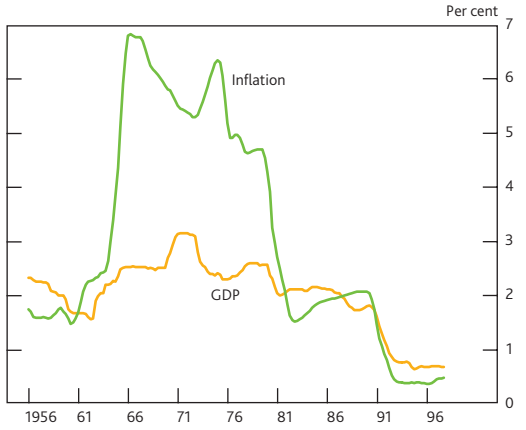
Chart 1 Inflation and real output growth volatility across countries



Note: The scatter plot shows the standard deviation of inflation and output growth for each of 20 industrial countries in different periods of similar length from 1950 to 2005.

Source: Global Financial Data.

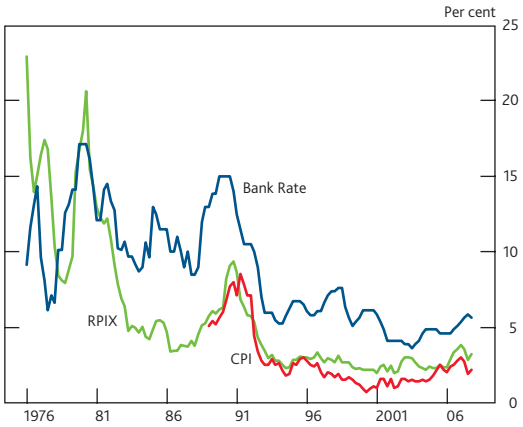
Chart 2 Inflation and real output growth volatility in the United Kingdom



Notes: Rolling ten-year standard deviations of four-quarter GDP growth and RPIX (RPI before 1976) inflation. Standard deviations are leading, so the final observation on the chart is 1998 Q1 showing the standard deviation over the subsequent ten years.

Not only was inflation low and stable during the Great Moderation, it was also less persistent than it had been at other times in the past: in other words, fluctuations in inflation tended to be short-lived. Greater stability was also achieved without an increase in nominal interest rate fluctuations. In fact, nominal interest rates were more stable between 1992 and 2007 than they had been in the past (**Chart 3**).

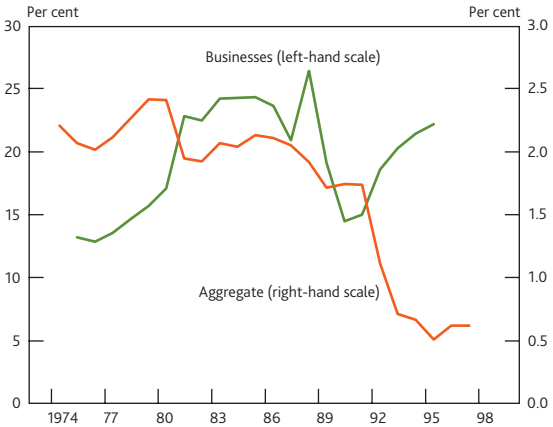
Chart 3 UK inflation and nominal interest rates



Business-level evidence

In his contribution to the conference, Diego Comin drew attention to evidence that greater stability at the aggregate level had not been matched among individual businesses.(2) A similar feature is present in the United Kingdom (Parker (2006)). In general, business-level volatility is much higher than aggregate output volatility because many of the shocks facing individual businesses cancel each other out at the national level — what is good for one business is often bad for another. Aggregate volatility is largely accounted for by the common macroeconomic shocks that do not cancel each other out. **Chart 4** shows that, in contrast to aggregate output volatility, the volatility of constant-price sales by publicly listed firms did not show any clear decline after 1992.

Chart 4 Volatility of aggregate output growth and average constant-price sales growth among individual businesses



Notes: The business-level measure is the weighted mean of the ten-year rolling standard deviation of constant-price sales growth of UK companies listed on the London Stock Exchange and the Alternative Investment Market. Standard deviations are leading, so the final observation on the chart is 1997 showing the standard deviation over the subsequent ten years.

Sources: ONS and Parker (2006).

(1) Benk, Gillman and Kejak (2007) show that the moderation in inflation and output volatility in the United States following the Second World War was much larger than that in the Great Moderation.
(2) Comin and Philippon (2005) and Comin and Mulani (2007).

Volatility of expenditure components, employment and productivity

One possible way to diagnose the cause of the Great Moderation is to investigate whether there were any changes in the cyclical behaviour of the individual components of demand or supply. **Table 1** reports relative standard deviations for the business cycle component of key UK variables in two subsamples: 1971 Q1–1992 Q3 and 1992 Q4–2006 Q2. The business cycle component of a series is calculated by removing both long-run trends and very short-term volatility, for instance that associated with seasonality. It shows that there was a general reduction in volatility over this period rather than a shift in particular categories. The main exception is that investment volatility fell by a little more than GDP volatility, due mainly to a relative decline in the volatility of household spending on durable goods, which is treated here as a component of investment rather than consumption.

Table 1 Standard deviations of key variables

Variable	1971 Q1–1992 Q3	1992 Q4–2006 Q2
GDP	1.59	0.80
Real expenditure components (relative to standard deviation of GDP)		
Consumption	0.94	0.92
Investment	4.37	3.44
Government consumption	1.23	1.30
Net exports	0.32	0.45
Subcomponents of real consumption (relative to standard deviation of GDP)		
Non-durable goods	0.99	0.84
Services	1.10	1.17
Subcomponents of real investment (relative to standard deviation of GDP)		
Durable consumer goods	3.93	3.14
Fixed business investment	3.04	3.66
Dwellings	4.71	4.93
Change in inventories	0.18	0.26
Labour input (relative to standard deviation of GDP)		
Employment (heads)	0.60	0.68
Total hours	0.87	0.96
Average hours	0.40	0.41
Average labour productivity	0.73	0.71
Nominal variables (relative to standard deviation of GDP)		
GDP deflator	1.66	1.26
GDP deflator inflation	2.64	1.38
Treasury bill yield	1.22	1.12

Notes: Except for net exports and the change in inventories, which are measured as fractions of GDP, and the inflation rate and the nominal yield, all series are in logs. All series are filtered using the Christiano and Fitzgerald (2003) band-pass filter.

Chart A plots correlations of the expenditure components and other real variables with GDP at different leads and lags for the two separate periods. For the most part there was little change in the cyclical behaviour of most of the expenditure components, including inventories, though investment in consumer durables became less procyclical.

There is also little evidence of a change in the relative volatility or business cycle properties of employment and labour productivity per hour (**Table 1** and **Chart A**). It would appear that there was simply a scaling down of the size of all fluctuations. The well-known tendency for employment to lag behind movements in output did not change. In particular there was no decline in the contemporaneous correlation between output and labour productivity per hour, such as that identified for the United States by Gali and Gambetti (2007).(1)

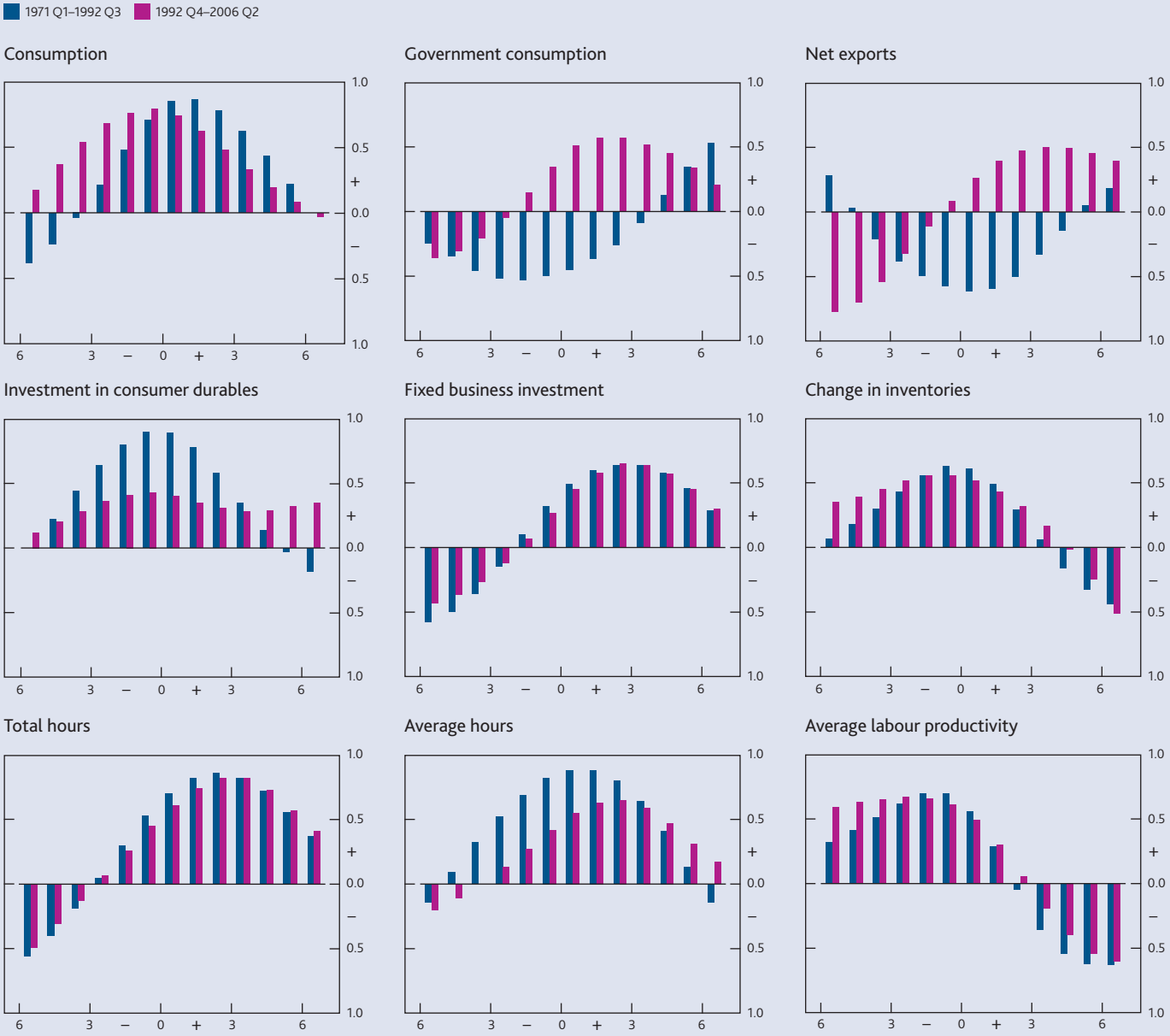
(1) Gali and Gambetti estimate that the contemporaneous cross-correlation between output and productivity in the United States fell from 0.62 before to 0.12 after 1984.

This suggests that the decline in aggregate volatility was due to there being a reduction in common, macroeconomic shocks that are correlated across individual firms.

Possible causes of greater macroeconomic stability

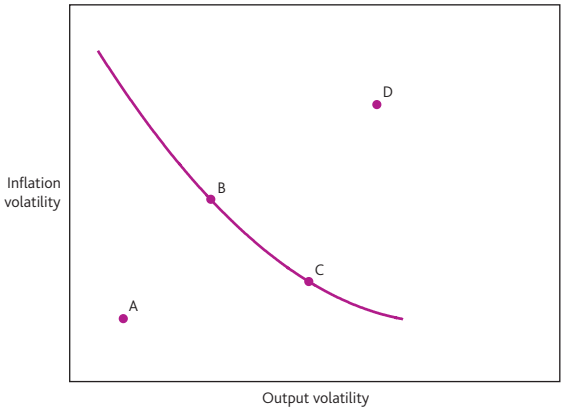
The possible causes of greater stability in both inflation and output growth can be understood within a simple framework used by many of the participants at the conference. **Chart 5** shows the 'stability possibility frontier' or 'Taylor frontier' that plots the lowest possible inflation volatility that is achievable for any given output volatility (Taylor (1979)). The position and shape of the Taylor frontier depends on the structure of the economy and the distribution of the shocks that it experiences. According to this framework, monetary policy makers can be thought of as choosing a point on the frontier depending on the relative importance they place on stabilising inflation and output growth. But the evidence presented above (**Chart 1**) suggests that, rather than moving from one point to another on the same frontier (ie from B to C), economies experienced lower volatility of both inflation and output growth during the Great Moderation (such as a move from B to A).

Chart A Cross-correlations of expenditure components and employment with GDP at various quarterly leads and lags



Note: The charts plot the correlation coefficient between x_{t+k} and y_t for k = -6,..,6 quarters, where x is the cyclical component of the variable in question and y is the cyclical component of real GDP.

Chart 5 Stability possibility frontier ('the Taylor frontier')



Within this framework, there are three possible causes of periods of greater stability in both output growth and inflation:

(a) Good luck. It could be that the Great Moderation period was one of unusually small or offsetting shocks that caused the frontier to shift inwards independently of any change in policy or the structure of the economy.

(b) Structural change that shifted the frontier inwards. For example, an increase in the responsiveness of prices to the output gap would cause the Taylor frontier to shift inwards. This is because when prices are more responsive to the output gap, policymakers need to move the output gap by less to control inflation in response to cost shocks.

(c) Improved monetary policy that moved the economy closer to the frontier from an inferior position (such as D in **Chart 5**). While the frontier depicts the best achievable combinations of output and inflation volatility, poor monetary policy would result in the economy operating within the frontier. Eliminating the errors caused by poor monetary policy could result in a reduction in both output and inflation volatility.

It is likely that each of these possible causes contributed somewhat to the Great Moderation. But quantifying the contribution of each more precisely is not straightforward. The remainder of this section discusses each possible cause in turn, drawing on contributions made at the conference, and some of the informal supporting evidence. More formal attempts to quantify their significance are discussed in the box on page 179.

Good luck

The 1970s is often thought of as a period of severe economic shocks that caused both output and inflation volatility to be high. But, as the Governor pointed out when commenting on the first decade of the MPC, 'the environment in which the MPC has had to operate has not been without excitement' (King (2007)). To support this, he drew attention to the large number of shocks to both the United Kingdom and world economies that occurred during this time, including: wars in Afghanistan and Iraq; global financial crises; a housing market boom; a boom, bust and recovery in equity prices; and a rise in oil prices comparable in size to that seen in the 1970s and 1980s.

This is not to deny that the broader macroeconomic environment, including beneficial tailwinds from globalisation, contributed to the Great Moderation. But the greater stability of this period might also be because the structure of the economy and the policy framework mitigated, rather than amplified, the effects of shocks on the economy as a whole. This possibility is being tested by the turbulence facing the global economy at present.

Structural change

Several different types of structural change have been suggested that might have improved the ability of the economy to absorb shocks over this period. These include changes in technology, business practices and inventory management, as well as labour market reform and other policy initiatives.

One important type of structural change that occurred in many countries from the early 1980s was a relaxation of household credit restrictions. With easier access to credit, households became better able to absorb shocks without changing their spending.(1) In an innovative paper presented at the conference, Campbell and Hercowitz (2007) examined the overall effect of reduced down-payments on consumer durables purchases. They argued that in an economy with high down-payments, a shock that increases borrowers' demand for durable goods also creates a need for households to work more to provide the down-payment required. This would accentuate the economic cycle. So a relaxation of these restrictions would have had a stabilising influence. Consistent with this, the evidence shown in the box on pages 176–77 suggests that spending on consumer durables was less procyclical in the Great Moderation period than it had been previously. But a challenge to this argument is that hours worked did not also become more stable relative to output. In an analysis of changes in volatility in the United States economy from 1919–2004, Benk, Gillman and Kejak (2007) found that 'good' credit shocks from financial deregulation helped promote stability after 1983, but 'bad' credit shocks contributed to high GDP volatility in the period before the Second World War.

A different type of structural change is that which has occurred within businesses. Changes in inventory management practices, for example, are sometimes argued to have helped stabilise the economy by providing a more effective buffer between fluctuations in sales and production. In one of the early contributions to the literature on the Great Moderation, McConnell and Perez-Quiros (2000) traced the reduction in US output volatility to a fall in the share of durables output accounted for by inventory investment. But it is not clear that this explanation can account for much of the Great Moderation. First, just-in-time inventory management within firms would tend to make production more sensitive to sales and so make inventories a less good shock absorber. Second, the evidence for the United Kingdom does not appear consistent with inventories playing a greater stabilising role. The evidence in the box on pages 176–77 shows that the relative volatility of the contribution to GDP of the change in inventories increased in the Great Moderation period and there was little change in the cyclicality of inventories. Further, the evidence provided by Comin and Mulani (2007) that volatility increased among businesses suggests that greater macroeconomic stability is unlikely to have been caused by changes in business processes alone.

There have been other stability-enhancing changes in the economic environment that have acted to dampen the response of the economy to shocks. For example, widespread formal and informal price indexation in the 1970s and early 1980s meant that shocks to individual prices were propagated throughout the economy in wage-price spirals. The apparent disappearance of such indexation is likely to have contributed to greater stability. To some extent this is likely to have been induced by better monetary policies and consistently lower inflation. As noted by Bernanke (2004), 'monetary policies that brought down and stabilised inflation

(1) See Benito *et al* (2007) for a discussion of this issue.

Econometric studies of the causes of the Great Moderation

Any attempt to measure the contribution of shocks, structure and policy to macroeconomic fluctuations requires a framework that explains how these all fit together. Given the lack of consensus about the appropriate way to model the macroeconomy and the absence of a single, coherent model that encompasses others it is doubtful that such an exercise will produce convincing results.

As an example, Benati (2007) used state-of-the-art techniques to investigate the causes of the Great Moderation in the United Kingdom. He reported that these methods suggest a dominant role for smaller or offsetting shocks — good luck — in fostering the more stable macroeconomic environment of the Great Moderation period, with little effect from changed monetary policy. But there is considerable doubt about the reliability of such results because of the difficulty in taking account of the various ways in which monetary policy works through expectations. Bernanke (2004) noted in comments on similar analyses for the United States that 'changes in inflation expectations, which are ultimately the product of the monetary policy regime, can also be confused with truly exogenous shocks in conventional econometric analyses'. As a consequence, econometric methods which do not make explicit allowance for changes in inflation expectations might wrongly attribute the Great Moderation to 'good luck' when it was actually caused by more firmly anchored inflation expectations due to improved monetary policy.

In their contribution to the conference, Benati and Surico (2007) explored this more formally and asked whether sophisticated analyses using vector autoregressions (VARs) were capable of correctly diagnosing the reasons for the Great Moderation. To answer this, they generated artificial data from an economic model in which the only source of change is a move from 'bad' to 'good' monetary policy; that is from one where the Taylor principle that nominal rates should rise by more than the rise in expected inflation was not satisfied to one where it was (Taylor (1999)). They found in this example that VARs would misinterpret an improvement due to good policy as being caused by good luck, because they were not able to distinguish between more stable inflation expectations due to better policy and smaller shocks.

This result suggests that VAR methods might be unreliable when they do not take explicit account of the role of good monetary policy in anchoring inflation expectations. In response, Canova and Gambetti (2007) presented a paper at the conference that investigated whether they could take explicit account of the role of good monetary policy in anchoring inflation expectations by using survey measures of inflation expectations for the United States. They argued that, despite playing some role in explaining inflation and interest rate dynamics, changes in the behaviour of inflation expectations appeared not to be sufficient to suggest an enhanced role for good monetary policy in explaining the Great Moderation. The use of explicit measures of inflation expectations in analyses of this type is likely to be a fruitful area for further research.

A different critique of models that find that the Great Moderation was caused by good luck has been put forward by Giannone, Lenza and Reichlin (2008). They claimed that the small-scale VAR models often used for this type of exercise do not reflect accurately the information processed by both markets and central banks when producing their forecasts. In principle this could have a serious effect on the reliability of the results produced by these small-scale models. In an empirical exercise they found that larger models were less likely to attribute the Great Moderation to a reduction in the volatility of shocks.

In their contribution to the conference Gali and Gambetti (2007) examined the nature of the shocks faced by the US economy over time. They decomposed the shocks into those which could be identified as having a permanent effect, associated with shifts in technology, and non-technology shocks, that could be thought of as shocks to aggregate demand. Gali and Gambetti claimed that the Great Moderation could be largely explained by a sharp fall in the contribution of non-technology shocks to the variance of output. Using a highly stylised model they showed how this change might be related to changes in the conduct of monetary policy.

may have led to stabilising changes in the structure of the economy as well, in line with the prediction of the famous Lucas (1976) critique that economic structure depends on the policy regime'.

Empirical research presented at the conference suggested that changes in the structure of the economy, such as businesses' price-setting behaviour, might have been linked to changes in monetary arrangements. For example, Rubio-Ramirez and Fernandez-Villaverde (2007) found strong evidence that prices in the United States are adjusted less frequently by businesses when inflation is lower. Groen and Mumtaz (2008) found that, in setting prices, businesses placed more weight on current costs rather than inflation expectations when average inflation was low.

Changes in the conduct of fiscal policy might also have contributed to greater stability. In a cross-country study covering the OECD countries, Aghion and Marinescu (2007) found that public debt has tended to become more countercyclical.

Change in monetary policy arrangements

In both the United States and the United Kingdom, improved macroeconomic performance followed changes in monetary arrangements, encouraging the view that this played a causal role. While ideas about monetary policy have evolved over time, the 'new consensus' about how monetary policy should be conducted is now very different to what it was at the beginning of the 1970s. The new consensus places particular emphasis on monetary policy as the primary tool of nominal demand management, central bank independence, a focus on ends (such as inflation) rather than means (such as intermediate monetary aggregates) as targets for policy and the key role of expectations and credibility in the monetary transmission mechanism (Bean (2007)).

Some influential academic papers have highlighted the role of more active monetary policy in bringing about greater stability in a single country. For example, Clarida, Gali and Gertler (2000) found that before 1979, the US Federal Reserve typically raised nominal interest rates by less than any increase in expected inflation, thus letting real interest rates decline in response to increased inflationary pressure. This is a violation of the 'Taylor principle' that nominal rates should rise by more than the rise in expected inflation and so bear down on nominal demand growth (Taylor (1999)). Clarida, Gali and Gertler argued that a weak monetary response to shocks of this type can create macroeconomic instability by leaving open the possibility of bursts of inflation that result from self-fulfilling changes in expectations and by failing to insulate the economy sufficiently from fundamental shocks. In a simple model they showed that a more responsive monetary policy leads to less output and inflation volatility and less inflation persistence, consistent with the facts of the Great Moderation.

In their paper at the conference, Blake and Markovic (2007) examined the effect of different monetary policy rules across countries. In particular, using a calibrated dynamic stochastic general equilibrium (DSGE) model of the United States, the United Kingdom and the rest of the world, they examined how the macroeconomic performance of a small country like the United Kingdom was affected by various monetary policies at home and abroad. In their model, monetary policy in each country can either be 'good', where the Taylor principle holds and nominal interest rates respond by more than any increase in inflation, or 'bad', where the Taylor principle is violated. Their results suggest that the economy is more stable under 'good' domestic monetary policy no matter what other countries do. Moreover, 'good' global policy cannot substitute for 'good' domestic monetary policy. If domestic monetary policy is 'good', then 'good' global monetary policy helps stabilise the economy. But if domestic monetary policy is 'bad', then 'good' global policy does not help.

The importance of the Blake and Markovic exercise is that it suggests that the cross-country reduction in macroeconomic volatility observed in **Chart 1** might be explained by improved monetary policy in each country. This can help explain why some countries, like West Germany, were able to avoid much of the instability of the 1970s by running a 'good' monetary policy at the time. It is also consistent with the view that the reduction in macroeconomic volatility was due to the spread of ideas of how monetary policy should be conducted and the widespread adoption of the new consensus.

Exercises like that of Blake and Markovic compare the properties of model economies under different monetary policy rules, where households and businesses are assumed to know the structure of the economy, including the rules followed by the central bank. This knowledge has important effects on how expectations of inflation are formed. But Blake and Markovic do not consider how the economy might move from one equilibrium to another when monetary policy rules change. One way of analysing this is to suppose that people know that there is always a possibility that monetary policy might switch between being 'good' and 'bad'. Davig and Leeper (2007) have argued that the prospect that a 'bad' monetary policy might subsequently be replaced by a 'good' one can in itself be a stabilising influence on the economy. But, in their contribution to the conference, Farmer, Waggoner and Zha (2007) showed the opposite result that the prospect of 'bad' monetary policy in the future can be destabilising today even if current policy is 'good'.

Changes in the conduct of monetary policy over time can be explained by policymakers learning about the effect of their actions on the economy. In his contribution to the conference,

Nelson (2007) examined detailed contemporary evidence on the views of UK policymakers covering most of the post-war period and drew attention to the overhaul of doctrine that took place in response to experience. He focused particularly on changes in understanding of the monetary transmission mechanism. Nelson's research provides compelling evidence that a lack of understanding among policymakers of how monetary policy affected the economy can help explain why it contributed to macroeconomic volatility in the 1970s. With hindsight, monetary policy before the Great Moderation period can be seen as having added extra volatility to the economy that resulted in excessive output and inflation volatility — a combination lying above the Taylor frontier depicted in **Chart 5**.

In his contribution to the conference, Sargent (2008) explored the changing dynamics of inflation and unemployment in models where policymakers do not understand fully how the economy behaves but learn about it based on their own limited experience. It is possible in these models, for economies to be settled for long periods of time in situations where policymakers falsely think they understand how the economy behaves, in the sense that their beliefs are not contradicted by events. But then unexpected shocks can cause stresses while policymakers adjust their behaviour and beliefs to new circumstances. The example Sargent considers is where there is an apparent trade-off between inflation and unemployment that occurs when inflation expectations are well anchored. But this trade-off cannot be exploited by policymakers because the attempt to do so would cause inflation expectations to become de-anchored. A worrying aspect of the equilibrium described by Sargent is that in this model it is possible for policymakers temporarily to learn that the optimum policy ignores the apparent trade-off between inflation and unemployment, only to re-adopt the suboptimal policy once they notice an empirical trade-off that they think they can exploit. As he notes, 'if this is a good parable for the Volcker-Greenspan stabilisation, we should be worried'. In other words, the Great Moderation could be temporary, having been brought about by a good policy chosen by good luck.

Alongside this pessimistic case, Sargent also raised the more intriguing and optimistic possibility that, in inflation targeting, policymakers might have discovered a device that compensates for their lack of full understanding of how economies work. If there is no exploitable trade-off between inflation and unemployment, then a mandate to target inflation prevents policymakers pursuing suboptimal policies. He considers a number of different examples showing the possible interactions between policies, expectations and outcomes for the economy where inflation targeting results in the best outcome in each case. This is consistent with the idea that inflation targeting promotes stability by providing a simple rule of thumb that people might use in forming their inflation expectations. Brazier *et al* (2006) show that the introduction of inflation targeting can stabilise inflation in this way.

In their contribution to the conference, Branch *et al* (2007) examined the case where people choose how much information to acquire in forming their expectations. They argued that when policymakers place greater emphasis on price stabilisation, the variance of the price level falls, and this provides less incentive for agents to update their information. That is, it may be rational for them not to pay attention to the general price level and, in the authors' words, this 'indirectly anchors expectations, which decreases output volatility'. This means that the Taylor frontier shown in **Chart 5** may not always be downward sloping, but may contain a region where greater stability in inflation brings about greater output stability too.

Understanding how economies respond to changes in monetary policy is still developing and remains controversial. It is partly for this reason that there is also controversy about how to quantify the contribution of each of the possible causes of changes in macroeconomic volatility.

Conclusions

The Bank of England conference on the sources of macroeconomic stability provided a strong sense of the range of possible explanations for changes in macroeconomic volatility over time. It also highlighted many of the controversies that surround the theory and empirics of how to interpret it. The debate on the relative contributions of good luck, structural change and good monetary policy to the Great Moderation is not yet settled.

Despite the lack of certainty on these issues, there is broad agreement that the adoption of the new consensus in monetary policy made some contribution to greater macroeconomic stability around the world, particularly with regard to inflation. This echoes the judgement of Federal Reserve Chairman, Ben Bernanke (2004) that 'few disagree that monetary policy has played a large part in stabilising inflation'. In purely descriptive terms, the timing of changes in monetary policy arrangements in different countries appears to fit with greater subsequent stability, and the narrative evidence indicates the extent of confusion about the role of monetary policy among policymakers in the 1970s. The business-level evidence is consistent with the improvement having had a macroeconomic cause since stability was associated with a reduction in the size of common shocks. And some of the possible structural changes that have been identified might also have been facilitated by lower inflation due to improved monetary policy. The evidence from the Great Moderation period and some of the explanations of structural change suggest that achieving

low and stable inflation also helps to stabilise the real economy.

It is certainly possible then that monetary policy has contributed to the greater macroeconomic stability observed in the Great Moderation period. According to the new consensus in monetary policy, it does this primarily by anchoring inflation expectations. A lesson from some of the papers presented at the conference and the wider academic literature is that those expectations cannot be taken for granted — they depend on the actions of monetary policy makers. Some of those papers suggested that the response of policy to an increase in incipient inflationary pressure must be strong enough that real interest rates rise to push back against it. Others suggested that the challenge for monetary policy is more complex than this.

There is clearly a need for more research on the issues covered at the conference. There was a general consensus that the literature has focused too much on a few macroeconomic time series from the United States and, to a lesser extent, the United Kingdom and that different types of evidence, covering more countries and using micro data sets, would be valuable. There was also general agreement that further research on learning and expectations formation on the part of both the private sector and policymakers was likely to be fruitful.

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Network models and financial stability

Summary of Working Paper no. 346 Erlend Nier, Jing Yang, Tanju Yorulmazer and Amadeo Alentorn

Systemic risk is a key concern for central banks charged with safeguarding overall financial stability. Systemic risk arises when there is the potential for multiple banks to fail and to impose costs on the financial system and ultimately on the economy as a whole. The costs of systemic failure have been estimated to be large.

A number of determinants of systemic failure, including the role of government safety nets have been studied extensively in the literature. However, relatively little is known about how the *structure* of a banking system, including the degree to which banks are connected to each other through bilateral exposures may affect its susceptibility to systemic breakdown. How does the size and distribution of exposures between banks determine the resilience of the system as a whole? How does the potential for interbank exposures to transmit shocks from one bank to another interrelate with the aggregate amount of capital available to cushion shocks? In the presence of interbank exposures, are more concentrated banking systems with a small number of large banks, more or less susceptible to systemic breakdowns than systems that comprise a large number of smaller banks? And, are 'tiered' systems, where a small number of first-tier banks coexist with a fringe of smaller banks, more or less susceptible to systemic breakdown than systems that are more uniform?

This paper studies these questions drawing on recent advances in the study of networks. A banking system is represented by a set of nodes (banks) that are connected by directed links (interbank exposures) with a certain predefined probability. The 'weight' of these links (the size of interbank exposures) determines the capacity for losses to flow from one bank to another. Capital and deposits are introduced as the first and ultimate recipients of any losses incurred. In this set-up we simulate the extent of contagious (knock-on) defaults arising from losses being transmitted through interbank exposures for a wide variety of banking systems that differ in their underlying structural characteristics.

The analysis suggests that increasing the size of interbank liabilities tends to increase the risk of knock-on default relatively sharply once the size of liabilities moves beyond a certain threshold. Moreover, this is the case even if banks hold capital against such exposures in the same way as they hold capital against other credit exposures. This means that capital requirements alone may not be adequate to protect the system against knock-on defaults. Further, the simulations show that the effect on the likelihood of systemic breakdown of varying the probability of connection and hence the resulting density of interbank connections (connectivity) is ambiguous and depends on the initial level. For a low initial degree of connectivity, an increase in connectivity unambiguously increases the risk of knock-on defaults. When connectivity is already high, however, a further increase in connectivity tends to help dissipate losses across the system and can thus make the system more resilient to shocks.

The potential for knock-on defaults depends on the aggregate level of capital in the system. The lower the aggregate amount of capital in the system the greater is the potential for knock-on defaults, for any given level of connectivity. Moreover, there is an interaction between the level of capital and the systemic risk created by varying the degree of connectivity. In particular, low aggregate capital increases the potential for interbank connections to transmit shocks through the system. This means that aggregate shocks that might be able to draw down the capital cushion of the system as a whole pose a risk in turning the system from one where connections dissipate shocks to one where connections tend to work as shock transmitters.

The results suggest that when there are few banks, the potential for one failure to entail knock-on defaults is greater, all else equal. This means that more concentrated banking systems are prone to larger systemic risk, all else equal. Further, the risk of contagion (knock-on defaults) is shown to depend on the degree of asymmetry (tiering) inherent in the structure of the banking system. However, the results suggest that tiering does not necessarily lead to greater scope for knock-on defaults. The reason is that the effect of connectivity on the likelihood of systemic breakdown is shown to be ambiguous. When large banks are connected to many other banks this increases the scope for shock transmission. But it could equally lead to better absorption of the initial shock.

Non-linear adjustment of import prices in the European Union

Summary of Working Paper no. 347 José Manuel Campa, José M González Mínguez and María Sebastiá Barriel

The impact that movements in nominal exchange rates have on the geographical allocation of economic activity and the volume of trade has been at the core of research in international economics for over three decades. One key point in this debate is the degree, speed and form in which domestic prices of imported products adjust to exchange rate changes. It is often reported that the high volatility of nominal exchange rates is not matched by the behaviour of import prices, which tend to be far less volatile. This gives rise to fluctuations in real exchange rates (the exchange rate adjusted for relative prices) which have been seen to be large and persistent over the past three decades, suggesting that the adjustment of import prices is very slow.

Several reasons have been suggested for such a slow adjustment of import prices. These include the existence of product differentiation and imperfect competition that can isolate, at least partially, foreign producers' pricing policies from exchange rate changes (implying price differentials between domestically produced and imported tradable products), and the presence of price rigidities driven by some form of fixed cost to changing prices.

Understanding the speed and the form in which the adjustment of import prices — and, thus, real exchange rates — to their long-run equilibrium takes place is an important issue in order to comprehend and anticipate inflation developments and, consequently, to provide an appropriate policy response by monetary policy authorities.

The adjustment of import prices to nominal exchange rate changes has also been an important part of the economic policy debate within the European Union (EU). The adoption of the euro by a subset of twelve countries and the large fluctuations in the value of this currency relative to the US dollar have led to a profound interest in the underlying determinants of import prices and their relationship with exchange rate and monetary conditions.

This paper looks at the process of adjustment of import prices in EU countries towards their long-run equilibrium when they deviate from it due to changes in exchange rates or in foreign prices. The main purpose of the analysis is to gain a better understanding of this adjustment process, in particular by looking at the possibility of a non-linear relationship between deviations from, and adjustments to, the long-run equilibrium (ie there is not a simple proportional relationship between the two). It is possible that prices react proportionally less to small deviations from equilibrium than to large deviations, or that the speed of adjustment back to equilibrium differs when prices are above or below that equilibrium. This is in contrast to the usual assumption that prices adjust linearly; that is, in strict proportion to the size of the deviation. Looking for evidence of non-linearities should help gain a better understanding of this adjustment process. A secondary goal that we try to achieve in this paper is to compare import price adjustment patterns among EU members that have adopted the euro as their currency and the non euro area countries. If they are different, this could give us some insight into possible structural change when joining a monetary union, which would ultimately affect inflation.

As far as non-linear adjustments are concerned, we considered three different possibilities: that they increase with the size of the deviation (non-proportionality); that they are asymmetric with respect to the sign of the deviation and, finally, that certain thresholds in the size of the deviation exist below which no adjustment takes place. We test these ideas by modelling the process driving foreign prices, nominal exchange rates and import prices in domestic currency allowing for non-linear adjustments. We use a combination of techniques that have been proposed in previous work to estimate such adjustments. We find strong evidence for the presence of non-linearities in the adjustment towards long-run equilibrium in certain industries. This effect is stronger in manufacturing industries. Non-proportional adjustment among manufactures points to the higher degree of price differentiation that characterises these products as an explanation for less adjustment. In contrast, linearity cannot be rejected for agricultural and commodity imports. In some (manufacturing and non-manufacturing) industries, the adjustment is faster the further away current import prices are from their implied long-run equilibrium.

However, in manufacturing there is further evidence of asymmetry in the adjustment to long-run equilibrium: deviations from long-run equilibrium due to exchange rate appreciations of the home currency result in a faster adjustment than those caused by a home currency depreciation. Finally, we also find evidence that prices do not adjust when the deviations are small. We estimate the minimum deviation required for prices to adjust and find that these thresholds tend to be much smaller for manufacturing industries than for commodities.

The resulting evidence points towards adjustment patterns that may differ by country. In general, the patterns of adjustment might be driven by the industry composition of each country's imports and by the competitive structure in each of those industries. In principle, it can be expected that the rate at which cost changes are 'passed through' into prices be lower and less linear in euro-area member states than in countries outside EMU. The reason is that the possibilities for foreign producers to deviate from local producers' pricing policies seem to be less pervasive in larger import destinations. However, the evidence does not point in this direction. In contrast, non euro EU member countries do not appear to have significantly different adjustment patterns from euro-area member states. This suggests that there are no structural differences among these two sets of countries in pass-through rates and that the introduction of the euro, by non euro area member states, is not likely to cause a structural change in this relationship.

The elasticity of substitution: evidence from a UK firm-level data set

Summary of Working Paper no. 348 Sebastian Barnes, Simon Price and María Sebastiá Barriel

The elasticity of substitution ('σ') between capital and other factors of production, such as labour, is a measure of the ease with which firms can substitute one input for another. For a constant level of output production, if there is a rise in the relative intensity with which one factor is used (eg a rise in the capital to labour ratio), then (except in the extreme case of perfect substitutability, $\sigma = \infty$), firms will have to use increasingly more of that factor (capital) to offset a given reduction in the quantity of the other (labour). At the other extreme, if capital and labour have to be used in rigid, fixed proportions, there is no flexibility, and the elasticity is zero. Generally, σ will take a value between these two limits. This degree of substitution also determines the responsiveness of factor demand to changing prices. Clearly, if factor proportions are fixed, then (for a given output) the demand for capital will not depend at all on the price of capital (or more strictly, the 'user cost' of capital, that takes into account the cost of owning capital, which is affected not only by the price but also by interest rates and other factors). But the larger is σ, the more responsive is capital to changing relative prices. So from the point of view of monetary policy, σ is of interest not least because investment is a major part of the monetary transmission mechanism, responding as it does to changes in interest rates.

Yet there is controversy about its size. Some researchers believe that the elasticity is around unity (the value taken by the widely used 'Cobb-Douglas' production function); others, that it is substantially lower, perhaps below 0.5. To help resolve this uncertainty, in this paper we bring to bear new evidence on investment, output and the user cost from a panel of UK firms.

Much of the debate in the empirical literature is about the proper treatment of short-run dynamics in estimation. The 'around unity' camp argues that there are short-run biases that reduce the estimated value. One of these might follow if firms expect shocks to the user cost to be quickly reversed. They might not then react to such shocks. Some of the US and Canadian evidence using aggregate data seems to support this, although this is not apparent in the UK data. Another potential bias might come from the short to medium-run supply elasticity; movements along a supply curve might be mistaken for shifts along the demand curve, making identification of the demand response (and therefore σ) problematic.

By contrast, some US results from Robert Chirinko and his co-authors using a US panel of firms found a well-determined estimated elasticity of around 0.4. Their method is designed to be unaffected by the dynamic issues mentioned above. By essentially estimating the cross-sectional relationship using 'time averaging' (changes over long periods), it is both simple and robust, and in this paper we apply it to a UK data set. We find similar values to those of Chirinko. Moreover, we find that other methods similarly designed to accurately estimate long-run parameters produce results that are in the same region. This is consistent with results from previous work on aggregate UK data that allow for short-run dynamics.

The main conclusion is that the average elasticity of substitution in our panel of firms is about 0.4, substantially less than unity. This broad conclusion remains largely unchanged no matter which econometric method we use. It is similarly invariant to whether we freely estimate the returns to scale or impose the commonly assumed value of unity (constant returns to scale). So this estimate, consistent with previous work using other UK data sets, seems relatively robust.

Dealing with country diversity: challenges for the IMF credit union model

Summary of Working Paper no. 349 Gregor Irwin, Adrian Penalver, Chris Salmon and Ashley Taylor

This paper assesses the efficiency of the International Monetary Fund's (IMF's) lending framework using a simple, yet novel theoretical model of the IMF as a credit union, in which the membership decides collectively by a vote on the size of the Fund and hence the amount of crisis lending it can provide. This decision, in turn, impacts on individual country choices over the amount of self-insurance to hold in the form of reserves. The equilibrium Fund size and individual country reserve choices are analysed under three different characterisations of the Fund's decision-making processes — unconstrained majority voting, constrained majority voting, and qualified majority voting with an agenda setter. The welfare implications in each case are assessed and we consider how the existence of spillovers between countries affects the outcome.

In all cases the analysis suggests the present IMF lending framework may no longer be appropriate. It may well have been during the first two to three decades of the Fund's existence, when almost all countries were potential Fund debtors and had broadly homogenous interests, but the analysis suggests it is much less well suited to the current situation in which members differ sharply in their economic characteristics and needs. In particular, we find that with an increasingly heterogeneous membership, in terms of crisis probabilities, the decisions over the size of the Fund are likely to be driven by members with a relatively low crisis probability. Consequently, the Fund is increasingly unlikely to provide financing on a sufficiently large scale to meet the demands of higher-risk members, leading them to rely more heavily on self-insurance. The analysis suggests that increasing the size of the Fund may be Pareto improving, but only if the financial burden is distributed so that those who benefit most — that is, the countries which have the highest crisis probability — pay the most. This would constitute a significant change in the financing of the Fund's lending operations.

The main message of the paper is that the framework governing the Fund's lending operations may no longer be appropriate. An alternative approach may be needed: one which takes into account that creditor and debtor countries have different interests, but which also takes into account the moral hazard consequences of large-scale lending.

Investigating the structural stability of the Phillips curve relationship

Summary of Working Paper no. 350 Jan J J Groen and Haroon Mumtaz

In the United Kingdom and other G7 countries, the short-run correlation between inflation and different measures of real economic activity has fallen over time and this has coincided with a fall in the level and persistence of inflation. The empirical evidence on shifts in the short-run relationship between inflation and real activity, however, is mainly reduced-form in nature — that is, it cannot by itself tell us about the causal relationships. Therefore, it is not straightforward to use these results to draw inference on the changes in underlying price-setting behaviour of firms. To be able to do that, a structural relationship is needed that embeds the inflation-real activity relationship in price-setting behaviour. We use the New Keynesian structural framework that is popular in the academic literature. This paper is an attempt to assess empirically how the 'deep' parameters that underlie — at least in New Keynesian theory — the price-setting behaviour of firms have changed over time. These 'deep parameters' include the equilibrium rate of inflation, which in the end is set by the central bank, and shifts in that variable can control for shifts in price-setting behaviour that are due to policy regime shifts.

What governs firms' price-setting behaviour? In the New Keynesian framework price stickiness is formalised by assuming that only a randomly selected fraction of firms can optimally reset their prices each period. They do this in the knowledge that their chance to optimise their prices may not be for several periods. Optimal prices are then based on the current level of real costs and inflation expectations. The remaining firms do not re-optimise their prices but instead index their current price increase to last quarter's inflation rate. In this model, the Phillips curve describes how current inflation is affected by current real costs and expected inflation. The contribution of each of these components to current inflation, in turn, depends on the following set of 'deep parameters' that summarise the price-setting behaviour of firms: (a) the fraction of firms that is allowed to freely set their price increase in a profit optimising manner; (b) the average mark-up that firms demand over their costs; (c) the degree of indexation to lagged inflation for firms that cannot determine their price increase in an optimising manner. A higher degree of indexation is associated with greater inflation persistence; and (d) the level of equilibrium inflation, which determines for the re-optimising firms their perceived risk that future profits can be eroded by increasing inflation. This in turn determines the relative weight the re-optimising firms place on current costs and future risks. In the New Keynesian framework, equilibrium inflation is determined by the central bank.

We estimate the parameters listed above for the euro area, the United Kingdom and the United States, using a method that allows for structural breaks or different states of the world. In other words, the estimated value of these parameters is allowed to be different across subsamples, where the timing and duration of these states is determined endogenously.

What do the key results suggest about the slope of the Phillips curve? As noted earlier, the Phillips curve in this model relates current inflation to current real costs and expected inflation. The weight placed on each component depends on the deep parameters described above. Our empirical analysis indicates that for all three economies only equilibrium inflation shifted over time, whereas the other deep parameters appear to have been unaffected by these shifts. Therefore, shifts in equilibrium inflation have been the main driver in the time variation observed in the slope of the Phillips curve. So our results suggest that the impact of current real costs has increased as equilibrium inflation has fallen. The intuition behind the increase in the impact of current costs is as follows: with low equilibrium inflation (as at present in the United Kingdom under inflation targeting), firms place more weight on current costs when setting prices as future economic conditions, and hence future profits, are more certain. This means that the response to shocks is now more immediate. And as the fall in equilibrium inflation implies that the agents place less weight on future inflation, this will result in a decline in the impact of expected inflation on actual inflation.

Report

A review of the work of the London Foreign Exchange Joint Standing Committee in 2007

This article reviews the work undertaken by the London Foreign Exchange Joint Standing Committee during 2007.

Introduction

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 wholesale foreign exchange market in London, representatives from brokers, the Wholesale Market Brokers' Association (WMBA), the Association of Corporate Treasurers (ACT), representing 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-2007 can be found at the end of this article.

The Committee met six times during 2007; the Annual Dinner of the main Committee followed the November meeting where the main topic of discussion was developments in credit markets. A key feature at the FXJSC meetings during 2007 was the ongoing discussion on market conditions. The work programme of the main Committee and its subgroups included: updating the Non-Investment Products Code (NIPs Code); liaison with the UK authorities in clarifying the treatment of foreign exchange instruments under the Markets in Financial Instruments Directive (MiFID); further work on the refining of contingency arrangements; and the publication of the semi-annual turnover survey of the UK foreign exchange market. Much of this work was progressed by subgroups, in particular those representing operations managers, legal representatives and other *ad hoc* specialist working groups. Members of the main Committee also met with representatives of the fund management and hedge fund community during 2007 to discuss market developments.

Non-Investment Products Code and the work of the operations subgroup

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 the markets for wholesale bullion and wholesale deposits. The Code is published by the FXJSC, with contributions from the Sterling Money Markets Liaison Group and the Management Committee of the London Bullion Market Association (LBMA) for the relevant sections. The Code was updated in December 2007.(1)

During 2007, the operations subgroup and its working groups, in conjunction with the legal subgroup, worked on preparing changes to the NIPs Code. The latest version of the Code incorporated a new section on dealing mandates and revised the section on confirmations and standard settlement instructions, to reflect current best practice.

The NIPS Code section on trade confirmations was expanded and updated to include a broader description of the processes for the confirmation and settlement of trades with additional practical and technical information. The Code also included a new section on mandates agreed with the Association of Corporate Treasurers. The LBMA provided an update of the section covering wholesale spot, forwards and deposits in gold and silver bullion.

Work of the FXJSC contingency subgroup

The contingency subgroup, which was established in 2005, continued to highlight business continuity issues relevant to the foreign exchange market. Members of the subgroup kept abreast of current business continuity developments. They were involved in designing a range of contingency scenarios for the operations subgroup to consider as part of business continuity planning.

As follow-up to the special meeting of the FXJSC members held in September 2006 to discuss business continuity, the operations subgroup, in consultation with the contingency subgroup, presented a series of questions to CLS and SWIFT,

(1) See www.bankofengland.co.uk/markets/forex/fxjsc/nipscode.pdf.

two key service providers to the foreign exchange market, on communication and operational issues during a contingency event.

Work of the legal subgroup

The legal subgroup was established in 2004 and comprises thirteen members offering in-house counsel from many of the major institutions involved in the wholesale foreign exchange markets in London. The group met three times in 2007. It appointed a new Chair and continued to be very active, making an invaluable contribution through its provision of legal support to the work of the FXJSC main Committee and operations subgroup, and in particular through advising on and drafting the sections to update the NIPs Code.

The legal subgroup also considered master non-deliverable forward (NDF)(1) confirmation documentation and contributed to international discussions on the multilateral master confirmation form which was subsequently published on the Emerging Markets Trading Association (EMTA) website. The legal subgroup also continued to liaise with a range of other domestic and foreign legal committees to keep abreast of topical issues relating to the foreign exchange markets.

Markets in Financial Instruments Directive (MiFID)

A MiFID working group, established under the direction of the FXJSC's legal subgroup, provided guidance to the main Committee on the impact of MiFID on the foreign exchange market, particularly its implementation in the United Kingdom and assisted the market's liaison with the UK authorities.

In July 2007 a question was posted on a public European Commission website asking whether foreign exchange forwards fell within the scope of MiFID. The working group considered the consequences of broadening the scope of MiFID and advised the Committee and the UK authorities accordingly. In 2008 the Commission published an answer to the effect that, consistent with the FSA's view, MiFID does not apply to commercial foreign exchange forward trades.

Chief Dealers' subgroup

The Chief Dealers' subgroup was established in July 2005. Its membership in 2007 comprised twelve chief dealers active in the London foreign exchange market.

The subgroup met four times during 2007. Members discussed conjunctural and structural developments in the foreign exchange market, focusing on e-commerce, MiFID and, in the latter part of the year, on the impact of the volatile market conditions.

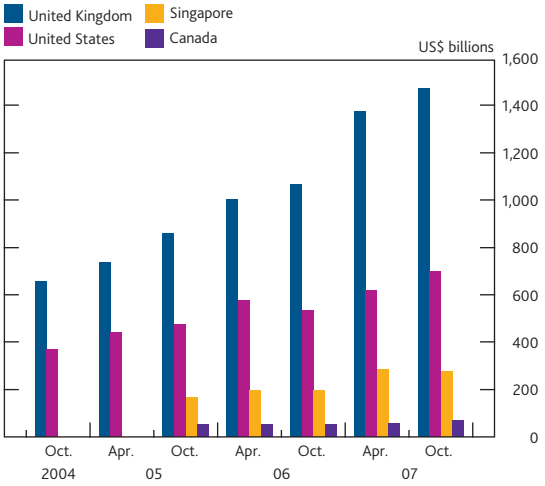
International co-operation

Liaison between the eight foreign exchange committees based in different financial centres (London, Frankfurt for the euro area, Hong Kong, New York, Singapore, Sydney, Tokyo and Toronto) continued during the year. There were discussions about topical issues in the foreign exchange market and the importance of working together on questions of common interest such as NDF confirmations and turnover surveys.

International survey results overview

Thirty banks, drawn from committee members and the most active participants in the London foreign exchange market, contributed to the sixth and seventh semi-annual surveys of foreign exchange turnover in London conducted by the FXJSC. The survey continued to show strong growth in London foreign exchange turnover. Average daily turnover(2) recorded in the October 2007 survey was $1,472 billion, 7% higher than the April survey, but some 38% higher than in October 2006, the biggest annual increase since the London survey began (**Chart 1**). By comparison turnover growth recorded by the New York Foreign Exchange Committee over the same period was 31% higher on the year, while Singapore and Canada were up 42% and 34% respectively.

Chart 1 Global FX(a) daily average turnover



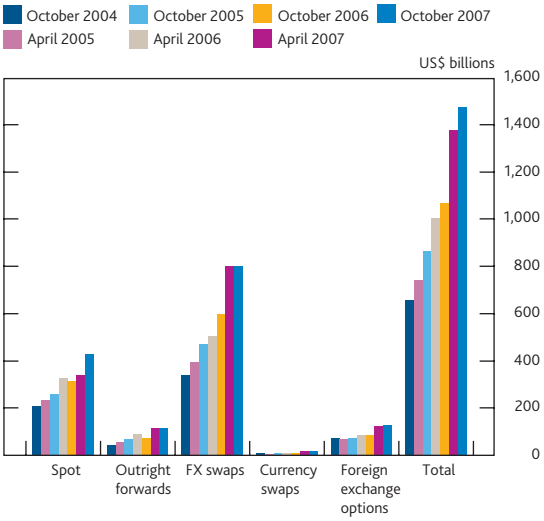
Sources: Canadian Foreign Exchange Committee, London Foreign Exchange Joint Standing Committee, New York Foreign Exchange Committee and Singapore Foreign Exchange Committee.

(a) This includes spot, outright forwards, FX swaps, currency swaps and FX options.

The FXJSC survey saw a continuation of growth in all products, except swaps which remained unchanged (**Chart 2**) following the disruption to forward markets during the financial turmoil in the autumn of 2007.

(1) NDFs are forward contracts in foreign exchange where one currency is not easily traded. The contract is priced by reference to a particular source for the bilateral exchange rate but is settled entirely in the more freely available currency, usually dollars.
(2) Based on spot, outright forwards, FX swaps and other OTC foreign exchange instruments.

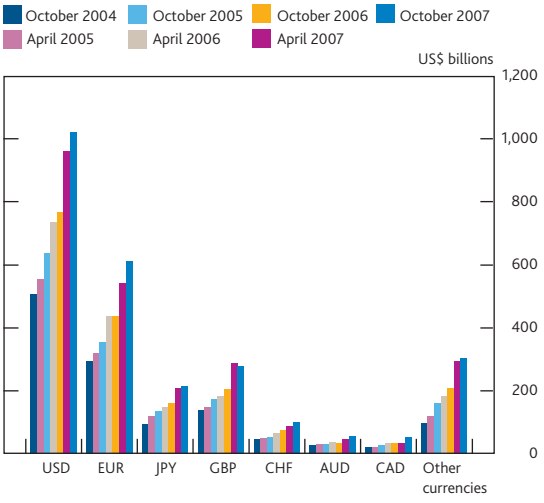
Chart 2 UK daily average turnover by product



Source: London Foreign Exchange Joint Standing Committee.

Among the major currencies (**Chart 3**), there was a fall in sterling turnover, despite the overall rise in the market. Turnover concentration in the top five banks fell slightly to 41% from 45%, while the number of banks accounting for 95% of turnover remained broadly consistent at 20 for October 2007. Following consultation among survey participants, conducted by a working group of market participants, a revised reporting form was put together by the survey working group for the 2008 surveys.

Chart 3 UK daily average turnover by currency



Source: London Foreign Exchange Joint Standing Committee.

The forthcoming FXJSC survey results for the April 2008 reporting period will be based on the new extended reporting form, which is more detailed than previously. The new return will provide detail on a number of different metrics including improved currency, counterparty, maturity and product data. The April 2008 survey results will be published in Summer 2008.(1)

(1) Turnover survey results are available on the Bank of England's website at www.bankofengland.co.uk/markets/forex/fxjsc/fxturnresults080128.pdf.

Members of the London Foreign Exchange Joint Standing Committee as at December 2007

Name	Firm/Organisation
Brian Welch	Association of Corporate Treasurers
Rob Loewy	Bank of China
Richard Gill	Bank of New York
Kazuki Fukunaga	Bank of Tokyo Mitsubishi UFJ
Ivan Ritossa	Barclays
Henri Foch	BNP Paribas
Alex Merriman	British Bankers' Association
Marcus Browning	Citigroup
Matthew Spicer	Credit Suisse
Zar Amrolia	Deutsche Bank
Heather Pilley	Financial Services Authority
Phil Weisberg	FXAll
Andrew Brown	HSBC
Christopher Wilcox	JPMorgan Chase
Richard Gladwin	Lehman Brothers
Harry Culham	Merrill Lynch
Peter Nielsen	RBS
Marcus Nysten	SEB
Michael Kahn	State Street
James Potter	Tullet Prebon
Darren Coote	UBS
Stewart Lloyd-Jones	Wholesale Market Brokers' Association
Leigh Meyer	Chair, operations subgroup
Susan Revell	Chair, legal subgroup
Paul Fisher (Chair)	Bank of England
Sumita Ghosh/Mika Inkinen (Secretariat)	Bank of England

Members of the London Foreign Exchange Joint Standing Committee operations subgroup as at December 2007

Name	Firm/Organisation
Michael Douglas	Bank of America
Richard Gray	Bank of England
Duncan Lord	Barclays Capital
Phil Kenworthy	CLS Services
Andreas Gaus	Credit Suisse
Michael Daly	Deutsche Bank
Susan Balogh	Goldman Sachs
Mike Neale	HSBC
Colin Perry	ICAP
Graeme Munro	JPMorgan Chase
Derrick Pearson	Lloyds
Kim Surendran	Mellon Bank
Andrew Harvey	Morgan Stanley
Kerry Peacock	Rabobank
John Moorhouse	Reuters
Isabelle Dennigan	Royal Bank of Scotland
Ian Cowell	State Street
Alan Spalding	SWIFT
Will Deighton	UBS
John Whelan	Association of Foreign Banks
John Ewan	British Bankers' Association
Leigh Meyer (Chair)	Citigroup
Sumita Ghosh/Mika Inkinen (Secretariat)	Bank of England

Members of the London Foreign Exchange Joint Standing Committee Chief Dealers' subgroup as at December 2007

Name	Firm/Organisation
Danny Wise	Barclays Capital
Robert de Groot	Citigroup
Bernie Kipping	Commonwealth Bank of Australia
Mike Leighton	Credit Suisse
Angus Grieg	Deutsche Bank
Gary Nettleingham	HSBC
Geoff Thorpe	JPMorgan Chase
Chris Nicoll	Morgan Stanley
Mark Iles	Royal Bank of Canada
Roger Hawes	RBS
Christoph Kreuter	UBS
Martin Mallett (Chair)	Bank of England
James O'Connor	Bank of England

Members of the London Foreign Exchange Joint Standing Committee legal subgroup as at December 2007

Name	Firm/Organisation
Gaynor Wood	Bank of America
Chris Allen	Barclays Capital
Richard Haynes	Citigroup
Julia Elliot	Citigroup
Leonie Miller	Credit Suisse
Yien Hong	Deutsche Bank
Anne Moore-Williams	FSA
Felicity White	HSBC
Andrew Hamper	JPMorgan Chase
Stephen Potts	Lloyds TSB
Daniel Rubin	Morgan Stanley
Alex Bouchier	RBS
Martin Oakley	Reuters
Alistair Clevely	Standard Chartered
Simone Paul	State Street
Kate Binions	UBS
Susan Revell (Chair)	Morgan Stanley
Jacqueline Joyston-Bechal (Secretary)	Bank of England

Speeches

Sovereign wealth funds and global imbalances

In this speech,[1] Sir John Gieve, Deputy Governor for financial stability, discusses the impact of sovereign wealth funds (SWFs) on the global financial system. He argues that the recent rapid growth of SWFs is a result of persistently large global imbalances, which, in turn, have helped create vulnerabilities in the world economy and financial system. That said, he argues that the fact they, and their central banks, are looking for higher returns and asset diversification should improve the efficiency of global asset allocation. Their long-term investment horizons should also help to moderate financial market downturns. However, he concludes that some increase in the transparency of these funds and the recipient country's approach to them would be helpful to ensure that they contribute to further global financial integration rather than act as a catalyst for a new wave of financial protectionism.

Introduction

Much of the debate on sovereign wealth funds (SWFs) has focused on political questions: do they reintroduce the failings of public ownership into market economies by the back door?; will SWFs use their ownership rights to pursue political ends?; and will resistance to foreign ownership lead to a new wave of protectionism? I want to concentrate today on some economic issues: why have they become so prominent recently?; how does that relate to imbalances in the world economy?; how are they affecting financial markets and what are the policy implications of their growth?

Background

But first let me set out some of the background.

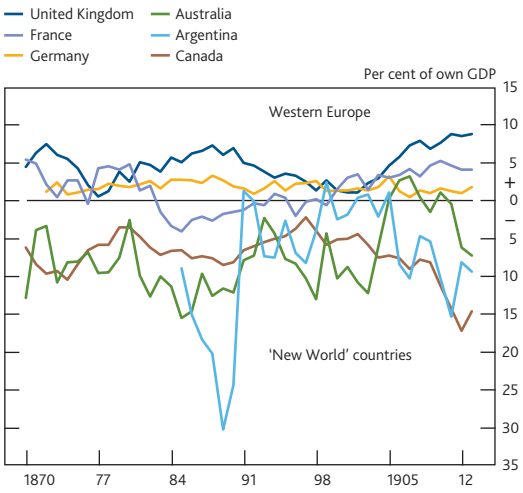
There is no off-the-shelf definition of an SWF. What I have in mind is a government investment vehicle that manages foreign assets with a higher risk tolerance and higher expected returns than for central bank foreign currency reserves.[2] The size of such funds is hard to measure, but may be in the $2 trillion–$3 trillion range.

Origins of SWFs

Investments by SWFs are one type of capital flow between countries so they have always been closely related to global imbalances in trade. When countries run surpluses on their current account, they generate equal and opposite net capital outflows of one sort or another and those capital flows produce an investment income.

That has been the story of the UK economy over the past 150 years. We ran continuous surpluses in the 50 years before the First World War and built up a large stock of foreign assets (**Chart 1**). Partly as a result of that, we benefited from a surplus on our investment account for most of the period since the 1870s.

Chart 1 Current account balances in the first wave of financial globalisation, 1870–1913



Source: Taylor, A (2002), 'A century of current account dynamics', *Journal of International Money and Finance*, pages 725–48.

(1) Given at the Sovereign Wealth Management Conference, London on 14 March 2008. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2008/speech339.pdf.

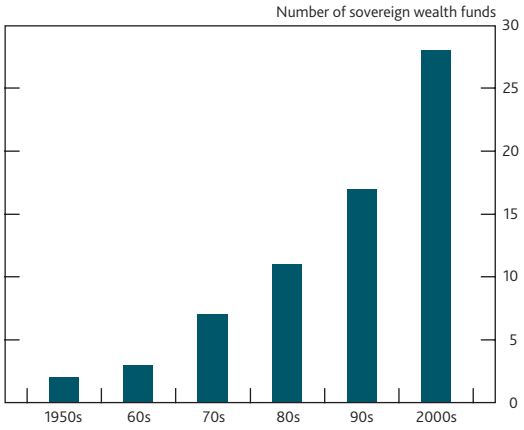
(2) There is some fuzziness at the edges of this definition. Central bank reserves in some countries, which traditionally have been invested mainly in liquid and safe instruments, are increasingly being switched into riskier assets. Also, in some countries, state-owned banks and other companies invest in foreign assets where some of the policy issues are the same as for sovereign wealth funds.

There are two key differences between that period of the United Kingdom's investment abroad and the situation today. One hundred years ago the developed countries were investing in emerging markets (at the time in the Americas and Australia) which had abundant land and natural resources but scarce capital and so the returns were high. Currently, capital is flowing 'uphill' from emerging to mature economies. Second, the investors before were mainly in the private sector and were seeking out the best returns on capital. Today the investors are mainly emerging market economies' (EMEs') central banks and governments and the build-up of foreign assets reflects their policy choices.

Modern sovereign wealth funds are not new, in fact the first — the Kuwait Investment Office — was set up here in London in February 1953 — just as Edmund Hillary and Tenzing Norgay were setting out to climb Everest.(1) And the number of funds has been increasing since then like the traffic on the slopes of Everest.

The next wave were set up by other oil producers after the price increases in the 1970s and 1980s for persuasive reasons (**Chart 2**). First, oil is a non-renewable resource so it can make sense for governments to spread the benefits of this endowment across generations by investing part of today's income in assets that will provide an income tomorrow. That would be so even if the path of oil prices was predictable but in fact it is not. That uncertainty about future income provides a second case for saving today. In the late 1970s, some oil exporters increased spending to match higher incomes and faced a painful adjustment when prices fell back again. Third, even if the rise in income was permanent there would be a case for phasing the growth of domestic spending and investment to prevent supply bottlenecks leading to inflation.

Chart 2 Number of sovereign wealth funds since the 1950s



Sources: Deutsche Bank and Morgan Stanley.

Recent growth of SWFs

Since the millennium at least ten new SWFs have been set up and there are reports of plans for more for example in Brazil, Japan and India.

This reflects the remarkable shift of EMEs from debtors to creditors. Ten years ago — at the time of the Asian crisis — emerging markets as a whole were running a current account deficit. Since then they have been running progressively bigger current account surpluses reaching an estimated $685 billion last year (1.3% of world GDP).(2) The counterpart to this is that developed countries as a group have been running progressively bigger current account deficits not just in the United States but also in a number of other developed countries including the United Kingdom.(3) Of course there are some notable exceptions in each group: Canada, Germany and Japan for example are still creditors while many countries in Central and Eastern Europe and Africa are running large deficits. But **Maps 1** and **2** show how much the pattern has changed in the past ten years. Most of South America and South East Asia have swung from deficit to surplus. Perhaps as important, the scale of the differences has grown with more countries running surpluses or deficits of over 5% of GDP.

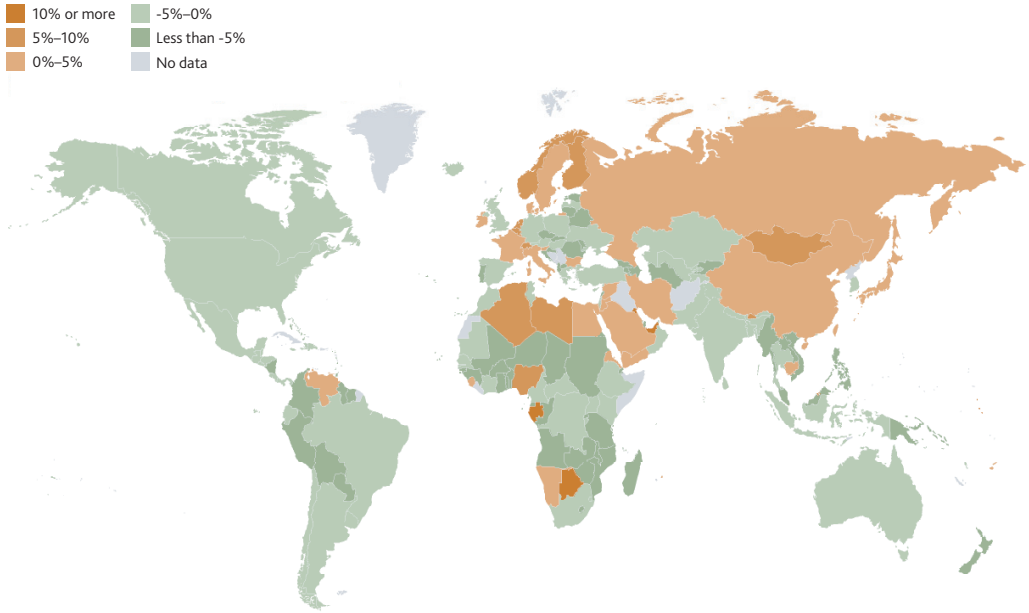
Oil and other commodity inflation is part of the story, of course, but that does not account for the large current surpluses in most of East Asia. In China, strong manufacturing growth resulting from higher labour productivity has not been matched by higher domestic spending so savings have grown ahead of even dramatic investment growth. A deliberate policy of fostering export industrial growth has slowed the rise of exchange rates that would reduce these imbalances.

As a result the build-up in EME foreign assets has been held mainly as central bank reserves especially in Asian countries (**Chart 3**). In total the foreign assets now held by EME central banks and governments is about $7 trillion, which compares with only $60 billion gross foreign assets held by the UK government. Many emerging economies concluded after the Asian crisis a decade ago that they needed bigger liquid reserves in traditional government debt to defend themselves against volatility in financial markets even when that carried the likelihood of a negative return (taking account of expected exchange rate movements). But when the reserves outstripped the levels needed for that purpose, it was natural to look to increase the returns on investment by widening the range of investments.(4)

And in the next few years, these current account surpluses are likely to remain high and the build-up of foreign assets by governments in oil-exporting and Asian countries is likely to

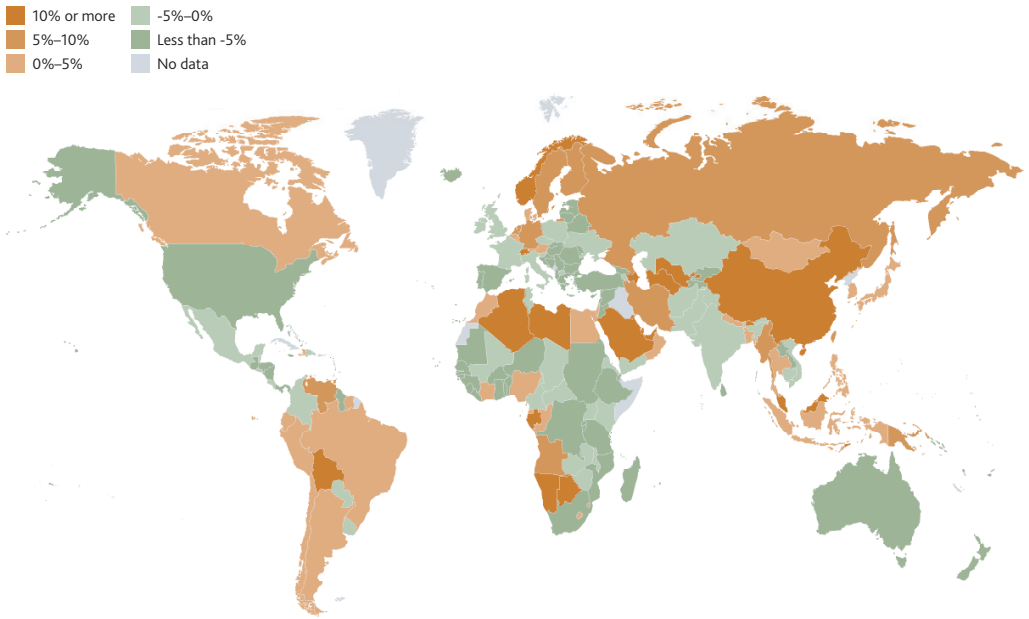
(1) The Kuwait Investment Office is the in-house investment arm of the Kuwait Investment Authority (formerly known as the Kuwait Investment Board) and was established by Sheikh Abdullah Al-Salem Al-Sabah on 23 February 1953. Edmund Hillary and Tenzing Norgay reached the summit on 29 May 1953.
(2) These figures include the newly industrialised countries (NICs). Excluding NICs the estimated surplus is $596 billion (1.1%).
(3) Latest data show that current account deficits were 5% of GDP or above not only in the United States but also in Australia, Greece, Iceland, New Zealand, Portugal, Spain and the United Kingdom.
(4) Foreign reserves held by EME central banks as a whole are about 60% (close to $3 trillion) higher than needed for conventional precautionary reasons to cover short-term external debt.

Map 1 Current account positions (per cent of own GDP) in 1997



Source: IMF Data Mapper, *World Economic Outlook*, October 2007.

Map 2 Current account positions (per cent of own GDP) in 2007



Source: IMF Data Mapper, *World Economic Outlook*, October 2007.

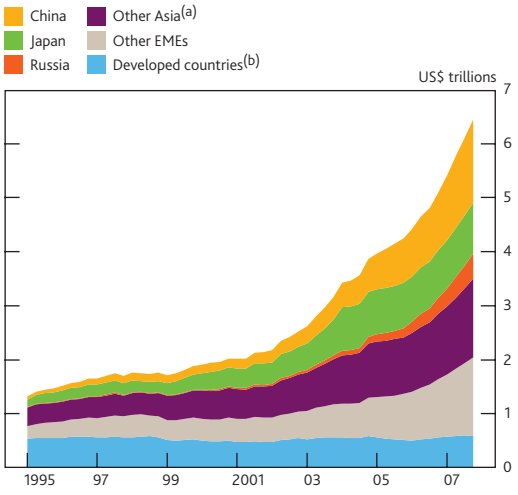
continue. According to the IMF's forecasts, the combined current account surplus of China and oil-exporting countries will be around $800 billion over the next three years. And the IMF estimates that sovereign wealth fund assets could grow to $6 trillion–$10 trillion within the next five years.

The impact of SWFs on financial markets

These are huge numbers and SWFs have become prominent and important players in many financial markets. But we should not exaggerate their impact on the global financial system. In aggregate, their assets under management are currently only less than one 20th of those held by private sector participants such as pension, insurance and mutual funds as well as hedge funds and private equity (**Chart 4**). And they account for about 2% of the total size of equity and bond markets globally. Even in five years' time — and on some of the fastest growth projections — assets under management by SWFs are projected to reach only about 6% of global financial assets.(1) Moreover, though they have more assets under

(1) Morgan Stanley, *Sovereign Wealth Funds and Bond and Equity Prices*, 31 May 2007.

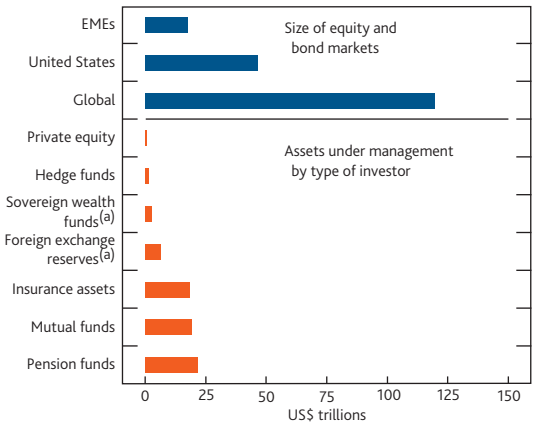
Chart 3 Global holdings of foreign exchange reserves (excluding gold), 1995–2007



Source: IMF *International Financial Statistics*.

(a) Excluding China and Japan.
(b) Excluding Japan.

Chart 4 Assets under management by SWFs relative to other investors and size of capital markets, end-2006



Sources: IMF *Global Financial Stability Report* October 2007, IMF *International Financial Statistics*, McKinsey and Co. and various estimates of SWF assets under management.

(a) Foreign exchange reserve holdings and estimates of SWF assets under management are for end-2007.

management than hedge funds they have smaller investments since they are not leveraged.(1)

It is not difficult to identify positive effects on the world's capital markets. SWFs have long investment horizons and generally have no commercial liabilities. Therefore, in periods of market stress they are likely to face less pressure than most private investors to reduce the size or increase the liquidity of their investments. They are well placed to play a contrarian role and help to stabilise markets by investing in times of stress. For example, when the global equity market fell sharply between 2000 and 2002, the Norwegian Government Pension Fund was a large buyer of global equities. And a number of SWFs have played an important and welcome stabilising role during the current turmoil by providing around $40 billion of

Table A SWF capital injections in financial institutions since November 2007

Date of announcement	Sovereign wealth fund	Financial institution	Amount (US$ billions)
26/11/2007	Abu Dhabi Investment Authority	Citigroup	7.5
10/12/2007	GIC — Singapore	UBS	9.8
19/12/2007	China Investment Corporation	Morgan Stanley	5.0
24/12/2007	Temasek — Singapore	Merrill Lynch	4.4
15/01/2008	GIC — Singapore	Citigroup	6.9
	Kuwait Investment Authority	Citigroup	3.0
15/01/2008	Korea Investment Corporation	Merrill Lynch	2.0
	Kuwait Investment Authority	Merrill Lynch	2.0
Total			**40.6**

Sources: Press releases and market reports.

new capital since November to some of the world's biggest commercial and investment banks (**Table A**).(2)

Taking a broader view, the switch of some reserves from government debt into SWFs which invest in a wider range of instruments should help to improve the allocation of resources if these investments are based on commercial criteria. Investing in equities may also help to reinforce and bring to the surface the common interest that EMEs and the advanced economies have in the good performance of the companies involved and the markets they operate in. It may thus help to integrate EMEs into the global financial system and encourage them to participate more in global policy making.

From a parochial point of view, the prospective increase in demand for equities relative to bonds could have a positive impact on London and sterling. Whereas the value of the UK market for public debt securities is only 3.3% of the global market, UK equities account for 7½% of the value of global equities. The rapid growth in SWFs is also a fillip for London as a leading international financial centre.

SWFs and transparency

The main doubts concern their objectives and how far their investments will be driven only by financial returns.

Public sector owners might have other objectives including national political interests, such as, accessing military technology, controlling strategic resources or markets, and influencing public opinion.(3) There are often complaints that SWFs lack transparency. Decoded, this is a request for reassurance about their investment policies.

(1) That said, the assets held by sovereign wealth funds are highly concentrated, with around 70% of total assets held by the five largest funds. So the largest sovereign wealth funds could have an impact on some markets especially smaller ones such as other EMEs.
(2) Also, a number of central banks from countries with large current account surpluses have been willing throughout the current liquidity crisis to lend to international banks, including UK ones, at longer, three to twelve-month, maturities.
(3) Note though that this distinction between foreign public and private sector owners is not cut and dried. Foreign private sector purchases of football teams or newspapers do not always seem to be driven by the profit motive.

I am certainly not going to argue against more transparency (except in the very special case of the market operations of central banks). More openness from SWFs may help to alleviate concerns in recipient countries — and thus reduce protectionist pressures. And it may improve the dissemination of information to market participants and to their own citizens. I know many SWFs are working with the IMF to produce a voluntary code of conduct that is based on best practices for the governance and transparency of SWFs. For example, it would be helpful if all SWFs were transparent about their overall strategies, objectives and broad investment guidelines. Norway's Government Pension Fund is a good example in this respect.

But there should be a level playing field applied to all investors. The case for greater transparency applies to other investors too. SWFs may take some comfort that they are not being singled out and that there are equally powerful pressures for transparency on hedge funds and private equity investors. In this respect, two recent initiatives are particularly welcome. First, a report under the chairmanship of Sir Andrew Large — my predecessor as Deputy Governor for financial stability at the Bank — on voluntary standards, including on disclosure, for hedge funds. And, second, a report by Sir David Walker — a former Executive Director of the Bank — on guidelines for disclosure and transparency by private equity funds.(1)

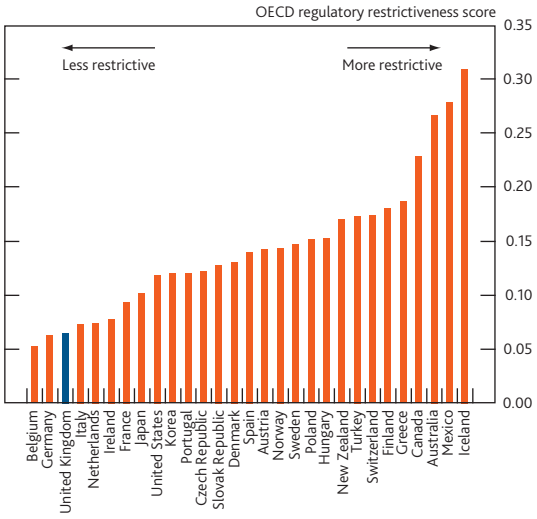
And transparency should not be one-sided among countries. I know SWFs themselves are often keen for more transparency from recipient countries on whether and how far they are welcome and the rules of engagement.

The United Kingdom in recent years has been unusually open to foreign investors and foreign ownership both in comparison to our past and in comparison to most other developed (and emerging) countries today. We have relied on regulation of infrastructure industries and on competition law to prevent the abuse of market power and most of our utilities, much of the financial sector, as well as an increasing number of our leading football clubs have come into foreign ownership. In its latest survey of international direct investment trends, the OECD ranked the United Kingdom as having one of the least restrictive regulatory environments for foreign direct investment (FDI) across all OECD member countries (**Chart 5**). And the United Kingdom has welcomed a number of SWFs to London as a base for international operations.

Sovereign wealth funds and global imbalances

However, the emphasis on transparency and the politics of SWFs risks missing a bigger policy issue: the recent rapid growth in SWFs reflects large and persistent global imbalances which are a continuing threat to the stability of the world financial system and the global economy.

Chart 5 OECD FDI regulatory restrictiveness index, 2006



Source: OECD.

Global imbalances and financial crises

While there are many examples of countries which have run deficits for many years such as Australia and New Zealand, history also shows how painful the eventual adjustment can be. There are many examples in which capital flight has resulted in a huge fall in GDP growth and broader financial crises — for example in Latin America in the early 1980s, in the Nordic countries in the early 1990s and the East Asian economies a decade ago — which, in turn, weakened global GDP growth or global financial institutions.

Countries with large deficits are vulnerable to a rapid reversal of capital flows. If investors are no longer willing to finance the deficit, domestic spending will need to be cut relative to output through a combination of reducing spending and switching production to the tradable sector. A recent IMF study reviewed 42 episodes of large reductions in current account deficits in developed countries over the past 40 years. In a quarter of the cases, which were mainly countries with limited real exchange rate depreciation, annual GDP growth fell by 3½ percentage points on average.(2)

There are dangers too for surplus countries. Large foreign exchange inflows are not easy to sterilise. They tend to contribute to asset price bubbles and higher inflation which itself can undermine economic and financial stability. The effect of such inflows into China and oil-exporting countries have been compounded recently by their exchange rates being

(1) Hedge Fund Working Group (2008), *Hedge Fund Standards: Final Report* and Walker Working Group (2007), *Guidelines for Disclosure and Transparency in Private Equity*. The *Large Report* recommends a set of best practice standards for hedge funds in terms of disclosure, valuation, risk, governance and shareholder conduct. The *Walker Report* recommends a set of guidelines for disclosure and transparency by private equity funds, including the publication of regular information on their financing, ownership and prospects.

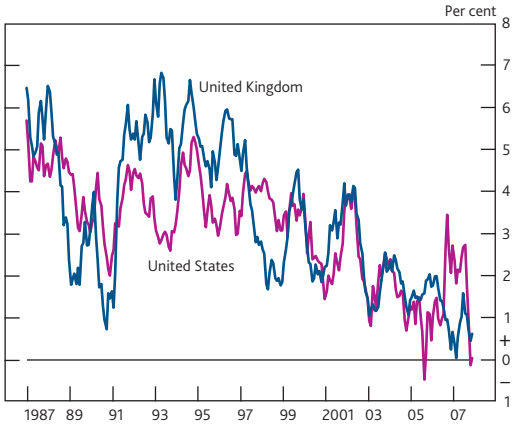
(2) IMF *World Economic Outlook* (2007), 'Exchange rates and the adjustment of external imbalances', April, Chapter 3.

pegged or managed against the falling dollar. This has contributed not just to the build-up of reserves and SWFs but also to the build-up of inflationary pressures within these countries.

No one would blame EMEs for the current turmoil in Western financial markets. It has been generated at home by the widespread mispricing of financial assets; this has been most obvious among the assets based on the US housing market but it is not confined to that sector. However, the way that the boom developed did owe a great deal to global imbalances.

The 'savings glut', to quote Ben Bernanke,(1) that developed in the oil-exporting countries and China contributed to the fall in real long-term interest rates.(2) In the United Kingdom, for example, real long-term interest rates, measured by the difference between the nominal ten-year government bond yield and the annual rate of inflation, fell from around 3.9% in 1997 to 1.6% in 2005. A similar pattern was also evident in the United States (**Chart 6**). In particular, interest rates on safe assets fell since the build-up in foreign assets were invested mainly in government bonds.(3) That both discouraged saving and boosted asset prices. In order to maintain their traditional returns, the private sector sought higher yielding strategies and were too ready to believe that these could be attained through new products without running bigger risks. We are now dealing with the consequences of that mistake.

Chart 6 Real long-term interest rates(a) in the United Kingdom and the United States, 1987–2007



Sources: Bloomberg, IMF *International Financial Statistics* and Bank calculations.

(a) Nominal yields on ten-year government bonds minus the twelve-month rate of inflation.

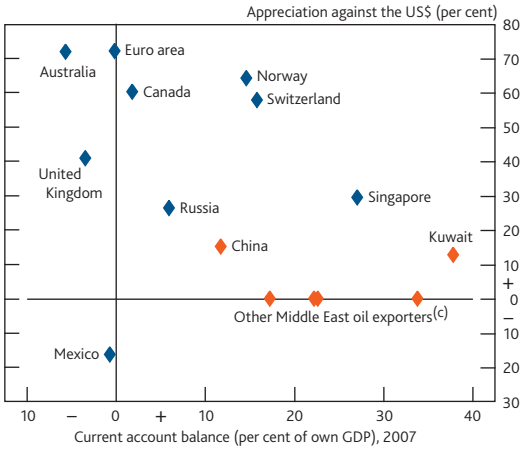
Global imbalances — where to from here?

The unwinding of global imbalances requires some combination of a slowdown in the growth of domestic demand in deficit countries and an increase in domestic demand in surplus countries. If the slowdown is not to dominate, we need to see a shift in relative prices to rebalance demand — that is a gradual real exchange rate depreciation of deficit countries against surplus ones.

The rise of SWFs may play a part in this dynamic. Their emergence is a sign that surplus countries may be less willing in future to accept such low yielding assets. That should put pressure on exchange rates to adjust and contribute to a reduction in global imbalances. So while SWFs may be a product of global imbalances, they may also play a part in the adjustment.

There are signs that in the United States, at least, imbalances are beginning to adjust. The US current account deficit now looks past its peak and the marked fall in the dollar — about 25% in real trade-weighted terms — since its peak in early 2002 should help in the adjustment. However, the decline in US relative demand is coming about mainly through slower domestic demand growth at home rather than faster demand growth abroad while the dollar has fallen less against currencies with the largest current account surpluses (**Chart 7**). There is a risk, therefore, that the fall in the US current deficit will not be matched by a fall of surpluses in high-surplus countries but a rise in deficits in other deficit countries. The imbalances could be transferred not reduced.

Chart 7 Nominal exchange rate adjustments since 2002(a) and current account balances(b)



Sources: IMF and Bank calculations.

(a) February 2002 to January 2008.
(b) Estimated current account balance in 2007.
(c) Bahrain, Qatar, Saudi Arabia and United Arab Emirates.

So it is important that the current large gap between savings and investment in the Far East and oil-exporting countries narrows. In the near term, the ability to increase spending will be constrained by the recent increase in inflationary

(1) Bernanke, B (2007), 'Global imbalances: recent developments and prospects', speech delivered for the Bundesbank Lecture, Berlin and Bernanke, B (2005), 'The global savings glut and the United States current account deficit', speech delivered for the Sandridge Lecture at the Virginia Association of Economists.
(2) A fall in desired investment (investment 'strike') in some countries also contributed to the decline in global real interest rates. For example, investment-GDP ratios fell sharply in the newly industrialised countries in the wake of the East Asian crisis a decade ago.
(3) For example Warnock, F E and Warnock, V C (2006), 'International capital flows and US interest rates', *NBER Working Paper no. 12560*, estimate that foreign official flows reduced US ten-year Treasury nominal yields by about 100 basis points lower than otherwise in the year to June 2005.

pressures in these countries. But more exchange rate flexibility should be helpful on both fronts. And over the medium term, in oil-exporting countries, government spending is likely to increase further in response to past increases in incomes since part of the rise in the oil price looks to be permanent. This gives oil exporters the opportunity to spend more on diversifying production in their economies. It is encouraging also that in China the government has plans to increase its own expenditure on the infrastructure, encourage higher spending by households through speeding up financial sector reform and improving the safety net as well as allowing more flexibility than in the past in the exchange rate.

Conclusion

Given the growth of foreign currency reserves in many EMEs, the emergence of SWFs making long-term investments on financial criteria in a wider range of instruments is a positive development. Some increase in the transparency both of the strategy and objectives of the funds and of recipient countries' approach to inward investment should help dispel concerns and ensure they are a force for greater global financial integration rather than a prompt for a new wave of financial protectionism. SWFs' recent investments in global financial institutions have been helpful in easing the current financial market turmoil. And the fact that they, and their central banks, are looking for higher returns and greater asset diversification should be beneficial both to the EMEs and to the recipient countries since it should improve the efficiency of global asset allocation.

But that positive story should not conceal that the growth of SWFs is also a result of persistent global imbalances in trade. These imbalances have helped create vulnerabilities in financial markets and in the wider economy. Our current experience is one more illustration of how painful the unwinding of such imbalances can be.

Monetary policy and the financial system

In this speech,[1] Paul Tucker, Executive Director for Markets and Monetary Policy Committee (MPC) member, discusses the challenges that the turmoil and fragility across financial markets has posed to monetary policy and financial stability. On monetary policy, the conditions were not favourable to a 'business as usual' approach to demand management; alongside the downside risks to demand from tighter credit conditions there were upside risks to inflation over the medium term stemming from the rise in commodity prices and the decline in the exchange rate. The broad policy strategy was to offset some but not all of the adverse shock to demand. If implemented successfully that strategy would enable the Bank to provide durable support to demand and activity. If, by contrast, the inflation genie threatened to escape from the bottle then policy would need to be tightened. On the financial system, the process of deleveraging in the financial system was not complete, and there was a risk that credit creation could be further impaired. In tackling these issues, he notes that the technology for central bank liquidity insurance — an important facet of the *de facto* Social Contract existing between the banking system and the authorities — had broken down since the summer, due to the stigma on borrowing from central banks' standing facilities. Central banks needed to innovate and reform the way in which they provided such insurance. More broadly, he suggests that a renewed debate is needed on policies to tame the credit cycle, but cautions there are formidable obstacles in finding a solution.

Alongside many others, the money market fund industry has for months now been grappling with turmoil and fragility across financial markets. It continues to pose serious challenges for all of us, and so I shall use this evening to summarise briefly a few of the strands in my own thinking about monetary policy and the financial system.

Monetary policy

First, monetary policy. The tightening of credit conditions domestically and internationally makes it likely that aggregate demand will slow, with a risk that it will slow considerably. There is, in consequence, a meaningful downwards threat to inflation over the medium term. Usually, the MPC would respond by cutting Bank Rate sufficiently to offset more or less entirely what we judged, over time, to be the impact of the tighter financial conditions on the path of spending, so as to ensure that aggregate demand remained broadly in line with the economy's productive capacity. But conditions do not favour such a 'business as usual' approach to demand management. That is because, alongside those downside risks to inflation, there are also upside risks to inflation over the medium term — and I am stressing 'medium term' — stemming from the rise in commodity prices and the decline in sterling's exchange rate. In the near term, CPI inflation is very likely to rise to materially above our 2% target. The question is whether that unavoidable temporary rise will remain just that, temporary; or whether it will feed into medium-term expectations of inflation, and so get reflected in wages and prices going forward and, thus, in domestically generated inflation.

Given this unusual combination of significant downside and upside risks to the medium-term inflation outlook, the broad policy strategy is to offset some but not all of the adverse shock to demand from tighter credit conditions. And to do so by changing Bank Rate gradually and with transparency about that broad strategy. To be clear, this approach probably means allowing a degree of slack to develop in the economy, in the interests of avoiding taking risks with inflation on the upside. Only by underpinning the credibility of the nominal anchor provided by the MPC's commitment to the inflation target will we maintain scope to cushion the real economy from the effects of the stresses in the international financial system. If we implement this strategy successfully, we will be able to

(1) Given at the Institutional Money Market Funds Association Annual Dinner on 2 April 2008. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2008/speech341.pdf.

provide more durable support for demand and activity. If, by contrast, we were to adopt a course that let the inflation genie out of the bottle, we would find ourselves needing to tighten policy, exacerbating the slowdown in activity.

That broad strategy is not a recipe for inaction. The central projection in February's *Inflation Report* was for inflation to return to close to the 2% target over the coming two to three years, conditional on the market's expectation of further cuts in Bank Rate. But nor does the strategy determine a definite path for Bank Rate over the coming months. Each of us on the MPC must form a judgement month by month on which of the risks to the inflation outlook — from financial conditions or from rising costs — is proving more potent, and so a judgement on the degree to which we can set a course that underpins demand.

Since the February *Inflation Report*, oil prices are around 10% higher, and sterling's exchange rate around 4% lower, so the immediate cost pressures are worse. The good news is that, in the labour market, nominal earnings growth has so far remained subdued, notwithstanding the rise in near-term inflation expectations revealed by a range of surveys. This is perhaps suggestive of the adjustment in real take-home pay made necessary by the sharp increase in firms' costs due to the further rises in commodity prices. In manufacturing, firms' input costs have risen sharply over the past twelve months; and output price inflation has reached nearly 6%. A big question is to what extent competition among retailers will dampen the pass-through into retail prices. Anecdotally, retailers still sound as though they are competing fiercely on prices, and driving down other costs in order to maintain their margins.

Meanwhile, on the other side of the ledger, many essentially backward-looking indicators of UK real demand and activity have held up reasonably well. But we should not yet place great weight on that. It can sometimes take time for disturbances to affect real economic activity. In the United States, arguably there was quite a lag between the onset of problems in housing finance and the pass-through to spending. The United Kingdom looks to be quite a lot better than the United States. The latest data for Q4 last year did, however, suggest that household spending on durables slowed quite significantly. And we are seeing softening in consumer confidence and property market conditions. So the picture on the real economy is mixed.

What is clear is that credit conditions are unambiguously tighter than two months ago, underlining that source of downside risk to the outlook for demand and inflation. In retail lending markets, banks have raised the interest rates charged (relative to Bank Rate) on new lending, but they have all been doing much the same and many borrowers seem to have been willing to pay the extra. In consequence, banks generally may not have achieved their desired conservation of balance sheet capacity, and we are now seeing the withdrawal of some lending products.

And in wholesale markets, the spread between the price that the banks themselves pay for funds, roughly Libor, and the expected central bank policy rate has, again, widened significantly over the past couple of months across the major international markets. Many financial contracts are linked closely to three-month Libor so, other things being equal, the increase in money market spreads has the effect of reducing the level of Bank Rate consistent with unchanged monetary conditions.

At the Committee's March meeting, I judged that an immediate further cut, following February's, might very easily have been misunderstood as a change of strategy away from the one focused on the medium-term outlook for inflation that I have spelled out this evening. My own vote at the April meeting will depend on all the data, some of it still to reach us, since then.

Financial system deleveraging: legacy portfolios

Whatever path monetary policy takes in the United Kingdom in the months ahead, it is clear that the process of deleveraging in the financial system is not complete. Some asset prices embody a hefty discount for the current illiquidity in markets, which feeds into the accounting measure of financial firms' capitalisation, and so into perceptions of counterparty credit risk and money market conditions. In consequence, there remains a risk that credit creation — the lubricant that the financial system provides to the real economy — will be further impaired. Several features of our financial system lie behind this, and I want to touch on just a few of them.

Financial markets have swung from a prolonged period of underpricing risk to now plausibly overpricing risk on at least some products. And yet, one might think perversely, we have also swung from an overabundant supply of credit to a much more restrictive supply of new credit. The global insurance industry provides an interesting contrast with banking in this respect. For sure, it too is capable of systematically misjudging risks. But when a shift in risk appreciation and pricing occurs, the reinsurance industry often separates the run off of old portfolios containing mispriced contracts from the establishment of new vehicles, capitalised separately to take advantage of attractive terms on new business. And for regular insurance, many contracts are annual, so adversely priced business can run off fairly quickly. Banking typically works quite differently. Banks around the world are carrying portfolios of term loans that are the legacy of the boom years. There is uncertainty — among banks' management,

shareholders and funders — about the degree of fundamental impairment in those portfolios. New loans are booked to the same balance sheets. And so many banks face a choice between, on the one hand, conserving capital and liquidity to support legacy portfolios; and, on the other hand, deploying capital and liquidity to write new business on what some see as the attractive terms and conditions now available. The banking system simply is not structured routinely to insulate new business from the legacy of past mistakes; funding and capital are fungible.

This predicament may be exacerbated by other features of the current environment.

One is an apparent reluctance on the part of banks to raise fresh capital except where the market thinks that it is beyond doubt that they need to do so. Given the feedback from credit conditions to asset prices and the real economy and so potentially to banks' future earnings, it might seem slightly odd for banks internationally to be maintaining distributions to shareholders but tightening credit availability in order to preserve resources. This has to be seen in the wider context.

One possible explanation for banks holding back from raising fresh capital is that they may want to avoid giving an adverse signal about themselves. If there is a co-ordination problem, the regulatory authorities internationally should be able to tackle it, allied to ensuring prudent valuations of legacy portfolios. But another possible explanation is that, like some other market participants, bankers may believe that many legacy assets are fundamentally undervalued at present and that the markets for securitised assets will, with time, recover and reopen. On that view, banks are avoiding becoming overcapitalised on a fundamentals (or forward-looking) basis, and so setting off another expansionary phase in the credit cycle, a little further down the road. The serious puzzle which that underlines is why there is a dearth of buyers for the supposedly undervalued paper. With the terms and availability of financing from banks and dealers having tightened, levered funds are hardly likely to be the US Cavalry. But it is interesting that there has not been more interest from investment institutions with ostensibly long holding periods, which are largely unlevered and are not exposed to liquidity risk from borrowing short and lending long. What we commonly hear from contacts is that investment managers do not want to be caught out if asset prices fall further before they recover. But no one can seriously believe that they can spot the bottom of the market, and short-term horizons should not weigh heavily in longer-term investment institutions. All of which suggests that there may be structural impediments. Those could include some combination of the reasonable difficulty that some asset managers experience in assessing the quality of securitised assets; and mandates and accounting policies that may have the effect of shortening asset managers' time horizons.

The challenge for your own industry seems to have been slightly different. The managers of some money funds around the world, although I am sure not all of your members, joined in the 'search for yield' by going down the credit spectrum and increasing maturity mismatch during the boom in credit markets. As those funds have moved back towards home base, shortening the maturity and increasing the liquidity of their assets, one effect has been a reduction in the net supply of term funding into the international banking system.

That has been one of many contributors to the liquidity strains evident in money markets. But those strains have also been exacerbated by an unexpected breakdown in the technology for liquidity insurance provided by central banks.

For well over a century, throughout the industrialised world there has in effect been something akin to a Social Contract between the banking system and the authorities. The banking system is permitted to profit from undertaking leveraged maturity transformation in the course of intermediating the liquid savings of depositors into illiquid loans to households, firms and others. In doing so, commercial banks provide liquidity insurance, whether via demand deposits or committed lines of credit. They can do this because their deposit liabilities are money, which puts them at the heart of the payments system and is what makes them special; banks are at the heart of a monetary economy. In return, the authorities respond with a combination of prudential supervision, to contain the risks that banks run; deposit insurance, to protect savers; and liquidity insurance from the central bank. Smaller commercial banks can try to buy liquidity insurance from their larger brethren. Large banks cannot realistically do the same. They need to hold liquid assets. But there is no cast iron guarantee that asset markets will remain liquid in all conditions. So since Bagehot's day, central banks have stood ready to provide unlimited liquidity against good collateral at a rate that is higher than the normal market rate. However, during the period of turmoil since last summer it has proved toxic, here and overseas, for banks to access liquidity on those terms from central banks unless in broad and quality company. That has created uncertainty about the access of banks to the central banks in practice, and has required innovation and clear assurances from the central banking community. This alone will require reforms to the way in which central banks use their balance sheets, and money creating power, to sustain financial stability.

Banks will also need to adapt. It seems that at not a few firms, the discipline of risk management somehow got separated from that of balance sheet management (or funding). It was effectively assumed that financing markets would remain open come what may. There is a question of whether treasury management should somehow be insulated from the pressures of a profit centre. Separately, assumptions were made about relationships between asset prices that have proved

groundless. One such is the spread between term money market rates and expected central bank policy rates. So long as the so-called Libor/overnight index swap (OIS) spread was narrow at all maturities, few market participants cared about whether they hedged against a Libor-based instrument when in fact sometimes they really needed a hedge relative to a risk-free rate. We sense that some international fixed-income asset managers would like there to be OIS-based contracts alongside Libor-based financial contracts, so that they can tailor their hedges more precisely. There should be wider benefits from contracts based purely on the risk-free rate rather than embodying liquidity premia and credit risk premia of various kinds. That is something for the industry.

But better liquidity-insurance technology and better risk management will not abolish the credit cycle. Looking further ahead, the big question will be whether the authorities can tame the credit cycle without sacrificing the incentives to enterprise that are so important in a dynamic economy. The debate about the micro regulation of banks will need to take account of whether or not we can deliver that macroprudential objective. For too long, the debate has got sidetracked. Into whether we can rely on monetary policy 'mopping up' after bubbles burst. Or into whether monetary policy could be used to control asset prices as well as doing its orthodox job of steering nominal trends in the economy, which I should say can include taking account of prospective risks of inflation volatility over the medium term. Ideas circulating already include minimum margin requirements or capital ratios that vary not only across instruments or firms but also through time as credit conditions change. We need calmly to explore whether there are also other possibilities. But let me make this absolutely clear: there are formidable obstacles to finding a solution. In the monetary sphere, a regime of floating exchange rates allows individual countries to pursue their own domestic monetary objectives. But in a world in which capital flows freely, local attempts to control the pace of credit creation, particularly within the financial system, may not work. All of that will need to be thought through. But first we need to concentrate on the immediate challenges.

Summary

In a speech four months ago, I stressed that 'we must try to avoid a vicious circle in which tighter liquidity conditions, lower asset values, impaired capital resources, reduced credit supply, and slower aggregate demand feed back on each other'. I identified monetary policy, liquidity policy, and regulatory capital policy as being among the instruments the authorities would need to use. That remains the case, as the stress in the global financial system has continued and, in the United States at least, evidence of a feedback loop is apparent. Each of those instruments is constrained in some degree. That underlines the need for close co-operation between the authorities and the industry, and internationally.

Inflation and the global economy

In this speech,[1] Professor Tim Besley,[2] a member of the Monetary Policy Committee (MPC), discusses differences and similarities between inflation rates across industrialised economies. Most countries experienced high and volatile inflation during the 1970s and part of the 1980s, and low and stable inflation thereafter. Professor Besley argues that the main contrast between these two periods is a significant change in central bank responses to inflation. Periods of high and volatile inflation were associated with *negative* real interest rates (ie the policy rate adjusted for inflation) in nine industrialised economies, which can be interpreted as symptomatic of a relaxed monetary policy. The most recent period of low and stable inflation is characterised, in contrast, by *positive* real rates of interest. The experience of the past suggests that using monetary policy to support the economy in the face of negative productivity shocks had little success. Professor Besley concludes that monetary policy cannot (and should not, therefore, try to) prevent warranted real economy changes taking place but it can perhaps smooth some of the adjustment in response to the real implications of the credit shock. The MPC will do its best to keep businesses' and households' inflation expectations anchored around the 2% target. This provides the best context to maintain the credibility of the framework that we have in the United Kingdom and allows monetary policy to play its part in maintaining the stability that is needed for households and businesses to plan for the long term.

Ladies and Gentlemen, thank you for coming.

Had I been speaking here a year ago on the challenges faced by the MPC, I would have emphasised the inflationary implications of the robust expansion in the UK economy in the face of mounting capacity pressures and some signs of a pickup in global inflationary pressure. You will recall that April 2007 was the month in which, for the first time, the Governor of the Bank of England was obliged, under the accountability arrangements put in place by the 1997 framework, to write an open letter to the then Chancellor of the Exchequer, Gordon Brown, explaining why inflation had risen to 3.1% in March, more than 1 percentage point away from the target of 2%. That letter underlined the determination of the MPC to take whatever action would be necessary to return inflation to target. It also explained why the MPC expected that inflation would fall back towards target as increases in domestic energy prices, in particular, dropped out of the base of the consumer prices index (CPI). This expectation was realised with inflation dipping a little below the target at 1.9% in July of last year.

While the first open letter after a decade of the post-independence period attracted a good deal of attention, it is important to look at the period since writing the letter in a wider context. Looking back, there is little to suggest that this period of above-target inflation led to second-round effects in wages and prices that could constitute the beginning of an inflationary spiral away from the target. Nonetheless, measures of inflation expectations, especially from surveys and pricing intentions in surveys of businesses, have remained elevated since that time.

The main headline event since that period is, of course, the financial market disruption that began last August and remains with us today. The far-reaching implications of this are still being studied. Managing its consequences presents a significant challenge to policymakers around the world as its effects filter through to businesses outside the financial sector and to households, not least in the latter's access to mortgage finance. This has created a rather different context for monetary policy compared to a year ago when the inflationary

(1) Delivered at the Canada-UK Chamber of Commerce, London on 22 April 2008. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2008/speech343.pdf.

(2) I am grateful to Neil Meads and Paolo Surico for their help and insights in preparing this speech, and colleagues for 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.

pressures that led to the open letter were accompanied by a robust picture for economic activity.

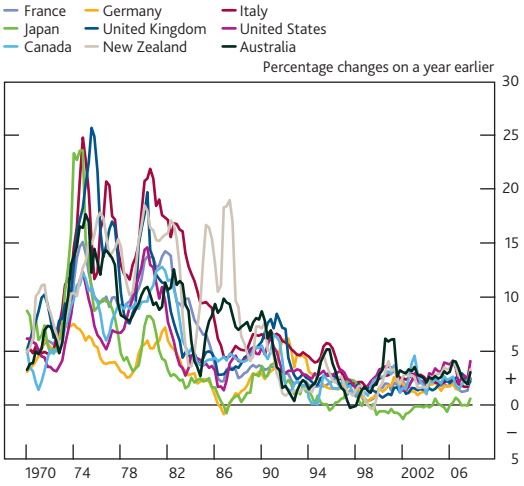
However, in common with a year ago, the challenge of responding to inflationary pressures remains. Prior to the publication of the February 2008 *Inflation Report*, I was struck how the focus on the financial market turmoil had largely deflected attention away from concerns about inflation. The MPC's remit is to maintain price stability by targeting 2% CPI inflation and, subject to that, to support the Government's economic objectives for growth and employment. Given this, we are obliged to remain firmly focused on the implications of developments in the economy for inflation in the medium term. There is now widespread recognition of the fact that the challenge for the MPC in setting interest rates is to try to balance two significant risks to the UK economy — the downside risk to demand and output which could eventually drag inflation below the target and the risk that upside shocks to energy and food prices lead to a more persistent period of inflation above the 2% target that becomes embedded in inflation expectations.

One striking feature of the inflationary pressure that we face in the United Kingdom is how far this is being mirrored by the experience in other countries. Inflation in the euro zone is 3.6%, the highest since the inception of the euro. In the United States, it is 4.0%,(1) in China 8.3% and in India 7.8%.(2) All are higher than a year ago. The fact that all countries have experienced increases in energy, food and other commodity prices is a significant factor. Wheat prices have risen from US$4.50 per bushel to US$7.62 per bushel and oil from US$65 per barrel to US$111 per barrel over the past twelve months.(3) These, of course, reflect the strong global economic performance in recent times — powered by the spectacular performances by India and China whose average annual growth rates have exceeded 8.5% and 10.2% respectively over the past five years. In short, the world does appear to have become a more inflationary place of late.

Looking at these issues in a broader historical context, the synchronous movement in inflation rates across industrialised economies(4) is quite striking. This can be seen in **Chart 1**, and it has been the subject of a number of recent economic analyses.(5) Many of you here will have lived through the early part of the period in this chart — sometimes labelled the 'Great Inflation'. The chart illustrates just how similar inflation rates have been across the industrialised world, with most countries experiencing high and volatile inflation during the 1970s and part of the 1980s, and low and stable inflation thereafter. The cause of this moderation in inflation is much debated.(6) In a nutshell, there are three main candidates: good luck, structural economic change and good policy.

The suggestion that the moderation in inflation is down to *good luck* argues that economies have not, in more recent

Chart 1 Inflation in nine industrialised countries



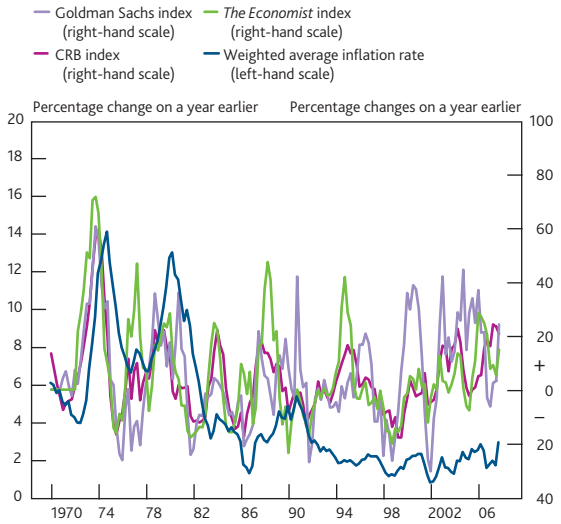
times, been subjected to too many inflationary cost shocks of the kind that we saw, in particular, with the two oil price hikes of 1973 and 1979. This, so the story goes, has diminished the challenges faced by policymakers charged with controlling inflation.

Given that the current pressure on inflation is so readily attributed to food and energy price pressures, it is tempting to believe that such movements are exceptional and that the great moderation was a reflection of stable commodity prices. In fact, this turns out to not be true as is illustrated in **Chart 2** which shows little evidence of a reduction in volatility in primary goods prices over either period.(7)

When I was first taught economics in the 1970s, it was sometimes suggested that the oil price shocks of 1973 and 1979 caused the 'Great Inflation'. But it was soon realised that this does not work as an explanation of inflation since these shocks were sudden and temporary while the inflation that they created was persistent. Of course, some kinds of commodity prices — notably oil — do generate temporary fluctuations in inflation as they pass through to households. But they cannot account, on their own, for persistent inflation. Indeed, **Chart 3** shows that, excluding the episodes of 1973 and 1979, oil price inflation and a measure of international inflation are virtually uncorrelated.(8) So I think that we need to look elsewhere to understand what drives the persistent patterns in inflation seen in **Chart 1**.

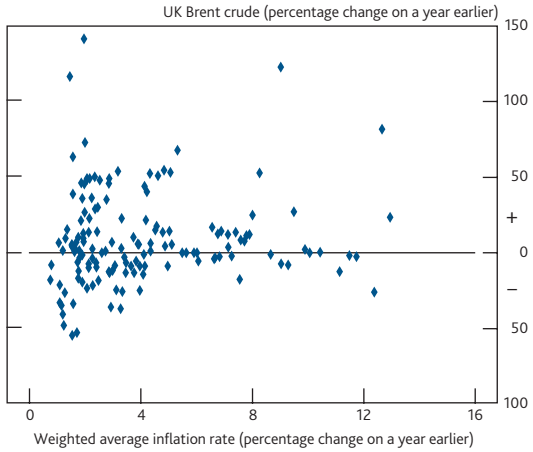
(1) Headline CPI inflation for March 2008.
(2) Based on Indian wholesale price index.
(3) Number 2 soft red wheat and crude oil prices reported for 18 April 2008.
(4) I will focus here on the experiences of nine countries only: Australia, Canada, France, Germany, Italy, Japan, New Zealand, the United Kingdom and the United States. However, the arguments discussed here are relevant to most OECD economies.
(5) See for instance Rogoff (2003), Ciccarelli and Mojon (2005), Borio and Filardo (2007), and Mumtaz and Surico (2008).
(6) The academic literature now uses the term the 'Great Moderation' to refer to the decline in the volatility of output growth. Here, I note that a similar decline occurred in the level and volatility of inflation across most industrialised economies.
(7) See Walton (2006) for a discussion of why the UK economy may have become less vulnerable to oil shocks.
(8) A similar result is reported by Mumtaz and Surico (2008).

Chart 2 International inflation and world commodity prices



Note: Average inflation based on the nine countries in **Chart 1**; weights based on real GDP shares in US dollars.

Chart 3 International inflation versus UK Brent crude (excluding 1973 and 1979)

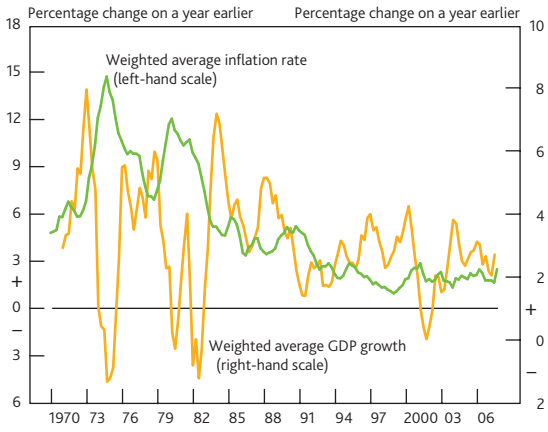


Note: Average inflation based on the nine countries in **Chart 1**; weights based on real GDP shares in US dollars.

One possibility is to look behind the causes of the current increases in commodity prices — which are largely attributable to the strength of the global economy, particularly the integration into the world economy of China and India.

Perhaps bouts of inflation in the industrialised world are then simply a reflection of global economic success. **Chart 4** looks at this issue plotting the relationship between global economic growth and international inflation in a sample of nine OECD countries suggesting a negative relationship between the two. Viewing this relationship as a structural feature of the global economy is tempting, but there are at least a couple of reasons to resist such a temptation.(1) First, in a world of floating exchange rates, there is scope for exchange rates to adjust across countries in response to domestic and foreign shocks.(2) Second, the recent period of global growth has been

Chart 4 International inflation and the international business cycle



Note: Averages based on the nine countries in **Chart 1**; weights based on real GDP shares in US dollars.

associated with an expansion in world trade that has reduced the costs of many manufactured goods in particular.(3)

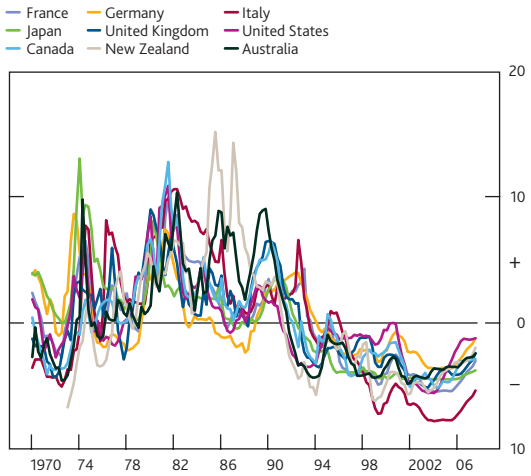
The *structural change* explanation for lower rates of inflation in recent years puts weight on the idea that fundamental reforms to product and labour markets, particularly in response to increased competition due to trade openness, has increased the flexibility of economies. This, in turn, makes it less likely that a given shock to costs or to demand results in inflationary pressure.(4) While there is little doubt that some economies are more flexible now than in the past, it is not at all obvious that this should result in lower inflation even though there may be many other beneficial consequences of increased flexibility. In particular, another feature of **Chart 4** — the observation that the rates of output growth in industrialised economies have been considerably less volatile since the mid-1980s — may well be attributable in part to increased flexibility.

The third explanation for the more recent experience of low inflation emphasises good policy. This has also been discussed extensively in the recent academic and policy literature.(5) Before turning to this in detail, let me begin with the observation that most, though not all, OECD countries appear to have had somewhat similar policies in the two periods documented in **Chart 1**. To see this, it is useful to look at **Chart 5** which gives the short-term interest rate in a sample of OECD countries. The chart illustrates the proposition that

(1) Borio and Filardo (2007) construct measures of the global output gap and show that these measures have some marginal predictive power for domestic inflation, over and above measures of domestic slack, using data for a panel of OECD countries. Ihrig *et al* (2007) assess the robustness of their results and provide evidence against the hypothesis that globalisation has increased the relative role of international factors in shaping the inflation process across eleven OECD countries. See Mishkin (2007) for an overview of this debate.
(2) See Sentance (2007).
(3) See, for example, Pain *et al* (2007).
(4) See Bean (2006) for further discussion.
(5) See, for example, Rogoff (2006) and Cecchetti *et al* (2007).

policies (in terms of central bank policy rates) have tended to move together.

Chart 5 Comovements in short-term interest rates (demeaned)



However, this observation tells us little on its own since the challenges being faced by policymakers were similar too. To believe that policy played a role in the moderation of inflation, one would need also to observe that the stance of policy was similar across countries. **Chart 6** gives us one clue on this. It plots the *real* interest rate, ie the policy rate adjusted for inflation, in nine countries over the period that I have been discussing. The message that I take away from this is that the period of high and volatile inflation was associated with *negative* real interest rates, which can be interpreted as symptomatic of a relaxed monetary policy. The most recent period of low and stable inflation is characterised, in contrast, by *positive* and higher real rates of interest.

This observation is consistent with what sometimes is called the Taylor principle — the notion that, in response to inflationary pressures, a central bank that wishes to maintain control over inflation needs to raise the nominal interest rate enough to generate a positive real rate. The fact that the central bank is expected to conform to the Taylor principle

Chart 6 Inflation and real interest rates

contributes to managing the demand side of the economy and keeps inflation expectations anchored around low inflation. Furthermore, the experience of recent years suggests that once credibility is established, inflation can be kept under control through sequences of small changes of the policy rate in the same direction.

This view that monetary policy matters argues that the main contrast between the two broad periods of inflation experience in **Chart 1** can be attributed to a significant change in central bank responses to inflation. In the 1970s and 1980s there were few central banks whose policy responses to inflation provide a sufficient tightening of policy in the face of inflation to anchor public beliefs around low and stable inflation. As is made clear by **Chart 6**, an exception to the general picture was the Bundesbank which kept stable and positive real interest rates over this period with the result that German inflation remained low and stable even though it was subject to the same international cost shocks as the other countries in this chart.(1)

In the United States, monetary policy changed notably in the 1980s during Paul Volcker's tenure as chairman of the Fed. He began the process of disinflation in the US economy which initiated a fundamental change in the intellectual climate on monetary policy thinking, leading ultimately to the adoption of explicit inflation-targeting mandates in New Zealand in 1990, Canada in 1991, the United Kingdom in 1992, Sweden in 1995 and other countries thereafter (**Chart 7**). But the constituency for low inflation was not built in a day. It took some time for the low inflation norm, supported by appropriate monetary policy, to become enshrined in behaviour.

During the period of low and stable inflation, monetary policy in the United Kingdom has been focused on the control of inflation, in line with the remit to maintain price stability. But, having been so successful in achieving this end, there is a danger that monetary policy will be asked to do more. In particular, monetary policy makers may be expected to protect the economy against persistent real shocks in the mistaken view that adjustments in real living standards can be avoided. This is an important issue in the United Kingdom at the present time when the economy is going through a period of rebalancing away from consumption and towards closing our current account deficit. At the same time, we are adjusting to the real implications of the credit shock. Monetary policy can perhaps smooth some of the adjustment in response to changes in the real economy. However, in my view, it cannot (and should not, therefore, try to) prevent warranted real economy changes taking place.

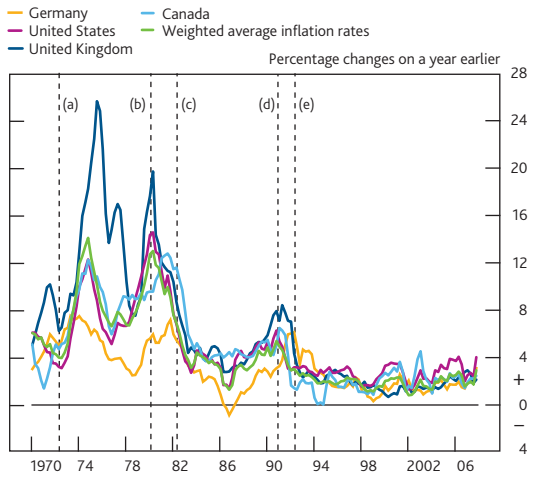
Given the immediacy of the present, it is always tempting to think that the lessons of history offer little help to the challenges that we face today. But I think that there are two main lessons worth thinking about in the current context.

First, this brief tour of history serves as a reminder that inflation targeting was born of a practical recognition that monetary policy *can* be used to manage inflation. The experience of the past suggests that using monetary policy to support the economy in the face of negative real productivity shocks had little success. In many cases, central banks were made independent and given their inflation-targeting remits to avoid a repeat of these errors. This affects the strategy of the MPC in a subtle, but important, way. In line with our remit, monetary policy in the United Kingdom ought to remain focused on achieving price stability as defined by the inflation target. Hence, we should avoid trying to offset downside shocks to the real economy except insofar as they lead to downside risks to inflation in the medium term. The remit does, however, give the MPC the scope to exercise its judgement about the best way to influence the path of the economy towards that objective.

Among the reasons that I welcome the initiative announced by the Bank of England yesterday is that it is targeted directly at alleviating a key stress that has followed from the current disruption in financial markets. This should allow the MPC to stay more focused on its task of using monetary policy to target inflation.

Second, there are challenges faced by the pressures that come from the similarities and differences in the policy stances of central banks around the world. One of my earliest academic papers was on the role of yardstick competition in shaping public policy decisions.(2) The focus of that work was on the observation that tax reforms (particularly increases in

Chart 7 Inflation and monetary policy regimes



(a) Collapse of Bretton Woods (1973).
(b) Volcker appointment as Fed Chairman (1979).
(c) Volcker's disinflation (1982).
(d) Inflation targeting adopted by Canada (1991).
(e) Inflation targeting adopted by the United Kingdom (1992).

(1) This argument comes from Mumtaz and Surico (2008).
(2) See Besley and Case (1995).

taxation) appeared to be correlated across states in the United States. It turned out that Governors of US states did not like to put up taxes unilaterally and there was an electoral cost to them of doing so. But if they put up taxes when Governors in surrounding states were also putting up taxes, then the electoral effect appeared muted. The main lesson from this strand of research is that particular domestic policies can be accepted more easily by the public if they are adopted also by countries that share a similar macroeconomic performance. The experience of the 'Great Inflation' of the 1970s as well as of the current credit crunch makes me only too aware of real time yardstick competition when strategies are being compared around the world. But, in the face of this, it is important to remain focused on implementing the policy that is needed based on circumstances here in the United Kingdom.

The MPC is now beginning its series of meetings leading up to the publication of the May *Inflation Report*. These meetings provide a good opportunity for us to look in greater detail at some aspects of the challenges that we currently face. In particular, it will be possible to process all the economic news since February and to assess how it affects the balance of risks, both upside and downside, to achieving the inflation target in the medium term. The arrangements that we now have in the United Kingdom allow the MPC to do so reflectively and independently, drawing on the considerable technical expertise of the Bank of England's staff. Our inflation-targeting remit anchors the discussions of the MPC so that we, in turn, can do our best to keep businesses' and households' inflation expectations anchored around the 2% target. This provides the best context to maintain the credibility of the framework that we have in the United Kingdom and allows monetary policy to play its part in maintaining the stability that is needed for households and businesses to plan for the long term.

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Does sterling still matter for monetary policy?

In this speech,[1] Andrew Sentance,[2] a member of the Monetary Policy Committee, discusses the recent fall in the value of sterling and its implications for monetary policy. He argues that the fall in sterling since mid-2007, particularly against the euro, reflects weaker prospects for UK domestic demand, increased perceptions of risk associated with sterling assets, and a growing belief that the sources of UK demand growth need to be rebalanced. With little evidence that a quick rebound is likely, the pound's weakness is likely to exacerbate short-term inflationary pressures as well as offsetting weakening demand. Significant moves in the external value of the pound can be important for monetary policy judgements, but need to be interpreted in the context of the overall balance of risks. In the current context, the response of wage growth to the upside risks to inflation expectations is a particularly important issue.

I am delighted to have the opportunity to speak here at the CBI headquarters at Centre Point, and I would like to thank the CBI staff involved — in particular Ian McCafferty and Doug Godden — for organising this event.

It is nearly fifteen years since I was last here giving a presentation in the Methuen Room at Centre Point, shortly before I left my position as the CBI's Director of Economic Affairs. In late 1993, I presented to CBI Council a paper entitled 'The conduct of UK monetary policy'. Its most significant recommendation was that the CBI should support the transfer of the control over monetary policy to an independent Bank of England committed to maintaining low and stable inflation. I could hardly have imagined then that I would be returning — many years later — as a member of the Monetary Policy Committee (MPC) which has indeed been charged with exercising independent control over UK monetary policy. It is a funny old world!

One of the key reasons that CBI members supported the case for an independent Bank of England in 1993 was the widespread business dissatisfaction with the conduct of monetary policy over many years in the United Kingdom. There were serious mistakes in economic management and many changes of policy regime. From the late 1960s until the early 1990s, inflation was not well controlled and the economy went through three large boom and bust cycles — with the latest of these coinciding with my time at the CBI in the late 1980s and early 1990s.

Fortunately, the business experience of UK monetary policy over the past decade and a half has been much better. Inflation has been kept low and stable and we now have a consistent monetary framework, with processes and institutions which have served us well over the past decade. This underpinning of greater monetary stability has improved the business climate and the performance of the UK economy has improved as a result.

In response to this better experience, there has been a sea-change in business attitudes to monetary policy since my time here at the CBI. In the 18 months while I have been on the MPC, I've had the opportunity to visit and meet with hundreds of businesses around the country. I have been heartened by the positive view within the business community of our current monetary policy framework and the processes and institutions which underpin them. That contrasts greatly with the mood of hostility and frequent criticism of monetary policy when I was here at the CBI. Of course, not all businesses in the land will agree with every decision that the MPC makes. But I have found within business strong and widespread support for keeping our economy on a low and stable inflation course and for the delegation of interest rate setting to an independent and expert body such as the MPC.[3]

(1) Delivered to the Confederation of British Industry, Centre Point, London on 23 April 2008. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2008/speech344.pdf.

(2) I would like to thank Andrew Holder and Nicola Scott for research assistance and invaluable advice. I am also grateful for helpful comments from other colleagues. 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.

(3) See Sentance (2007a) for a fuller discussion of changing business attitudes to UK monetary policy.

Current challenges

However, I have also learned over the past 18 months that monetary policy makers cannot rest on their laurels. It is clear from recent events that the real world has a habit of throwing up new and interesting challenges for us to face.

The turbulence on global financial markets which has been dominating the economic news since last summer is a major challenge for the MPC. And it is not the only one we face at present. The task of responding to this turbulence has been greatly complicated by two other features of the current economic situation which threaten to push up inflation, at least in the short term. First, we are facing strong upward pressure on inflation from rising global energy and commodity prices. Second, the pound has fallen sharply since last summer, particularly against the euro. Whereas the strength of sterling helped to dampen imported inflationary pressures in the last wave of energy and commodity price inflation from 2004 to 2006, the weakening pound is now adding to the upward pressures on costs and prices from global markets.

Monetary policy must steer a course which takes account of all these influences with the aim of keeping the economy on a low and stable inflation path over the medium term. That is certainly not easy in the current climate.

Recent economic commentary has focused mainly on the difficult balancing act of responding to the two big shocks from the global economy — energy and commodity price inflation and the financial turmoil.(1) This evening I want to discuss in more detail the third ingredient in the equation — how our response should also take into account the recent decline in the pound.

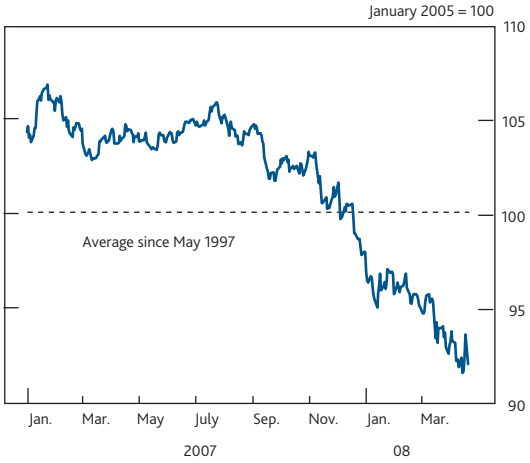
Through my time here at the CBI in the late 1980s and early 1990s, the value of the pound was centre-stage in UK monetary policy. In the late 1980s, the government adopted a policy of informally shadowing the deutschemark, and then made membership of the ERM the key anchor for UK economic policy from October 1990 until September 1992. Under our current framework of inflation targets, sterling no longer has that role as the lodestar of monetary policy. But movements in sterling can still be significant for monetary policy, influencing economic growth and inflation, through their impact on business costs and competitiveness.

So this evening I want to focus particularly on the recent fall in the pound and its significance for the difficult monetary policy balancing act that the MPC is currently undertaking. I'll try and answer three questions. First, how significant is the recent decline in the pound, in relation to its recent history? Second, why has the pound moved in the way it has? And third, how does the recent decline affect the monetary policy judgements that the MPC has to make in the current economic situation?

The recent decline in sterling

In late July last year, in an economic world somewhat different from the one we currently inhabit, sterling hit a short-term peak against a trade-weighted basket of currencies — 105.8 on the exchange rate index calculated by the Bank of England. As **Chart 1** shows, this was not quite as strong as the level the pound achieved in January 2007, on the back of a rise in interest rates which surprised the markets. But it was still nearly 6% above the average level of the pound during the period in which the MPC has been setting interest rates. Since then, sterling has been on the slide. The pound has fallen about 13% against the trade-weighted basket of currencies. So from being just under 6% above its average value over the past decade, sterling has moved to over 7% below.(2)

Chart 1 Sterling effective exchange rate



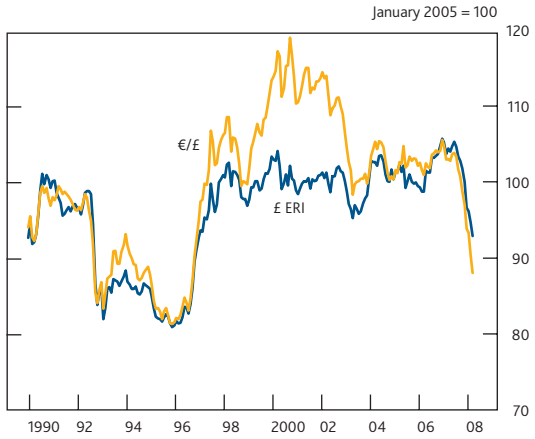
There has also been a pronounced regional bias to the recent downward shift in the pound, as **Chart 2** shows. Sterling has fallen by over 16% against the euro, which is the most important single currency for UK trade, as the countries which make up the euro area account for about half of total UK exports and imports.(3) On the other hand, sterling has hardly weakened at all against the dollar and the current value of close to $2 to the pound is strong in relation to its level over the past two decades. Exporters who are heavily dependent on the US and other dollar-related markets will not be feeling the same competitiveness benefits as companies selling into European markets.

Despite this relative strength against the dollar, the recent downward shift in sterling appears to be very significant, as **Chart 3** shows. Against the trade-weighted basket of currencies, the pound has moved to its lowest value while the

(1) See Sentance (2007b) and Bean (2008) for analysis by MPC members of the 'twin shocks'.
(2) The sterling exchange rate index (January 2005 = 100) averaged 100.1 over the period since May 1997. Its average level in the week commencing 14 April 2008 was 92.3, compared with 105.8 on 25 July 2007.
(3) In 2007, trade with euro-area countries accounted for 51.4% of UK goods exports and 47.6% of UK goods imports.

Chart 2 Sterling exchange rates against dollar and euro

Chart 3 Sterling effective exchange rate and euro/sterling



Notes: Chart based on monthly average data; April 2008 is based on average up to 21 April. Before 1999 a synthetic €/£ exchange rate is shown, based on 1999 conversion rates and weighted by the country shares of extra euro-area trade.

MPC has been in existence. It is also at its lowest value against the euro since that currency was launched in 1999.

Looking back further, it is interesting to compare recent movements in sterling to the 1990s when we last saw big swings in the value of sterling — downwards in the early 1990s and upwards later in the decade. **Chart 3** shows this comparison, both for the exchange rate basket and the euro — which has been synthetically recreated for the period before 1999. Two interesting points stand out from this comparison.

First, the fall in the average value of the pound over the past nine months is now on a par with the post-ERM drop in sterling. Against a trade-weighted basket of currencies, the downward shift is broadly equivalent — though the recent drop against the euro is significantly larger than the 12% drop against the equivalent European currencies we saw in the wake of the ERM exit in 1992.

Second, a substantial part of the significant appreciation of the pound in the late 1990s has now been unwound. Over the past decade, the average value of the pound has been around 20% above its level in the mid-1990s. About half of that increase has now been eroded by recent movements.(1) However, the move against the euro is more striking. In relation to continental European currencies, we appear to be back to where we were in the mid-1990s, when the pound was very competitive against the rest of Europe. The euro is currently worth around 80 pence, whereas the average value of a synthetic euro over the period 1993–96 would have been 81 pence. In old money, the pound is now down to about DM2.50 which was regarded as a very competitive exchange rate in the 1980s and the 1990s. If this position is sustained, it should provide a significant competitive advantage for UK exporters selling into European markets over the next few years.(2)

Why has the pound fallen?

So why has the pound fallen so dramatically since late July last year? Accounting for movements on currency markets is not easy. No single theory can explain the behaviour of the exchange rate. Long-term fundamentals, medium-term factors such as the balance of payments, and short-term fluctuations in demand, financial flows and interest rates all appear to play a part. However, the importance of different factors can change over time and market sentiment plays a significant part in the relative valuation of currencies. This makes it hard to account for exchange rate movements and almost impossible to forecast them!(3)

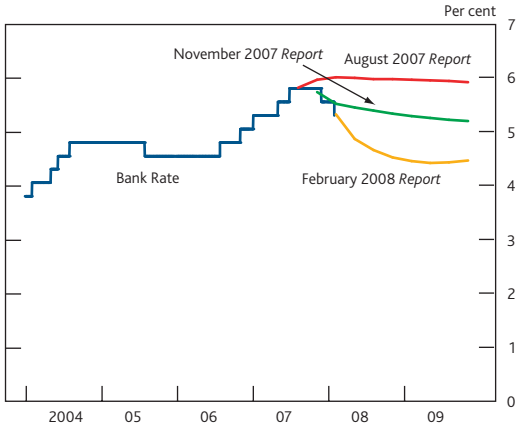
However, it is surely not a coincidence that this latest period of sterling weakness is almost exactly contemporaneous with the period of financial turbulence which started last summer. It has also been noticeable that sterling has taken a number of lurches downwards when there has been bad news or unhelpful rumours relating to financial markets or the health of financial institutions. For example, sterling dropped around 2% in value in the week following the run on Northern Rock, and fell sharply again in the wake of the rescue of Bear Stearns.

There appear to be three main factors behind the current weakness of the pound and all can be linked in some way to recent financial market turbulence.

(1) The sterling exchange rate index (January 2005 = 100) has averaged 100.1 since May 1997 compared with 84.4 for 1993–96. The average value of 92.3 last week (week commencing 14 April 2008) is almost exactly midway between these two values.
(2) Longer-term comparisons of competitiveness should also take into account differences in relative inflation by comparing movements in real exchange rates. However, differences in inflation rates across major economies have been limited since the early 1990s and real and nominal exchange rates have moved broadly in line over this period.
(3) See Taylor (1995) for a comprehensive review of exchange rate theory and evidence. See Wadhwani (1999, 2000) and Vickers (2000) for previous assessments of exchange rate movements by MPC members following sterling's appreciation against the euro in the late 1990s.

First, demand prospects in the UK economy have weakened significantly over the past nine months, leading market participants to expect significantly lower interest rates, as **Chart 4** shows. Over the past nine months, forecasts of the growth of demand and output for the UK economy in 2008 and 2009 have been revised down significantly. There is accumulating evidence that the pressures in the financial markets are affecting the availability and cost of credit, particularly mortgage lending. And this has reinforced a downward trend in property markets which started to emerge last year. Meanwhile, survey evidence shows consumers and businesses becoming more cautious about future prospects.

Chart 4 Bank Rate and market interest rate expectations



Notes: Futures curves are estimates of market participants' expected path for UK short-term interest rates. See **Chart 1.1** of Bank of England *Inflation Report*, February 2008 for full explanation of how these curves were derived.

Sources: Bank of England and Bloomberg.

All this negative news about future demand prospects has persuaded market participants that interest rates would fall significantly this year against the background of a slowing economy. And that expectation has been reinforced by the interest rate cuts which have already taken place — last December, in February and this month. Of course, it remains to be seen if these interest rate expectations are correct. But this change of view gives currency investors less reason to hold sterling in relation to other currencies such as the euro — where the weakening of demand is expected to be less marked and the view of future interest rates has not come down as much as in the United Kingdom and the United States.

This shift in interest rate views provides a reasonably good explanation of the fall in sterling last year, particularly against the euro. But it does a less good job of explaining why sterling has continued to fall this year and has dropped so far. So some other factors are clearly at work.

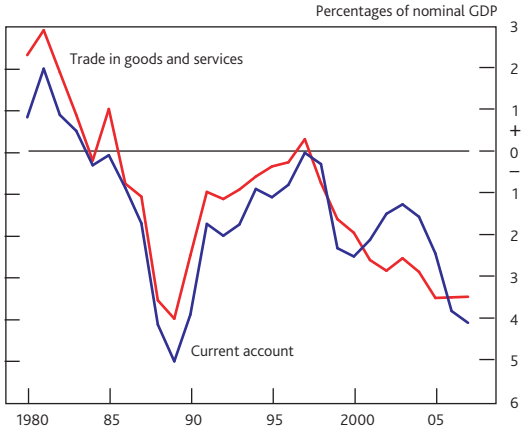
A second possible reason why sterling may have weakened so sharply in response to the financial turmoil is that recent developments seem to have increased the perception of risk associated with the UK economy and sterling assets. Evidence that this risk perception is affecting sterling can be found in the forward currency markets. There is a downside skew to the current structure of options contracts — with the market charging more for protection against a fall in sterling relative to the forward rate than it requires to insure against a rise.

This increased perception of risk appears to be associated with the view that the United Kingdom might share some of the financial vulnerabilities which have affected the US economy and its housing market. In support of this proposition, investors can point to the fact that both the UK and US economies have highly developed and deregulated financial sectors, and both have seen strong lending growth associated with house price inflation. Both economies have seen individual financial institutions succumb to difficulties as a result of the recent turbulence. Evidence that the UK housing market is weakening sharply will have fuelled these parallels.

Now it is important to point out that this assessment of risks attached to the UK economy is not necessarily correct. There are some important structural and cyclical differences between the positions of the United States and the United Kingdom, too. However, financial sentiment does not have to be rational or well founded for it to influence the behaviour and attitudes of market participants.

The third factor that has been contributing to the weakness of the pound is the growing perception that there will need to be a rebalancing of the sources of demand growth in the UK economy in the years ahead. Over the period since the late 1990s, the United Kingdom has seen a progressive increase in its trade deficit and a widening current account imbalance, as **Chart 5** shows. Indeed, towards the end of last year, the Office for National Statistics significantly increased its recent estimates of the current account deficit — causing financial analysts to focus more closely on the imbalances in the UK economy.

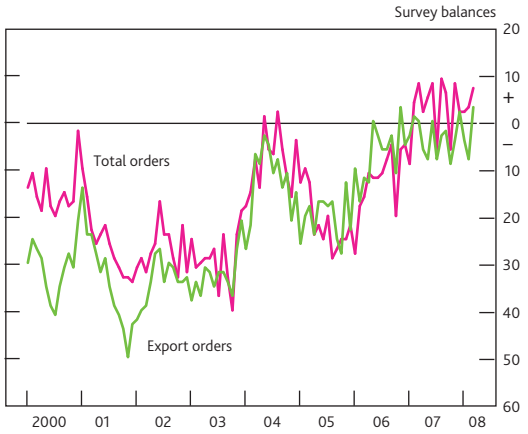
Chart 5 UK external balances



Correcting this imbalance is likely to require an unwinding of the forces which created it. **Chart 5** shows that this is exactly what happened in the mid-1990s when a competitive pound supported a rebalancing of the economy — closing the deficit created by the excesses of the late 1980s. Once again, strong domestic demand and a strong pound need to give way to a period of weaker growth of domestic spending, accompanied by a more competitive currency. This process of rebalancing is likely to benefit sectors more heavily dependent on overseas demand — such as manufacturing industry — with exports and import substitution playing a much stronger role in the growth of the economy than we have seen for most of the past decade. Offsetting this, it is also likely to require more subdued growth in consumer-oriented sectors of the economy than they have experienced in recent years.

The evidence from the CBI's manufacturing survey, shown in **Chart 6**, suggests that this rebalancing may be already beginning to take place. Manufacturing order books have held up remarkably well in the face of evidence of weakening demand and export orders are at the highest level seen since the mid-1990s. It will be interesting to see what the CBI's quarterly *Industrial Trends Survey* reveals on this issue when it is released tomorrow.

Chart 6 Order books in CBI manufacturing survey



Note: Chart shows the net balances of manufacturing firms that consider their order books to be above normal, excluding seasonal variations, in volume terms.

Source: CBI.

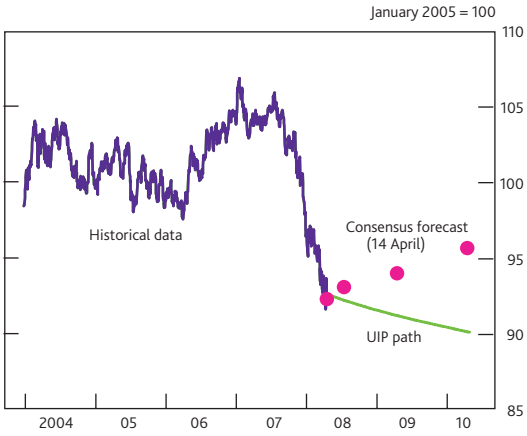
A rebalancing of demand in the United Kingdom has been expected for some time, but there are two reasons why it may have started to have a bigger impact on sterling since the onset of the financial market turbulence. First, the uncertainty created by financial market events can often provide the trigger for currencies to move in response to a case for a currency shift which has been building for some time. We saw this, for example, in the Asian currency crisis and in the re-evaluation of the prospects for the dollar which has taken place since the early 2000s. Second, the impact of the turbulence on borrowing costs, the availability of credit, consumer attitudes to debt and the housing market all make the rebalancing more likely. A significant slowdown in UK consumer spending has increased in likelihood since last summer, and with it the prospect that the UK economy will need an offsetting boost to demand from a more competitive pound.

So to sum up, three ingredients appear to underpin the recent decline in sterling. First, demand prospects have weakened, closing the expected interest rate gap with the euro area in particular. Second, perceptions of financial risks have increased in relation to the UK economy and sterling assets. And third, a period of rebalancing in demand now appears more likely, warranting a more competitive pound to act as a counterweight to more subdued consumer demand.

However, foreign exchange markets are notoriously volatile. Could the weakness of sterling prove temporary and unwind quickly? This seems unlikely, and would not be a safe assumption for policy, for a number of reasons. First of all, the consequences of the 'credit crunch' and the associated impacts on financial markets are likely to be with us for some time. Already, the impact of financial turbulence has been longer and more sustained than seemed likely when it first appeared. And even when financial markets settle down, it would be reasonable to expect longer-lasting impacts on demand through a much more cautious attitude to lending that could persist for some time. Second, the rebalancing of the UK economy will take time to unfold. The fall in the value of sterling which helped underpin the economic rebalancing in the mid-1990s was sustained for about four years.

In addition, market participants do not appear to expect a significant rebound in sterling. As **Chart 7** shows, though Consensus forecasts do suggest a little scope for sterling to rebound over the next few years, forecasters expect the bulk of the recent depreciation to be sustained. By contrast, if sterling

Chart 7 Outlook for sterling ERI



Note: The ERI projection (UIP path) is based on interest rate differentials between the United Kingdom and countries represented in the ERI basket.

Sources: Bank of England and Consensus Economics Inc.

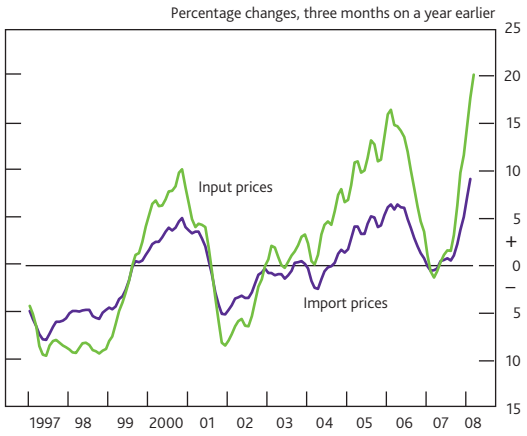
follows the path suggested by forward exchange markets based on interest rate differentials, it could weaken further. In reality, the prospects for sterling are still very uncertain. But there does not appear to be much evidence to support a quick and sustained unwinding of the recent decline.

How should monetary policy respond?

So, on the assumption that the weakness of sterling does not unwind, how should monetary policy respond? Our monetary policy framework is focused on achieving price stability, defined in terms of a target of 2% CPI inflation. The remit for the MPC recognises the reality that we cannot hit the inflation target at all times. However, we should ensure any deviations of inflation from the target are not persistent and prolonged. If we are not able to do that, the credibility of the framework and the target will be undermined. So the key issue for the MPC is how will the decline in sterling affect the inflation outlook, and how do we stabilise inflation over the medium term even if there are short-term fluctuations.

A change in the value of sterling is likely to have an impact on the inflation rate in two main ways. First, it will affect the prices of imported goods which will eventually feed through the supply chain into higher prices for consumers — though the speed of the pass-through does depend on whether a squeeze in margins or other costs cushions the impact. We already see the beginnings of this process in relation to the recent decline in sterling. **Chart 8** shows that the prices of imports have risen sharply and this is feeding through into rising input costs for producers. This sharp rise in input costs also reflects the impact of increasing oil and other energy prices. But even excluding oil, import prices are now rising at their fastest rate since 1995.(1)

Chart 8 Import costs and manufacturing producer input prices



The second influence is through the impact of a change in the value of the pound on demand. In the case of a fall in sterling, this demand effect is the product of two elements working in different directions. Manufacturers and other firms which compete with overseas producers in home and export markets will receive a boost to their competitive position, adding to their profits and supporting labour incomes in the internationally tradable sectors of the economy. Working in an offsetting direction is the negative impact that higher import prices could have on real household incomes and spending as they feed through into the prices paid by consumers. However, consumers also tend to cushion short-term changes in real incomes by adjusting saving and borrowing. So the dampening effect of a weaker pound on consumption depends on the extent to which consumers believe their incomes have been squeezed in the longer term — which is often difficult for them to gauge.

In the short term at least, therefore, we would expect producers to respond to the gain in competitiveness from a lower pound — generating stronger demand and higher economic activity for a period of time. If the change in the value of the pound is sustained for long enough and consumers eventually adjust to the fact that their living standards have been squeezed, the longer-term impact on demand may be more neutral.

For the setting of monetary policy, these two effects both create upside risks to inflation which could persist into the medium term. The temporary rise in inflation could create a knock-on impact through its effect on wage increases and expectations of inflation more generally. In addition, the decline in the pound is likely to create a net addition to demand, by providing a boost to competitiveness. If other elements of demand do not change to offset this, there is likely to be some upward pressure on domestic costs and prices. These two risks are not unrelated because if wages rise to compensate for a temporary increase in inflation, either because employees resist a squeeze on their real incomes or because they begin to expect higher future inflation, there is much less likely to be a squeeze on consumer spending to offset the demand boost from increased competitiveness.

However, these risks cannot be seen in isolation from the other factors which are influencing the inflation outlook at present — the disruption to financial markets and the surge in global energy and commodity prices. The fall in the pound will aggravate the inflationary impulse coming through from higher global energy and commodity prices. The upside risk to inflation expectations will therefore be increased by the fact these factors have come together — producing a bigger and possibly more sustained short-term surge in inflation.

At the same time, the fall in the pound will also provide some demand offset to the negative impact of the 'credit crunch'

(1) Non-oil import prices in the three months to February 2008 were 4.8% higher than a year earlier — the fastest rate of increase since January 1996.

and other financial market developments. It is unlikely to provide a total offset and it would be undesirable if it did. In relation to the healthy growth we saw last year, a significant weakening in domestic demand is needed to provide a countervailing influence to short-term inflationary pressures and the risks that these pose to wage growth and inflation expectations. However, there remains a great deal of uncertainty around how much demand will weaken over the year ahead and the potential impact of a weaker pound is a further ingredient adding to this.

So how should the MPC respond in the light of this analysis? It is clear that there are no simple rules to guide monetary policy in these circumstances. But I would draw four broad conclusions for my policy judgements as a member of the MPC going forward.

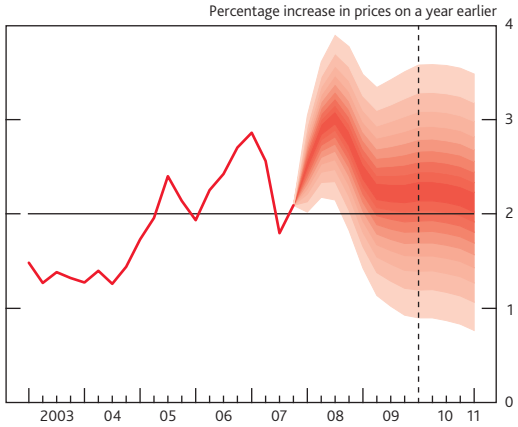
First, sterling does matter for the control of UK inflation. Even though UK monetary policy is no longer organised around an explicit objective for the value of sterling, the balance of risks for inflation can change when the external value of the pound moves significantly. The recent decline in the pound creates additional upside risks for inflation which need to be taken into account in the overall policy judgement.

Second, the impact of a decline in the pound cannot be judged in isolation from other factors affecting the inflation outlook. Monetary policy must be set in relation to the overall balance of risks. That means judging how far the shift in sterling will help to offset negative demand influences from financial markets and the US economy and how it will interact with the other inflationary impulses from global markets.

A key vehicle through which the MPC produces and communicates its assessment of the balance of risks is the quarterly *Inflation Report* forecast. **Chart 9** shows the MPC's assessment of the inflation outlook published in February. Then, our central forecast suggested a rise in inflation in the short term to close to 3%, followed by a fall back towards the target as one-off price rises dropped out and the spare capacity created by an economic slowdown helped to counter imported inflationary pressures. Our assessment in February was that on the market's view of interest rates, inflation would not fall back to target on the central forecast — sounding a cautionary note about the market's expectation of future interest rate cuts. But given the uncertainty around the projections, reflected in the width of the fan charts, it was also clear that the MPC would be heavily reliant on the unfolding economic data to inform its assessment of the balance of risks.

We are now updating our assessment for the May *Inflation Report* and that should enable us to more systematically analyse the impact of recent developments. Since the February *Inflation Report* we have seen significant upside news for inflation in the short term from continued rises in oil prices,

Chart 9 CPI projection based on market interest rate expectations



Note: The fan chart depicts the probability of various outcomes for CPI inflation in the future, with the darkest central band and each pair of the lighter red bands representing 10%; and the entire fan chart representing 90%.

Source: Bank of England *Inflation Report*, February 2008.

a further drop in the pound and rising producer prices. We will need to weigh this against the more downbeat news on credit conditions, from the housing market and from some business and consumer surveys. The policy response to these developments should reflect the news on both sides of the inflation account — recognising the increased upside risks from a rising short-term inflation profile as well as the potential downside risks from weaker economic activity and the 'credit crunch'.

The third main conclusion I would draw about our response to the weakening of sterling is the critical importance of subdued wage growth. In our February forecast, this was a key stabilising influence on medium-term inflation prospects in the face of short-term inflationary pressures. The muted response of pay growth also underpinned the benign inflation outcome in the early 1990s, when inflation did not rise as much as many forecasters expected following the United Kingdom's exit from the Exchange Rate Mechanism. However, in that episode, the experience of a recent recession and unemployment of around three million provided a strong countervailing influence to any pay pressures. We hope not to have to rely on such strong offsetting factors this time round. Instead, the track record of low inflation over the past decade and the credibility that has attached to the current monetary framework as a result should help to keep inflation expectations better anchored than would have been the case in the early 1990s.

So far wage growth has been remarkably steady even though some widely used measures of inflation — such as the retail prices index — have been elevated for some time. This is a reassuring indicator for the medium-term inflation outlook, even though there has been evidence of upward pressure on other shorter-term measures of inflation expectations. However, developments on the pay front will need to be

watched closely by the MPC as we move through another spike in CPI inflation over the course of this year.

The final conclusion I would highlight from my analysis is that with a weaker pound, consumer spending is likely to bear more of the burden of keeping demand in check in the future than in the past. Not only should we expect consumer spending to slow in response to recent economic developments, but it may need to be subdued for some time while the economy rebalances, as was the case in the mid-1990s. A consequence of this rebalancing is that some sectors may be more significantly affected by the slowdown in the economy than others. Activities more dependent on the UK consumer and with strong links to property and financial markets are likely to see a more marked change in demand. By contrast, UK manufacturing and other sectors more dependent on overseas markets will see an offsetting benefit from a more competitive pound.

In many sectors of business, though, life may well become rather uncomfortable this year and next, as companies seek to manage a period of slowing growth, accompanied by short-term cost pressures. Even though inflation is being pushed up in the short term by global inflationary forces and by a declining pound, the MPC's job is to bring it back to target again. That is likely to require relatively weak growth in 2008 and 2009 — as the turbulence in financial markets takes its toll and the economy begins to rebalance — and we cannot guarantee that this period of adjustment will be smooth.

The MPC has a difficult balancing act to strike in judging the level of interest rates best designed to keep inflation on target in the face of the potential downside impact on inflation of the 'credit crunch' and the upside risks to the medium-term inflation outlook from short-term inflationary pressures. In striking this balance, you should not be surprised to see occasional differences of judgement between Committee members about individual interest rate decisions — as today's minutes show.

But on one thing I believe all members of the Committee are united, and on this I hope we can make common cause with the business community. Our objective is to keep the UK economy on a course underpinned by low and stable inflation. That approach has provided a much better climate for business than when I was here at the CBI in the late 1980s and early 1990s. And that must remain the focus of our policy actions as we aim to steer the UK economy through some rather turbulent waters.

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Strengthening regimes for controlling liquidity risk: some lessons from the recent turmoil

In this speech,[1] Nigel Jenkinson,[2] Executive Director for financial stability, emphasises that the management of liquidity risk is a key counterpart to banks' maturity transformation role. Over the decade prior to 2007 he explains how banks' vulnerability to liquidity risk increased as the rapid growth of structured products dispersed risk throughout the financial system but increased the system's interconnectedness and banks' reliance on wholesale markets as source of funding. He explains that common defences to a decline in the availability of liquidity (securitising illiquid assets, bidding for retail deposits, reducing assets) do not work well when all banks face funding pressures simultaneously as happened when financial market conditions deteriorated rapidly in August 2007 and wholesale term markets dried up. The last line of defence is to hold a buffer of high-quality liquid assets: the banking system has, however, reduced this buffer steadily over the past century. Jenkinson concludes with four recommendations: (1) banks and authorities develop better understanding regarding the vulnerability to liquidity risk particularly under stressed conditions; (2) banks develop more effective contingency funding plans; (3) banks support improved market functioning through better disclosure; and (4) supervision of liquidity risk is strengthened to ensure that banks' liquidity risk management is undertaken to a more robust standard that internalises some of the costs of a bank failure on the wider financial system.

Introduction

Commercial banks play a pivotal role in the economy. They facilitate payments and the smooth transfer of goods and services, and they match savers who may lack detailed knowledge of borrowers and who (generally) want to be able to withdraw their money at short notice, with borrowers who often wish to repay their loans over a longer-term horizon. This 'maturity transformation' performed by banks is essential to allow capital to be invested in a productive way to support economic growth. But by offering such maturity transformation, banks are inherently exposed to liquidity risk — the risk that a bank is unable to meet its commitments should depositors attempt to withdraw their funds ahead of the bank's capacity to repay them.

As many bankers through the ages have found to their cost, the key objective for the management of liquidity risk is the retention of confidence. A bank may be well capitalised and profitable with a sound loan book, but if depositors lose confidence in the bank's ability to provide their funds as and when they request them, the crystallisation of liquidity risk can bring down an otherwise viable institution in short order. Once under way, a liquidity crisis can be very hard to stop. Adverse dynamics may feed back on themselves as the limited offer of immediate, full repayment awaits those first to the exit. Moreover, liquidity risk can be triggered through the realisation of other risks, such as the disclosure of large and unexpected trading losses, or the discovery of fraudulent activity within the bank. But it is just as likely to develop independently through the simple combination of an inherently vulnerable funding position and a sudden (and not necessarily rational) turn in market sentiment.

These considerations illustrate why it is of crucial importance to build strong defences against this risk, particularly as the macroeconomic and financial market developments of the past few years have in my view led to an increase in many banks' overall vulnerability to liquidity risk. And while this

(1) Given at the Euromoney Conference on Liquidity and Funding Risk Management on 24 April 2008. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2008/speech345.pdf.

(2) I am very grateful to Emily Beau for her collaboration on this speech, and to Andrew Bailey, Adrian Chiu, John Gieve, Laurie Roberts and Forrest Capie for help and comments.

changing environment has led to distinct improvements in banks' efficiency and management of other risks, liquidity risk management and supervision have not always kept pace. Recent events have clearly demonstrated that the current defences have proved wanting, with banks insufficiently prepared for a period of severe liquidity strain. The experience of the past few months already suggests a number of key lessons for liquidity risk management and supervision which I will cover later. But I would first like to review the impact of market developments in recent years for liquidity risk management.

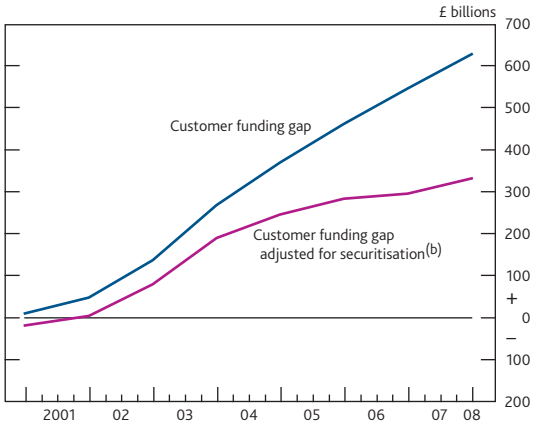
Changing environment and business models

How then has the financial environment changed in the past few years, and why has this led to a greater vulnerability to liquidity risk? The decade leading up to July 2007 has been described as a period of great stability: around the world, economic conditions were dominated by low inflation, low nominal yields, and lower volatility of the economic cycle. The benign macro background was associated with a fall in financial market volatility. And advances in technology spurred a wave of financial innovation and the development of new products offering improvements in the tailoring and matching of risks to investors' risk appetite. This combination of factors encouraged investors to seek out riskier investments in search of higher returns — the 'search for yield'.

One feature of this 'search for yield' was the rapid expansion of structured financial instruments; for example, where individual loans are packaged into tradable securities, such as residential or commercial mortgage-backed securities, or where the risk of a pool of loans is packaged into complex securities offering different levels of exposure to the potential losses in the pool (a collateralised debt obligation). Moreover, new products emerged which also supported the transfer, hedging and dispersion of risks, such as credit derivatives. And the use of these instruments strengthened the interrelationships between financial market participants across the globe: greater integration of markets went hand in hand with the acceleration of financial innovation and rapid growth of market activity.

These developments helped stimulate important changes in banks' business models. Constraints on growth were eased as funding sources widened. Many banks took advantage of new sources of wholesale funding available from securitisation — the packaging of loans into instruments which could be sold on in financial markets. In many cases, assets were routinely transferred into off balance sheet vehicles which funded themselves through asset-backed commercial paper, with the sponsoring bank providing a back-up liquidity line. By applying this 'originate and distribute' model, banks tapped a new source of funding on a large scale. More traditional and stable sources of funding, such as retail deposits, declined in importance (**Chart 1**). In addition, many banks saw opportunities to generate new sources of revenue and fee income by developing and deepening their activities in international capital markets.

Chart 1 Major UK banks' customer funding gap(a)



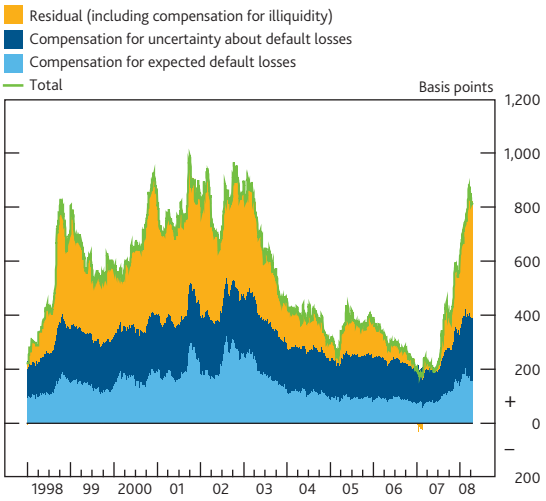
Sources: Dealogic, published accounts and Bank calculations.

(a) Data exclude Nationwide.
(b) Customer funding gap less securitised debt. Where not available, stocks of securitisations are estimated from issuance data.

Innovation has provided banks with greater opportunities to hedge and diversify risks. For example, a regionally based bank in country A can easily lower its geographical concentration, for example by selling credit risk to other investors who had not previously been able to access such exposures, and/or by purchasing exposure to credit risk elsewhere. The resulting dispersal of risk allows banks to diversify their risk profile as well as their sources of revenue. Providing that the gain from diversification outweighs the increased cost of credit assessment, as banks take on exposure to entities where they have no banking relationship, and that risks are priced fully and appropriately, such innovation should improve market efficiency and lower the cost of intermediation and of capital.

These changes in the financial environment, however, resulted in banks increasing their exposure to liquidity risk. Banks originated large volumes of long-term loans in the expectation that they could be quickly and readily sold on, but leaving them with additional funding risks if they could not. Contingent liquidity lines to securitisation conduits and special purpose vehicles rose rapidly with little expectation that they would be drawn. Exposures to higher-yielding complex structured products rose, with market participants failing to recognise sufficiently that the high yields offered by such products were in part compensation for higher liquidity and market risk and that prospective risk-adjusted returns were much lower than might first appear from their short historic track record. Moreover, in buoyant market conditions, the compensation for liquidity risk itself was bid down to negligible levels by early 2007 (**Chart 2**). By that stage, many market participants recognised that compensation for risk-taking was too low, but judged that the business risks of

Chart 2 Decomposition of sterling high-yield corporate bond spreads[a]



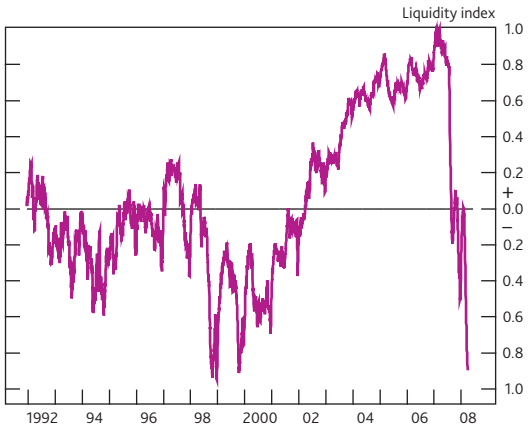
Sources: Bloomberg, Merrill Lynch, Thomson Datastream and Bank calculations.

(a) Webber, L and Churm, R (2007), 'Decomposing corporate bond spreads', *Bank of England Quarterly Bulletin*, Vol. 47, No. 4, pages 533–41.

exiting lines outweighed the financial risks of continuing to write new business.[1] Firms became overconfident in their ability to hedge or exit positions if conditions changed, failing to recognise that many participants would be attempting to do the same and that market liquidity would then evaporate. Indeed, given a change in sentiment, the increased integration of financial markets transmits risks just as much as it disperses them.

Banks' funding thus became increasingly vulnerable to a sudden shift in financial market conditions. As covered extensively elsewhere,[2] the crystallisation of this risk in August 2007 led to a sharp decline in liquidity across a wide range of markets (as shown in **Chart 3**). Funding pressures intensified as asset managers lowered demand for

Chart 3 Financial market liquidity[a]



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

(a) The liquidity index shows the number of standard deviations from the mean. It is a simple unweighted average of nine liquidity measures, normalised on the period 1999–2004. Data shown are an exponentially weighted moving average. The indicator is more reliable after 1997 as it is based on a greater number of underlying measures.

asset-backed securities and complex products more broadly, to lower risks and to guard against pressures from their investors for early redemption. And as banks attempted to fund contingent claims, liquidity in wholesale term markets dried up — adding to the strain. A number of institutions across the globe, such as Northern Rock, IKB and Bear Stearns have succumbed to the pressure, necessitating public sector intervention to support financial stability.

Defences against liquidity risks

Banks have a range of defences to a sudden decline in the availability of wholesale funds. Recent developments have highlighted a number of limitations in these defences in addressing the recent system-wide liquidity shock.

One potential counter-measure to liquidity pressures is to transform illiquid assets into cash. So in the event of increased funding pressures, a number of banks had planned to use securitisation techniques more intensively to liquefy assets such as mortgages. Such a counter-measure may well succeed if a single firm faces a liquidity problem on its own. But of course this approach fails completely when the source of the change in market conditions is a lowering of global demand for securitised products and a widespread closure of term lending markets.

Another approach is to bid for higher retail deposits. That is likely to take time as many individual retail savers react only slowly to changes in relative interest rates and as banks offer higher rates on term deposits to limit their movement. More importantly, this approach can only succeed by offering rates above those of competitors, thereby eroding margins. And in an environment of general liquidity strain, competitors are likely to follow suit to protect their market share. So the impact on each bank in the medium term is likely to be limited to a share in any rise in aggregate retail savings.

Faced with restrictions on raising liquidity, a bank must respond to a funding shortfall by acting on the asset side of its balance sheet to lower its financing need: in other words, by slowing or even reducing its lending to households and corporate customers. This policy will ease funding pressures and boost liquidity, but it has two major drawbacks. The first is that it takes time to take effect. Many lending decisions are agreed weeks or months in advance and cannot be readily reversed. So the approach will not stem a very fast drainage of liquidity. Moreover, as one bank tightens lending conditions to restrict balance sheet growth, other banks facing similar pressure will react to limit any additional diversion of funding pressure onto their own balance sheets. The second is that a retrenchment in lending can have significant implications for

(1) See Bank of England *Financial Stability Reports* July 2006 and April 2007.
(2) See, for example, Bank of England *Financial Stability Report*, October 2007.

the wider economy, as fewer funds are available to companies and households to support long-term investment and consumption. We are seeing some signs of that beginning to occur as highlighted in the most recent Bank of England *Credit Conditions Survey*.

These defences suffer from a common shortcoming. While they may work well when one bank is facing funding pressure on its own, when liquidity pressures are widespread every bank will attempt to use them at the same time. The actions of one bank will work to negate those of a competitor in these circumstances as gains and losses of market share will net out. That implies an increase in the economy-wide costs of adjustment, posing increased risks to financial stability during the adjustment process.

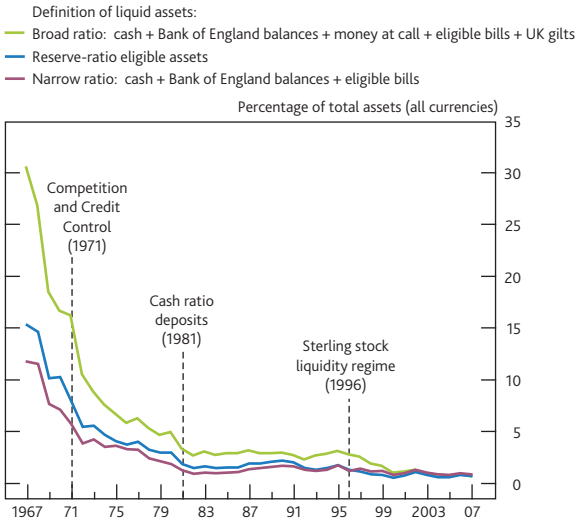
There is, however, one last line of defence left. A bank holding a buffer of reliable high-quality liquid assets, such as Treasury bills or other government securities, can draw on them immediately and directly in the event of a sudden withdrawal of market liquidity or an unexpected increase in its funding requirement. Of course, safe, liquid assets offer lower returns than other types of assets, so there is an opportunity cost in maintaining such a liquidity cushion on the balance sheet. But such assets nevertheless provide the most readily available and reliable provision against a crystallisation of liquidity risk.

Unfortunately, banks' reserves of reliable liquid assets have proved insufficient to meet the recent funding shock. With hindsight, incentives to raise the efficiency of maturity transformation have lowered this safety valve in the system too far.

I would like to examine in a little more detail the UK experience in this respect. In the mid-19th century, UK banks held on average 60% of liquid assets as a proportion of total deposits, an extremely high ratio explained by the frequency of liquidity crises around that time. Shortly after the 1866 Overend and Gurney crisis, the Bank of England accepted a role as lender of last resort, leading banks to relax their extremely conservative (and inefficient) approach to liquidity. The average liquidity ratio dropped to around 30% of total deposits. The first agreement on liquidity between the Bank of England and private banks occurred in 1947, and involved a requirement to hold a minimum liquid assets ratio of 32% (lowered to 28% 16 years later). The regime prevailed until 1971, when the Competition and Credit Controls Act (CCC) introduced a minimum reserve ratio of 12½%. The CCC had two objectives: first, it was intended to strengthen control over monetary policy, by creating a solid money base to underpin it; second, it aimed to unify restrictions on banks to strengthen competition in the industry. The minimum reserve ratio was designed with this aim in mind, and this perhaps took priority over any desire to impose prudential liquidity reserves.

While CCC undoubtedly liberalised the UK banking sector and thus supported improvements in competition and efficiency, it led to a fall in very high-quality sterling liquid asset holdings of UK banks, as shown in **Chart 4**. After twice lowering the minimum requirement, the Bank of England finally replaced the reserve ratio regime with the cash ratio deposit regime in 1981, which did not directly require a minimum level of liquid assets. The sterling stock liquidity regime in 1996 focused on holding sufficient liquidity to meet a particular severe cash-flow funding stress. It is calibrated to ensure that a bank has enough highly liquid assets to meet its outflows for the first week of a liquidity crisis without recourse to the market for renewed wholesale funding, in order to allow the authorities time to explore options for an orderly resolution. It was designed as one component of a wider crisis management regime, and not as a means for a bank to manage its precautionary buffer for addressing liquidity strain on a going concern basis.(1)

Chart 4 Sterling liquid assets relative to total asset holdings of UK banking sector



Sources: Bank of England data and calculations.

Chart 4 shows how actual liquid reserves fell in line with minimum requirement levels until 1981, and continued to decline afterwards, albeit more slowly. Clearly, over this same period, banks also diversified their liquid asset holdings to include other currencies, and started using repo markets extensively. So the chart may exaggerate the decline somewhat. Nonetheless, the overall historical pattern has clearly been one of a marked secular decline in cushions of high-quality liquid assets. Similar trends also prevailed in countries other than the United Kingdom, such as the United States, Canada and Sweden.(2) And focusing on the

(1) See Financial Services Authority (2007), 'Review of the liquidity requirements for banks and building societies', *Discussion Paper 07/7*, December. The UK regime is under review.
(2) See Goodhart, C A E (2008), *Liquidity and money market operations: a proposal*, London School of Economics, *mimeo*.

past decade, while holdings of very high-quality liquid assets have remained relatively stable, they have not increased to match banks' rising vulnerability to liquidity risk described above.

Lessons

The recent turmoil has highlighted clear deficiencies in banks' liquidity risk management. And it has also demonstrated that these deficiencies pose serious risks to financial stability and thus to the economy more broadly.

To address this risk in the near term, central banks globally have provided additional liquidity to the banking system and emergency operations have been conducted to support Northern Rock and Bear Stearns. Additional liquidity has been provided at longer-term maturities to address the problem of funding an unexpected overhang of illiquid assets. The Bank's recently launched Special Liquidity Scheme is enabling UK banks to liquefy a proportion of their outstanding stock of illiquid assets by swapping them for high-quality liquid government securities, while ensuring that credit risks remain very clearly with the banks. That should ease current funding pressures.

But in the medium term, it is clear that action is needed to strengthen the financial system's defences to liquidity risk to limit the likelihood of any recurrence of the recent problems. Central banks globally are reviewing the lessons of the episode for their market operations, for example, to ensure that the usefulness of facilities is not undermined by perceptions of stigma that may be attached to a bank that uses them. But it is clear that primary responsibility for bolstering the defences lies with the banks themselves and that supervisory regimes for liquidity risk need reinforcing to support that process.

I would like to highlight four emerging lessons from the current crisis that should help prevent future problems. First, we need to understand better the various sources of liquidity risk, particularly under stressed conditions. Second, banks need to develop more effective contingency funding plans. Third, banks should support improved market functioning and stricter market discipline through better disclosure. And finally, supervision should ensure that banks' liquidity risk management is undertaken to a more robust standard, in order to internalise some of the costs of a bank failure on the wider financial system. I shall cover these briefly in turn.

Banks and public authorities alike need to develop a more in-depth and more complete understanding of the various forms in which liquidity risk can arise. That requires both a careful analysis of the various potential sources of liquidity risk, and of how such risks may crystallise under stressed market conditions. As outlined earlier, in today's financial environment, it is not just the simple maturity transformation between deposits and loans that generates liquidity risk for banks. To this must be added contingent risks, such as the potential activation of liquidity lines to off balance sheet vehicles, or the drawing of committed facilities extended to corporate customers. Contingent risks may also arise, in a variety of forms, from complex trading instruments, as detailed well by the Institute for International Finance last year.(1) Yet more sources of potential funding pressure have emerged from greater activity in capital markets, such as the pipeline risk that arises from being unable to offload leveraged loans and warehouses of loans awaiting securitisation when unfavourable market conditions prevail. And banks are also subject to the risk of exposures previously passed on to third parties flowing back to them, for example when sub-prime residential mortgage-backed securities are 'put back' to the originator should they be found to breach certain credit criteria. Finally, banks are also exposed to the risks of a decline in asset market liquidity and falls in market prices through the potential for higher collateral or margin requirements. These may substantially raise the level of funding a bank requires on a day-to-day basis.

As emphasised in a recent report by the Senior Supervisors Group,(2) banks need to develop a comprehensive approach to the management of liquidity risk to ensure that it is in line with the bank's overall risk appetite. One strong recommendation in the report is that financial organisations develop and apply a systematic policy of internal charging for liquidity risk. In particular, banks need to ensure that risk decisions made by front-office traders price appropriately the liquidity risk generated by new products and business lines, rather than treating it as a 'free good' or overhead to be managed centrally by the treasury function. Furthermore, banks and supervisors should analyse in far greater depth how the wide range of liquidity risks may crystallise, separately or conjointly, in a stressed market environment. Rigorous stress testing should span individual, group-wide and market-wide scenarios. There is considerable scope for much better consideration of likely system-wide interactions, including the potential impact of 'crowded trades' being unwound, the dynamics of liquidity hoarding, and the risks of signalling weakness and thus losing market confidence and funding lines. Stress scenarios should test properly for the outright closure of funding markets, and explore the possibility of several markets being shut concurrently. Finally, testing should consider longer horizons, to cater for the possibility that a liquidity crisis could persist for some time. These are just some of the areas which could be considered in more detail — clearly banks, supervisors and central banks all have much to learn with regards to the design of appropriately demanding and comprehensive stress scenarios.

(1) Institute for International Finance (2007), *Principles of liquidity risk management*, March.
(2) Senior Supervisors Group (2008), *Observations on risk management practices during the recent market turbulence*, March.

Recent events have also highlighted the need to devise considerably tougher contingency plans. Closer integration with stress tests will help firms develop more reliable and robust responses to future episodes of strain. Experience has highlighted the need to improve resilience to a sharp decline in market liquidity and to demonstrate that firms can survive the closure of one or more funding markets by ensuring that finance can be readily raised from a variety of sources. Consideration should clearly be given to boosting holdings of very high-quality liquid assets that can provide reliable reserves under all conditions. And it is important that plans are legally robust and that they are regularly tested.

Another lesson from the recent episode is that disclosure practices in relation to liquidity risk management objectives, controls and metrics vary significantly. In some cases, banks go as far as providing information on stress tests and contingency funding plans; in others there is a relative paucity of information. That hampers market functioning: in times of heightened uncertainty, a lack of information can lead to defensive reactions by market counterparties that provision of additional information could prevent. There are some risks from greater disclosure. For example, a bank revealing a weak funding position could precipitate an adverse reaction, although that should of course lead to stronger risk management as a precaution against that risk. There are also measurement challenges. It is difficult to present a simple, representative summary measure of liquidity risks run by a given bank — any single definition of such a complex array of risks will necessarily be approximate. But that does not seem a sufficient reason not to disclose any measure — indeed there may be some parallels with market risk where a single metric such as a firm's overall Value-at-Risk is not viewed as encapsulating all dimensions of such risk. Nonetheless, the degree of disclosure on market risks which banks are now providing under Pillar 3 of the Basel II Accord marks a definite improvement in this area. While liquidity risk metrics remain complex and challenging, I believe that there is scope over time to achieve some degree of enhanced, consistent disclosure across institutions.

The final lesson is the need for stronger oversight of banks' liquidity risk management practices. The authorities' role is to preserve financial stability by lowering the probability and impact of bank failures that could threaten the functioning of the financial system more broadly through contagion, spillover and damage to financial networks. There is no incentive for private banks to bear this cost spontaneously, as their responsibility is to their shareholders rather than to users of the financial system more broadly. The objective of prudential supervision is to correct this misalignment between private incentives and public policy goals, by forcing banks to deliver higher standards of liquidity risk management and to build stronger defences than they would naturally provide of their own volition.

That leaves open the formidably difficult question of the level of resilience to liquidity stress that the authorities should seek from individual banks. An answer to this question requires a balance to be struck between the risks to financial stability if resilience is set too low, and the risks of inefficiency of financial intermediation if buffers are set too high. Moreover, in addressing this question the authorities also need to take into account that some actions taken today to limit the likelihood and costs of financial instability if risks do crystallise may lead agents to underinsure against future risks. They may thus raise the probability and amplitude of future problems.

Resolving these issues raises major challenges for the global regulatory community given the strong increase in financial market integration and the substantial growth in internationally active banks. Action is under way internationally(1) as well as domestically(2) to improve and strengthen the management and supervision of liquidity risk and to promote greater consistency of approach. The Basel Committee on Banking Supervision is working on producing revised Sound Practices for the management and supervision of liquidity risk. These will be released for consultation in the early summer. The Committee of European Bank Supervisors is undertaking work in parallel. The aim is to strengthen the platform for the management and oversight of liquidity risk. Among other areas for improvement, supervisors are driving higher standards for stress testing and subjecting contingency funding plans to more rigorous cross-examination before they are validated.

Conclusion

To conclude, developments in financial markets have increased the importance and complexity of liquidity risk management over the past decade. That, in turn, increased the vulnerability of banks to a system-wide liquidity shock. Preparations for such a shock proved inadequate and insufficient. But the recent experience already provides us with important lessons both for banks and for public authorities and points to a clear need for action by both.

(1) Basel Committee on Banking Supervision (2008), *Liquidity risk: management and supervisory challenges*, February.
(2) Financial Services Authority (2007), 'Review of the liquidity requirements for banks and building societies', *Discussion Paper 07/7*, December.

Inflation, expectations and monetary policy

In this speech,[1] Professor David Blanchflower,[2] member of the Monetary Policy Committee (MPC), talks about the importance of inflation expectations for monetary policy making. He discusses what has happened to inflation and inflation expectations in recent months, and what actions should be taken in this area in the context of the current conjuncture. He then identifies four distinct phases of the downturn in the United States, and notes a number of similarities with the United Kingdom, suggesting that in the United Kingdom we may see a substantial decline in growth, a pickup in unemployment, and declining consumption growth driven by significant declines in house prices. He emphasises the importance of getting ahead of the curve in order to head off these downside risks.

Introduction

It is a great pleasure to be addressing you here this evening at the David Hume Institute. I am a strong believer in Hume's own view that we should not seek to solely explain events and behaviour with theoretical models, rather, as Hume wrote in his *A Treatise of Human Nature*, we should use 'experience and observation' ie the empirical method. As Arnold Harberger (1993) famously said 'economics is fundamentally an observational discipline'. I even made a speech on this theme last year entitled 'The economics of walking about' (Blanchflower (2007a)). In the United Kingdom economics has traditionally tended to emphasise the importance of theory, downplaying the role of observation.[3]

In this speech I am going to talk about the current conjuncture and especially what has happened to inflation and inflation expectations recently and what should be done about it. I am particularly concerned that the United Kingdom exhibits broad similarities to the US experience. It does seem to me that we really know very little, in 2008, about how truly to stabilise economies and run them properly in the face of shocks both to commodity prices *and* to credit. We are probably in the grip of world forces that are greater than most people realise. Forecasting is thus very difficult at such times. I believe more action is needed to prevent the United Kingdom falling into recession. An important first step is the Bank of England's Special Liquidity Scheme to increase liquidity into the system announced last week. Monetary policy in my view still remains restrictive currently, and we need to take action to loosen policy sooner rather than later. I do feel that the slower rates fall, the further they will eventually have to go down to boost the economy.

Inflation in the United Kingdom and the monetary policy framework

The Bank's monetary policy objective is to deliver price stability — low inflation — and, subject to that, to support the Government's economic objectives including those for growth and employment. The inflation target is symmetric, and if the target is missed by more than 1 percentage point on either side — ie if the annual rate of CPI inflation is more than 3% or less than 1% — the Governor of the Bank must write an open letter to the Chancellor explaining the reasons why inflation has increased or fallen to such an extent and what the Bank proposes to do to ensure inflation comes back to the target. This has happened only once so far, in March 2007.

Inflation in the United Kingdom was high and unstable in the 1970s and 1980s. Following the 1973 and 1979 oil price shocks, inflation was greater than 10% for much of the 1970s, with RPI reaching a high of just over 26% in 1975. Inflation targeting was adopted in the United Kingdom in 1992, and in 1997 the Bank of England was granted independence to set interest rates to meet the Government's inflation target. Since 1997, inflation in the United Kingdom has been relatively low and stable.

(1) This is an abbreviated version of a speech delivered at the Royal Society, George Street, Edinburgh on 29 April 2008. The full version can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2008/speech346.pdf.

(2) Bruce V Rauner Professor, Dartmouth College, University of Stirling, IZA, CESifo and NBER. I am most grateful to Mike Goldby, Roger Kelly, Helen Lawton and Nicki Scott for their invaluable assistance in preparing this speech, and to colleagues for helpful comments.

(3) In the United States there is a much stronger tradition in empirical work. The National Bureau of Economic Research, where I am a research associate, which is the pre-eminent organisation of economists, and which is responsible for dating recessions, emphasises the importance of empirical work. The NBER concentrates on four types of empirical research: developing new statistical measurements, estimating quantitative models of economic behaviour, assessing the effects of public policies on the US economy, and projecting the effects of alternative policy proposals.

In recent months there has been strong upward pressure on UK inflation, because of higher global prices, particularly for energy and food. The price of oil has reached record highs of almost $120 a barrel for US light crude and annual food price inflation is currently estimated to be running at over 5%. These higher global prices have been compounded by the recent fall in the sterling effective exchange rate.

The MPC's central projection is for CPI inflation to rise quite sharply in the short term, and be considerably above the 2% target for much of the rest of 2008. The reason for the projected increase in the short term is because commodity and import price increases are likely to work their way through the supply chain and may put upward pressure on prices beyond the energy and food sectors. Further ahead, the Bank expects inflation to fall back as commodity prices stabilise.

There are considerable risks to this forecast. The risks to inflation on the downside are of more concern to me than those to the upside, and I think that the probability of having to write an open letter to the Chancellor because inflation has fallen below 1% at some point before the end of my present term on the MPC is rising. As I said in my recent testimony to the Treasury Select Committee, I am concerned about the possibility of seeing something 'horrible', which I think is more likely to arise in the real economy.

These risks to the downside have increased since the February *Inflation Report* was published, as new data have come in suggesting that the prospects for the real economy have slipped, driven by declining house prices and limited credit availability. According to the Royal Institute of Chartered Surveyors, the number of estate agents saying house prices rose, rather than fell, has dropped to the lowest point since the survey began in 1978; the new instructions to sell balance and the new buyer enquiries balance were both lower in March. This confirms the bleak picture painted in the Halifax index which reported a 2.5% monthly fall in house prices, the biggest since 1992. Persimmon the house builders last week reported a decline in sales volume of 24% on the year, and a decline in sales value of 18%.

In my view a correction of approximately one third in house prices does not seem implausible in the United Kingdom over a period of two or three years if house price to earnings ratios are to be restored to more sustainable levels. That would mean the ratio of over six would have to come down to around four which is closer to its long-run value. This is broadly in line with the projections made by the IMF (2008) who note that the United Kingdom is especially vulnerable to house prices declines — along with France, Ireland and the Netherlands — and suggest that UK house prices are 30% higher than justified by fundamentals. I am not suggesting that such a drop will necessarily occur, but it may. Cutting interest rates now may help to prevent such a dramatic fall.

The downbeat news from the housing sector now seems to have started to spread to the consumer. Surveys by the Bank's Agents, BRC, CBI Distributive Trades have shown consumption to be weakening. Consumer confidence is falling. For example, the headline GfK consumer confidence balance fell in February to its lowest level since December 1992, with all five of the component balances falling.

The Bank's Agents report a weakening of employment intentions in both services and manufacturing sectors. The *KPMG/REC Report on Jobs* for March suggested that there had been a slowing in the growth of vacancies and demand for labour and that wages were slackening. The Chartered Institute of Personnel and Development had reported that the proportion of businesses expecting to make some staff redundant in the near term had risen. Total job losses in London's financial district may hit 40,000, JPMorgan said recently, doubling its previous forecasts. The most recent labour market data published by the ONS (*Labour Market Statistics*, First Release, April 2008) suggests that the decline in the numbers of unemployed has slowed. Total hours are falling, and the number of part-time workers who can't find a full-time job has increased. The labour market seems to be turning.

Inflation expectations

But the extent to which inflation falls back in the face of a potential slowdown depends to a large extent on what happens to inflation expectations. Inflation expectations play an important part in an inflation-targeting regime, although what matters most for inflation prospects are the expectations of those directly involved in setting prices and wages. Wages are set on an infrequent basis, thus wage-setters have to form a view on future inflation. If inflation is expected to be persistently higher in the future, employees may seek higher nominal wages in order to maintain their purchasing power. This in turn could lead to upward pressure on companies' output prices, and hence higher consumer prices. Additionally, if companies expect general inflation to be higher in the future, they may be more inclined to raise prices, believing that they can do so without suffering a drop in demand for their output. A third path by which inflation expectations could potentially impact inflation is through their influence on consumption and investment decisions.

What is of interest for monetary policy makers such as us in the MPC are signs that expectations have become de-anchored, which we can interpret as being the case if the public reacts to a short period of higher-than-expected inflation by increasing their long-run expectations. As we will see, measuring inflation expectations is far from an exact science, so measuring when they have become de-anchored is certainly not easy. This is just one of the many uncertainties

that we face as MPC members and which makes monetary policy making interesting!

One of the problems we face is that we don't know how individuals form expectations. Indeed, in practice, it is probably impossible to generalise, as individuals are likely to form their expectations heterogeneously, using different information sets, relying on different models and having different capacities for processing the information. This heterogeneity is noted in a useful study from the Bank of England (Driver and Windram (2007)). The study reports that some households may form their expectations based on a structural relationship, such as the trade-off between inflation and unemployment or demand; others may use an empirical approach, eg their recent memories of inflation data. Furthermore, people may be entirely forward looking or entirely backward looking, or a combination of both. In inflation-targeting countries, people may simply assume inflation will equal the target.

In a paper that is to be released today (Blanchflower and Kelly (2008)), Roger Kelly and I have used data from the Bank of England/NOP survey and the GfK surveys to provide some broad generalisations about the macroeconomic literacy and numeracy of different groups of people. We also look at how good people are at forming inflation expectations. So while we may not be able to specify *how* people form their expectations, we can at least test *how well* they are doing it. The findings make for interesting reading.

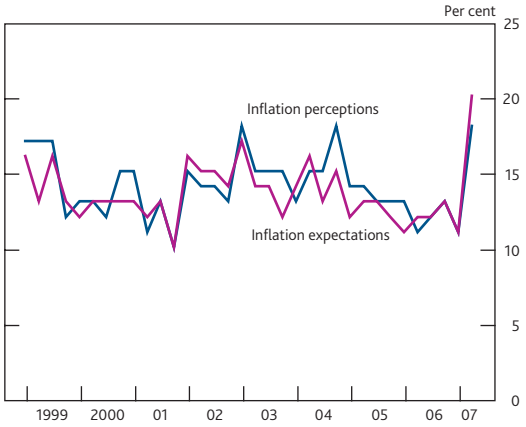
First, there is evidence that significant numbers of individuals do not know what the inflation rate is, or how it has changed, and are increasingly unable to predict how it might change in the future. This is consistent with recent evidence from the United States suggesting very low levels of financial literacy.

Second, there is evidence of very high non-response rates in these various surveys to questions on how satisfied respondents are with the job the Bank of England has been doing as well as to how much prices have risen in the past or in the future. In all of these surveys non-response rates are especially high among the least educated, females, individuals with low incomes and the young. We cannot assume that non-response implies a lack of understanding, but it is one possibility. **Chart 1** shows that this non-response — both of expectations and perceptions — has risen a lot recently.

Third, we find that *price* expectations are strongly influenced by past experience. There is evidence that expectations of the future path of prices are highly correlated with an individual's evaluation of current inflation.

Fourth, the probability of predicting inflation 'correctly' twelve months ahead, that is within 1 percentage point either side of the actual outcomes of the CPI or the RPI, is higher among

Chart 1 Non-response rates to inflation expectations and perceptions



Sources: Bank of England/NOP and GfK.

males, homeowners, workers, the more educated, richer individuals and those living in the South East.

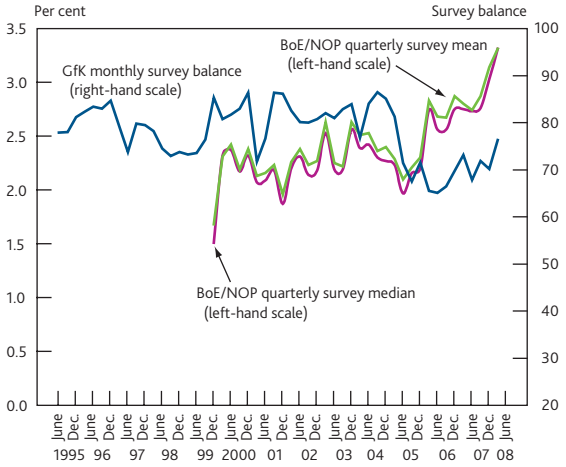
To what extent is this lack of knowledge of (and possible lack of understanding of) rudimentary macroeconomic data an issue? In monetary theory, inflation expectations affect inflation through two main channels — by individuals bargaining over nominal pay and companies setting prices. As long as those who are actually in a position to influence the rate of inflation (ie those who are in a position to bargain for their wages/set prices) have an understanding of what inflation is and a well-grounded expectation of what it is likely to be in the future, then the assumption made in most macroeconomic models, including the Bank of England's Quarterly Model, that inflation expectations are 'model-consistent', holds. It is probably safe to assume that companies involved in setting prices are on the whole sufficiently sophisticated to fall into this category. And our findings above demonstrate that the awareness of what inflation is (and the accuracy of people's awareness/expectations of inflation) is higher among those categories who tend to have higher employment rates (ie males, the more educated, the employed, the 'not young' etc). This is likely to be because the inflation rate is a far more relevant concept to them, as they are likely to be in more of a position to influence their income (through the wage-bargaining process) than those who do not receive an income from employment. So on this basis it would seem that the assumption of model-consistent expectations is not unreasonable.

What has happened to inflation expectations in the recent past?

There are a number of possible ways to measure expectations. It is instructive to see what has happened to these measures in the recent past.

Survey measures of household inflation expectations have picked up markedly since early 2005 alongside the increase in inflation (**Chart 2**). As discussed earlier, there is evidence that households' inflation expectations are closely related to their perceptions of current inflation. Thus, some of the rise in expectations in recent months is likely to reflect the rise in inflation during 2005–06. However, expectations have remained elevated during 2007 despite the easing in inflation during the first half of the year.

Chart 2 Consumer inflation expectations for the twelve months ahead



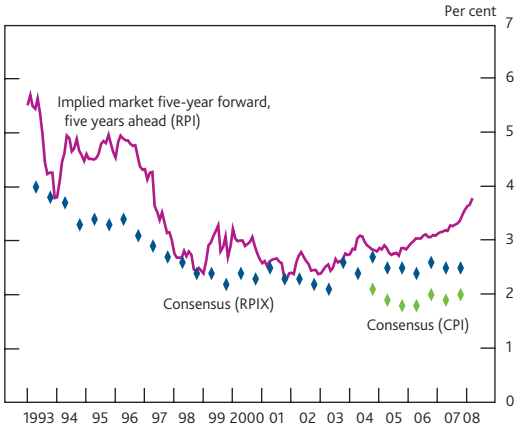
Sources: Bank of England/NOP and GfK.

Household inflation expectations may also be influenced by the degree of public coverage of inflation (Driver and Windram (2007)). More frequent discussions of inflation may increase awareness of inflation among members of the general public. Newspaper coverage was on an upward trend through much of 2006 and rose sharply in early 2007 (Driver and Windram (2007)). This may have contributed to the rise in households' inflation expectations during this period. However, both current CPI inflation and media coverage of inflation fell back through 2007, while expectations remained elevated. This may suggest that expectations are sticky, that is they may persist at a new higher level for a period of time, despite actual inflation moving down again. Or it may be that survey respondents were more focused on RPI inflation, which did not fall back as much as CPI.

It is possible that households believe that past above-target inflation outturns, combined with the prospect of further increases in inflation in the near term, are indicative of monetary policy being less restrictive in the future. If so, the rise in these short-term measures of inflation expectations would contain information about medium-term beliefs, which could have significant implications for wage and price-setting.

The average forecast by professional forecasters for CPI inflation at the end of 2008 is 2.4%. This is expected to return to 2% by the end of 2009.(1) The Bank asks professional forecasters for an assessment of the risks around their forecasts. In the latest survey, published in the February *Inflation Report*, CPI inflation in two and three years' time was expected to be centred around the 2% target, with only around a one-in-ten chance that it would exceed 3% per annum over that horizon. At longer horizons, the latest Consensus Economics survey of expectations of annualised five-year RPIX inflation five years ahead, taken in October 2007, was 2.5% and of CPI was 2% (**Chart 3**).

Chart 3 Consensus and implied market forecasts of inflation



Sources: Bank of England and Consensus Economics.

Financial market measures of inflation expectations are derived from instruments linked to RPI rather than CPI inflation, so movements could reflect changes in market estimates of the wedge between the two rates rather than changes in the markets' assessment of future inflation trends more generally (Bank of England (2008)). The interpretation of market-based measures is further complicated by the fact that these instruments also reflect risk premia associated with uncertainty about future inflation and liquidity, and they could be influenced by institutional factors, for instance if large institutional investors favoured attaching a higher value to inflation protection. Implied RPI inflation forwards have picked up steadily since 2005 at five-year horizons (**Chart 3**). There is some evidence to suggest that strong pension fund demand for inflation-protected bonds has pushed down their yields relative to those on conventional bonds, thereby pushing up implied inflation forwards.

Our concern on the MPC is whether inflation expectations remain anchored. My colleague Andrew Sentance has argued, and I agree with him, that the crucial test of whether inflation expectations remain anchored is whether wages remain under control. Wage settlements data show there has been little pass-through, if any, of price increases to wages so far — wage growth in the United Kingdom remains muted. My preferred pay measure — hourly earnings of full-time workers in the

(1) Source: HM Treasury of forecasts received between 27 February and 5 March 2008.

Labour Force Survey (LFS) — confirms earnings growth is benign and slowing fairly sharply. I use hourly earnings rather than weekly earnings to remove any variation caused by changes in hours, which are declining currently. The LFS has the great advantage that it is nationally representative of *all* wage workers, in contrast to other national wage measures. The latest ONS data — in the form of the AEI and AWE data — suggests that the year-on-year change (three-month average) of earnings with bonuses continues to fall. However, there are strong grounds for believing that both the AEI and AWE actually overstate earnings growth because the Monthly Wages and Salaries Survey, on which they are both based, excludes *all* workers employed in firms with less than 20 employees. It also excludes the self-employed. This selection rule excludes 98.0% of all private sector firms and 39.4% of all private sector workers and 27.1% of all private sector employees.(1) This is important, as the wages of those in the smallest firms in Britain tend to be particularly flexible downwards in the face of changes in labour market conditions. Furthermore, it tends to be the least skilled, who are disproportionately located in small firms, who gain the most in booms and lose the most in slumps. As a consequence, when economic conditions change, the bias from excluding the lowest part of the wage distribution also changes. Hence, the wage data in the LFS are the most relevant wage statistics to use as a labour market starts to loosen.

It is unclear whether workers will be able to resist further erosion of their spending power, but I suspect they will be unable to do so, certainly in the near term. I have argued for some months now that wages are well controlled. Workers are concerned about job security: one of my ex-students, who works at a major financial institution in the City, told me his boss had told him that his bonus this year was that he still had a job.

So far I have highlighted the importance of inflation expectations for monetary policy making. I don't believe that inflation expectations have become de-anchored. I hope that it is clear that this is not me being complacent about inflation; I have been inaccurately referred to as an 'arch-dove'. I simply have not seen evidence of domestically driven medium-term inflationary pressures, particularly in the labour market. If I had seen these pressures, especially on the wage front, I would have voted for increases in interest rates. In reality I focus on what is going on in the data rather than having a pre-determined rate-setting agenda. David Hume would think of me as a 'positive' economist in this sense. As I mentioned earlier, I believe that we face a real risk that the United Kingdom may fall into recession, and I am concerned about the associated implications for inflation on the downside. Despite the current short-term inflationary pressures in the UK economy, my view is that there is a real risk that inflation may undershoot the target in the medium term, and take us into letter-writing territory; hence I am generally inclined to loosen policy. Members of the MPC are labelled doves and hawks based on their revealed preference for tighter or looser monetary policy; it does *not* reflect the degree to which they are concerned about inflation. We are all concerned about inflation, that's our job. My votes have been driven by my view that there are considerable amounts of spare capacity in the economy — both within firms and in the labour market. Hence, I have not expected to see much, if any, domestically generated inflationary pressure, and so it has turned out. And although output price inflation has risen recently, I think the slack labour market will prevent any second-round effects.

Similarities between the US and UK experiences

The big question is where the UK economy is headed over the next two to three years. I spend approximately half of my time in the United Kingdom and half in the United States and so I am probably quite well placed to make the comparison. For some time now I have been gloomy about prospects in the United States, which now seems clearly to be in recession. I believe there are a number of similarities between the United Kingdom and the United States which suggest that in the United Kingdom we are also going to see a substantial decline in growth, a pickup in unemployment, little if any growth in real wages, and declining consumption growth driven primarily by significant declines in house prices. The credit crunch is starting to hit and hit hard.

I have identified four phases of the downturn in the United States based on data up to 23 April 2008, as follows.

Phase 1 (January 2006–April 2007). The housing market starts to slow from its peak around January 2006. Negative monthly growth rates in house prices start to appear from the autumn of 2006 (**Chart 4**).

Phase 2 (May 2007–August 2007). Substantial monthly falls in house prices and housing market activity including starts and permits to build are observed from late spring/early summer of 2007. Consumer confidence measures, alongside qualitative labour market indicators, such as the proportion of people saying jobs are plentiful, started to drop precipitously from around September 2007 (**Chart 5**).

Phase 3 (September 2007–December 2007). Average hourly earnings growth starts to slow from September 2007 as does real consumption. The growth in private non-farm payrolls starts to slow. House price and activity declines speed up (**Chart 6**).

(1) Source: http://stats.berr.gov.uk/ed/sme, Table 1.

Chart 4 United States — Phase 1 (January 2006–April 2007)

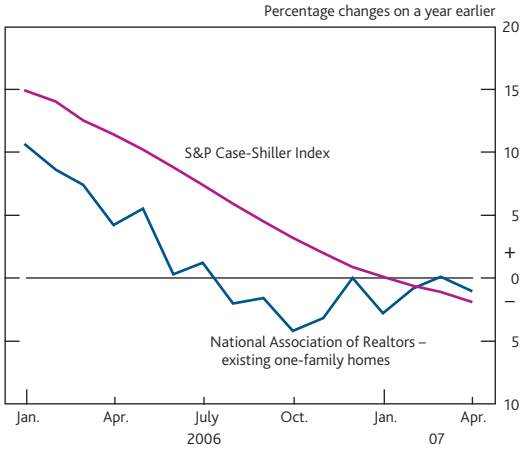
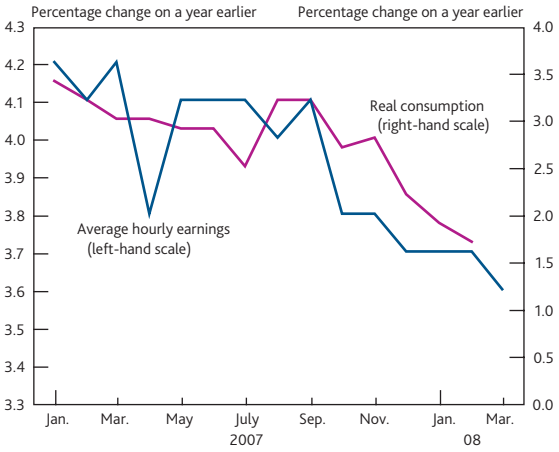


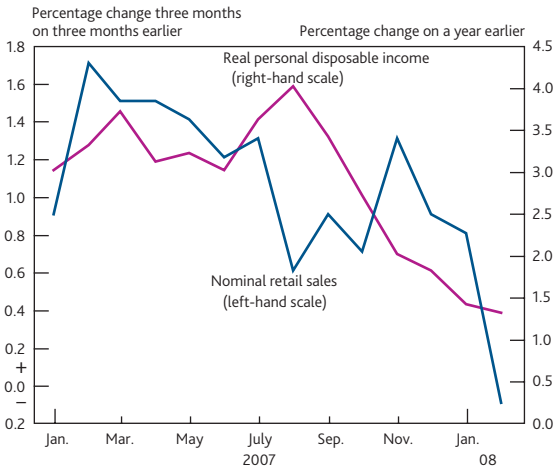
Chart 5 United States — Phase 2 (May 2007–August 2007)

Chart 6 United States — Phase 3 (September 2007–December 2007)



Phase 4 (January 2008–). By approximately December 2007 the housing market problems have now spilled over into real activity. The United States seems to have moved into recession around the start of 2008. There have been big falls in house prices. In March 2008 housing starts were at a 17-year low. Foreclosure filings jumped 57% in March compared with the same month last year. One out of every

Chart 7 United States — Phase 4 (January 2008–)

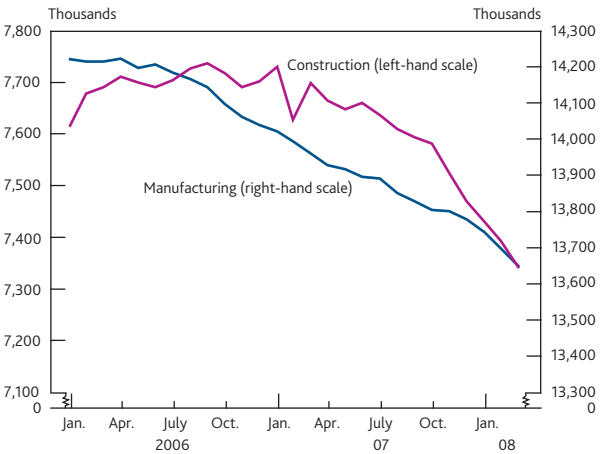


139 Nevada households received a foreclosure filing last month. California was second with a rate of one in every 204 homes with Florida third with a rate of one in every 282 being hit with a foreclosure filing. Mortgage application volume fell 14.2% during the week ending 18 April, according to the Mortgage Bankers Association's weekly application survey. Refinance volumes fell 20.2% on the week.

Nominal retail sales and real personal disposable income have both fallen sharply since the start of the year (**Chart 7**). Real annual GDP growth in 2007 Q4 is now down to +0.1%, from 1.2% in 2007 Q3.

Spending on big-ticket items in the United States is tumbling. For example, Harley-Davidson, the biggest US motorcycle maker, is cutting jobs and reducing shipments to dealers amid declining sales. Harley sold 14% fewer bikes in the United States in the first three months of the year than in the same period in 2007. US automakers such as GM and Ford reported double-digit US sales declines in March as demand for trucks and sport utility vehicles plummeted, with consumers holding back because of concerns about gas prices, the housing slump and tightening credit. Even McDonald's Corp.,

Chart 8 United States — manufacturing and construction employment



the world's biggest restaurant company, has seen US comparable-store sales fall 0.8% in March 2008, the first decline since March 2003. Declines in employment to this point in the United States have been concentrated in manufacturing, construction and financial activities (**Chart 8**).

There seem to be a number of similarities between the United Kingdom and the United States: the big difference is that in the United Kingdom the housing market was booming in 2006 and most of 2007.

Phase 1 (August 2007–October 2007). House prices start to slow in 2007 Q2 and 2007 Q3. Housing activity measures also slow from around October 2007 (**Chart 9**).

Phase 2 (November 2007–January 2008). Consumer confidence measures start slowing sharply also from around October 2007. The qualitative labour market measures such as the REC Demand for Staff index also start slowing from around October 2007 (**Chart 10**).

Phase 3 (February 2008–). In early 2008 the Halifax index and the RICS survey both suggest that house prices falls have started to accelerate. The Council of Mortgage Lenders (CML) recently announced that mortgage lending in March was down 17% on the year. Loan approvals are down, and the RICS ratio of sales to stocks is down from 0.38 in September 2007 to 0.25 in March 2008 (**Chart 11**). Bradford and Bingley, Britain's biggest buy-to-let lender, has recently reported that some borrowers are finding it hard to repay their loans, so mortgage arrears are growing, reminiscent of what has been happening in the United States. The latest figures showed that the number of people whose homes were repossessed in 2007 went up by 21%. The CML said 27,100 homes, the highest figure since 1999, were taken over by lenders after people fell behind with repayments. According to data published by the British Bankers' Association, the number of mortgages granted to homebuyers dropped last month by 47% below the same month last year to its lowest level in more than a decade. Some 35,417 mortgages were approved for home purchase in March compared with 43,147 in February, a drop of 18%. As in the United States, recent declines in employment in the United Kingdom are concentrated in manufacturing, construction and financial activities (**Chart 12**).

Phase 4 is coming. More bad news is on the way. I think it is very plausible that falling house prices will lead to a sharp drop in consumer spending growth. Developments in the United Kingdom are starting to look eerily similar to those in the United States six months or so ago. There has been no decoupling of the two economies: contagion is in the air. The United States sneezed and the United Kingdom is rapidly catching its cold. I was especially taken by the following statement in the latest minutes of the FOMC at their March 2008 meeting:(1)

Chart 9 United Kingdom — Phase 1 (August 2007–October 2007)

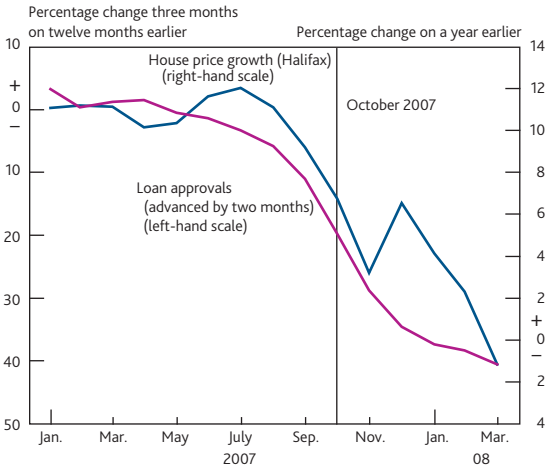


Chart 10 United Kingdom — Phase 2 (November 2007–January 2008)

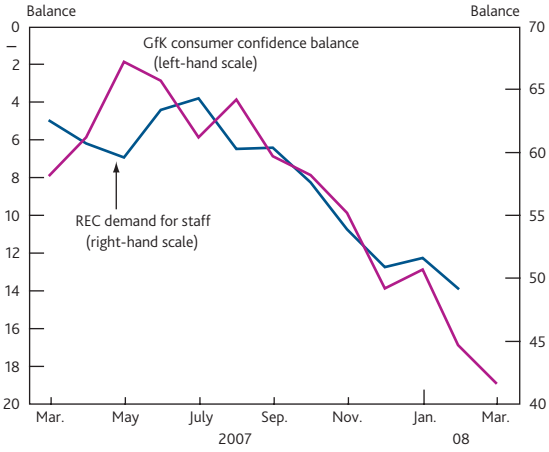
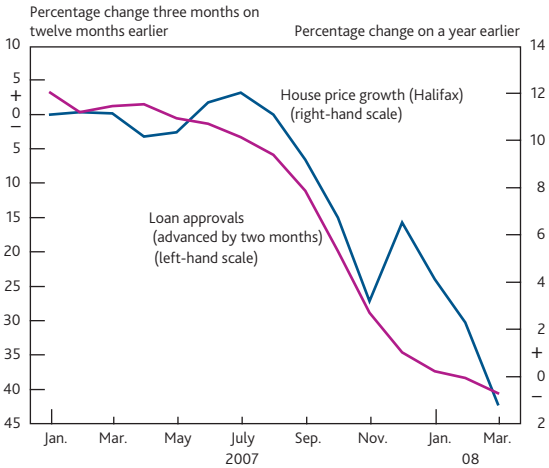


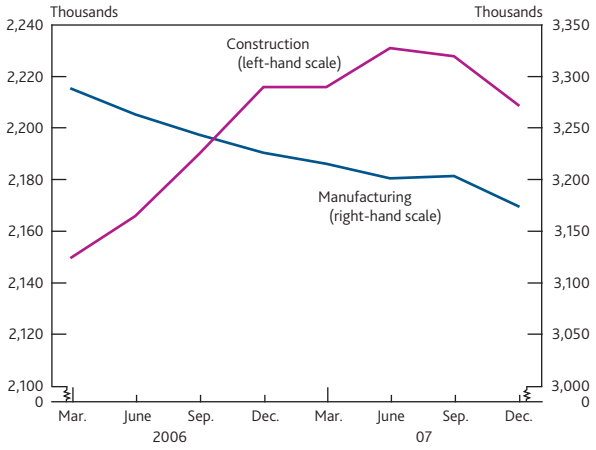
Chart 11 United Kingdom — Phase 3 (February 2008–)



'some participants expressed concern that falling house prices and stresses in financial markets could lead to a more severe and protracted downturn in activity than currently anticipated' 18 March 2008.

(1) Minutes of the Federal Open Market Committee of the Board of Governors of the Federal Reserve on 18 March 2008, page 5. Available at www.federalreserve.gov/monetarypolicy/fomc.htm#calendars.

Chart 12 United Kingdom — manufacturing and construction employment



I have identical concerns for the United Kingdom. Generally, forecasters have tended to underpredict the depth and duration of cyclical slowdowns.

Conclusions

So what do we do? The job of the MPC is to focus on getting inflation to the target in the medium term, and subject to that, to support the Government's objectives for economic growth and employment, as set out in the Monetary Policy Committee's remit from the Chancellor.(1)

This part of the legislation was presumably included precisely for times such as this. We need to be mindful of the fact that it is Her Majesty's Government that sets the terms of our remit and the Bank of England simply implements it. Sam Brittan may well have a point though,

> 'It is one thing for central banks to hold price increases generated in their own countries or regions to 2 per cent. It is quite another to compress them to offset potentially large price increases emanating from outside their area. ...For the time being, all that is required is some emphasis on the domestic versus external elements in inflation in, for instance, the monthly press conference of the ECB or the letters the governor of the Bank of England is required to write to the chancellor when inflation strays by more than one percentage point from target.' *Financial Times*, 27 March 2008.

Currently, the MPC needs to look through the short-run inflation outlook: keeping monetary policy too restrictive would impact output and jobs negatively. At the present time inflation in the United Kingdom is largely being driven by imported goods, principally commodities, oil and food. I often tell my students that when we advocate a policy prescription we must always try to answer the question what if we are wrong, what are the downside risks? There is a danger, but I don't think it is a substantial one, that inflation expectations become de-anchored. People understand that prices have gone up because the price of oil has risen and that is not the fault of the Bank of England. People are concerned about falling house prices, low incomes and the possibility of negative equity. Indeed, there is evidence that people care more about unemployment than they do about inflation (Blanchflower (2007b)). The fear of unemployment is rising (Blanchflower and Shadforth (2007)). We need to look through the short-run hiccups in inflation that will occur over the next few months. Our main priority now is to ensure we conduct monetary policy in such a way that the United Kingdom doesn't slip into recession, causing us to significantly undershoot the inflation target. It isn't too late.

Some commentators have argued that the MPC should have been more aggressive in cutting interest rates in order to head off the downside risks. I agree. My biggest concern right now is that the credit crisis will trigger a rapid downward spiral in activity. Now it is time to get ahead of the curve.

(1) This remit is specified at least annually, the most recent (and unchanged) remit being specified in a letter from the Chancellor to the Governor on 11 March 2008.

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Appendices

Bank of England speeches

Speeches made by Bank personnel since publication of the previous *Bulletin* are listed below.

Inflation, expectations and monetary policy

(Reproduced on pages 229–37 of this *Bulletin*.)
Speech by David Blanchflower at the Royal Society, George Street, Edinburgh on 29 April 2008.

www.bankofengland.co.uk/publications/speeches/2008/speech346.pdf

Macroeconomic literacy, numeracy and the implications for monetary policy

Accompanying paper.

www.bankofengland.co.uk/publications/speeches/2008/speech346paper.pdf

Strengthening regimes for controlling liquidity risk: some lessons from the recent turmoil

(Reproduced on pages 223–28 of this *Bulletin*.)
Speech by Nigel Jenkinson at the Euromoney Conference on Liquidity and Funding Risk Management, at the Hyatt Regency London on 24 April 2008.

www.bankofengland.co.uk/publications/speeches/2008/speech345.pdf

Does sterling still matter for monetary policy?

(Reproduced on pages 214–22 of this *Bulletin*.)
Speech by Andrew Sentance to the Confederation of British Industry at Centre Point, London on 23 April 2008.

www.bankofengland.co.uk/publications/speeches/2008/speech344.pdf

Inflation and the global economy

(Reproduced on pages 207–13 of this *Bulletin*.)
Speech by Tim Besley at the Canada-UK Chamber of Commerce, London on 22 April 2008.

www.bankofengland.co.uk/publications/speeches/2008/speech343.pdf

Walking the tightrope: prospects for the UK economy

Speech by Charles Bean to Members of the Community of the Ismaili Centre on 17 April 2008.

www.bankofengland.co.uk/publications/speeches/2008/speech342.pdf

Monetary policy and the financial system

(Reproduced on pages 203–06 of this *Bulletin*.)
Remarks by Paul Tucker to the Institutional Money Market Funds Association Annual Dinner on 2 April 2008.

www.bankofengland.co.uk/publications/speeches/2008/speech341.pdf

Extract from a speech to the Bank of Israel, Jerusalem

Given by the Governor, Mervyn King on 31 March 2008.

www.bankofengland.co.uk/publications/speeches/2008/speech340.pdf

Sovereign wealth funds and global imbalances

(Reproduced on pages 196–202 of this *Bulletin*.)
Speech by Sir John Gieve at the Sovereign Wealth Management Conference in London on 14 March 2008.

www.bankofengland.co.uk/publications/speeches/2008/speech339.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/publications/quarterlybulletin/index.htm.

Articles and speeches

Speeches are indicated by (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)

2006 Q3

- The UK international investment position
- Costs of sovereign default
- UK export performance by industry
- The Governor's speech in Edinburgh, Scotland (S)
- The Governor's speech at the Mansion House (S)
- Stability and change (S)
- Financial system risks in the United Kingdom (S)

2006 Q4

- The economic characteristics of immigrants and their impact on supply
- Recent developments in sterling inflation-linked markets
- The state of British household finances: results from the 2006 NMG Research survey
- Measuring market sector activity in the United Kingdom
- The Governor's speech at the Great Hall, Winchester (S)
- Trusting in money: from Kirkcaldy to the MPC (S)
- The Governor's speech to the Black Country business awards dinner (S)
- International monetary stability — can the IMF make a difference? (S)
- The puzzle of UK business investment (S)
- Hedge funds and financial stability (S)
- Practical issues in preparing for cross-border financial crises (S)
- Reflections on my first four votes on the MPC (S)
- Prudential regulation, risk management and systemic stability (S)
- Globalisation and inflation (S)

2007 Q1

- The Monetary Policy Committee of the Bank of England: ten years on

- The macroeconomic impact of globalisation: theory and evidence
- The macroeconomic impact of international migration
- Potential employment in the UK economy
- The role of household debt and balance sheets in the monetary transmission mechanism
- Gauging capacity pressures within businesses
- Through the looking glass: reform of the international institutions (S)
- The Governor's speech to the Birmingham Chamber of Commerce Annual Banquet (S)
- Perspectives on current monetary policy (S)
- The MPC comes of age (S)
- Pricing for perfection (S)
- Risks to the commercial property market and financial stability (S)
- Macro, asset price, and financial system uncertainties (S)
- The impact of the recent migration from Eastern Europe on the UK economy (S)
- Inflation and the supply side of the UK economy (S)
- Inflation and the service sector (S)
- Recent developments in the UK labour market (S)

2007 Q2

- Public attitudes to inflation and interest rates
- National saving
- Understanding investment better: insights from recent research
- Financial globalisation, external balance sheets and economic adjustment
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2006
- The MPC ten years on (S)
- The City's growth: the crest of a wave or swimming with the stream? (S)
- The changing pattern of savings: implications for growth and inflation (S)
- Interest rate changes — too many or too few? (S)
- A perspective on recent monetary and financial system developments (S)
- Recent developments in the UK economy: the economics of walking about (S)

2007 Q3

- Extracting a better signal from uncertain data
- Interpreting movements in broad money
- The Bank of England Credit Conditions Survey
- Proposals to modify the measurement of broad money in the United Kingdom: a user consultation
- The Governor's speech to CBI Wales/CBI Cymru, Cardiff (S)
- The Governor's speech at the Mansion House (S)
- London, money and the UK economy (S)
- Uncertainty, policy and financial markets (S)
- Central banking and political economy: the example of the United Kingdom's Monetary Policy Committee (S)
- Promoting financial system resilience in modern global capital markets: some issues (S)
- UK monetary policy: good for business? (S)
- Consumption and interest rates (S)

2007 Q4

- Household debt and spending: results from the 2007 NMG Research survey
- The macroeconomic impact of higher energy prices on the UK economy
- Decomposing corporate bond spreads
- The foreign exchange and over-the-counter derivatives markets in the United Kingdom
- The Governor's speech in Northern Ireland (S)
- Current monetary policy issues (S)
- The global economy and UK inflation (S)
- Trends in European labour markets and preferences over unemployment and inflation (S)
- Fear, unemployment and migration (S)
- Risk, uncertainty and monetary policy (S)
- New markets and new demands: challenges for central banks in the wholesale market infrastructure (S)
- A tale of two shocks: global challenges for UK monetary policy (S)

2008 Q1

- Capital inflows into EMEs since the millennium: risks and the potential impact of a reversal
- Recent developments in portfolio insurance
- The Agents' scores: a review
- The impact of low-cost economies on UK import prices
- The Society of Business Economists' survey on MPC communications
- The Governor's speech in Bristol (S)
- The impact of the financial market disruption on the UK economy (S)
- The return of the credit cycle: old lessons in new markets (S)
- Money and credit: banking and the macroeconomy (S)
- Financial markets and household consumption (S)

2008 Q2

- Public attitudes to inflation and interest rates
- Recent advances in extracting policy-relevant information from market interest rates
- How do mark-ups vary with demand?
- On the sources of macroeconomic stability
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2007
- Sovereign wealth funds and global imbalances (S)
- Monetary policy and the financial system (S)
- Inflation and the global economy (S)
- Does sterling still matter for monetary policy? (S)
- Strengthening regimes for controlling liquidity risk: some lessons from the recent turmoil (S)
- Inflation, expectations and monetary policy (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. 338 Monetary policy shifts and inflation dynamics (January 2008)
Paolo Surico

No. 339 The integrated impact of credit and interest rate risk on banks: an economic value and capital adequacy perspective (January 2008)
Mathias Drehmann, Steffen Sorensen and Marco Stringa

No. 340 Financial innovation, macroeconomic stability and systemic crises (February 2008)
Prasanna Gai, Sujit Kapadia, Stephen Millard and Ander Perez

No. 341 Evolving international inflation dynamics: evidence from a time-varying dynamic factor model (February 2008)
Haroon Mumtaz and Paolo Surico

No. 342 That elusive elasticity and the ubiquitous bias: is panel data a panacea? (February 2008)
James Smith

No. 343 Efficient frameworks for sovereign borrowing (March 2008)
Gregor Irwin and Gregory Thwaites

No. 344 International monetary co-operation in a world of imperfect information (March 2008)
Kang Yong Tan and Misa Tanaka

No. 345 Summary statistics of option-implied probability density functions and their properties (March 2008)
Damien Lynch and Nikolaos Panigirtzoglou

No. 346 Network models and financial stability (April 2008)
Erlend Nier, Jing Yang, Tanju Yorulmazer and Amadeo Alentorn

No. 347 Non-linear adjustment of import prices in the European Union (April 2008)
José Manuel Campa, José M González Mínguez and María Sebastiá Barriel

No. 348 The elasticity of substitution: evidence from a UK firm-level data set (April 2008)
Sebastian Barnes, Simon Price and María Sebastiá Barriel

No. 349 Dealing with country diversity: challenges for the IMF credit union model (May 2008)
Gregor Irwin, Adrian Penalver, Chris Salmon and Ashley Taylor

No. 350 Investigating the structural stability of the Phillips curve relationship (May 2008)
Jan J J Groen and Haroon Mumtaz

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/externalmpcpapers/index.htm.

The following papers have been published recently:

No. 19 Monetary policy and data uncertainty: a case study of distribution, hotels and catering growth (December 2007)
Lavan Mahadeva

No. 20 Insiders versus outsiders in monetary policy-making (December 2007)
Timothy Besley, Neil Meads and Paolo Surico

No. 21 The behaviour of the MPC: gradualism, inaction and individual voting patterns (January 2008)
Charlotta Groth and Tracy Wheeler

No. 22 Has trade with China affected UK inflation? (February 2008)
Tracy Wheeler

No. 23 Time-varying yield curve dynamics and monetary policy (March 2008)
Haroon Mumtaz and Paolo Surico

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 on a monthly basis, free of charge, on the Bank's website at:

www.bankofengland.co.uk/statistics/ms/current/index.htm.

Following user consultation, printed editions of *Bankstats*, which were previously published twice a year in January and July, have been discontinued since July 2006.

Further details are available from: Leslie Lambert, Monetary and Financial Statistics Division, Bank of England: telephone 020 7601 4544; fax 020 7601 3208; email leslie.lambert@bankofengland.co.uk.

Articles that have been published in recent issues of *Monetary and Financial Statistics* can also be found on the Bank's website at:

www.bankofengland.co.uk/statistics/ms/articles.htm.

Financial Stability Report

The *Financial Stability Report* is published twice a year in April and October. 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 at a charge, from Publications Group, Bank of England, 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.

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 'Red Book' is available at:

www.bankofengland.co.uk/markets/money/publications/redbookjan08.pdf.

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.

www.bankofengland.co.uk/publications/other/beqm/index.htm.

Cost-benefit analysis of monetary and financial statistics

The handbook describes a cost-benefit analysis (CBA) framework that has been developed within the Bank to ensure a fair balance between the benefits derived from good-quality statistics and the costs that are borne by reporting banks. Although CBA is a well-established approach in other contexts, it has not often been applied to statistical provision, so techniques have had to be adapted for application to the Bank's monetary and financial statistics. The handbook also discusses how the application of CBA has enabled cuts in both the amount and the complexity of information that is required from reporting banks.

www.bankofengland.co.uk/statistics/about/cba.htm.

Credit Conditions Survey

As part of its mission to maintain monetary stability and financial stability, the Bank needs to understand trends and developments in credit conditions. This survey for bank and non-bank lenders is an input to this work. Lenders are asked about the past three months and the coming three months. The survey covers secured and unsecured lending to households and small businesses; and lending to non-financial corporations, and to non-bank financial firms.

www.bankofengland.co.uk/publications/other/monetary/creditconditions.htm.

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.

Bound volumes of the *Quarterly Bulletin* (in reprint form for the period 1960–2004) can be obtained from Schmidt Periodicals GmbH, Ortsteil Dettendorf, D-83075 Bad Feilnbach, Germany, at a price of €4,100 per complete 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, Inflation Report* and *Financial Stability Report* can be bought separately, or as combined packages for a discounted rate. Current prices are shown overleaf. Publication dates for 2008 are as follows:

Quarterly Bulletin

Q1	17 March
Q2	16 June
Q3	22 September
Q4	15 December

Inflation Report

February	13 February
May	14 May
August	13 August
November	12 November

Financial Stability Report

1 May
23 October

Quarterly Bulletin, Inflation Report and Financial Stability Report subscription details

Copies of the *Quarterly Bulletin* (*QB*), *Inflation Report* (*IR*) and *Financial Stability Report* (*FSR*) can be bought separately, or as combined packages for a discounted rate. Subscriptions for a full year are also available at a discount. The prices are set out below:

Destination	2008					
	QB, IR and *FSR* package	*QB* and *IR* package	*IR* and *FSR* package	*QB* only	*IR* only	*FSR* only
United Kingdom						
First class/collection[1]	£31.50	£27.00	£13.50	£21.00	£10.50	£5.25
Students/schools (concessionary rate UK only)	*£10.50*	*£9.00*	*£4.50*	*£7.00*	*£3.50*	*£1.75*
Academics (concessionary rate UK only)	*£21.00*	*£18.00*	*£9.00*	*£14.00*	*£7.00*	*£3.50*
Rest of Europe						
Letter service	£38.50	£33.00	£17.00	£25.00	£13.00	£6.50
Outside Europe						
Surface mail	£38.50	£33.00	£17.00	£25.00	£13.00	£6.50
Air mail	£50.00	£43.00	£21.50	£34.00	£17.00	£8.50

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