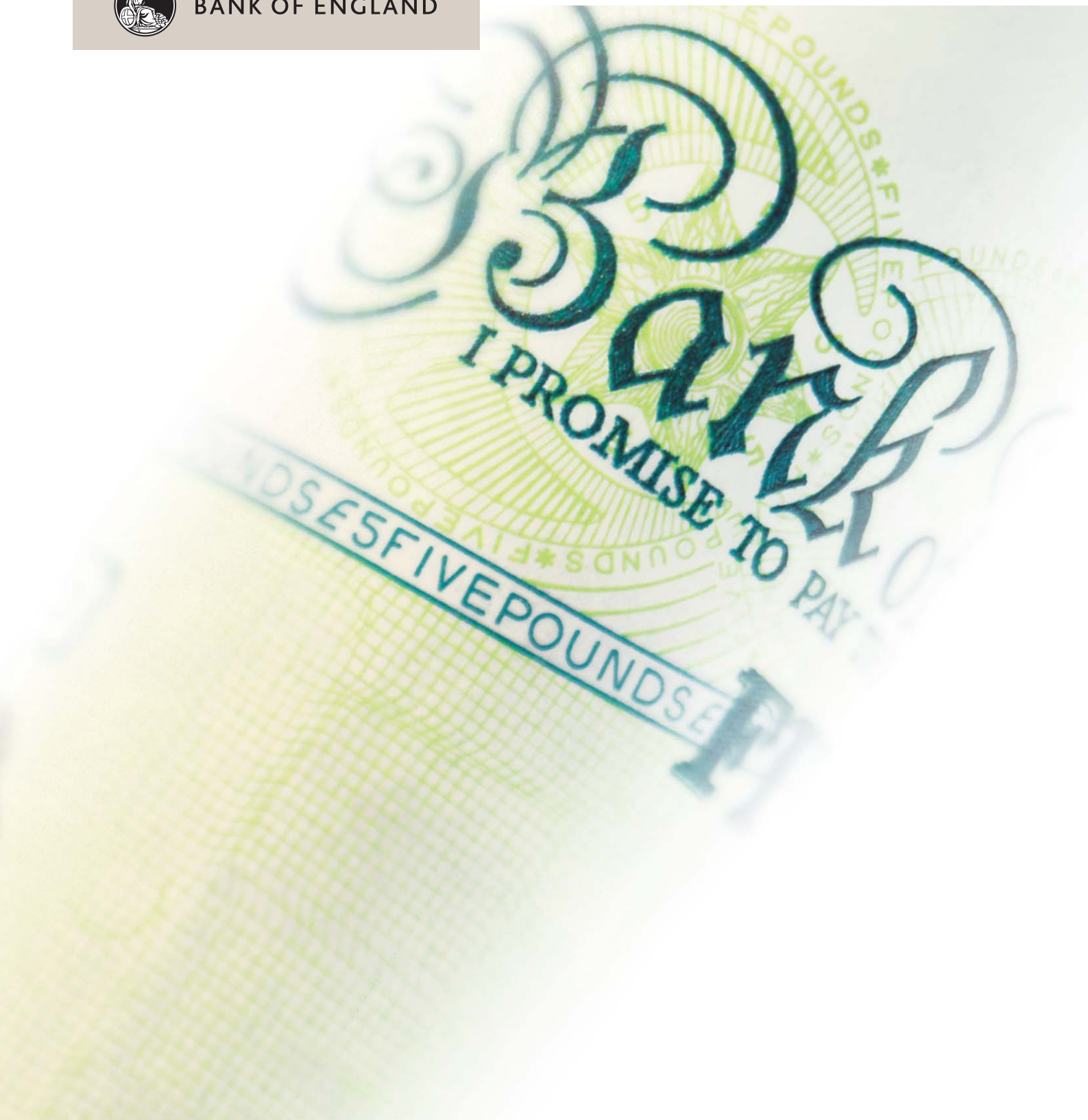


Quarterly Bulletin

2007 Q3 | Volume 47 No. 3



BANK OF ENGLAND





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Foreword

Every three months, the Bank of England publishes economic research and market reports in its *Quarterly Bulletin*. This quarter's edition begins with the *Markets and operations* report which reviews developments in sterling financial markets since the 2007 Q2 *Quarterly Bulletin* up to the beginning of September — a period of stress in international financial markets. It also reviews the Bank's official operations during this period. A fuller evaluation of financial market developments will be included in the Bank's *Financial Stability Report*, to be published on 25 October 2007.

This edition of the *Bulletin* also contains material on two key issues for monetary policy: coping with economic data that are an imperfect reflection of reality ('data uncertainty'); and using indicators of money and credit to assess the prospects for inflation.

Monetary policy must be forward looking. But even assessing the present is subject to considerable uncertainty: data can provide only an imperfect picture of economic developments. The fact that economic data are typically subject to measurement error is not a criticism of the bodies that provide it. It is inherently difficult to measure an economy — particularly one in which services play a major role — and the steady accrual of information about the past means that early estimates of data will be naturally prone to revision.

Such data uncertainty is a fact of life for policymakers, including the Monetary Policy Committee (MPC). Past *Quarterly Bulletins* and *Inflation Reports* have reported on some of the techniques currently employed by the Bank to handle uncertain data, in particular the use of business surveys to identify the likely direction and magnitude of future revisions to early estimates. In this edition, Alastair Cunningham and Chris Jeffery describe the results of the Bank's latest research in this field, which allows for richer forms of measurement error and the use of additional information, such as accounting identities. These techniques are then applied to produce an illustrative 'backcast' of business investment growth, a series that is particularly prone to revision.

Recent MPC minutes and *Inflation Reports* have included detailed discussions of developments in money and credit, and their implications for the inflation outlook. Monetary data can potentially provide important corroborative or incremental information about the outlook for inflation. However, past experience, particularly during the monetary-targeting period, strongly suggests that there is no hard-and-fast link between money growth and inflation. So understanding the possible implications of broad money growth for the economic outlook requires a detailed assessment of the causes. Stuart Berry, Richard Harrison, Ryland Thomas and Iain de Weymarn provide an overview of the potential channels through which broad money growth may affect inflation and describe the Bank's current approach to analysing developments in monetary aggregates. Further work in this area is planned.

One important step in analysing monetary demand and supply shocks involves improving the Bank's information about credit conditions. For some time, the Bank has held periodic meetings with the main lending institutions to discuss trends in credit markets. Earlier this year, the Bank began supplementing these discussions with a formal Credit Conditions Survey, the first results of which will be published on 26 September. Ahead of that first release, Ronnie Driver describes the background to the survey, outlines its main features and discusses, in the light of similar surveys in the United States and the euro area, what we may learn from it.

In economies with undeveloped financial systems and in which banks are the main financial intermediaries, it is relatively easy to define a suitable concept of broad money. However, as financial systems become more sophisticated and intermediation between savers and borrowers become more complex, so it gets harder to identify the most useful definition of money. In the United Kingdom, the money-creating sector is defined as those institutions licensed to accept deposits. But it is by no means clear that this results in an appropriate definition of money; for instance, the non-bank private sector includes some institutions which intermediate funds from one bank to another. We are therefore considering refining our definition of broad money (M4), so as to provide a measure that is more likely to reflect its use in economic transactions. The article by Stephen Burgess and Norbert Janssen sets out proposals for reform, and invites outside views on those proposals by the end of December.

A handwritten signature in black ink, appearing to read 'C Bean', with a horizontal line underneath.

Charles Bean

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

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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The speeches contained in the *Bulletin* can be found at
www.bankofengland.co.uk/publications/speeches/index.htm

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



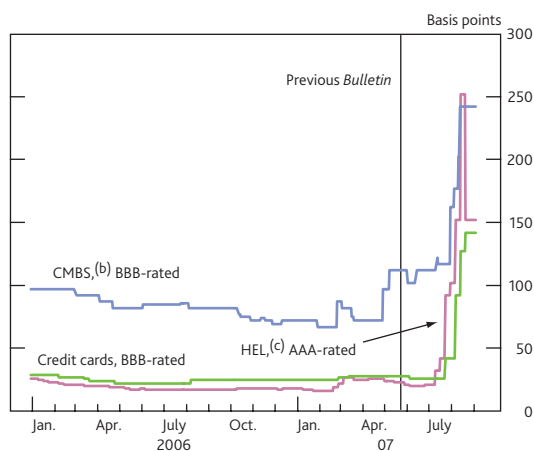
Markets and operations

This article reviews developments in sterling financial markets since the 2007 Q2 *Quarterly Bulletin* up to the beginning of September, which was a period of stress in international financial markets. It also reviews the Bank's official operations during this period. A fuller evaluation of the significance of financial market developments will be included in the Bank's *Financial Stability Report*, to be published on 25 October 2007.

International influences on sterling markets⁽¹⁾

A broad deterioration of conditions across credit markets was associated with increased volatility and impaired liquidity in global financial markets more generally in the review period. The trigger was renewed concerns about the US sub-prime mortgage market in June, following an earlier episode of stress in February and March this year.⁽²⁾ This resulted in the near failure of two large hedge funds in the United States. Efforts by the creditors of these two funds to realise the value of the collateral they held, in order to limit their exposure to the funds, raised concerns about secondary market liquidity and the valuation of all, but especially senior (AAA-rated), tranches of asset-backed securities (ABS) of US sub-prime mortgages, and of collateralised debt obligations (CDOs) containing those tranches.

Chart 1 Spreads on US asset-backed securities^(a)



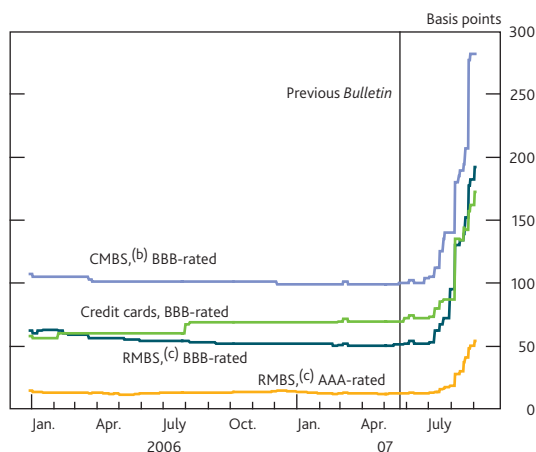
Source: Lehman Brothers.

- (a) Three-year sterling floating rates over one-month Libor.
- (b) Commercial mortgage-backed securities.
- (c) Home equity loans.

As investors reconsidered the risks associated with sub-prime ABS, there was a widespread repricing of securitised products

more generally, including US mortgage-backed securities (MBS) of higher credit standing; MBS in other countries, including the United Kingdom; and ABS backed by other receivables such as credit card payments (Charts 1 and 2).

Chart 2 Spreads on UK asset-backed securities^(a)



Source: Lehman Brothers.

- (a) Five-year sterling floating rates over Libor.
- (b) Commercial mortgage-backed securities.
- (c) Residential mortgage-backed securities.

In part, these wider developments seemed to reflect a loss of investor confidence in the ratings given to such securities by rating agencies; and also the difficulty of assessing the level and composition of the risks underlying complex portfolios of such instruments. Secondary market prices of all tranches fell sharply, and contacts described the primary market as largely closed.

The near closure of primary markets for CDOs of ABS was accompanied by a sharp drop in issuance of collateralised loan obligations (CLOs). CLOs had been reported by contacts to

(1) This section focuses on sterling market developments. The data cut-off for this section was 7 September 2007.
(2) See April 2007 *Financial Stability Report*, pages 20–25 and 2007 Q2 *Quarterly Bulletin* page 194.

account for more than half of the investor base for leveraged loans, which are loans issued by non-investment grade companies. The significance of this was that, when demand from CLOs dried up, it shut off the pipeline for the distribution of loans arising from leveraged buyouts (LBOs) of companies by private equity firms. Some of these LBOs, in both the United States and Europe, were of considerable size. Banks that had underwritten the loans had then to hold on their own balance sheets, rather than distribute, the exposures arising from these 'hung deals'. Market intelligence suggested that in early September the aggregate size of such exposures in Europe and the United States might be of the order of \$450 billion (£225 billion).

The impact of the unexpected balance sheet expansion arising from hung LBOs, and uncertainty surrounding valuations of CDOs of ABS, prompted banks and dealers to reduce risk by tightening the terms on which these assets could be financed. This put further strain on some leveraged investors.

Investors may be leveraged in different ways. They may employ balance sheet leverage: that is, borrow to finance the purchase of an asset, for example, in the repo market. Or they may obtain leverage by exposure to a financial instrument that embodies leverage, such as derivatives. In both cases, the effect is to increase (decrease) the net worth of the investor by a multiple of the rise (fall) in price of the asset or the asset referenced by the derivative contract. So as asset prices fell and financing terms tightened, these investors had to deleverage. Some CDOs of ABS with sub-prime exposure could not be financed at all and 'haircuts' — margin payments leveraged investors pay their brokers for financing — were raised across assets. As liquidity deteriorated, banks and dealers raised haircuts further and the triparty repo market,⁽¹⁾ an important source of funding for some leveraged investors, effectively closed for a time. Higher margin payments added to pressure on leveraged investors to sell assets and, in turn, to downward pressure on CDO prices.

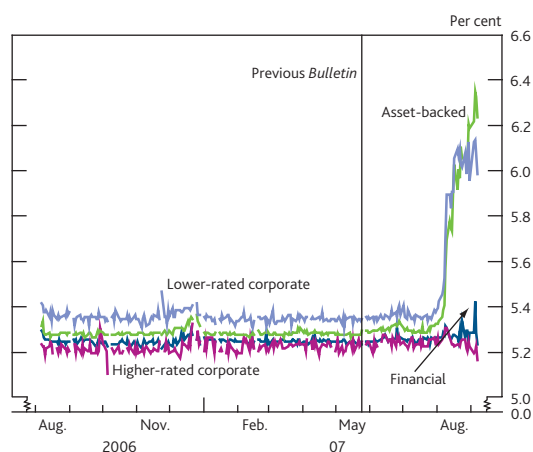
One of the dominant types of leveraged investor in the senior tranches of ABS and CDOs had been off balance sheet vehicles: conduits and structured investment vehicles (SIVs).⁽²⁾ As spreads widened, it became clear that the asset quality of some of these vehicles had deteriorated. Those invested in securities backed by sub-prime mortgages attracted particularly significant attention. Investors became reluctant to invest in the short-term debt issued by these vehicles, known as asset-backed commercial paper (ABCP). The box on page 348 provides more detail on the type of conduits that issue ABCP and discusses the maturity mismatch associated with their method of funding.

As demand for ABCP dissipated, it became more likely that conduits and SIVs would call on committed liquidity lines from banks.⁽³⁾ SIVs without such support were particularly

vulnerable; and some were forced to restructure. But all ABCP issuers found themselves having to roll over their funding at very short maturities. As a result, many banks were faced with the sudden and uncertain prospect of having to bring effectively, or actually, the assets back onto their own balance sheets at a time when they were already holding loans arising from hung LBO deals. They therefore faced the prospect of having to hold on their balance sheets various consumer assets that would usually be securitised and sold.

The banks' demand for liquidity increased against this prospective or actual expansion of their balance sheets, resulting in a preference to hold 'cash' at very short maturities. In combination with uncertainties about the location of losses on exposures to sub-prime assets, banks became reluctant to lend to each other beyond short-term maturities. And contacts suggested that other wholesale investors also became reluctant to lend in the money markets at term maturities, as they sought to preserve their own liquidity. This, in conjunction with the increasing amounts of ABCP being rolled over at very short maturities, created the prospect of a gathering 'snowball' of funding having to be rolled over every day in the overnight or short-term money markets, which had previously been funded at term maturities of a few months. There was also a dislocation in yields of longer-term ABCP versus other types of commercial paper (CP) that was rolled (Chart 3). This put considerable strain on money markets internationally, heightening the vulnerability of the financial system to further shocks.

Chart 3 Yields on US longer-term commercial paper^(a)



Source: Board of Governors of the Federal Reserve System.

(a) 30-day commercial paper.

- (1) In a triparty repo, a third-party custodian (typically a bank or clearing organisation) acts as an intermediary between the parties in a repo agreement. This reduces the administrative burden for investors and provides smaller market participants, who may not have sufficient infrastructure to conduct bilateral repo transactions, with access to repo funding.
- (2) For more detail on types of specialist financing vehicles, see the speech by Paul Tucker entitled 'A perspective on recent monetary and financial system developments', 2007 Q2 *Quarterly Bulletin*, pages 310–16.
- (3) The risk that banks may have been underpricing committed liquidity facilities to commercial paper (CP) issuers has been noted in previous issues of the Bank's *Financial Stability Review*. See for example, June 2002, pages 67–68.

ABCP-funded vehicles

The rapid growth in securitisation over the past decade, and particularly in the past three years, has led to a rise in issuance of short-term instruments, backed by the cash flow of other assets, known as asset-backed commercial paper (ABCP). Like more traditional commercial paper issued by banks and non-financial corporates, ABCP is a money market instrument with a maturity of no longer than one year.

In a securitisation, assets are sold to a special purpose vehicle (SPV), which issues securities backed by the cash flows on its assets. When the securities issued are ABCP, the SPV is typically known as an ABCP conduit.

ABCP conduits

The first conduits funded entirely by ABCP appeared in the mid-1990s. Since then, the market has grown rapidly; in 2007 Q2 global ABCP outstanding totalled \$1.48 trillion. Many (but not all) ABCP conduits are sponsored by large commercial banks. There are typically two main motivations for setting up a conduit. First, by issuing highly rated short-term notes, conduits can obtain a funding advantage for their sponsoring banks. Second, by selling assets to a conduit and shrinking its balance sheet, a bank will generally gain regulatory capital relief.

By funding a portfolio of longer duration assets with short-term paper, ABCP conduits perform a maturity transformation. That means that they are exposed to the risk that they are unable to reissue (or 'roll') maturing ABCP.

In order to assign high ratings (A1/P1) to the ABCP issued by a conduit, rating agencies typically require conduits to have committed liquidity lines from highly rated commercial banks to cover the full amount of commercial paper (CP) issued so that ABCP investors do not incur losses in the event that CP cannot be rolled. Most ABCP conduits are structured with liquidity support to cover at least 100% of the value of ABCP issued. As well as liquidity lines, ABCP conduits usually have some form of credit enhancement to shield investors from credit risk. This may take the form of over-collateralisation (where the value of assets exceeds the amount of ABCP issued) or a guarantee of repayment from a sponsoring or other highly rated commercial bank.

ABCP conduits can be classified into a 'programme type' depending on their function and the assets they hold. Broadly, there are five programme types:

Single-seller; sponsored by a bank or finance company that is the sole originator of the conduit's assets — the sponsor uses the vehicle for the benefit of its primary business.

Multi-seller; typically sponsored by a bank but also purchases assets from many different sellers — used to provide financing for the sponsor and its clients.

Credit arbitrage; sponsored by a bank to finance the purchase of highly rated securities, typically ABS/CDO tranches, at low interest rates to earn a spread.

Hybrid; sponsored by a bank to invest in securities and provide financing for the sponsor and its clients.

Repo/TRS; sponsored by a non-bank — the conduit takes exposure to assets via repo or total return swap (TRS) agreements typically with highly rated financial counterparties.

Structured investment vehicles

A structured investment vehicle (SIV) is a special type of credit arbitrage conduit. A SIV is a leveraged investment company that raises capital by issuing capital market securities (capital notes and medium-term notes) as well as ABCP. ABCP typically comprises around 20% of the total liabilities for the biggest SIVs.

A variant of a SIV is a so-called SIV-lite. SIV-lites share some similarities with collateralised debt obligations (CDOs) in that they are closed-end investments. SIV-lites issue a greater proportion of their liabilities as ABCP than SIVs (around 80%–90%), are typically more highly leveraged, and seem to have invested almost exclusively in US RMBS. As a consequence, several SIV-lites have restructured their liabilities following the recent turmoil in US mortgage markets.

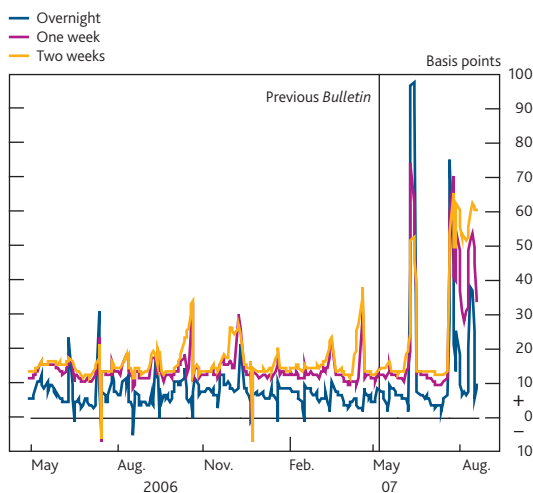
Unlike conduits that issue only ABCP, SIVs and SIV-lites tend not to have committed liquidity lines from banks that cover 100% of their ABCP. Rather, they use capital and liquidity models, approved by ratings agencies, to manage liquidity risk. The lack of a full commercial bank guarantee has reportedly led to discrimination against SIV paper by ABCP investors.

Recent developments in sterling markets

The resulting strains in money markets were seen not only in the dollar and euro markets, in which the bulk of the ABCP had been issued, but also in sterling markets. This was most significant in term markets, but also featured in very short maturity markets.

Spreads to Bank Rate of sterling overnight and other short-term secured and unsecured interest rates widened to higher levels than those seen on average since the Bank's reforms of May 2006 to its official money market operations (**Chart 4**). On 5 September, before the beginning of the maintenance period starting after the September Monetary Policy Committee (MPC) meeting, the Bank announced measures that it was prepared to take in pursuit of its objective that interest rates on secured overnight borrowing should be close to Bank Rate set for that period by the MPC. For a fuller discussion, see pages 358–60.

Chart 4 Spread to Bank Rate of short-term unsecured sterling interest rates^(a)

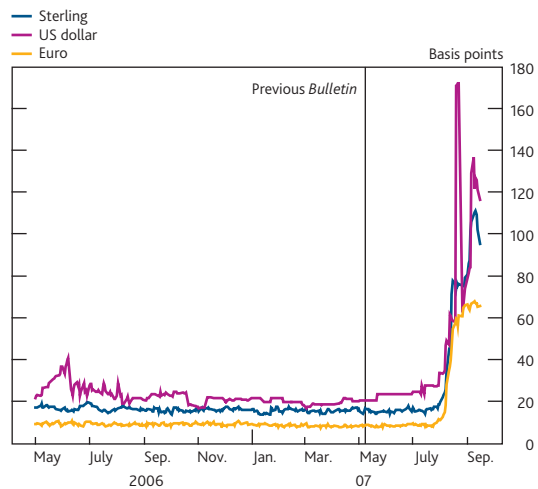


Sources: Bloomberg and British Bankers' Association.

(a) Sterling Libor rates less Bank Rate.

Market contacts reported that money markets became less liquid with maturity, with the number and size of transactions at so-called term maturities (one, three, six and twelve-months) being very curtailed in most major economy currencies. This was particularly pronounced in unsecured interbank interest rates. For example, spreads between these rates, as measured by the daily London interbank offered rate (Libor) and Euro interbank offered rate (Euribor) fixings, and secured rates, rose at term maturities in sterling, euro and dollar markets (**Chart 5**). Spreads between term Libor rates and estimates of the market's expectations of official policy rates also widened. This was slightly less pronounced in the euro market than in sterling and dollars. As explained in the box on pages 350–351, the widening in these spreads could have reflected liquidity and/or credit concerns.

Chart 5 Spread between three-month unsecured and secured interest rates^(a)



Sources: Bloomberg and British Bankers' Association.

(a) Three-month Libor rate less three-month GC repo rates.

Liquidity also deteriorated in the foreign exchange swap market for term trades and transaction volume fell sharply. The issues in this market were largely the same as those in the money markets. It would have been much more difficult for each bank to manage its liquidity carefully, in each currency, if swap desks' transactions were having the effect of continually changing the currency composition of the bank's overall liquidity position. In consequence, market making in foreign exchange swaps was limited, according to contacts. The pricing of foreign exchange swaps was also made more difficult by the volatility of term money market interest rates.

Futures contracts settling on Libor suggested that implied future sterling interbank rates rose in the first half of the period, fell during the early stages of the increase in financial market volatility in the second half of July, and then rose again in the second half of August as strains in money markets became apparent. A similar pattern was seen in euro and dollar short-term interest rates (**Chart 6**). Market rates had risen in May and early June, although they subsequently fell back in dollar and euro, reflecting expectations of monetary policy. Sterling rates had continued to rise, in part following the minutes of the June MPC meeting published on 20 June, when market expectations of a rise in Bank Rate at the July MPC meeting had firmed.

The rise in market rates in the second half of August and early September seems to have reflected liquidity positions in money markets rather than upward revisions to market participants' views of the likely path of official rates. That was the view of the Bank's market contacts, and it is supported by the Bank's own estimates of market expectations derived from sterling overnight index average (SONIA) swaps (**Chart 7**), which suggested that at the end of the review period, Bank

Recent rise in Libor rates

Interest rates that banks charge each other for unsecured borrowing and lending at term maturities, proxied by Libor, have risen sharply across many currencies. This box explains what Libor is and how it is calculated. It also examines possible factors behind higher Libor rates and notes some potential implications.

Calculating Libor

Libor stands for London interbank offered rate. It is the most widely used benchmark for short-term interest rates in major currencies worldwide. It is compiled by the British Bankers' Association (BBA) and is published daily between 11.00 am and 12 noon London time.⁽¹⁾

Libor fixings are published for ten currencies over a range of maturities from overnight to twelve months. The most commonly cited is three-month Libor.

Libor rates are truncated averages of interbank rates submitted by a panel of banks. The panel is selected to reflect the balance of activity in the interbank deposit market. For each currency, panels comprise at least eight contributor banks. Sterling, dollar, euro and yen panels contain 16 banks.

To calculate Libor, contributed rates are ranked in order and only the middle two quartiles averaged arithmetically to get the fixing for that particular currency, maturity and fixing date.

An individual contributor submits the rate at which it could borrow funds, were it to do so by asking for and then accepting interbank offers in 'reasonable market size' just prior to 11.00 am.

Libor is not the only measure of unsecured interbank interest rates. But all measures have risen recently. For example, Euribor, which is a widely used reference rate for the euro interbank market, is typically highly correlated with euro Libor and has remained so through the recent volatility.

Factors that have influenced Libor

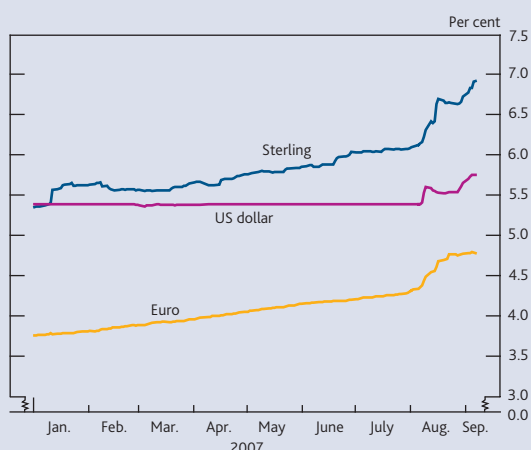
Libor rates reflect:

- current and expected future overnight risk-free interest rates, ie the expected path of monetary policy, as reflected in secured money market rates; and
- a wedge between unsecured and secured interest rates, which may reflect liquidity premia or perceived credit risk.⁽²⁾

Impact of monetary policy expectations

During the review period three-month Libor rose markedly in sterling and euro (Chart A). But three-month dollar rates have

Chart A International three-month Libor rates



Source: British Bankers' Association.

been influenced by market participants assigning a higher probability to the FOMC reducing dollar policy rates.

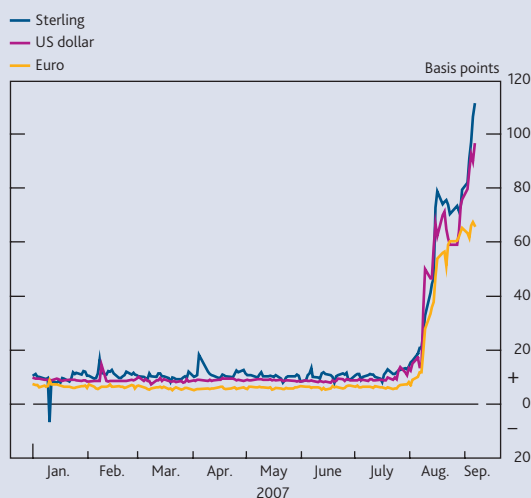
To try and strip out the influence of changes in monetary policy expectations, Libor rates can be compared with interest rates implied by overnight interest rate swap (OIS) agreements. OIS rates should incorporate expectations of future policy rate changes but be less affected by interbank liquidity and credit conditions. That is because the credit risk in overnight transactions is smaller than for equivalent longer maturity deals. Also, OIS are derivative instruments that use margining agreements to reduce counterparty credit risk. Moreover, since there is no exchange of cash at the inception of a swap agreement, they cannot be used for funding purposes.

Between early August and 7 September the spread between three-month Libor and rates implied by three-month OIS widened by around 100 basis points in sterling, 80 basis points in dollar and 60 basis points in euro (Chart B) despite a different pattern in increases in three-month Libor levels — over a similar period sterling, dollar and euro Libor rose, respectively, by 85, 35 and 50 basis points. At one-month, sterling and dollar spreads rose by about the same amount (Chart C). After controlling for changes in monetary policy expectations, the magnitude of Libor increases have therefore been comparable across currencies. This suggests the factors pushing up Libor have been global and reflect liquidity and/or credit management.

Liquidity

Market contacts have suggested the most important factor has been banks hoarding liquidity. This is because, as described in the main text, many banks had provided committed liquidity lines to specialist financing vehicles, conduits and corporates. Increased uncertainty about if and when these lines may be drawn made banks reluctant to lend

Chart B Spreads of international three-month Libor rates to three-month overnight interest swap rates

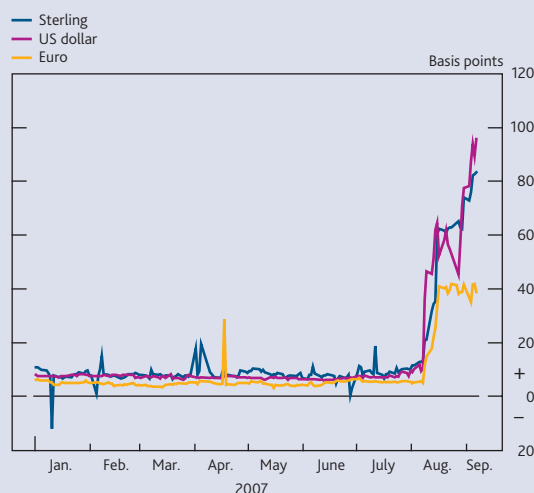


Sources: Bloomberg and British Bankers' Association.

beyond short maturities. Meanwhile, demand for term funds has increased.

Temporary central bank injections of short-term liquidity, aimed at stabilising overnight market interest rates, did not materially narrow the spread between Libor and expected policy rates at term money market maturities.

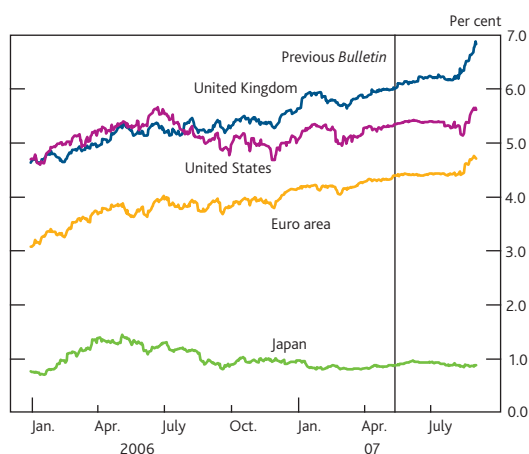
Chart C Spreads of international one-month Libor rates to one-month overnight interest rate swap rates



Sources: Bloomberg and British Bankers' Association.

- (1) For more details see the BBA's website, www.bba.org.uk/bba/jsp/polopoly.jsp?d=141.
- (2) In practice the demand for government bond collateral can also influence the spread between secured and unsecured interest rates. A general shortage of collateral can force those needing it to accept lower interest rates on the cash they lend in exchange for collateral. Such collateral 'squeezes' can widen the secured-unsecured spread. For more detail see the box entitled 'Idiosyncratic volatility in the overnight gilt repo market', *Bank of England Quarterly Bulletin*, 2006 Q3, page 286.

Chart 6 Implied international interest rates from short-term futures contracts^(a)

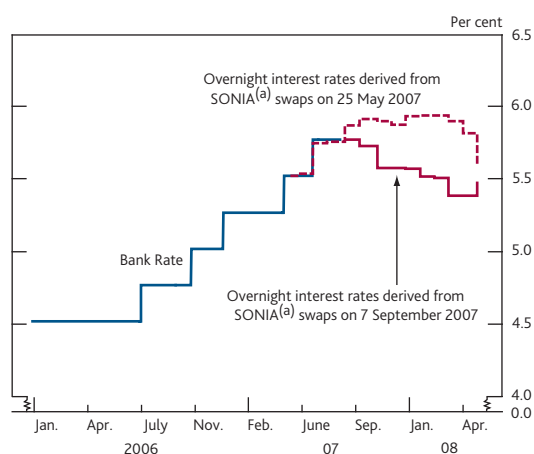


Sources: Bloomberg and Bank calculations.

(a) Uses the futures contract closest to maturity.

Rate was expected to be maintained at 5.75% until the end of the year. This was consistent with survey data: the monthly Reuters survey of UK economists in early August suggested that two thirds of economists surveyed expected Bank Rate to rise to 6.0% by the end of 2007; but by early September, at least two thirds expected it to be maintained at 5.75% (Chart 8).

Chart 7 Bank Rate and forward market interest rates



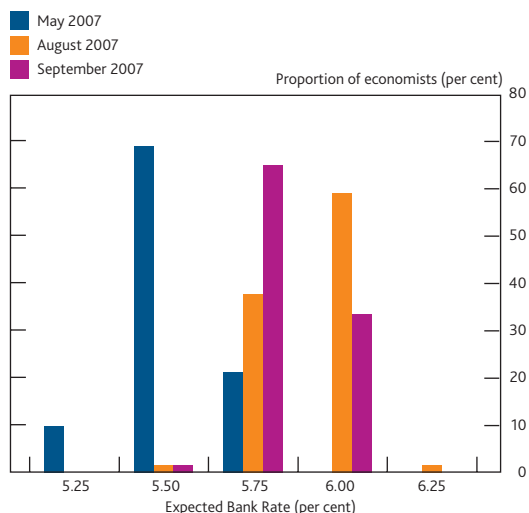
Sources: Bank of England and Reuters.

(a) Sterling overnight index average.

Internationally, market expectations were for the ECB refinancing rate to remain unchanged until at least the end of the year, but for the FOMC to reduce rates by up to 75 basis points to 4.50%.

Uncertainty about short-term interest rates, as measured by implied volatility derived from interest rate options, rose in sterling and other currencies during the market turbulence

Chart 8 Economists' forecasts for Bank Rate at end-2007^(a)



Source: Reuters.

(a) Note that the sample size across surveys can differ. As a result, proportions may change owing to different samples and/or respondents revising forecasts.

from late July (**Chart 9**). The interest rates on which these options are based are Libor rates, which for the reasons discussed above had risen well outside their usual and largely stable relationship to expected policy rates. It is not possible therefore to infer the extent to which the increase in implied volatility related to increased uncertainty about Libor fixings relative to policy rates, or to uncertainty about policy rates themselves. **Chart 10**, however, suggests that, while short-term sterling interest rate uncertainty rose, uncertainty about longer-term rates was little changed over the period as a whole.

Chart 9 International three-month implied volatility from interest rate options



Sources: Bank of England and Euronext.liffe.

The sterling effective exchange rate index (ERI) ended the review period little changed. However, within the period it increased by up to 1.7%. This reflected an appreciation against

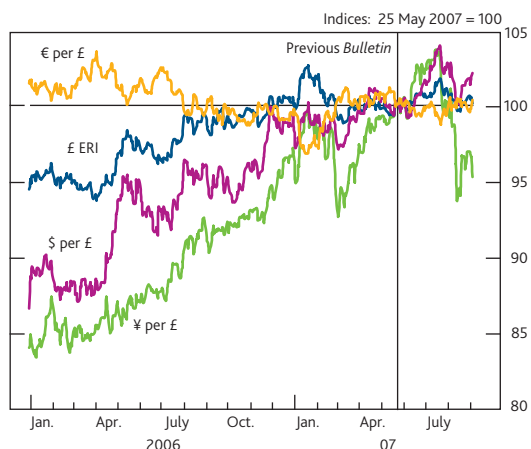
both the dollar and the yen. The dollar/sterling exchange rate reached \$2.06 on 24 July, a 26-year high. On 17 July, the yen/sterling exchange rate reached a 17-year high of ¥250.33. Towards the end of the period, sterling depreciated against the major currencies (**Chart 11**).

Chart 10 Implied volatility from sterling swaptions



Source: JPMorgan Chase & Co.

Chart 11 Cumulative changes in sterling exchange rates



Sources: Bank of England and Bloomberg.

The depreciation later in the period was particularly sharp against the yen, and contacts reported significant unwinding of yen-funded 'carry trade' positions, by speculative and Japanese domestic investors. (In a foreign exchange carry trade, an investor typically borrows in the currency of a country with low interest rates and invests in assets denominated in the currency of another country paying higher rates of interest.)

Given these swings in the exchange rate, short-term realised and implied sterling exchange rate volatility increased for all major currency pairings, particularly against the yen (**Chart 12**), which briefly caused concern in foreign exchange options markets on 16 August. Looking ahead, futures prices

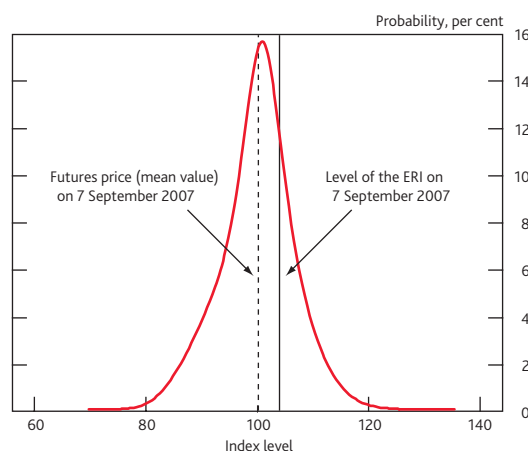
suggested the sterling ERI will depreciate a little over the next two years. And currency option prices indicated that the implied probability distribution of the sterling ERI was roughly symmetric (**Chart 13**).

Chart 12 Three-month implied sterling exchange rate volatility



Sources: Bank of England and Bloomberg.

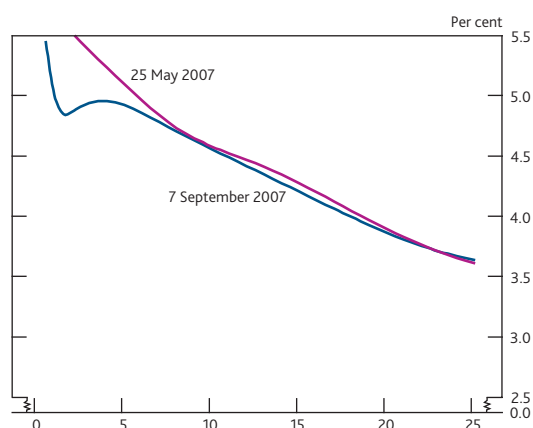
Chart 13 Two-year unconditional sterling ERI probability distribution^(a)



(a) Probability of the sterling ERI being within ± 0.5 index points of any given level. For example, on 7 September 2007 the probability of the ERI being at 100 (between 99.5 and 100.5) in two years' time was around 15%. For details of how this probability distribution is constructed see the box on pages 130–31 of the Summer 2006 *Quarterly Bulletin*.

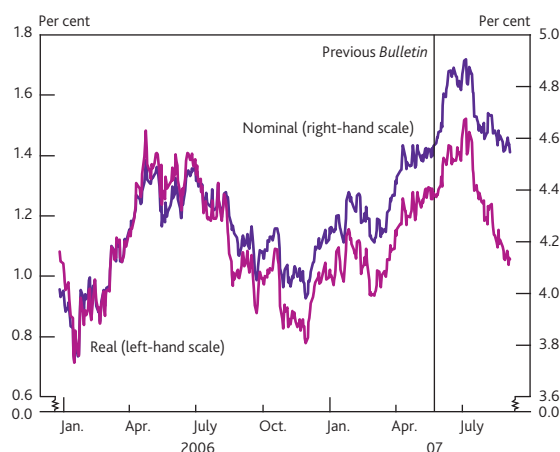
At medium maturities, sterling nominal forward interest rates fell from their May 2007 levels (**Chart 14**). This largely reflected falls in real interest rates on inflation-indexed bonds, and was consistent with market comments about a 'flight to quality' — an increase in demand for safe, liquid assets — in the broader market turmoil (**Chart 15**). Further along the yield curve, nominal forward rates increased slightly over the review period as a whole. At the beginning of the period, sterling forward interest rates had risen broadly in line with dollar and euro rates, reflecting higher real interest rates. However, these rises in nominal and real interest rates were reversed during the later period of market turmoil.

Chart 14 Sterling nominal forward rates^(a)



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

Chart 15 Sterling ten-year nominal and real forward rates^(a)

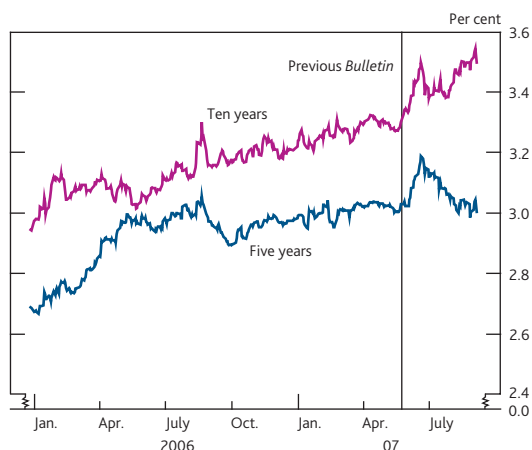


Source: Bank calculations.

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

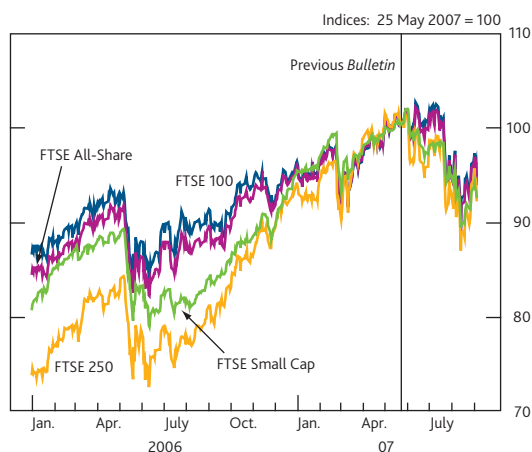
Shorter-term breakeven inflation rates, derived from the difference between yields on conventional and index-linked gilts, ended the period little changed, but longer-term rates drifted up further to around 3.5% (**Chart 16**). In principle, a rise in breakeven rates either reflects an increase in market participants' expectations of future inflation, or a larger risk premium to compensate investors for uncertainty about inflation. As discussed in previous *Bulletins*⁽¹⁾ it is difficult to distinguish between the influence of these two factors. In practice however, market frictions may distort this picture in the short term. In particular, the rise in recent breakeven rates reflects real interest rates falling by more than equivalent conventional gilt rates. Contacts suggest this might be attributable to the more limited supply of index-linked government bonds.

(1) See Hurd and Relleen (2006), 'New information from inflation swaps and index-linked bonds', *Bank of England Quarterly Bulletin*, Spring, pages 24–34.

Chart 16 Sterling breakeven inflation forward rates^(a)

(a) Implied instantaneous inflation rates five and ten years ahead, based on the difference between yields on nominal and inflation-linked government bonds. The instruments used are linked to RPI, rather than CPI, and so are not directly comparable to the Bank's inflation target.

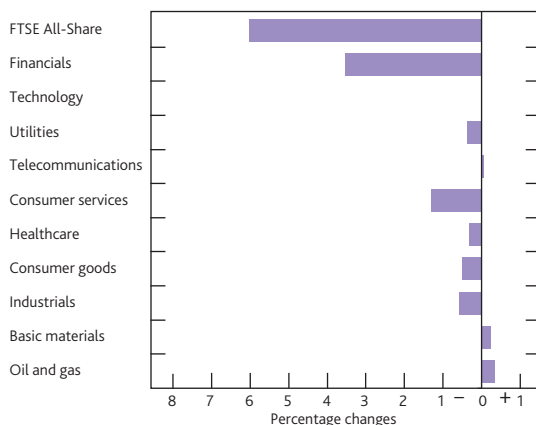
UK equity prices fell within the review period, as did equity prices in other major economies. The FTSE All-Share index fell by 6% over the review period as a whole (**Chart 17**). Most of the fall occurred within a three-week period, between late July and mid-August, at the onset of the broader market turbulence. The falls were consistent with a degree of repricing of assets across financial markets. Market contacts reported that equity price falls were amplified, in part, by speculative investors selling out of equity positions to raise short-term liquidity to meet margin calls against positions in other markets.

Chart 17 Cumulative changes in UK equity indices

Sources: Bloomberg and Bank calculations.

Towards the end of the period, equity prices recovered some of their earlier falls. There were particularly sharp rises in equity prices internationally following the US Federal Reserve Board's decision to reduce the rate at the Discount Window by 50 basis points, to 5.75%, on 17 August and a statement by the FOMC which said that the downside risks to growth had 'increased appreciably'.

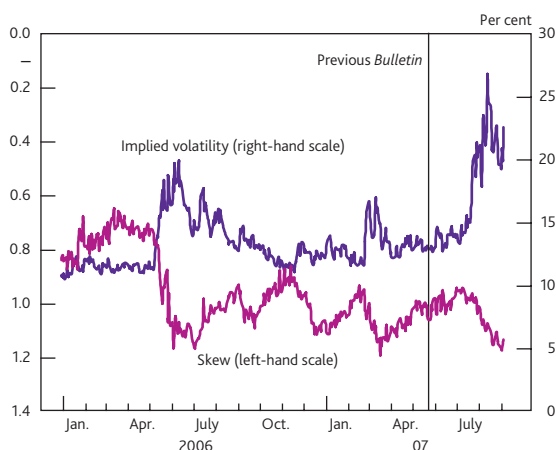
Within index sectors, and consistent with the nature of the strains in financial markets discussed earlier, there were particularly pronounced falls in equity prices of financial companies (**Chart 18**).

Chart 18 Sectoral contributions to changes in FTSE All-Share index since 25 May 2007^{(a)(b)}

Sources: Thomson Datastream and Bank calculations.

(a) Sector contributions are weighted according to their contribution to market value.
(b) This chart uses Thomson Datastream indices, rather than the FTSE, in order to make a detailed breakdown possible.

Measures of implied uncertainty about expected future equity prices, derived from options prices, increased sharply (**Chart 19**). This was consistent with the rise in realised volatility in the period of market turbulence, as markets adjusted to the developments in loan and securitisation markets discussed earlier.

Chart 19 FTSE 100 option-implied volatility and skews^{(a)(b)}

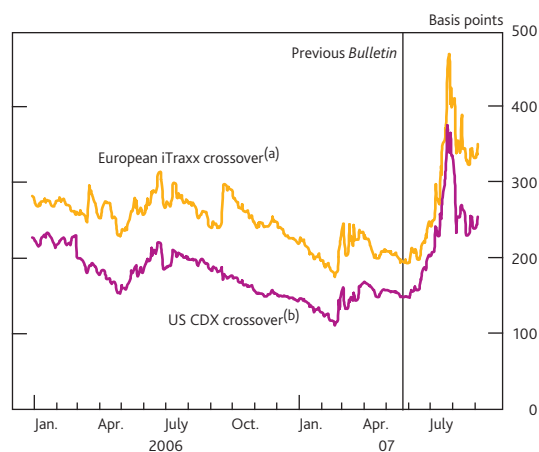
Sources: Bank of England and Euronext.liffe.

(a) Calculated from the distribution of returns from three-month option prices.
(b) A negatively skewed distribution is one for which large negative deviations from the mean are more likely than large positive deviations.

The strain in loan and securitisation markets was accompanied by a deterioration in wider credit markets, particularly for weaker credits (**Chart 20**). Liquid, and easily observed,

measures of this are the Crossover indices of credit default swaps on companies with an average rating of BB in Europe and the United States. However, market contacts report that within this latest period of turbulence, the iTraxx crossover index was used as an instrument to hedge (partially) the risk of a wide range of credit positions (ie not just corporate credit risk) hence implied spreads were not necessarily an accurate reflection of the market price of credit risk of the companies referenced in this index. Indeed, the recovery in spreads from their peak on 30 July reportedly reflected speculators selling credit protection, having been attracted by spread levels that were far out of line relative to most estimates of fundamental default probabilities.

Chart 20 Corporate credit default swap spreads

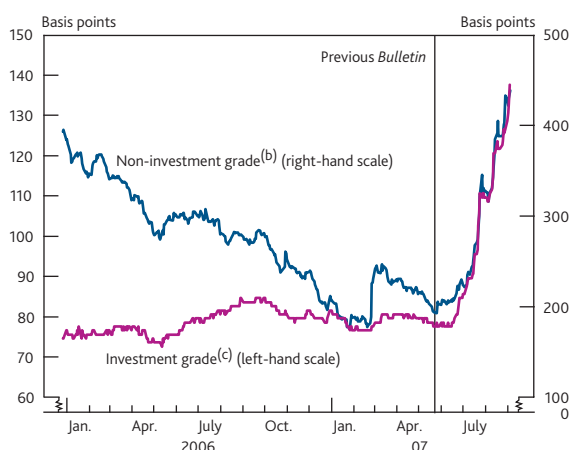


Source: JPMorgan Chase & Co.

- (a) The iTraxx crossover index comprises of credit default swaps on 50 equally weighted European entities with an average rating of BB.
 (b) The CDX crossover index comprises of credit default swaps on 35 equally weighted US entities with an average rating of BB.

Sterling-denominated corporate bond spreads changed little early in the review period, but subsequently non-investment grade spreads widened by 245 basis points and investment grade spreads widened by 60 basis points (**Chart 21**). This might be attributed to the general repricing of risky assets. However, the sterling high-yield market is much less developed than the corresponding dollar or euro high-yield markets. Non-investment grade and investment grade spreads in dollar markets rose by 228 and 62 basis points, and in euro markets by 242 and 45 basis points, respectively. It is possible that the larger moves in sterling spreads were exacerbated by the sterling index referencing fewer names than the corresponding dollar or euro indices. As discussed later in this *Bulletin*, the Bank's regular Credit Conditions Survey, to be published on 26 September, will be used to give a fuller picture of trends in the demand for, and the supply of, credit, including terms and conditions attached to lending.

Chart 21 Sterling corporate bond spreads^(a)



Source: Merrill Lynch.

- (a) Spreads over Treasuries.
 (b) Aggregate indices of bonds rated lower than BBB3.
 (c) Aggregate indices of bonds rated BBB3 or higher.

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 banking services to other central banks; provision of payment services for the UK financial system and the wider economy; and management of the Bank's free capital and cash ratio deposits from financial institutions.

Sterling monetary framework

This section reviews the period from 10 May to 13 September — four completed reserves maintenance periods and the first days of a fifth.

The current framework for the Bank's operations in the sterling money markets was introduced in May 2006. The new framework brought about an immediate reduction in the volatility of both secured and unsecured short-term interest rates (**Charts 22 and 23**). In the early months of 2007 volatility fell further⁽¹⁾ and low volatility continued into the first part of the period now under review.

May–June maintenance period

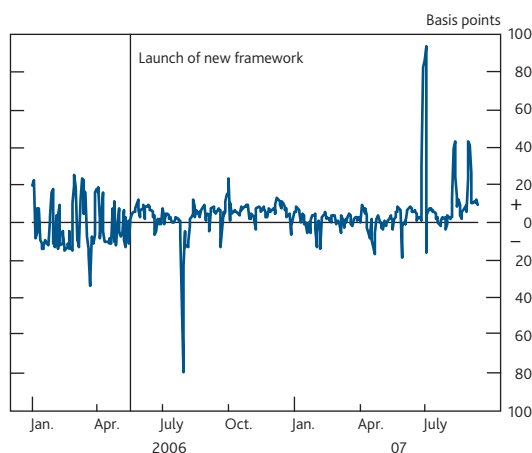
In the maintenance period beginning on 10 May, the secured and unsecured market overnight rates remained close to Bank Rate on average, with very little day-to-day fluctuation. The median spread of SONIA⁽²⁾ to Bank Rate was only 5 basis points, and the average absolute deviation from the median spread (a measure of day-to-day volatility) was only 2 basis points. For the secured rate the equivalent figures were both 4 basis points. These statistics are reflected in **Charts 22**

(1) See pages 202–03 of the 2007 Q2 *Bulletin*.

(2) The sterling overnight index average (SONIA) is the daily trade-weighted average interest rate from unsecured overnight sterling transactions brokered in London.

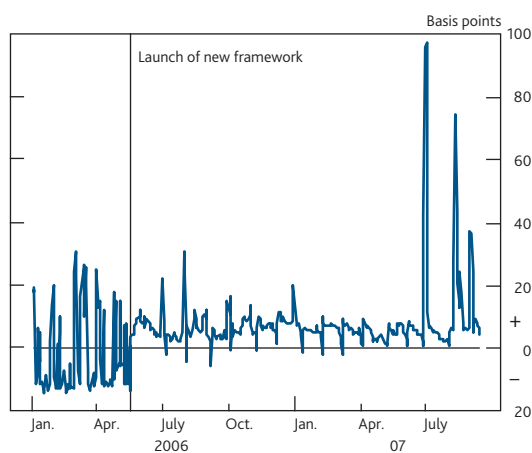
and 23 on the spreads between these rates and Bank Rate. The peaks of the distributions were close to the zero point on the horizontal axis — meaning that on average the spreads were close to zero. And the distributions were very narrow, meaning that there was little variation in the spread from day to day.

Chart 22 Spread to Bank Rate of secured market interest rate



Sources: ICAP and Bank calculations.

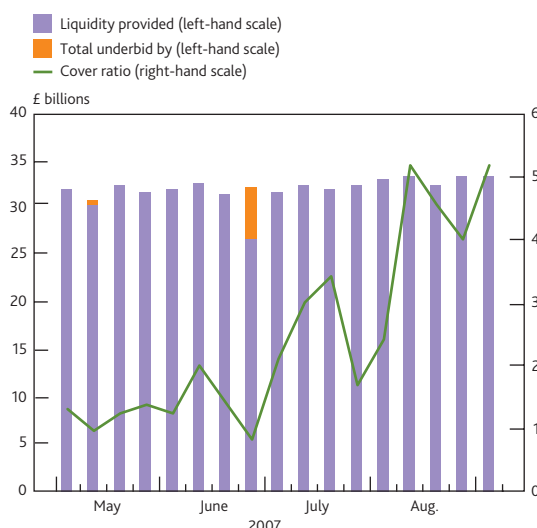
Chart 23 Spread to Bank Rate of unsecured sterling overnight interest rate



Sources: Wholesale Market Brokers' Association and Bank calculations.

This stability in rates was not disturbed by the fact that the second weekly open market operation (OMO) of the period, on 17 May, was not completely subscribed, the first time that that had happened since the launch of the new framework.⁽¹⁾ As **Chart 24** shows the amount of funds offered but not taken was relatively small (£609 million). The framework provides that 'in the event of underbidding, any funds not allocated are taken into account in the subsequent scheduled OMOs within the maintenance period' (paragraph 103 of the 'Red Book').⁽²⁾ That was done, and the uncovered operation had little effect on market rates.

Chart 24 Liquidity provided in weekly operations and cover ratio



June–August maintenance periods

For the first three weeks of the four-week maintenance period beginning on 7 June the pattern of stable rates continued. But then on 28 June, the final OMO of the maintenance period was underbid by a significant amount, and overnight rates rose sharply.

Before the operation on 28 June, overnight market rates, although close to Bank Rate (then 5.5%), had been drifting down. On the morning of 28 June, ahead of the tender at 10.00 am, overnight secured money (general collateral gilt repo) had been trading at 5.55%. Perhaps because the Bank's counterparties expected market rates to fall further, the tender was underbid by £5.4 billion. After the result was announced, the overnight GC repo rate rose to 5.62% by 10.30 am and had reached 6.75% by 1.30 pm.

The shortfall of £5.4 billion was significant in relation to the aggregate reserves target of £16.4 billion. But the Bank regularly undertakes a fine-tuning OMO on the final day of each maintenance period, to bring average reserves into line with aggregate targets. In this case, funds offered in the fine tune scheduled for 4 July would take into account the amount offered but not allocated on 28 June. In itself, the undersupply in the one-week OMO on 28 June meant that reserves balances would be lower than intended for seven days. If that had all had to be made good in the overnight fine-tuning OMO, seven times the shortfall would have had to have been offered (£37.8 billion), to offset in one day the shortfall over seven days. But in the event, high market rates induced use of the Bank's standing lending facility over three days, adding reserves to the system. This meant that less needed to be offered in the fine tune (£24.4 billion).

(1) See also page 204 of the 2007 Q2 Bulletin.

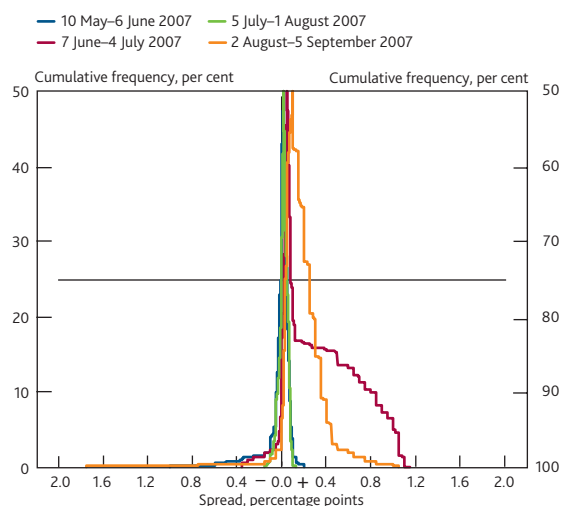
(2) *The Framework for the Bank of England's Operations in the Sterling Money Markets*, www.bankofengland.co.uk/markets/money/index.htm.

Aggregate daily use of the standing facilities was published, as usual, on the following day. And the amount of funds forecast to be offered in the fine-tuning OMO was published, as usual, on each day of the final week of the maintenance period, starting on 29 June. In this way, counterparties were informed of the scale of the supply of funds in the standing lending facility and the prospective supply of funds in the OMO on the final day. That fine-tuning OMO was oversubscribed (£32.6 billion was bid for) and aggregate reserves ended up very close to target, averaged over the maintenance period as a whole.

As is normal, the fine-tuning operation on the final day of the maintenance period was undertaken at Bank Rate, and funds were available on that day in the standing lending facility at 25 basis points above Bank Rate compared with 100 basis points earlier in the maintenance period. But despite the prospect of funds being available from the Bank at these rates on the final day, market overnight rates on the Friday, Monday and Tuesday of the final week of the maintenance period were close to the rate charged in the Bank's standing lending facility on those days (100 basis points above Bank Rate). Trade-weighted daily average rates, both secured and unsecured, were just below the standing facility rate, but some individual trades were above it. But after the fine-tuning operation had been conducted on Wednesday, market rates returned close to Bank Rate.

The impact of high market rates, in the final week, on the outturn for the June–July maintenance period as a whole can be seen in **Charts 25 and 26**. In both the secured and unsecured markets, three quarters or more of the volume of trades in the maintenance period were undertaken at rates

Chart 25 Folded cumulative distribution^(a) of spread of sterling secured overnight interest rate (trade weighted) to Bank Rate

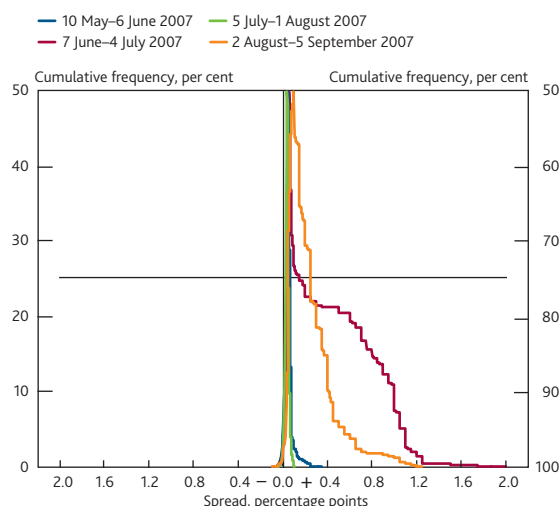


Sources: BrokerTec and Bank calculations.

(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.

close to Bank Rate. But in both charts there is a long tail to the right of the distribution, containing trades undertaken at higher rates. In both cases the tail extends to more than 1 percentage point above Bank Rate (as shown on the horizontal axis). That reflects trades undertaken at rates above the maximum standing lending facility rate.

Chart 26 Folded cumulative distribution^(a) of spread of sterling unsecured overnight interest rate (trade weighted) to Bank Rate



Sources: Wholesale Market Brokers' Association and Bank calculations.

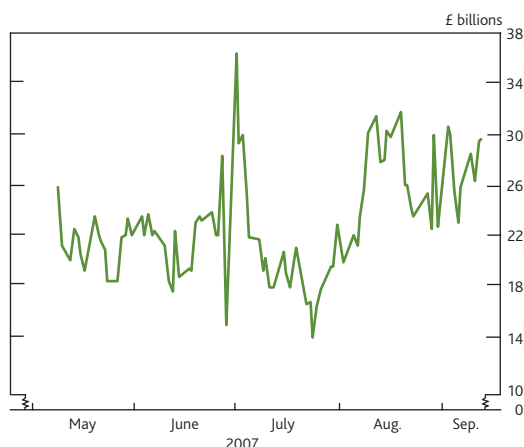
(a) Distribution of the spread between overnight interest rate at end-of-day and the official interest rate. The distributions are folded at the median so that cumulative probabilities for values above (below) the median are indicated by the right-hand (left-hand) scale.

Market rates, having come back into line with Bank Rate on the final day of the June–July maintenance period, remained there throughout the July–August period. The median spread from Bank Rate was only 2 basis points for the secured overnight rate and 4 basis points for the unsecured rate. The measures of volatility were also very low at 3 and 2 basis points respectively. The distributions of spreads to Bank Rate in the July–August maintenance period plotted in **Charts 25 and 26** are accordingly narrow and close to zero.

August–September maintenance period

Early in the August–September reserves maintenance period, sterling money markets were struck by the widespread increase in demand for liquidity described earlier (see page 349 of this *Bulletin*). At the very short end of the market, trading volumes were particularly vigorous (**Chart 27**). But with banks keen to conserve liquidity against the possible need to deploy the funds in other markets, the balance of supply and demand shifted and market interest rates rose sharply. By 10 August the spread of the daily (trade-weighted) average secured overnight rate above Bank Rate had reached 40 basis points, and that of the unsecured rate had reached 75 basis points (**Charts 22 and 23**).

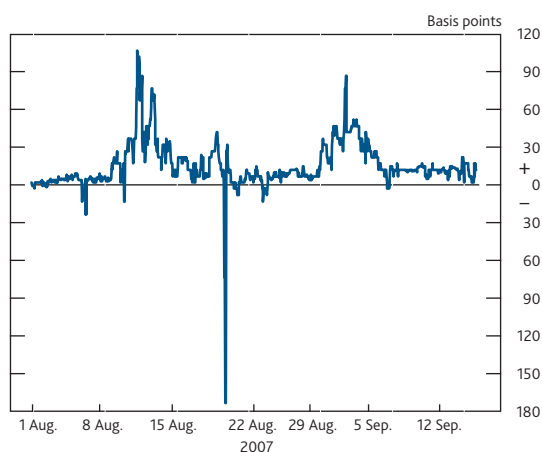
Chart 27 Volume of brokered business in the sterling overnight unsecured market



Source: Wholesale Market Brokers' Association.

These peaks in rates were short-lived. In the following two weeks, market rates fell towards Bank Rate, although generally remained further above it than usual. But at the end of calendar August, liquidity pressures returned and the spreads of the secured overnight rate to Bank Rate widened again, particularly intraday (**Chart 28**). According to market contacts a number of factors contributed to this. One was an unusually strong desire of some banks and securities dealers to show high liquidity in their published balance sheets, given heightened uncertainty in many markets. The US Labor Day holiday on 3 September curtailed banks' ability to manage liquidity by using foreign exchange swap markets. And some contacts suggested that a perception that wider market problems would persist for longer than had previously been thought also added to the demand for liquidity. In the event, market rates did fall back in the early days of September but again remained further above Bank Rate than normal, and in the case of the secured rate, further above than before the month-end.

Chart 28 Spread to Bank Rate of intraday secured sterling overnight interest rate



Sources: BrokerTec and Bank calculations.

As **Charts 25** and **26** show, market rates were more often away from Bank Rate in the August–September maintenance period than they had been in June–July. But there were fewer cases of extreme deviation. The Bank's standing facilities were used in the August–September period, but on fewer occasions and for lower amounts than in June–July (**Table A**).⁽¹⁾

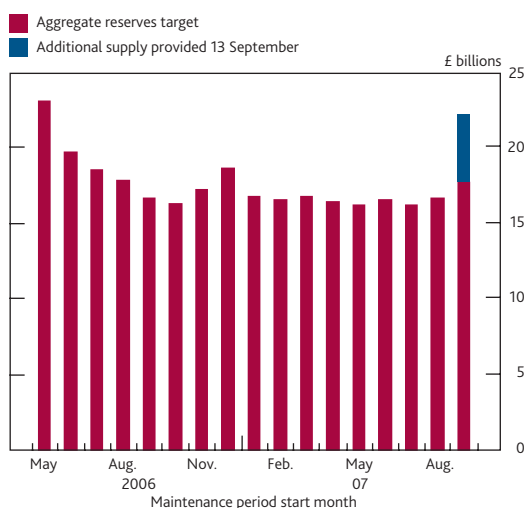
Table A Use of standing facilities

Average amounts outstanding in £ millions		
Maintenance periods 2007	Lending facility	Deposit facility
10 May–6 June	47	–
7 June–4 July	496	13
5 July–1 August	4	–
2 August–5 September	53	43

September–October maintenance period

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 in its open market operations 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. It was not surprising therefore that for the reserves maintenance period starting on 6 September reserves banks in aggregate increased their targets: by 6% from £16,560 million to £17,630 million (**Chart 29**).

Chart 29 Aggregate reserves targets



There was, however, reason to believe that this increase did not fully reflect banks' demand for reserves. The Bank pays Bank Rate on reserves holdings (within a range around each

(1) And Table D2.2.1 in *Monetary and Financial Statistics (BankStats)*, www.bankofengland.co.uk/statistics/ms/2007.htm.

bank's target) and supplies reserves in its OMOs at Bank Rate. But if an OMO tender is oversubscribed, bids from individual counterparties are scaled back. Reserves banks that are OMO counterparties cannot therefore be sure of obtaining the reserves they need directly from the Bank in the OMOs. And some reserves banks are not OMO counterparties and so necessarily have to obtain the funds they need in the market. Many banks therefore compare Bank Rate paid on reserves with a market rate, as the marginal rate for funding reserves. The cost of that interest rate spread is to be compared with the benefits provided by reserves as a buffer for absorbing shocks to banks' payment flows. With market rates high and payments uncertainty increased, both costs and benefits will have increased during the August–September maintenance period.

Reserves targets for the September–October maintenance period needed to be set on the basis of *expected* costs and benefits, and here a co-ordination problem seemed possible. If banks collectively set higher reserves targets and the Bank supplied the extra liquidity, pressures in the money market might be expected to ease, and market rates, and the cost of holding reserves, might be expected to fall. But individual banks setting reserves targets would not know what targets other banks would set. And the incentive for any individual bank to set a higher target was diluted to the extent that the benefit of its action would go partly to other banks in the form of lower funding costs.

The Bank could not know whether or to what extent such a co-ordination problem had affected targets set for the September–October maintenance period, but it took the possibility seriously. When it announced the new aggregate target on 5 September it stated that in its OMO on the following day it would offer to supply reserves to meet the new target, following standard practice. But if over the subsequent week the secured overnight rate continued to exceed Bank Rate by an unusual amount it would in the following OMO, on 13 September, offer to supply, at Bank Rate, additional reserves of up to 25% of the aggregate reserves target. If they were supplied, the Bank would accommodate the extra reserves by widening the range around banks' reserves targets within which reserves are remunerated at Bank Rate. Widening the range around banks' reserves targets and/or supplying additional reserves are contingencies set out in the 'Red Book'; a summary of these contingencies is shown in the box opposite.

In the event, the secured overnight rate did fall back in the subsequent week, but it was still unusually high relative to Bank Rate. The Bank accordingly offered in the OMO of 13 September extra reserves equivalent to 25% of the aggregate target. The OMO was oversubscribed and the additional reserves were all supplied (**Chart 29**). Later that day the secured and unsecured overnight rates fell further and

Contingency planning in the 'Red Book'

The *Framework for the Bank of England's Operations in the Sterling Money Markets*⁽¹⁾ (the 'Red Book') contains a number of provisions that can be used in stressed or otherwise extraordinary conditions. Those most relevant to the recent period describe ways in which each of the three main elements of the framework can be operated if there is 'major operational or financial disruption'.

- *The Bank can raise the ceilings on the reserves targets which reserves banks are allowed to set.*
Red Book paragraph 92
- *It can carry out exceptional fine-tuning OMOs if circumstances are such that this is needed to ensure a smooth pattern of reserves supply.*
Red Book paragraph 112
- *In the event of major disruption during a maintenance period it can increase the supply of central bank money through regular or exceptional OMOs. They can be for a fixed amount determined by the Bank or an offer of funds on demand.*
Red Book paragraphs 93, 113
- *If it increases the supply of central bank money, it can raise reserves targets and/or widen the range around them, to accommodate the extra supply.*
Red Book paragraphs 93, 113
- *It can also widen the range around reserves targets even if it does not supply extra central bank money via OMOs.*
Red Book paragraph 94
- *If it increases the supply of central bank money via OMOs it can narrow the spread between the standing lending and deposit facility around Bank Rate, including to zero.*
Red Book paragraph 113
- *It can also narrow the spread between the standing lending and deposit facility around Bank Rate, including to zero.*
Red Book paragraph 129
- *It can extend its list of eligible collateral in exceptional circumstances, including major operational or financial disruption, for example to include US Treasury bonds.*
Red Book paragraph 137

(1) www.bankofengland.co.uk/markets/money/publications/redbookfeb07.pdf.

traded close to Bank Rate. The Bank will continue to monitor the position.

Because banks' targets had not changed, reserves ranges around those targets needed to be enlarged to accommodate the increased supply. Additional reserves equivalent to 25% of aggregate targets had been supplied and the Bank would offer to roll over the extra supply in the remaining weekly OMOs of the maintenance period. If an extra 25% were supplied for three weeks in a four-week maintenance period, on average over the maintenance period as a whole, reserves would be 18¾% above target. Reserves ranges were widened to plus or minus twice that amount ($\pm 37\frac{1}{2}\%$) to allow flexibility in the distribution of the additional reserves between banks. Some banks might wish to hold reserves up to the top of the new range. Other banks might wish to hold reserves at their target. A range of $\pm 37\frac{1}{2}\%$ provided room for banks to make these different choices.

In the period under review the Bank continued to undertake longer-term repo operations against eligible collateral at four different maturities (Table B). These operations were all fully

Table B Long-term repo operations

	Three-month	Six-month	Nine-month	Twelve-month
15 May 2007				
On offer (£ millions)	1,500	750	400	150
Cover	1.79	2.04	2.81	3.62
Weighted average rate ^(a)	5.605	5.697	5.780	5.840
Highest accepted rate ^(a)	5.630	5.710	5.780	5.840
Lowest accepted rate ^(a)	5.580	5.695	5.780	5.840
Tail ^(b) basis points	0.2	0	0	0
19 June 2007				
On offer (£ millions)	1,500	750	400	150
Cover	2.03	1.32	1.87	2.95
Weighted average rate ^(a)	5.691	5.842	5.965	6.060
Highest accepted rate ^(a)	5.705	5.845	5.965	6.060
Lowest accepted rate ^(a)	5.680	5.830	5.965	6.060
Tail ^(b) basis points	0.01	0	0	0
17 July 2007				
On offer (£ millions)	1,600	750	400	200
Cover	2.64	1.68	1.5	2.00
Weighted average rate ^(a)	5.883	6.023	6.140	6.225
Highest accepted rate ^(a)	5.890	6.025	6.140	6.225
Lowest accepted rate ^(a)	5.875	6.015	6.140	6.225
Tail ^(b) basis points	0.01	0.01	0	0
14 August 2007				
On offer (£ millions)	1,500	750	400	200
Cover	2.27	1.05	1.13	1.25
Weighted average rate ^(a)	5.907	5.932	5.985	6.010
Highest accepted rate ^(a)	5.930	5.950	5.985	6.010
Lowest accepted rate ^(a)	5.900	5.800	5.985	6.010
Tail ^(b) basis points	0.01	0.13	0	0

(a) Per cent.

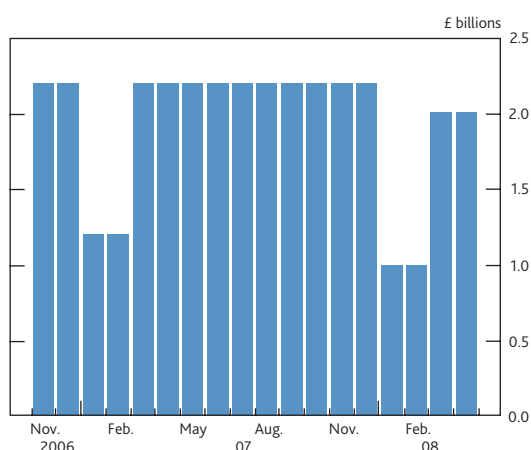
(b) The yield tail measures the difference between the weighted average accepted rate and the lowest accepted rate.

covered. The cover ratios were not unusually high in the tender held on 14 August.

Foreign currency reserves

There have been no significant developments in the Bank's holdings of foreign exchange reserves over the review period. The assets held in the reserves are currently funded by two liabilities: a euro-denominated note which matures on 28 January 2008 and the new programme of annual bond issuance which commenced in March 2007. As shown in Chart 30, upon maturity of the 2008 Note, the level of reserves will drop back from the current level of just over £2 billion to around £1 billion until the subsequent bond issue, due in March 2008, is planned to take the level back up to £2 billion. At present, the steady state of the Bank's foreign exchange reserves is planned to be around £3 billion.

Chart 30 Planned evolution of the Bank's foreign exchange reserves



Capital portfolio

The Bank holds an investment portfolio that is approximately the same size as the Bank's capital and reserves (net of equity holdings, eg in the Bank for International Settlements (BIS) and European Central Bank (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 and short-term repos. Securities purchased by the Bank for this portfolio are normally held to maturity.

Purchases are generally made each month with purchase details announced in advance on the Bank's wire service pages. Gilt purchases of £20 million each were made in June, July and August.

Balance sheet

As already described, reserves banks chose higher targets for the September–October reserve maintenance period and the Bank supplied extra reserves in its open market operation on

13 September. The Bank's balance sheet was thus expanded towards the very end of the period under review. **Table C** shows the size and composition of the balance sheet on the final days of the maintenance periods ended in early May and early September. Between those dates the balance sheet was not much changed. There was a modest increase in the note issue. In aggregate reserves banks hardly changed their

reserves targets over this period (**Chart 29**). The increase in their actual reserve holdings between the two dates shown in **Table C** simply reflects the pattern of reserves supply — a modest use of the standing lending facility on 9 May and a somewhat larger supply by way of a fine-tuning open market operation of £2.3 billion on 5 September (included in 'short-term sterling reverse repo' in **Table C**).

Table C Simplified version of Bank of England consolidated balance sheet^{(a)(b)}

£ billions					
Liabilities	5 Sep.	9 May	Assets	5 Sep.	9 May
Bank note issue	41	40	Short-term sterling reverse repo	36	31
Reserves account balances	21	18	Long-term sterling reverse repo	15	15
Standing facility deposits	0	0	Ways and Means advance	13	13
Other sterling deposits, cash ratio deposits and the Bank of England's capital and reserves	10	11	Standing facility assets	0	1
Foreign currency denominated liabilities	12	11	Other sterling-denominated assets	4	4
			Foreign currency denominated assets	16	16
Total^(c)	84	80	Total^(c)	84	80

(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.

Research and analysis



Extracting a better signal from uncertain data

By Alastair Cunningham and Christopher Jeffery of the Bank's Conjunctural Assessment and Projections Division.

Most macroeconomic data are uncertain — they are estimates rather than perfect measures. One symptom of that uncertainty is the propensity of statistical agencies to revise their estimates in light of new information or methodological advances. While revisions should move estimates closer to the 'truth', the potential for early estimates to be revised poses challenges for forecasting and economic analysis. Over the past few years, Bank staff have undertaken a range of research into how best to deal with the ensuing uncertainty. The results of that research have been used for some time as part of the toolkit available to staff when briefing the Monetary Policy Committee. This article describes some further developments in that research effort aimed at refining the staff's toolkit.

Introduction

Most macroeconomic data are uncertain — they are estimates rather than perfect measures. Measurement errors arise because data are often based on samples. And they also arise because many variables — for example, in-house software investment — are not easily observable at all, necessitating the use of proxies. Such uncertainty poses challenges for both forecasting and economic analysis. As such, according to Lomax (2004), 'few subjects consume more of [the Monetary Policy Committee's] time and energy'.

But how can the extent of the data uncertainty problem be judged and what can be done about it?

One symptom of data uncertainty is the propensity of statistical agencies to revise their estimates. In order to provide a timely indication of economic developments, the Office for National Statistics (ONS) publishes early estimates based on the survey responses available at the time. These estimates are inevitably revised as more information is received. Additionally, the ONS periodically reviews its statistical methods. To ensure comparability of the National Accounts through time, the ONS reconsiders the back data in the light of any methodological changes — leading to further revisions. The scale of the ensuing revisions gives one indication of the extent of data uncertainty in the past. And to the extent that past revisions give a good guide to the likely scale of revisions in the future, they can also be used to gauge the uncertainty associated with the latest data.

Recognition of this uncertainty leads naturally to a probabilistic view of the past. Estimation of a confidence interval around the published data is a first step, and gives an indication of the potential scale of revisions. Going further,

economists can make use of additional evidence about the current economic conjuncture and the past patterns in revisions to assess the likely direction of future revisions.

Treating uncertain data in this way is neither new nor unique to the Bank. A study by the Statistics Commission (2004) concluded that 'the main users of the [ONS] statistics knew that revisions should be expected, understood the reasons for them, and were able to make some allowance for them when taking important decisions'. However, most attempts to allow for potential revisions are informal — recognising that revisions might occur but not offering any quantification of how large they could be.

Recognising the potential for revisions to macroeconomic data, Bank staff have undertaken a range of research into how best to deal with data uncertainty. Some of that research has focused on the potential implications of data uncertainty for forecasting and policy formation — see, for example Jääskelä and Yates (2005). Other work has aimed to enhance the interpretation of uncertain data. Lomax (2004) describes the array of evidence — such as business surveys and reports from the Bank's regional Agents — deployed by staff in interpreting the recent conjuncture. And Ashley *et al* (2005) set out a first-pass method for formalising — and hence making more rigorous — the Bank staff's approach to combining the evidence from such publicly available sources. The statistical methods outlined in Ashley *et al* (2005) have been used by Bank staff for some time when briefing the Monetary Policy Committee (MPC) on developments in output growth. And this method was used in the August 2007 *Inflation Report*.

This article describes further developments in this research which aim to exploit a richer array of evidence. The next section describes the scale of revisions to early National

Accounts estimates. Subsequent sections describe how the uncertainty caused by prospective revisions can be mitigated. As mentioned above, the aim of the exercise is to make the best use of publicly available evidence when interpreting the picture painted by the latest ONS estimates.

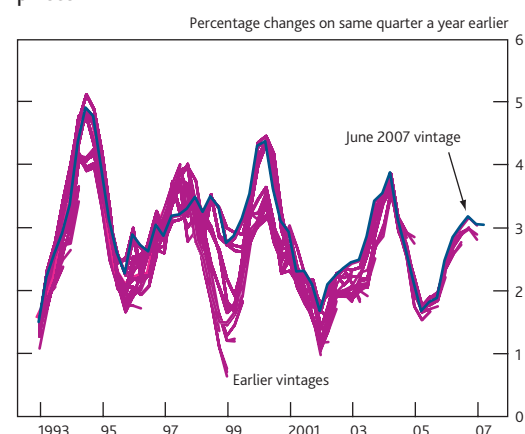
The cornerstone of the approach described in this article is the use of the experience of past revisions to proxy current data uncertainty. This raises two important caveats. First, data uncertainty may not be fully captured in revisions — even where data are not subject to revision, they may be based on samples and proxy measures and hence offer an uncertain measure. Second, past revisions may not always be a good indicator of prospective revisions. The statistical methods described in this article should not therefore be used in isolation. They need to be complemented with a careful understanding of the way in which macroeconomic aggregates are compiled and revised. The box on page 366 describes the revisions process applied in the production of the United Kingdom's National Accounts and introduces some issues in mapping from the scale of past revisions to a view of current data uncertainty.

The scale of past revisions

Reviewing the scale of past revisions is a natural first step in interpreting data that are subject to revision. And in recent years, a number of 'real-time' data sets — describing the evolution of estimates through successive data releases (or vintages) — have been developed to facilitate this sort of exercise. The Bank first published a limited real-time data set in 2002. This database has subsequently been updated and materially extended and now covers around 100 macroeconomic time series.⁽¹⁾

To illustrate the potential scale of the uncertainty in National Accounts data, **Chart 1** compares the latest estimate of GDP growth with earlier vintages released since January 1993. Revisions to GDP growth have often been large.

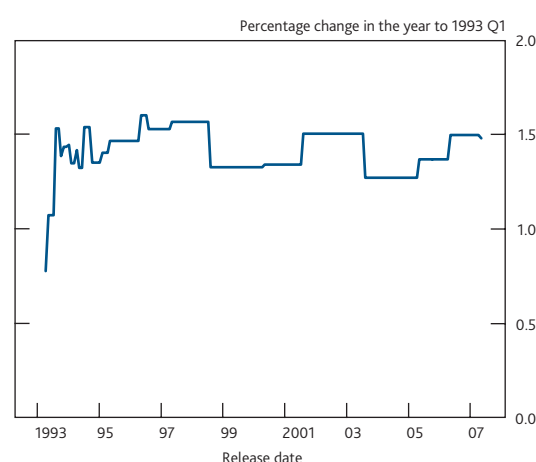
Chart 1 Real-time estimates of real GDP at market prices^(a)



(a) The blue line shows the profile of GDP growth published in the 2007 *Quarterly National Accounts* (QNA). Each pink line shows the profile of GDP growth published in an earlier vintage of the National Accounts.

Revisions have also occurred several years after the event, as shown in **Chart 2**, which plots successive estimates of annual GDP growth in 1993 Q1.

Chart 2 Successive estimates of annual growth in real GDP in 1993 Q1



The potential for revision means that early estimates can give a noisy signal of the underlying growth profile that will be revealed in more mature data. One metric for this uncertainty is the variance of revisions to the first estimates published by the ONS. **Table A** shows this 'revisions variance' for estimates of quarterly growth in real GDP and a selection of the output and expenditure components published in the first *Quarterly National Accounts* (QNA) release (column A).⁽²⁾

Table A Scale of revisions to first estimates of quarterly growth for select constant price National Accounts components^(a)

	Variance of revisions since first QNA release	Variance of growth shown in the latest vintage of data	Noise to signal ratio at first QNA release ^(b)
	A	B	C = A/B
GDP	0.10	0.07	1.38
Household consumption	0.22	0.25	0.91
Whole-economy investment	2.40	2.99	0.80
Government consumption	1.09	0.51	2.14
'Economic' exports	1.77	3.52	0.50
'Economic' imports	0.96	2.17	0.44
Service sector output	0.13	0.10	1.30
Production sector output	0.35	0.55	0.63

(a) Figures have been estimated over data released between 1993 and the latest (June 2007) QNA. While revisions could be estimated over a longer time horizon, there is some evidence of a structural break in the scale of revisions to National Accounts variables in the early 1990s (see Garratt and Vahey (2006)). The same estimation window is used throughout this article.

(b) Note that figures are rounded so columns A and B may not map to column C.

(1) The data are available at www.bankofengland.co.uk/statistics/gdpdatabase.

(2) **Table A** is based on revisions over the five years since the first QNA release. So, revisions to the first QNA estimate of each quarter's growth are evaluated over a fixed five-year window. The calculations exclude the impact of any revisions made during the 1998 *Blue Book*, which saw — among other things — the introduction of a new system of national accounts (ie ESA 95) because those revisions were associated with a change in economic classification and are not judged to be indicative of ongoing data uncertainty. This treatment is retained throughout.

Past revisions to the United Kingdom's National Accounts as an indicator of current uncertainty

The Office for National Statistics (ONS) periodically reviews the causes and scale of past revisions to the United Kingdom's National Accounts — see, for example Obuwa and Robinson (2006). National Accounts estimates are revised for a number of reasons: to correct any processing errors; to incorporate additional information received; to re-reference and rebase; and to incorporate changes to either the accounting framework or the methods used to construct estimates. Revisions to correct processing errors have been infrequent in the past, but revisions for the other reasons have been material.

So how sure can one be that the scale of past revisions is representative of current uncertainty?

Revisions as information is received and processed

The evidence available to support the published National Accounts grows from the time of the first estimates. The body of evidence grows as surveys of firms' output are supplemented by increasing information on expenditure and income. Such quarterly information is then benchmarked to annual data from a variety of sources. This benchmarking exercise is typically completed three to fifteen months after the first estimates — the results being published in the annual *Blue Book*. Even then, the various sources available may not give a consistent impression of activity across the National Accounts. The ONS therefore applies a set of disaggregated coherence checks (known as input-output balancing), motivating further revisions. This process generates revisions up to ten quarters after the first estimates. And further revisions are possible as some evidence is received with a longer lag.

As long as early estimates continue to be based on incomplete information, the past experience of revisions in the first few quarters after data are released is likely to be informative about the magnitude of current data uncertainty. That said, the ONS has embarked on a major statistical modernisation programme (see Beadle (2007)), one aspect of which is to enhance input-output balancing. Successful delivery will accelerate the input-output balancing process and hence might increase the rate at which noise in early data estimates is reduced.

Revisions due to re-referencing and rebasing

The National Accounts measure activity in both real and nominal terms. Real measures adjust for any changes in the aggregate price level, and are currently referenced to 2003 prices. Since the *Blue Book* published in 2005, ONS policy has been to shift the reference year forwards by one year with the publication of each annual *Blue Book*.⁽¹⁾

Re-referencing leads naturally to revisions to the levels of both price deflators and real measures, but has no effect on growth rates. However, re-referencing is also accompanied by changes to the latest base year. The relative price of different goods and services is fixed at the base-year level when calculating real growth rates. Rebasing will therefore lead to revisions to growth profiles, as the spending basket is updated to reflect changing patterns of expenditure.

As long as disaggregated spending patterns remain hard to measure, the past experience of revisions associated with rebasing is likely to be informative about current data uncertainty.

Revisions as methods are changed

Data remain subject to revision for many years after the initial release. One reason for such late revisions is that the methods used to manipulate statistical returns are subject to continuous review by ONS staff. When methods are changed, the ONS work through any implications for back data and incorporate revisions in subsequent annual *Blue Books*. So, for example, in the 2006 *Blue Book* the method used to estimate capital depreciation was changed, leading to revisions to the profile of investment from 1948. Revising the back data in this way helps ensure comparability across the whole time series.

The degree to which past methodological revisions are informative about current uncertainty depends on the nature of the methodological change. Some methodological revisions reflect changes to economic classification or one-off improvements to data processing technologies. For example, in September 1998, the National Accounts moved to a new accounting framework known as ESA 95. Such changes do not reflect ongoing difficulties in measurement and hence are not informative about current data uncertainty. But others follow from continued attempts to improve the measures used to capture aspects of economic activity — for example, the revisions that followed the *Atkinson Review* of public sector output and productivity (Atkinson (2005)). These considerations show that careful thought about the factors driving past methodological revisions is required when constructing estimates of current uncertainty.

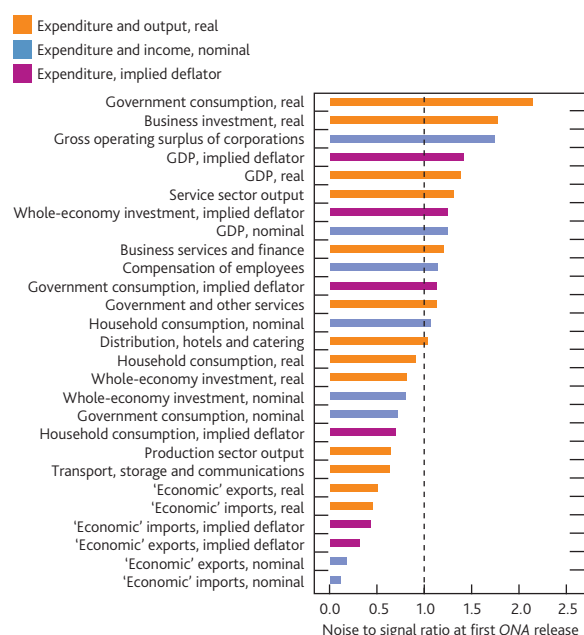
(1) The *Blue Book* published in 2007 was an exception. To free up resources necessary to allow delivery of modernised National Accounts, the ONS reduced the scope of that *Blue Book*. One element of the reduced scope was maintenance of 2003 as the reference price level.

Ranking variables by this measure may give a misleading impression of how far the potential for revision complicates economic analysis, because the measure does not control for differences in the volatility of their growth profiles over time. For example, a revision of 0.1 percentage points may be material for analysis of a variable with a relatively smooth growth profile (like GDP), but is unlikely to be material for a relatively volatile variable like whole-economy investment. Column B reports the variance of the quarterly growth rates shown in the latest vintage of data, and demonstrates a wide variation in the volatility of growth profiles.

The 'noise to signal' ratio (column C) provides a more natural metric for the scale of data uncertainty. This measure compares the variance of revisions (the noise — in column A) to the variance of the growth profile shown in the latest data (the signal — in column B)⁽¹⁾ and hence puts the scale of revisions in the context of the relative volatility of the underlying series (A/B). On this measure, revisions noise appears to have been most material for GDP, government consumption and service sector output.

Chart 3 plots the noise to signal ratio for the first QNA estimates of quarterly real GDP growth alongside 26 expenditure, output and income series. The chart shows considerable differences across variables — some early estimates providing a noisier signal than others.

Chart 3 Noise to signal ratio for first QNA estimates of quarterly growth^(a)



(a) The sample used is as in Table A.

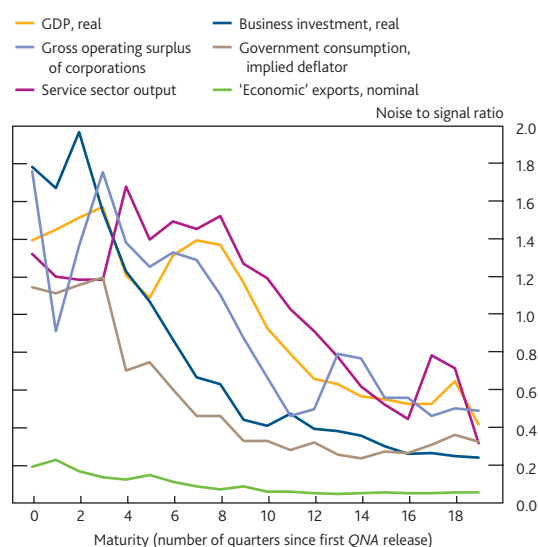
For around half of the variables in **Chart 3**, the noise to signal ratio is above one. Put another way, revisions have been more volatile than the growth profile shown in the latest vintage of the series in question. For these variables, revisions have led to large changes in the published growth rates. This is

particularly marked for estimates of real government consumption growth. This may be because early estimates of government consumption are based on only a small sample of the information that eventually becomes available. And it may also follow from the ongoing methodological changes made to measures of government consumption.

In contrast, the noise to signal ratio across all components of the trade accounts is relatively low. For trade data, revisions have not significantly altered the growth profile shown in early National Accounts releases. In other words, the challenge in interpreting trade data is the volatility of the growth profile rather than the propensity for revision.

Chart 3 shows the extent to which the potential for revisions can cloud the picture painted by the estimates published in the first QNA after each quarter. But as time elapses the ONS is able to incorporate more information so that more mature estimates might be expected to provide a less noisy signal. This fits the experience of past revisions, as shown in **Chart 4**, which plots the decrease in the noise to signal ratio in various published estimates over the five years since initial publication.⁽²⁾

Chart 4 Noise to signal ratio for estimates of quarterly growth of varying maturities^(a)



(a) The sample used is as in Table A.

The chart also shows considerable differences across variables. Notably, revisions noise surrounding estimates of business investment has decreased more rapidly than has been the case for service sector output or the gross operating surplus of corporations.

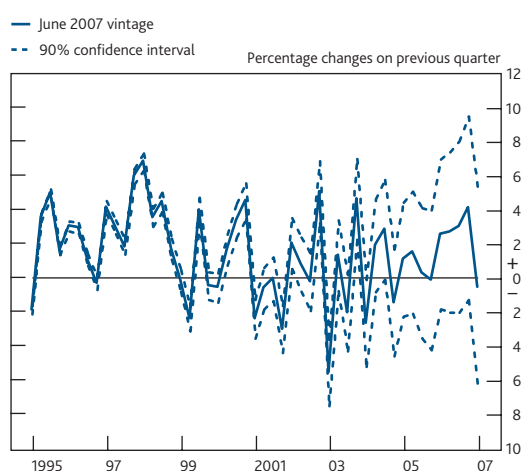
This analysis of historical revisions can be used to estimate a 'confidence interval' surrounding the latest vintage of data. As an example, **Chart 5** plots the resulting confidence interval

(1) At the time of writing, the latest QNA data were those published on 29 June 2007.

(2) Revisions in **Chart 4** are evaluated over a five-year window from each maturity.

around the June 2007 vintage of quarterly growth in real business investment. Were future revisions to be of a similar magnitude to those observed in the past, there is a 90% probability that any mature data point would fall within the dotted lines. To draw out the decrease in the noise to signal ratio as data become more mature, the chart smoothes through any bumps in the profile shown in **Chart 4**. In doing so, the data are assumed to get better over time until, eventually, they are no longer revised.

Chart 5 Confidence interval around the June 2007 vintage of real business investment



Reflecting the decline in the noise to signal ratio as time elapses, the confidence interval is narrower for estimates of growth some years ago than it is for estimates in the most recent past. And because revisions noise decreases relatively rapidly for business investment, the confidence interval narrows quickly — the estimated variance of revisions declines by just under 50% every five quarters. There is, however, substantial uncertainty surrounding the most recent past. As a result, undue emphasis should not be placed on small changes in the quarterly growth profile shown by the early estimates.

Assessing the likely direction of future revisions

Confidence intervals of this form are helpful in forming an initial impression of the significance of small changes in published growth rates. But they do not give any indication of whether apparent 'news' is more likely to be revised away than it is to be amplified through subsequent revision.

Making fuller use of the available evidence may help shed light on the probable direction of future revisions. In particular economists can appeal to:

- (a) Any patterns in past revisions — such as any tendency to revise weak early estimates up; or for revisions to growth

in one quarter to correlate with revisions to growth in the adjacent quarters.

- (b) The indications offered by other measures of activity — such as business surveys or the scores produced by the Bank of England's regional Agents.
- (c) The time-series properties of the data — recognising, for example, that if quarterly growth rates have not been volatile in the past, one should be wary of early estimates that show large quarterly swings.

(a) Patterns in past revisions

The ONS periodically reviews any large revisions to specific components to check whether they were due to predictable factors; and hence, whether data processing procedures should be improved. While it is hard to identify obvious and recurring factors driving specific revisions, there are patterns in revisions to the National Accounts aggregates. Recognising these patterns can help data users (such as Bank staff) to interpret the picture painted by early data releases.

Early estimates have tended to be revised upwards

For most components of the National Accounts, early releases have tended to be revised up more often than down. And upward revisions have tended to be larger than have downward revisions.

Table B shows the mean revision to early estimates of quarterly growth for real GDP and a selection of the output and expenditure components published in the first QNA release (column A). As in **Table A**, it is important to control for the relative volatility in the different variables (column B) to understand how materially any average revisions might affect economic analysis. So, column C shows the mean revision normalised to take account of the variation in the time profile of growth for each variable. On this basis, the tendency to revise up appears to have been most marked for GDP and service sector output.

Table B Direction of revisions to first estimates of quarterly growth for select constant price National Accounts components^(a)

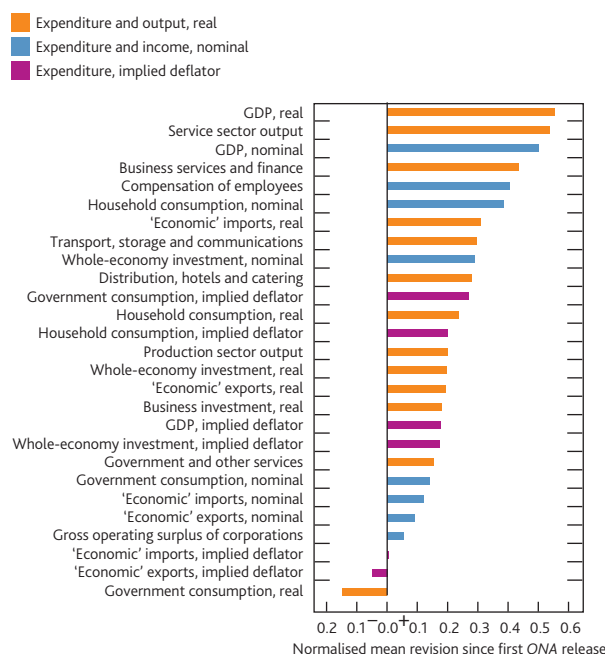
	Mean revision since first QNA release	Variance of growth shown in the latest vintage of data	Normalised mean revision since first QNA release ^(b)
	A	B	C = A/√B
GDP, real	0.15	0.07	0.55
Household consumption	0.12	0.25	0.24
Whole-economy investment	0.34	2.99	0.20
Government consumption	-0.11	0.51	-0.15
'Economic' exports	0.37	3.52	0.19
'Economic' imports	0.45	2.17	0.31
Service sector output	0.17	0.10	0.54
Production sector output	0.15	0.55	0.20

(a) The sample used is as in **Table A**.

(b) Note that figures are rounded so columns A and B may not map to column C.

The pervasive tendency for revisions to move estimates upwards is revealed in **Chart 6**, which shows the 'normalised mean revision' to early estimates of quarterly growth for a wider range of National Accounts aggregates.⁽¹⁾

Chart 6 Direction of revisions to first QNA estimates of quarterly growth^(a)

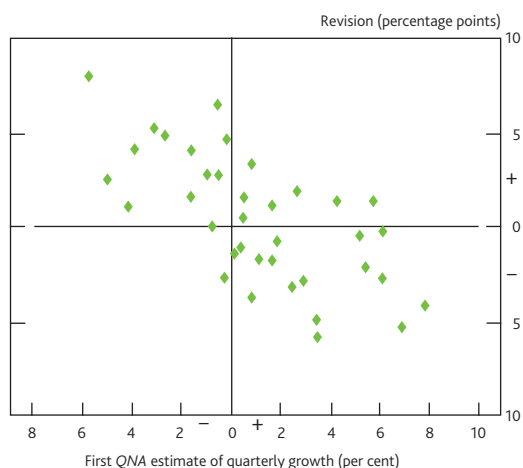


(a) The sample used is as in Table A.

Weak early estimates have tended to be revised up by more than strong early estimates

In general, revisions have been inversely related to the strength of the early estimates. As an example, **Chart 7** plots the first QNA estimates of quarterly growth of real business investment against the revisions to those estimates.

Chart 7 Relationship between first QNA estimates of real business investment and revisions^(a)



(a) The sample used is as in Table A.

The chart reveals a negative relationship between the strength of the first QNA estimates and subsequent revisions to them.

Such negative relationships appear pervasive across the National Accounts aggregates — albeit typically less pronounced than has been the case for real business investment.

Revisions to quarterly growth rates have tended to be partially offsetting from one quarter to the next

Upward revisions to data in one quarter have typically been partially offset — in terms of their impact on the level of the series in question — by downward revisions in adjacent quarters. In other words, negative serial correlation is another pervasive feature of the experience of past revisions to the National Accounts. One corollary of this feature is that early estimates of annual growth have tended to provide a less noisy signal than early estimates of quarterly growth.

(b) Other measures of activity

Although the ONS is the primary source of macroeconomic data for the United Kingdom, it is by no means the only one. The Bank's regional Agents report on the experience of their contacts across the country. And several business organisations publish surveys that provide indications of, for example, output growth and costs for particular industries.

A number of caveats should be borne in mind when interpreting such business surveys: they rely on substantially smaller samples than the official data; and they are typically based on an aggregation of qualitative responses by individual firms. Nevertheless, such alternative indicators can be used to provide a cross-check on early National Accounts estimates — identifying where the early estimates appear most surprising in the light of other available evidence.

The usefulness of the cross-check depends on how closely the indicator has correlated with mature National Accounts data in the past, and on whether there is any doubt that past correlations might break down.

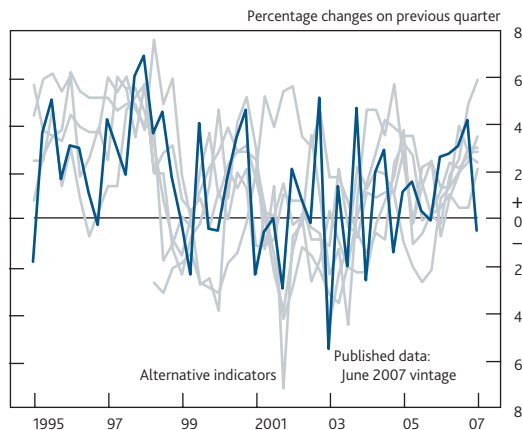
As an illustration, **Chart 8** shows the range of indicators available to help interpret the picture painted by early ONS estimates of business investment growth.⁽²⁾ Each grey line shows the profile of one alternative indicator. The blue line is the June 2007 vintage of the National Accounts. The past experience of revisions suggest that ONS estimates of the recent past are quite uncertain. So the alternative indicators provide a cross-check on the picture of the recent past painted by the blue line. Earlier in the sample, where the ONS

(1) The chart does not provide any statistical test of the significance of average revisions. Garratt and Vahey (2006) find that — over the period 1961–99 — the tendency to revise real GDP growth upwards was statistically significant at the 5% level. There is, however, some evidence that statistical quality improved during the early 1990s.

(2) The alternative indicators are two balances from the *CBI Quarterly Industrial Trends Survey* (the capital expenditure balance, and the proportion of respondents viewing uncertainty about demand as a constraint on investment), quarterly profit warnings, and sectorally weighted investment intentions balances from the *British Chambers of Commerce Quarterly Economic Survey* and the Bank of England's *Agents' Summary of Business Conditions*. The alternative indicators have been rescaled to have the same mean and standard deviation as the published data over the longest available common subsample.

estimates are more mature, the blue line provides a guide to the information content of the alternative indicators.

Chart 8 Range of alternative indicators of real business investment



The chart shows that most of the alternative indicators would be consistent with some recovery in investment growth through 2006 but that the ONS estimates were towards the top end of the range through the year. It also reveals that the survey indicators have not correlated particularly strongly with the profile of business investment growth in the past.

(c) Time-series properties of the data

In gauging where early estimates appear most surprising, economists can also appeal to what they know of the time-series properties of the data. For most macroeconomic variables, growth outturns have tended to cluster around their average. In other words, episodes of extreme growth have been rare. Taken together with the tendency for weak early estimates to be revised up by more than strong early estimates, this might suggest some caution before taking extreme early estimates at face value.

More generally, even before receiving any estimates, economists can draw on past patterns in the data to form a 'prior' view of how they expect the economy to evolve. And, given the uncertainty surrounding early releases it is unlikely to make sense to discard this prior as soon as the first estimates of National Accounts data become available.

Combining evidence from different sources

The discussion above suggests that there are a range of factors to consider when assessing the likely direction of revisions. Cross-checking the official data along these lines is neither new nor unique to the Bank. But approaching this issue formally can add rigour to the exercise of combining such diverse sources of information: helping economists to challenge evidence about different variables in a consistent way.

This sort of exercise is known as a 'signal extraction problem' and its output is a prediction of the profile that will be revealed once the early ONS estimates have matured. Research into this sort of problem is not new: one early example is Howrey (1978), who used a Kalman filter to predict revisions to US disposable income.⁽¹⁾

Following this example, Bank staff have developed a signal extraction model to help predict how far, and in what direction, the latest National Accounts data might be revised. Given the focus on the profile of growth in the past, the exercise might be described as 'backcasting' — as opposed to forecasting — economic activity. Intuitively, the model proceeds in two stages:

- Early ONS estimates are adjusted for any past tendency to be revised up or down.
- The official estimates and survey indicators are used to update a prior view of how the data should evolve.

The degree to which the resulting backcast 'aims off' the early ONS estimates depends on the noise surrounding the early ONS estimates, and the degree to which early estimates are 'surprising'. The 'surprise' in the early estimates is quantified in the light of: (i) past patterns in revisions; (ii) the profile of the survey indicators; and (iii) the time-series properties of the data — that is, the prior view of how the data would evolve. Importantly, the model recognises that revisions to adjacent quarters are unlikely to be reinforcing when there has been significant negative serial correlation in past revisions.

The noise in early ONS estimates reflects both the scale of past revisions to early estimates and the rate at which that noise has dissipated with maturity. In other words, it maps directly from the revisions experience used to estimate the confidence interval in **Chart 5**. The annex to this article explains some further details of the model set-up and its estimation.

The model detailed in the annex develops the work of Ashley *et al* (2005), who used regression analysis to combine information from the latest vintage of ONS data and alternative data sources such as business surveys. One important difference between the two models is that Ashley *et al* (2005) assume that ONS estimates accurately capture the underlying movements in the data once they have been fully balanced (usually around two years after publication of the initial estimate). In practice, ONS estimates remain subject to revision for several years after the initial release, and that is explicitly accounted for in the model used below.

(1) The Kalman filter is a tool for estimating the value of dynamic variables in light of a set of incomplete or noisy measurements. It has a wide range of applications across the physical and social sciences.

Example 1: real business investment

The recent profile of real business investment is considered as an example. As shown in **Chart 5**, the June 2007 National Accounts pointed to a sustained period of growth in real business investment throughout 2006, in contrast to the experience of the preceding five years. However, **Chart 5** also highlighted that early estimates of growth in business investment have been prone to significant revision — a point flagged in recent *Inflation Reports*. And while that noise has tended to decay with maturity, there has still been substantive uncertainty surrounding data a year after the initial release. So how well founded is the picture of recovery in business investment through 2006?

Casual inspection of the past profile of business investment suggests that the reported growth rates during 2006 were by no means unprecedented. And there have been two other episodes over the past fifteen years in which investment has grown for four or more consecutive quarters. But large swings from quarter to quarter have been more typical — in other words, the time-series properties of the data show little persistence in deviations of growth from its average. So, the sustained growth during 2006 that was reported in the June 2007 vintage of data appears unusual. In gauging how far to challenge this profile, the model appeals to the profile of alternative indicators and any patterns in past revisions.

As noted above, most of the alternative indicators would be consistent with some pickup in investment growth during 2006; but perhaps not to the full extent shown in the official data. However, neither the alternative indicators nor the early official estimates have correlated particularly strongly with mature estimates of business investment growth.

Based solely on this evidence, one might be cautious about taking the evidence from the early ONS estimates at face value, and draw only limited comfort from the recovery apparent in the alternative indicators. But simple inspection of correlations between early estimates, surveys and mature data misses an important feature of past revisions — that it has been rare for estimates of strong growth across successive quarters to be revised down.

Chart 9 shows a 'backcast' for real business investment that follows when all these factors are taken into account using the model summarised in the annex to this article.⁽¹⁾ At best, making use of this wide range of evidence can only reduce, not eliminate, any uncertainty. It therefore makes sense to view such backcasts in probabilistic terms, and a fan chart can be used to depict a distribution of possible values of the mature data. Such charts are constructed so that mature ONS estimates would be expected to lie within each pair of purple bands 10% of the time. Consequently, the mature data points are expected to lie somewhere within the entire fan chart 90% of the time.

Chart 9 'Backcast' for quarterly real business investment growth

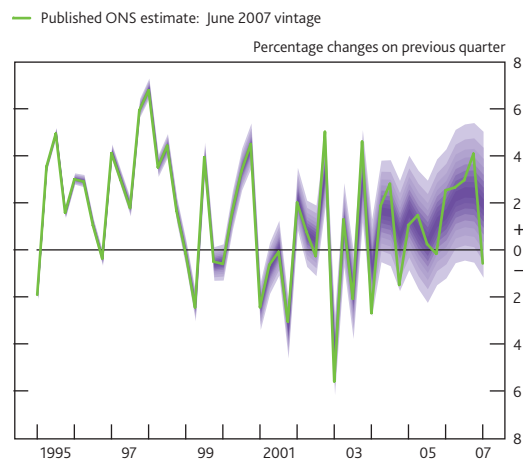
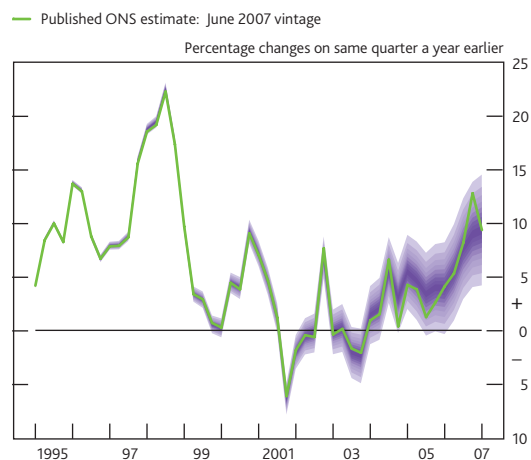


Chart 9 shows the estimated probability distribution for quarterly growth. The centre point of the fan chart is slightly below the published data through 2006, suggesting that downward revisions are more likely than upward revisions. The odds are not, however, extreme and the likelihood that data will be revised far enough to show a fall in investment during 2006 is low. Indeed, the chart also shows a reasonable probability that the profile will be revised to reveal even stronger growth during 2006.

The picture is clearer when the backcast is plotted for annual, as opposed to quarterly, growth rates (**Chart 10**). That chart makes it clear that the estimated recovery in business investment during 2006 is likely to be a robust feature of the data.

Chart 10 'Backcast' for annual real business investment growth



Looking at the experience before 2006, the charts suggest that uncertainty surrounding the backcast decays quite rapidly. This follows from the relatively short half-life of past revisions

(1) Full details are set out in Cunningham *et al* (2007 forthcoming).

to investment data — in common with the confidence interval estimated around the latest official estimates (**Chart 5**). The quarterly backcast fan chart (**Chart 9**) is narrower than that confidence interval, reflecting the in-sample gains from allowing for patterns in revisions, alternative indicators and past patterns in mature data. One important caveat in interpreting these results is, however, that the model behind the fan charts relies on past experience providing a good guide to the future. In practice, this may not always be the case.

Drawing on stories about other related variables

The model used above captures an array of patterns in revisions and dynamics in the uncertain data. But it retains one major simplifying assumption — namely that revisions to one variable are assumed to be independent of revisions to other variables within the National Accounts. However, while Bank staff may track separate indicators for a range of National Accounts components, those components are related by a lattice of accounting identities.

These accounting identities can be used to challenge whether stories about one variable are consistent with stories about other variables. For example, the output and expenditure sides of the National Accounts should balance. So if economists expect upward revisions to household consumption, they must also expect either upward revisions to output components or downward revisions to other expenditure components. Alternatively, any top-down assessment of the likely direction of revisions to a National Accounts aggregate (for example overall service sector output) can be cross-checked with evidence of likely revisions to its components (bottom-up).

It is quite likely that ‘top-down’ and ‘bottom-up’ estimates will give a slightly different impression of the profile of growth. The models may well draw on different business surveys. And, in small samples, the time-series properties of the data and patterns in past revisions may differ slightly. In other words, there is likely to be a ‘residual’ between the bottom-up and top-down estimates. Closer inspection of this accounting residual can help cross-check the top-down estimates. The issue is how far to adjust those top-down estimates in the light of the residual.

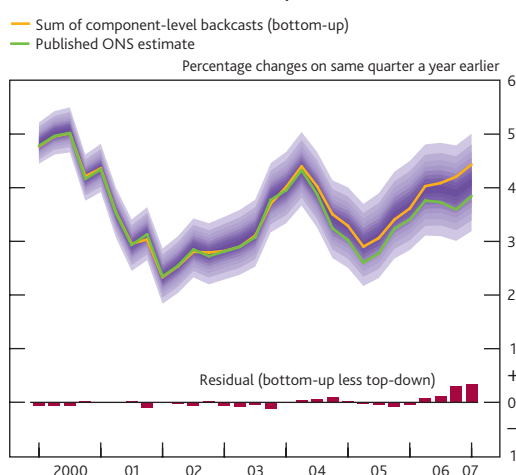
One approach to adjusting the top-down estimate in the light of evidence about prospective revisions to its components is to use a simple rule to allocate any ‘residual’ between backcasts on both sides of the identity. This follows a method first developed by Weale (1985) to produce reconciled National Accounts estimates. The rule used allocates any accounting ‘residual’ according to the degree of uncertainty surrounding the components — the larger the component and the more

uncertain the backcast for a variable, the greater the share of any residual attributed to it. So if the top-down estimates are much less uncertain than the bottom-up estimates then the cross-check will not add much value. But if both are equally uncertain, the bottom-up cross-check may help interpret the picture painted by the aggregate data.

Example 2: services output

As an example, **Chart 11** compares a backcast estimated for aggregate service sector output with the sum of backcasts for its constituent parts — in both cases using the new toolkit described above.⁽¹⁾ The green line shows the profile of the published data, the purple bands show the probability distribution derived from a top-down backcast, and the orange line shows the central (or point) estimate derived from the bottom-up sum of backcasts for the various components of service sector output.

Chart 11 Service sector output

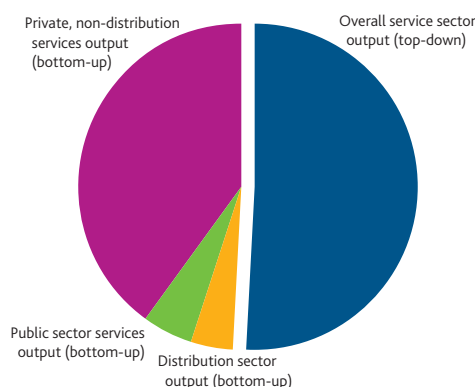


The orange (bottom-up) line is reasonably close to the centre of the (top-down) fan chart, suggesting that any differences between top-down and bottom-up estimates are small relative to the uncertainty surrounding those estimates. But there are periods of discrepancy — as shown by the red bars. For example, in late 2006/early 2007, the disaggregated picture is a little stronger than the top-down assessment — in part due to the strength of some surveys of non-distribution output. The bottom-up estimates suggest growth is increasing while the top-down estimates suggest more of a flattening off.

A consistent picture across aggregate service sector output and its components can only be derived by eradicating any residual. **Chart 12** shows the proportion of the residual that would be allocated to the backcasts of overall service sector output and its various components when their relative uncertainty is used to guide that process.

(1) The constituent parts used here are private non-distribution services output; distribution sector output; and public sector services output.

Chart 12 Allocation of accounting residual across 'top-down' and 'bottom-up' backcasts



If the top-down and bottom-up approaches generated equally uncertain estimates, any residual would be allocated 50–50. In practice, this appears to be the case. So the bottom-up view provides a cross-check on the top-down fan chart.

Conclusion

Bank staff have long recognised the potential for revisions to macroeconomic data and have undertaken a range of research into how best to deal with the ensuing data uncertainty. Early results of that research have been used for some time as part of the toolkit available to the staff when briefing the MPC on developments in output growth. This article describes some further developments in this research effort that were undertaken to refine the staff's toolkit. The aim of this exercise — and the earlier work — is to make the best use of publicly available evidence when interpreting the picture painted by the latest ONS estimates. The model described in this article uses the historical experience of revisions as a basis for estimating how confident one should be in early releases and predicting how far and in what direction those early releases might be revised.

Given the focus on uncertainty, the output of the model is a fan chart outlining the probability distribution across potential revisions. Such charts make clear that one should not place undue emphasis on small changes in growth rates shown in early estimates and that uncertainty may persist for some time.

The techniques described in this article add to the toolkit available to staff when briefing on data that are subject to revision. Bank staff can apply these modelling techniques

when briefing the MPC on recent developments. There is, however a substantial role for economic judgement in gauging how much weight to place on model results.

One natural caveat in interpreting model results is that the statistical methods rely on past revisions as a good indicator of current uncertainty. But this may not always be the case:

- Revisions may become less predictable in the future. In the past, some major changes to statistical practices appear to have led to changes in the patterns of revisions — for example, Garratt and Vahey (2006) found evidence of a structural break in revisions in the years following the *Pickford Report* (Pickford (1989)). Looking forward, successful delivery of the ONS's Statistical Modernisation Programme will enable more timely balancing of National Accounts data from differing sources and facilitate internal reviews of collation procedures.
- Significant methodological revisions in the past — such as the introduction of the ESA 95 accounting framework — may not be representative of current uncertainty. One important judgement in applying models of the type described in this article is, therefore, whether to exclude any past revisions from the analysis.

It is also quite possible that alternative indicators that provided a good mapping to mature ONS data in the past could offer a worse indication in the future — for example if the sample of respondents to a particular business survey becomes unrepresentative.

From all of this it should be clear why it is users of data (such as Bank staff) rather than data providers (such as the ONS) who set up this kind of signal extraction model. The degree to which past patterns in revisions are representative of current uncertainty is an economic judgement rather than a 'hard' statistical fact.

With each major methodological advance in published statistics, Bank staff will need to assess the extent to which past revisions provide a robust guide to ongoing data uncertainty. Close dialogue between users and providers of data is therefore vital to help ensure that use of statistical techniques to extract the signal from uncertain data is founded on a proper understanding of the way in which data are compiled.

Annex

Model of uncertain data

The model is set up to predict the cumulative impact of revisions to the profile shown in the latest National Accounts. It is founded on a representation of the patterns apparent in past revisions. This aspect of the model, termed a 'measurement' system, describes how the latest ONS estimate relates to the 'true' data — assumed here to be the profile that will be revealed once data are sufficiently mature that uncertainty has decayed completely.

This mapping draws on a number of features of the historical revisions experience. It treats the early estimates as equal to the truth plus a term describing the average revision and a measurement error.

$$y_t^{t+n} = y_t + c^n + v_t^{t+n} \quad (1)$$

where y denotes the 'true' data at time t

n describes the maturity of the data – the initial release having a maturity of 1

y_t^{t+n} is the ONS estimate of y at time t released at time $t+n$

c^n is the average revision at maturity n

v_t^{t+n} is the measurement error.

In order to capture the statistical properties of historical revisions, some structure is imposed on the measurement errors. First, serial correlation in revisions is accommodated by expressing errors in the measurement of growth in any period as a function of errors in measures of growth in the previous p quarters.

$$v_t^{t+n} = \sum_{i=1}^p b_i v_{t-i}^{t+n} + \varepsilon_t^{t+n} \quad (2)$$

The model allows for the tendency for measurement errors to tail off as data become more mature. The variance of measurement errors is assumed to decay as maturity increases — in line with the treatment used to estimate the confidence interval shown in **Chart 5**.

$$\sigma_{v_n}^2 = \sigma_{v_1}^2 (1 + \delta)^{n-1} \quad (3)$$

where the variance at maturity n (that is, $\sigma_{v_n}^2$) is a function of the variance at the initial release and δ , the rate of decay in the revisions variance [$-1 < \delta \leq 0$]. The average revision in equation (1) also decays with maturity in a similar way, so that the ONS estimates are assumed to converge on the 'true' data eventually.

A further measurement equation describes the relationship between any alternative indicators and the 'true' data. The measurement errors associated with alternative indicators are modelled far more crudely than the uncertainty surrounding the official estimates — assuming a constant mapping between the indicators and the mature data.

$$y_t^s = c^s + Z^s y_t + v_t^s \quad (4)$$

where y_t^s is the alternative indicator

c^s and Z^s describe the relationship between the rescaled indicator and the true data

v_t^s is the measurement error.

Under this representation, there is assumed to be no improvement in measurement as indicators become more mature — after all, surveys are not typically subject to revision. And, for simplicity, the model does not allow for any serial correlation in measurement errors for survey indicators. This simplifying assumption may not always be warranted, motivating careful thought about the relationship between indicators and mature data when interpreting model results.

The final leg of the model is a description of the time-series properties of the 'true' data — termed a 'transition equation'. The transition equation helps establish the degree to which early estimates are 'surprising' in light of past experience — for example, whether large swings in the data have been common in the past. A simple autoregressive model is used to describe the properties of the 'true' data:

$$y_t = \mu + \sum_{i=1}^q A_i y_{t-i} + e_t \quad (5)$$

The model is estimated in two steps:

- The first step is to estimate parameters driving the revisions process, using real-time data.
- The second step is to estimate the remaining parameters using the latest available vintage of ONS data and any alternative indicators. In doing so, the model allows for any past correlation between measurement errors and the growth rates revealed by the mature National Accounts data.

The model's output is a profile of the 'true' data — the backcast — that is consistent with these parameters and the latest profiles shown by the official estimates and survey indicators. Full details are set out in Cunningham *et al* (2007 forthcoming).

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Interpreting movements in broad money

By Stuart Berry, Richard Harrison, Ryland Thomas and Iain de Weymarn of the Bank's Monetary Analysis Division.

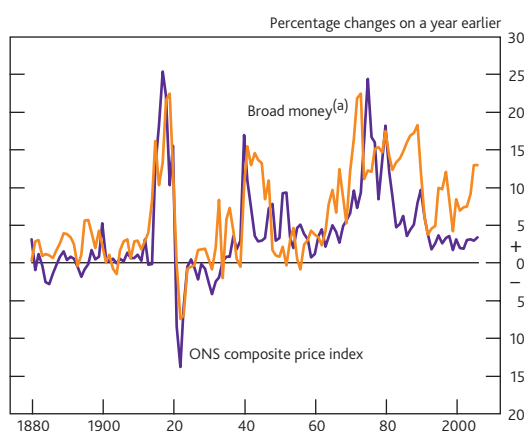
Understanding the role of money in the economy has always been an important issue for policymakers. And the pickup in broad money growth and decline in credit spreads over the past three years together with more recent financial market turbulence has made it a particularly pertinent issue. Monetary data can potentially provide important corroborative or incremental information about the outlook for inflation. But understanding the possible implications of money for the economic outlook requires a detailed assessment of the causes of money growth. Such an assessment must recognise the interactions between money and credit creation and the information contained in both price and quantity data. This article provides an overview of the potential channels through which money growth may affect inflation and the Bank's current empirical approach to analysing developments in monetary aggregates.

Introduction

Money plays an important role in the economy. And as Friedman (1963) famously said: 'inflation is always and everywhere a monetary phenomenon'. The behaviour of money holdings by households and companies, therefore, should be of interest for monetary policy. This article builds on a long stream of work at the Bank on the role of money. Following on from papers such as Goodhart and Crockett (1970), Thomas (1996), King (2002) and Hauser and Brigden (2002), it provides an overview of the Bank's current framework for thinking about money, and highlights where innovative analysis is most needed. As such, the article represents a starting point for a larger programme of work on the causes of money and credit growth and their implications for the inflation outlook.

There is a well-established long-run empirical relationship between broad money growth and inflation across a variety of countries and monetary regimes (see for example Benati (2005) and King (2002)). In the short run, however, growth in the stock of broad money held by households and companies is affected by a number of factors, including financial innovation and portfolio shifts, that tend to make the relationship with inflation more variable (**Chart 1**). This makes interpreting movements in money growth more difficult over the horizons that are most relevant for monetary policy. Understanding why money growth has evolved as it has is key to assessing the implications for inflation.

Chart 1 Broad money growth and inflation



Sources: Bank of England, Capie and Webber (1995) and ONS.

(a) Based on M3 until 1963 and then M4.

In the second half of 2006, broad money growth rose to its highest level since 1990 and has remained high. Over the same period, interest rate spreads on household and corporate credit declined to unusually low levels. In recent months there has been considerable turbulence in financial markets — a process that is still under way. A key question is what developments in money and credit growth imply for the inflation outlook. The first section of this article looks at what money is and how it is created. The theoretical underpinnings of the relationship between money and inflation are discussed next, before considering an empirical approach to assessing the implications of monetary developments for inflation. The

final section concludes and sets out potential avenues for further investigation.

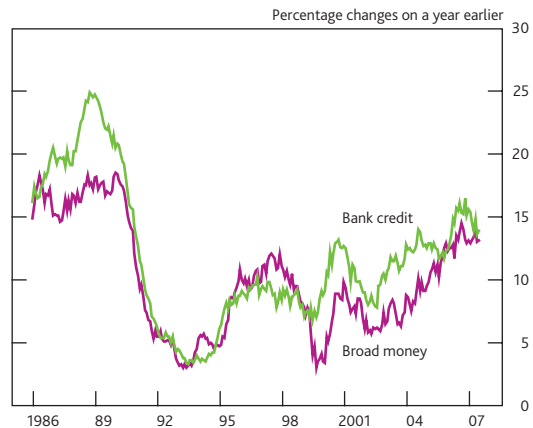
What is money and how is it created?

At the outset, 'money' needs to be defined, and this is traditionally done through its principal function — a medium of exchange or means of payment. Money exists because of frictions and trading costs associated with conducting sequences of transactions at different times across a range of different markets. In particular, money eliminates the need to find individuals who wish to trade one particular good for another — known as the double coincidence of wants. Money also facilitates timely settlement of transactions, avoiding the need to extend credit to those about whom the seller may know very little.⁽¹⁾ The ultimate means of settling transactions is 'central bank money', either in the form of notes and coin or the balances held by banks at the central bank (reserves). That is generally referred to as narrow money. However, households and companies settle many transactions using their deposits with banks and building societies. These deposits are typically included in a wider definition known as broad money. The standard measure of broad money in the United Kingdom is M4. At the end of 2007 Q2, the stock of M4 was around £1.6 trillion, around 1.2 times annual nominal GDP. Notes and coin make up only around 3% of total M4.

The appropriate definition of broad money is by no means universal or constant. Differences across countries and over time largely reflect the structure of the financial system. For example, alternative assets may increasingly become 'money-like' as they are used for settling transactions, or some financial institutions outside the banking sector may begin to behave more like banks. Burgess and Janssen (2007), also in this *Quarterly Bulletin*, describe some recent difficulties in defining the appropriate boundaries for money in the United Kingdom.

Money is a key part of the transmission mechanism from monetary policy to economic activity and inflation. Monetary policy is typically implemented by setting the short-term interest rate, with the central bank allowing the supply of narrow money to expand or contract as required to meet the needs of households and companies at that rate.⁽²⁾ But by far the largest role in creating broad money is played by the banking sector. Banks intermediate funds by taking deposits and lending part of that money to others. When banks make loans they create additional deposits for those that have borrowed the money. There is, therefore, a strong link between the growth of money and credit (**Chart 2**).⁽³⁾ And the supply of broad money will depend on the behaviour of the banking system, as well as on official interest rates.

Chart 2 Broad money and bank credit^(a)



(a) Monthly data. Broad money is defined as M4, while bank credit is defined as M4 lending (excluding the effects of securitisations and loan transfers).

Money and economic theory

The traditional view of money and inflation

The cornerstone of the traditional theoretical relationship between money and inflation is the Quantity Theory of money. This is based on an identity known as the equation of exchange, which relates money to the transactions it is used to settle:

$$M \times V \equiv P \times T$$

where M denotes the money stock, V is the number of times the money stock circulates through the economy during a given period of time (the velocity of circulation), P is the price level and T is the number of transactions undertaken during that period.

In the long run it seems plausible that the number of transactions, T , in the economy will be determined by non-monetary factors (such as the quantity of labour and capital available for production and the structure of markets). Similarly, the rate at which money circulates through the economy, V , is likely to be determined by factors such as the efficiency and degree of development of the financial system. Under the assumption that these factors remain fixed, an increase in the money stock, M , would be expected to be associated with a proportionate increase in the price level, P , in the long run.

The difficulty with relying on this relationship in the short run, as highlighted in the 1980s, is that velocity is often volatile

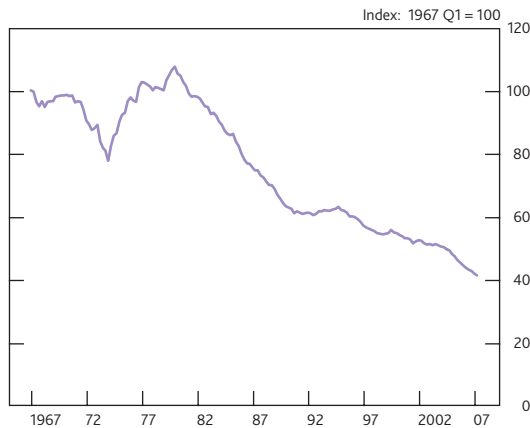
(1) See Kocherlakota (1998) for a formal treatment.

(2) An alternative way of implementing monetary policy is to control some definition of the supply of money such that the market-determined interest rate is in line with the desired monetary policy stance.

(3) The two are not identical because the banking sector also conducts transactions with institutions not covered by the money and credit data. For example, banks can fund their UK lending by borrowing overseas. And deposits held by the public sector are not included in the standard measures of money and credit so payments to and from that sector will affect the gap between M4 and M4 lending.

(Chart 3). Although velocity has generally declined over time, the speed of that decline has varied considerably. As a result, the empirical link between money growth and inflation has been less predictable over the past 30 years.

Chart 3 Velocity of circulation^(a)



(a) Nominal GDP divided by the outstanding money stock (M4).

Money demand and money supply

The equation of exchange says little about what determines the stock of money or indeed velocity. It only describes the relationship between those variables and a measure of the value of transactions in the economy such as nominal spending. But understanding the drivers of changes in the stock — or 'supply' — of money and changes in velocity — a proxy for factors affecting the 'demand' for money — is important. That is because the way in which different factors affect the interaction between the demand for money and its supply will determine the implications for nominal spending and, ultimately, inflation.

Monetary policy is a key driver of changes in the supply of money. When official interest rates fall, borrowing becomes more attractive, tending to induce higher bank lending and greater money creation. But that is not the only factor affecting the stock of money in the economy. In practice, the borrowing decisions of households and companies depend on the retail interest rates they face, rather than the policy rate. And there is a wide range of different products with interest rates set at various spreads to the policy rate. The quantity of bank lending, and hence broad money creation, will also depend on banks' lending criteria covering factors such as the creditworthiness of borrowers and loan to value ratios for secured borrowing. Changes in either spreads or lending criteria could therefore lead to changes in money growth without any change in the official interest rate.

Much of the demand for money stems from the need to fund transactions, as embodied in the equation of exchange. But money is also held as part of a portfolio of assets. So changes

in overall wealth can affect the demand for money if individuals wish to maintain the share of their assets held as money. In addition, changes in the relative attractiveness of money compared with other assets could alter the share of individuals' portfolios that they wish to hold as money. Changes in official interest rates can therefore affect the demand for money as well as money supply. Technological innovations that make it easier to use higher-yielding deposits in transactions, could also make holding those types of money more attractive.

According to standard economic theory, households and companies are likely to have a target level of money balances that they wish to hold — their demand for money. But they will often accept holding more or less than that amount in the short term as a (possibly very temporary) means of bridging the gap between payments and receipts. Over time they will attempt to return to their target level following a change in their money holdings. This is known generally as the buffer-stock theory of money demand.⁽¹⁾ Theory implies that the target level of money demand should be defined in terms of the real value of money balances, as that represents the purchasing power of money holdings. Given individuals' expectations about the current and future price level this then implies a target for the future path of nominal balances.

As noted earlier, changes in the money stock primarily reflect developments in bank lending as new deposits are created. Often, those who borrow will not want to keep the new deposits, but will instead use them to purchase goods and services or other assets. So the money passes to other individuals as the transactions are completed. These other individuals will also not want to hold the extra money balances for long unless their demand for money has changed. So over time they will spend the extra money, moving it on once again to a different set of individuals who face the same issue. To the extent that money balances are not used to repay loans, they cannot be eliminated, only moved around the economy. So an increase in money supply, other things being equal, leads to households and companies having temporary 'excess' money balances that they are prepared to hold in the short term as a buffer, but do not want to hold in the medium term. That leads to higher demand for goods and services or other assets that will eventually push up their prices.⁽²⁾ As prices rise, the real value of money balances falls back, restoring the balance between money demand and money supply.

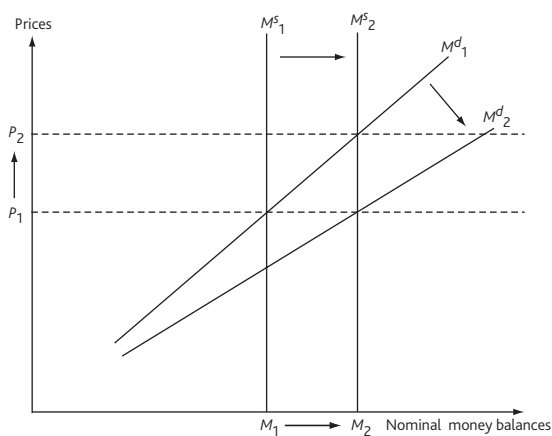
Figure 1 illustrates this process graphically. Initially, the money supply is assumed to be fixed at M^s_1 , and M^d_1 shows the demand for nominal money balances for a given level of real money balances. The demand curve slopes upwards

(1) See Laidler (1984) and Milbourne (1988) for a discussion of buffer-stock models.

(2) See Congdon (2007) for a discussion of this mechanism.

because a higher price level, P , requires a proportionate increase in the holdings of nominal money balances, M to achieve a given level of real money holdings. The slope of the money demand curve depends on the velocity of circulation as shown by the equation of exchange discussed earlier. Money demand and money supply are equal at the price level P_1 . If the supply of money then increases to M^s_2 , and money demand remains unchanged at M^d_1 , the higher short-run level of real money balances will push up spending until prices are bid up to P_2 , where money supply is again in line with money demand and real money balances are unchanged.

Figure 1 Changes in money demand and money supply



By contrast, if the increase in the money stock is accompanied at the same time by an increase in money demand, individuals will want to hold some or all of the extra money balances rather than spend them. As a result, the rise in money supply will have less effect on the demand for goods and services or other assets and hence inflation. A shift in money supply to M^s_2 met entirely by a shift in money demand to M^d_2 , leaves prices unchanged at P_1 .

So monetary policy clearly plays an important role in movements in money supply and money demand. And in many ways the transmission mechanism through to activity and inflation suggested above, can be described in an equivalent way using changes in official interest rates. But, importantly, the drivers of money supply and demand are not confined to the effects of changes in official interest rates. Developments in the banking sector and the financial sector more broadly also play a key role. So to the extent that these other monetary factors are likely to affect inflation, there could be incremental information in money growth over and above that contained in official interest rates.

It is also possible that there are other channels through which money specifically, rather than interest rates, can influence inflation. For example, some economists argue that temporary excess money balances can lead to additional changes in asset prices, which will affect nominal spending and

inflation through their impact on wealth. If assets are imperfect substitutes, individuals care about the composition of assets within their portfolio. As Tobin (1969) highlights, changes in money holdings would require the prices, and therefore returns, on other assets to adjust to induce them to want to hold that new level of money balances. That could be because the marginal value of additional money held for prudential reasons falls as more money is held (such that the risk of needing such large sums diminishes). The potentially imperfect substitutability of some types of asset is also a key part of the traditional monetarist view as set out, for example, in Meltzer (1995).

The influence of the banking sector on money and the imperfect substitutability of assets do not necessarily mean that policymakers need to focus on money growth. Looking at the full range of yields on other assets and banks' lending and deposit criteria could provide similar information. But money may be a useful summary statistic for this diverse set of data. And some yields, such as the liquidity benefits from holding certain assets, may be unobservable. Indeed, Friedman (1956) suggested that human wealth — the expected value of future earnings — might also influence the demand for money. Overall, this section has highlighted a number of ways in which monetary developments can go beyond the impact of changes in official interest rates. And that is particularly relevant in the context of modern macroeconomic models, which are discussed in the next section.

The role of money in modern macroeconomic models

The current practice of central banks to implement monetary policy through changes in interest rates rather than changes in money supply has been reflected in modern macroeconomic models. In standard New Keynesian models, for example, aggregate demand is determined by expected real interest rates, with monetary policy characterised by an interest rate rule. There is no explicit role for money at all in such models.⁽¹⁾ This is also true for many of the larger models of this type used by central banks and others for forecasting purposes, including the Bank's quarterly model BEQM (see Harrison *et al* (2005)). Indeed, Woodford (2003) highlights that the relationships in New Keynesian models would hold even if the quantity of money in circulation became vanishingly small.⁽²⁾

Implicitly, these standard models assume that movements in interest rates adequately capture changes in other asset prices as well. That is the case if there are complete and flexible asset markets, such that the risk-adjusted returns on all assets are equalised. But the monetarist view suggests that this might not be the case, and so excluding money could be important

(1) See for example Clarida, Gali and Gertler (1999) and Rotemberg and Woodford (1997).

(2) However, the current framework for the implementation of monetary policy depends crucially on the banking system's demand for central bank money. See for example Clews (2005).

unless all yields are included in the model. By necessity, economic models are simplifications of the real world. And these additional monetary channels can sometimes be difficult to capture. So it could also be that standard models ignore these particular channels because their effects are small and do not significantly affect the model's performance.

Money can be added to standard models. But this is typically done in a way that makes it an additional output of the model rather than part of the transmission mechanism, for example through a 'cash in advance' constraint that forces money to be held to conduct transactions. Woodford (2007) shows that adding a money demand equation to a standard New Keynesian model in this way does not alter the paths of inflation, output and interest rates; it only provides extra detail about the outcome. So an active role for money is still missing. In addition, the standard macroeconomic models do not usually include a banking sector, a key part of the broad money creation process.

The exclusion of money from standard macroeconomic models raises two possibilities. It could be that money is indeed not needed or at least plays only a very small incremental role. It may contain only the same information about future inflation as other variables in the model, such as interest rates and output, and so have no incremental value. There is some empirical support for this. Studies such as McCallum (2001) and Ireland (2004) find only small effects from including money.

But it is also possible that the simplifications made by the standard models exclude important channels of the monetary transmission mechanism. Alternative models that attempt to capture some of the key features of money more explicitly generally fall into two groups: those that focus on the frictions and transaction costs that can influence the demand for money; and those that incorporate elements of the banking sector which can affect money supply. As noted above, two key frictions that generate a demand for money as a medium of exchange are the need to find buyers and sellers willing to trade (the double coincidence of wants), and the desire to avoid extending credit when little is known about other traders. These frictions are modelled, albeit in a stylised way, by Kiyotaki and Moore (2002) and Kiyotaki and Wright (1989). More recently, work has focused on integrating these features into broader macroeconomic models (see for example Aruoba and Chugh (2006)).

Frictions also affect the demand for money as a store of value. A key strand of this literature has looked at the extent to which transactions costs prevent some people from switching money into higher-yielding, but less liquid, assets such as bonds or equities. In these 'limited participation models', changes in technology that reduce transaction costs can affect money demand and therefore the prices of other assets.

Reynard (2004) finds that rising wealth in the United States has played a significant role in increasing participation in asset markets, and may help to explain changes in money demand.

Transaction costs in asset markets can also lead to different types of assets being imperfect substitutes. That would add to the value placed on liquid assets such as money. And as monetarist theories highlight, this can lead to changes in the quantity of money holdings affecting asset prices. Andres, Lopez-Salido and Nelson (2004) incorporate these features into an empirical model, and find that changes in money balances can have significant effects on asset prices.

A large part of the literature looking at how the banking sector may influence the supply of money is focused on the transmission of changes in monetary policy. For example, Bernanke, Gertler and Gilchrist (1999) develop a 'financial accelerator' model, where changes in interest rates can also affect the creditworthiness of potential borrowers, exacerbating the impact on bank lending and therefore the generation of deposits. Other papers, such as Markovic (2006), have looked at how the cyclical influence of monetary policy might also affect banks' own capital and hence their willingness to lend. But a second strand of the literature considers whether changes emanating from the banking sector itself may affect the supply of money. Gaspar and Kashyap (2006) introduce a spread between the policy rate and banks' lending rate into a standard New Keynesian model, with the implication that changes in the spread can affect spending and inflation. Goodfriend and McCallum (2007) model the banking sector more explicitly and find that changes in banking sector productivity can have substantial effects on spreads and therefore borrowing and spending decisions. Such models may prove to be useful tools for analysing the possible effects of recent financial market turbulence. Despite such advances, it is not straightforward to apply these findings in a policymaking context. In particular, most studies have focused on specific channels, and do not bring together money demand and money supply in a coherent way that can be incorporated in wider macroeconomic models.

Money as an indicator

Even if money plays no incremental role in the transmission mechanism, it may still be a useful additional indicator. As noted earlier, it can be a useful summary statistic for the wide range of yields that must be taken into account in a world with imperfect asset markets, or the range of lending and deposit criteria that affect the role of the banking sector in the economy. Nelson (2003), for example, suggests that developments in monetary aggregates can be informative for this reason. Money can also provide an important cross-check for other indicators of inflationary pressures within the economy. For example, a key variable for judging medium-term inflationary pressure within the standard New

Keynesian model is the output gap — actual output relative to its sustainable level. But this gap can only be measured imperfectly. The sustainable level of output is not directly observable, and early estimates of actual output are subject to considerable uncertainty. So money growth may provide corroborative evidence to the extent its role as a medium of exchange means it is correlated with movements in activity.

Monetary data can be used, therefore, to complement the analysis of other economic data. They also have the advantage that they are typically published in a more timely manner. And estimates are not subject to sampling error as they are based on data from the entire population of banks. However, identifying the correct definition of the money stock can be difficult (see Burgess and Janssen (2007)). And as noted above, it is hard to judge the level of money growth that would be consistent with a given level of inflation, due to changes in money demand. For example, Coenen, Levin and Wieland (2005) find that, in recent years, the extent of changes in money demand in the euro area have meant that money has fairly limited information content as an indicator. And Dotsey and Hornstein (2003) find similar results for the United States. But this could simply highlight the need to understand better the drivers of money demand. Choi and Oh (2003) find that taking into account uncertainty over output and inflation can improve estimates of money demand in the United States. And that could make money more useful as an indicator.

Money demand and money supply in practice

Whether money is useful purely as an additional corroborative indicator or as an incremental source of information, the key to the practical task of assessing the implications of developments in monetary aggregates for inflation is understanding why money growth has evolved as it has. Unanticipated events — ‘shocks’ — can occur for many different reasons. But ultimately the aim is to identify the extent to which different shocks have affected money demand and money supply. Changes in money growth must reflect changes in supply, but the key question, as illustrated in **Figure 1**, is whether that change to supply occurred in isolation, or whether it was accompanied by a change in the demand for money.

In practice, assessing how shocks affect money demand and money supply is difficult. And that has led to problems in the past in judging the appropriate policy response to monetary developments. The box in this article on page 382 highlights examples of substantial changes in both money demand and money supply in the 1980s. But difficulties in understanding the underlying drivers of the data are not unique to monetary aggregates. And they do not mean that money should simply be ignored. As King (2007) notes, the same issues arise when assessing developments in other economic variables, such as

output. Economists routinely try to assess whether movements in output reflect demand pressures or changes in the underlying capacity of the economy. In the same way, careful analysis is required of the likely causes of changes in money growth, in order to assess the potential risk posed to inflation by monetary developments. This point was also emphasised recently by Goodhart (2007). The next section sets out an initial step towards an analytical approach that can be employed to help form that judgement.

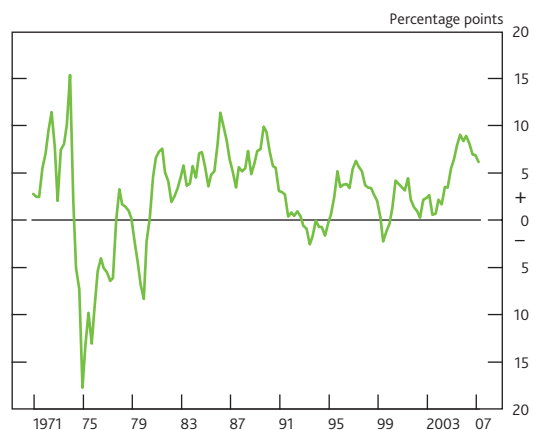
Identifying the causes of money growth

When analysing monetary aggregates, the aim is to be able to build up a detailed picture of the likely impact of each potential factor affecting the growth in money. Overall growth can then be assessed to consider the extent to which changes in money supply have been accompanied by changes in money demand. In practice, estimates of the impact of different factors on money supply and demand are likely to be highly uncertain. And it is unlikely that money growth will be entirely ‘explained’ by the factors identified. But this process should at least provide a guide to the balance of risks. A range of information that can be used to identify potential factors affecting money growth is set out below.

The standard determinants of money demand

As noted earlier, part of the growth in money is associated with rising demand for transactions balances as nominal spending increases over time. So one simple indicator of temporary ‘excess’ money balances is the extent to which money growth exceeds nominal spending (**Chart 4**).⁽¹⁾ However, as there are many other reasons why the demand for money may have changed, this indicator only really signals that further investigation is required.

Chart 4 Annual money growth less nominal spending growth^(a)



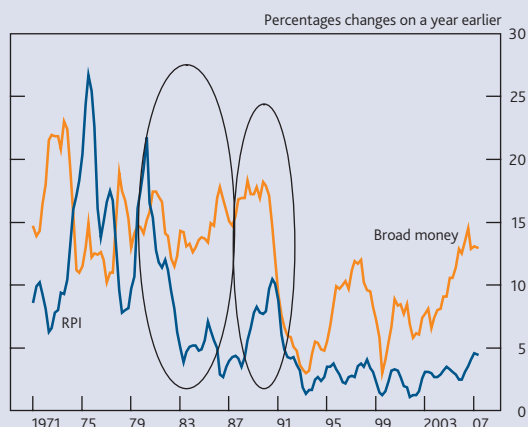
(a) Growth in M4 less growth in nominal GDP.

(1) Using the equation of exchange terminology, money growth in excess of nominal demand growth is equivalent to a falling velocity of circulation.

Examples of money demand and money supply shocks in the 1980s

The 1980s provide a useful example of the difficulties of assessing the implications of strong money growth from the headline data alone. Annual growth in broad money remained high throughout the 1980s, averaging around 15%. But inflation followed a quite different path. It fell back rapidly in the early part of the decade before picking up sharply towards the end (**Chart A**). During that decade, there were substantial changes to both money supply and money demand. And as the balance between the different factors driving these changes evolved, the implications for inflation also changed.

Chart A Broad money growth and inflation



The impact on money demand of changes in spending, and other key determinants such as relative returns and wealth, can be estimated more formally through econometric equations. Such equations have often proved to be unstable in the past, reflecting the fact that they omit other influences on money demand.⁽¹⁾ These other factors are often difficult to capture in a single equation, either because they are a series of one-off events or are difficult to quantify. In spite of these difficulties, a simple mechanical approach, using standard determinants, can provide a useful starting point for estimating a measure of 'excess' money supply that might feed through to inflation. When estimated gaps arise, as they have in recent years, the key task is then to build up a more informative picture of other factors that may have influenced money demand or money supply through more detailed analysis.

Information from the sectoral breakdown of money growth

The UK M4 data provide a breakdown of who holds deposits: households, private non-financial companies or non-bank (and

The 1980s were a period of substantial financial liberalisation and innovation. That boosted money growth through deregulation of the financial sector. Bank credit became easier to obtain, leading to more rapid creation of deposits. This was accompanied by innovations that made holding money balances more desirable. For example, current accounts began to pay interest and credit and debit cards made the use of interest-bearing deposits for settling transactions much easier. The move away from the very high and volatile inflation in the 1970s is also likely to have made holding money balances more attractive. In the early 1980s, money growth was high, but it did not feed through to nominal spending, and hence higher inflation, because households and companies wanted to hold more money balances.

In the mid-to-late 1980s, money growth was further boosted by monetary policy easing. This led to households and companies temporarily holding 'excess' money balances. In turn, that put upward pressure on the demand for goods and services and other assets which ultimately lead to higher inflation. But because rapid changes in money demand were still taking place, it was less clear at the time that strong money growth was signalling rising inflationary pressures.

A detailed analysis of the likely impact of financial market developments on money demand as well as money supply may have given a clearer picture of the risks to inflation. But the 1980s episode also highlights the importance of looking at other indicators in conjunction with money growth to assess inflationary pressures. For example, credit growth was even stronger than money growth in the late 1980s, with the annual rate peaking at almost 25% in 1988.

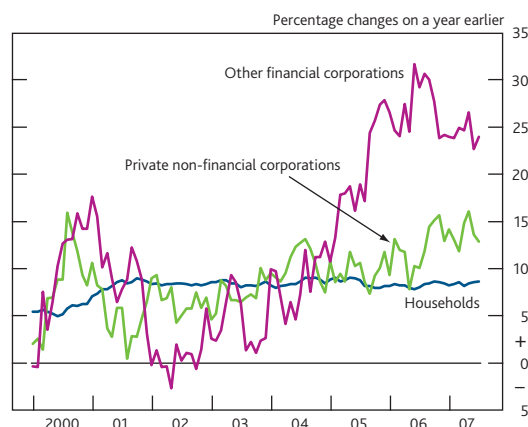
non-building society) financial companies (known as OFCs — other financial corporations). A similar breakdown is provided for bank lending. That can help to identify the potential causes of changes in money demand and supply by narrowing the focus onto a particular sector. But care is needed when using a sectoral approach. Changes in money supply may be generated by lending in one sector, but lead to temporary 'excess' money holdings in a different sector, as the additional money balances circulate around the economy.

In recent years, for example, much of the pickup in overall M4 growth has been driven by OFCs (**Chart 5**). OFCs' money growth tends to be much more volatile than other sectors, but the latest pickup has been sustained: deposits have risen by more than 85% over the past three years. This sector has become increasingly important over the past 25 years, with its share of overall deposits rising to around a quarter. In part, that reflects a growing share of households' assets being held

(1) For a discussion of the instability of estimated money demand equations and potential explanatory factors, see Ireland (1995).

indirectly through financial intermediaries such as pension funds. But the OFCs sector comprises a diverse range of businesses. And for some of the other companies within the sector, less is known about their motives for holding money. Improving the understanding of money growth in the OFCs sector is a key challenge for the Bank's current work on monetary analysis (see Burgess and Janssen (2007) for a discussion of some key issues relating to OFCs' deposits).

Chart 5 Broad money holdings by sector



Temporary holdings of excess money balances in different sectors are likely to have different implications for activity and inflation. An overhang of money in the household sector might lead to higher consumption, while an overhang in non-financial companies might lead to increased investment spending. Excess money holdings by OFCs are perhaps more likely to feed through to asset prices, as those companies attempt to rebalance their asset portfolios. Disaggregated money data can be useful, therefore, as an indicator of specific components of spending (see Hauser and Brigden (2002) and Thomas (1997a, b) for more detail), as well as highlighting where corroborative evidence of a money overhang might arise.

Understanding developments in the banking sector and financial markets

Innovations in the financial sector are another key source of changes in money growth. For example, the box in this article on page 382 highlights the impact of financial liberalisation in the early 1980s on both money supply and money demand. That reflects the fact that the banking sector plays such an important role in the creation of money. Changes in the terms for deposits will affect the demand for money, while changes in the terms for loans will affect the amount of bank lending and hence money supply.

There are a number of different sources of information that can be used to identify and evaluate changes in banking sector behaviour that may have affected money growth. For example, data are collected on the retail interest rates faced by

households and companies. And time-series data are available on some bank lending criteria, such as loan to value and loan to income ratios. Changes in lending terms and conditions can also reflect innovations in the structure of banks' balance sheets which can be monitored. Indeed, in some circumstances credit rationing may occur, in which case data on the size and composition of banks' balance sheets may contain more information than quoted interest rates.

But other changes may be less apparent in standard statistical series. In such cases, market intelligence can often provide an important additional source of information. The Bank maintains a dialogue with participants in the banking sector and the financial markets more generally through a variety of channels. These range from the new Credit Conditions Survey (see the article by Driver (2007) in this edition of the *Quarterly Bulletin* for more details) to reports from the financial market contacts of the Bank's regional Agents and other, less formal, regular working level discussions. The importance of developments in the banking sector and financial markets for interpreting movements in money growth is highlighted in the discussion below of recent trends in money growth.

Judging the implications of money shocks

Once the candidate drivers of money demand and money supply have been identified, the next step is to understand how they might, on balance, feed through to inflation. That can be difficult because the impact on the transmission mechanism of the interaction between such a potentially wide range of factors is not well specified in the theoretical literature. This is an area where further research may prove useful. But the lack of good models should not lead policymakers to ignore the shocks. Instead, as is often the case with other economic developments, judgement must be exercised. That will involve generating a pragmatic assessment of the risks posed by the various monetary shocks. In that way, policymakers can then decide on the appropriate policy response. As part of that process, it is also important that the potential implications of developments in money for other variables, such as asset prices, are taken into account, to avoid double counting the news contained in those indicators.

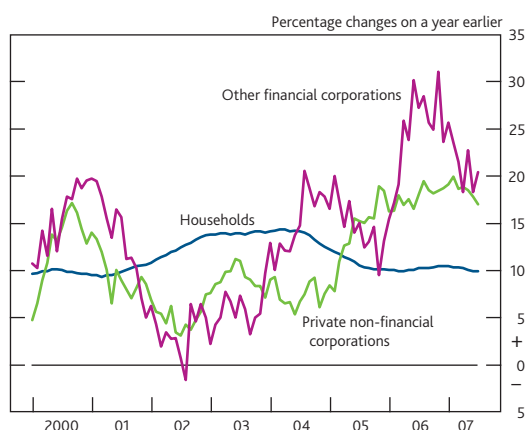
Interpreting recent movements in broad money

In practice, policymakers consider a range of evidence on the potential drivers of monetary data. The pickup in money growth, declining credit spreads over recent years and the incipient tightening of credit conditions associated with the financial market turbulence over recent months, provide useful examples. The rapid money growth and declining credit spreads over the past few years are discussed first before

turning to the developments associated with the more recent financial market turbulence.

As noted earlier, much of the pickup in broad money growth over the past three years can be accounted for by OFCs. In large part that has been generated by increases in the growth of bank lending to that sector. But there has also been a pickup in the growth of lending to private non-financial corporations (PNFCs) (Chart 6).

Chart 6 M4 lending by sector^(a)

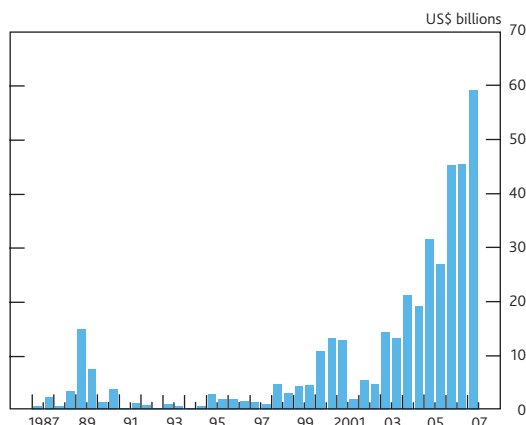


(a) Excludes the effects of securitisations and loan transfers.

In part, these movements are likely to reflect changes in the structure of financial markets. Burgess and Janssen (2007) highlight two substantial changes. First, the expansion of OFCs intermediating between banks is likely to have boosted both money and credit growth in that sector. And second, the rapid growth in securitisations of loans could have led to increases in both aggregate money and credit (though this depends on how the deals were structured and on the behaviour of the aggregate banking system in response). Tucker (2007) notes that securities dealers may also have expanded their borrowing and deposits through greater repo activity with banks. Much of this may net out for the dealer concerned, but will still appear on both sides of banks' balance sheets, boosting money and credit growth. Such transactions between the bank and OFCs sectors are unlikely to have any direct implications for inflation — additional deposits are willingly held so the increase in money supply has been associated with an equivalent increase in money demand.

Other changes could affect asset prices. For example, the rapid growth in debt-financed merger and acquisition activity led to sharp increases in lending to companies (Chart 7). The deposits generated by such lending may be held by the acquiring companies temporarily, but will ultimately be used to buy other assets which may be associated with higher asset prices. The extent to which asset prices have already adjusted in anticipation of such activity is unclear.

Chart 7 LBO loan issuance^(a)

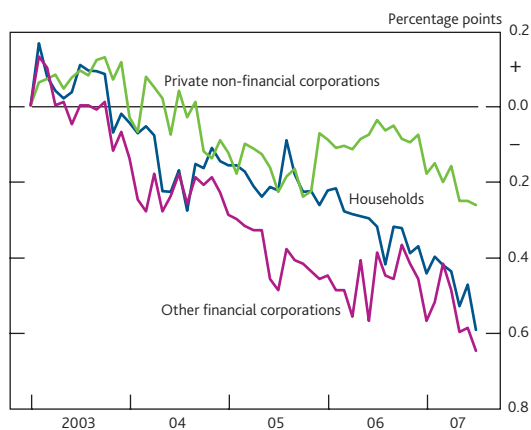


Source: Dealogic.

(a) Leveraged buyout loans taken out by UK companies. Half-yearly data as at 6 September.

These changes are unlikely to explain all of the pickup in money growth over the past three years. Another contributory factor could have been a loosening of credit conditions by the banking sector over the same period. Spreads on bank lending to both households and companies narrowed between 2004 and mid-2007 (Chart 8). To the extent that this was not offset by increases in other price components of lending, such as fees, it is likely to have increased bank lending, generating stronger money growth. Further, the proportion of new mortgages taken out at higher loan to value and loan to income ratios increased during that period (Chart 9), suggesting that banks may have loosened their non-price criteria for household secured lending. That is consistent with evidence from banks, which also indicated an easing of non-price terms on corporate borrowing in recent years. These developments are likely to have boosted the supply of money.

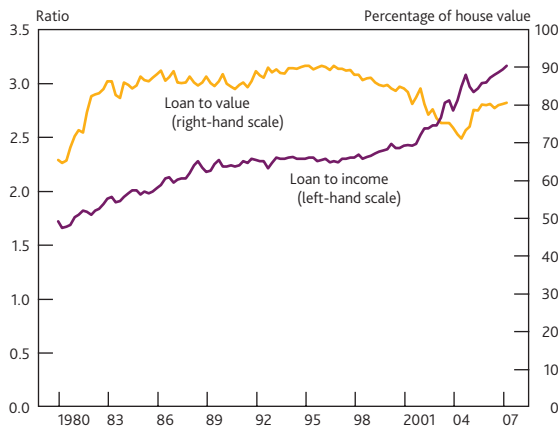
Chart 8 Changes in bank lending spreads between January 2003 and July 2007^(a)



Sources: Bank of England and Bloomberg.

(a) Effective retail interest rates on the stock of outstanding loans relative to an appropriate funding rate. For floating-rate products, that is assumed to be Bank Rate. For fixed-rate products, Libor and swap rates of similar maturities are used (averaged over the relevant horizon and lagged one month). Prior to 2004, the shares of each product within the total borrowing for each sector are held constant due to lack of data.

Chart 9 Median loan to value and loan to income ratios on new mortgages^(a)



Source: CML/BankSearch Regulated Mortgage Survey.

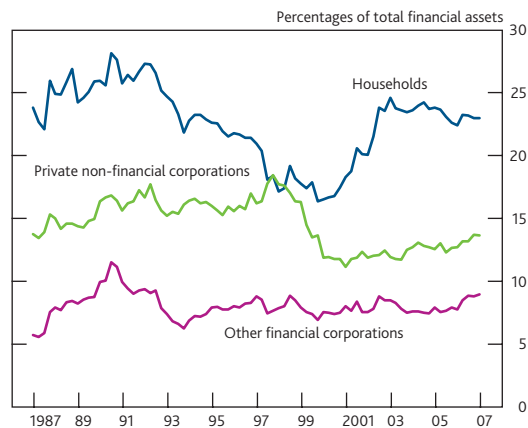
(a) New loans for house purchases by both first-time buyers and home movers. Changes to the methodology and sample of the survey in 1992 Q2 and April 2005 mean that the figures before and after those dates are not strictly comparable.

The loosening in credit conditions between 2004 and mid-2007 could have partly reflected an increase in banks' ability to intermediate funds. For example, the expansion of the securitisation market allowed banks to obtain funding for their lending at lower interest rate spreads relative to the policy rate. And to the extent that banks used securitisations to shift credit risk off their balance sheets, they may have been able to expand their lending more rapidly for a given capital base. Gieve (2007) also highlights the potential role of developments in information technology and derivatives markets that may have allowed banks to manage their risk exposures more effectively. Another possible explanation for the loosening in credit conditions may have been greater competition within the banking sector.

The implications for activity and inflation of this possible boost to credit and the money supply in the past few years will depend, as noted above, on whether there was an associated increase in the demand for money. Money demand may have increased to some extent. Over the past three years, deposit rates for OFCs have increased relative to Bank Rate, increasing their attractiveness. That could have been a counterpart to the expansion of credit, if banks were trying to attract deposits as a way of funding their lending. However, over this period spreads on deposit rates for private non-financial companies have been broadly stable while household deposit rates have fallen relative to an appropriate set of market interest rates. Another possibility is that rising wealth could have boosted the demand for money by households and companies, as they sought to maintain the share of their overall asset portfolios held as money. Despite the rapid growth in money holdings, the proportion of financial asset portfolios accounted for by money has remained broadly constant since 2004 (**Chart 10**). However, the key issue is what caused wealth to increase over this period. The increase in wealth may have been the result of the credit supply shock as the faster creation of money

balances boosted the prices of other assets. The extent to which the demand for money increased independently of the credit supply shock, therefore, is unclear. And at least part of the past increase in money growth may have reflected an increase in supply alone, which could ultimately feed through into inflation.

Chart 10 Broad money as a share of financial assets^(a)



(a) Non seasonally adjusted quarterly data.

So developments in the banking sector and financial markets appear to have affected both money demand and money supply in recent years. But quantifying the scale of the different factors, and hence any potential overhang of temporary excess money balances, is difficult. Further development of the analysis set out above, using a wide range of quantitative and qualitative information, may help to provide more robust estimates. In addition, other economic indicators can be used as a cross-check on the potential effects of strong money growth. For example, the recovery in business investment during 2006 is consistent with the pickup in corporate borrowing.

Some of the factors discussed above reflect structural changes in the financial sector that are likely to persist. But it is possible that at least part of the developments in the monetary data over the past few years was cyclical. Indeed, a key judgement for policymakers is the likely persistence of such effects. The turbulence in financial markets in recent months and the likely associated tightening of credit conditions suggests that market participants may be re-evaluating the riskiness of lending portfolios. This could ultimately lead to a slowdown in bank lending and potentially lower spending and inflation. While the extent to which credit conditions might tighten is highly uncertain at this stage, this episode highlights the important role of monetary data in assessing the situation. In exceptional times, substantial liquidity and risk premia may affect financial market prices so that quantity information — on both broad money and credit — can be particularly useful for analysing the behaviour of the financial sector. Continued monitoring of developments in

money and credit in the coming months will help to shed light on recent events.

Conclusions and future work

Standard macroeconomic models are largely silent on the role of money in the economy. And empirical relationships between money and inflation have tended to be unreliable over short horizons. But that does not necessarily mean that developments in monetary aggregates are irrelevant. At the very least they provide a cross-check for other economic indicators that are subject to uncertainty. And there may also be channels through which monetary quantities contain incremental information for inflation.

Broad money growth has picked up sharply over the past three years. Understanding why that has happened is crucial in assessing the possible implications for inflation. Looking at the potential factors in more detail, a number of these appeared to boost money supply and, to some extent, money demand. While money growth associated with changes in money demand is likely to have few implications for inflation, changes in supply that generate an overhang of temporary 'excess' money balances could lead to higher demand for goods and services and other assets, pushing up inflation. Over recent months, credit conditions are likely to have tightened in light of global financial market turbulence. It is too early to judge if these effects will persist, which could lead to a slowdown in bank lending and potentially lower spending and inflation.

And assessing these very recent developments is certainly not an easy task. But to put the recent events in context requires an analysis of the developments in broad money and credit over the past few years. And judging their likely impact on inflation going forward requires continued monitoring of money and credit data.

The basic approach set out in this article provides a starting point for thinking about movements in broad money. And it has underpinned the analysis of recent monetary developments in the Bank, as discussed in recent *Inflation Reports* and the minutes of recent meetings of the Monetary Policy Committee. But further development of this analysis is required. Three main areas of work are planned. First, innovations in the banking sector raise measurement issues regarding the appropriate definition of money. The article by Burgess and Janssen (2007) in this *Quarterly Bulletin* is a first step in setting out the issues in this area. Second, the rapid pace of technological change in the financial sector means that it is important to utilise market intelligence to understand the implications of these changes. The Bank is continuing to develop its market intelligence function, and the new Credit Conditions Survey (outlined in the article by Driver (2007) in this edition of the *Quarterly Bulletin*) is an important element of this process. Finally, further work on modelling the role of money in the economy may allow the insights from monetary aggregates to be captured more formally.

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The Bank of England Credit Conditions Survey

By Ronnie Driver of the Bank's Monetary Assessment and Strategy Division.

The Bank has for many years held regular discussions with major UK lenders and money market participants to discuss trends in credit markets. Earlier this year, the Bank began supplementing these discussions with a formal Credit Conditions Survey, similar to those already conducted by the US Federal Reserve, the Bank of Japan and the European Central Bank. The survey is intended to assess trends in the demand for, and the supply of credit, including terms and conditions. It covers both household and corporate lending markets. Although the concept of the survey predates the recent movements in financial markets, the first results of the survey, which will be published on 26 September, will provide a good opportunity to assess trends in credit conditions. This article introduces the survey.

Introduction

In pursuing its goal of maintaining a stable and efficient monetary and financial framework, the Bank has two Core Purposes. The first is to maintain stable prices (as defined by the Government's inflation target) and confidence in the currency. The Bank seeks to meet this Purpose primarily through the decisions on interest rates taken by the Monetary Policy Committee (MPC), explaining those decisions transparently and implementing them effectively in the money markets.

The second Core Purpose entails identifying, assessing and reducing threats to the financial system as a whole. Such threats are detected through, among others, the Bank's surveillance and market intelligence functions.

To help achieve both Core Purposes, the Bank needs to understand trends and developments in a wide range of markets, including developments in the markets for money and credit. The 'Markets and operations' article in this edition of the *Quarterly Bulletin* discusses recent movements in financial markets in more detail. An article by Berry *et al*, also in this edition, discusses a framework for thinking about trends in money growth. And an article by Burgess and Janssen discusses issues about how the quantity of money should be measured.

In order to improve its understanding of credit markets, the Bank first signalled its intention to introduce a Credit Conditions Survey in a consultation document published in August 2006. Lenders and market participants were strongly supportive of the initiative. As a result, the Bank confirmed in

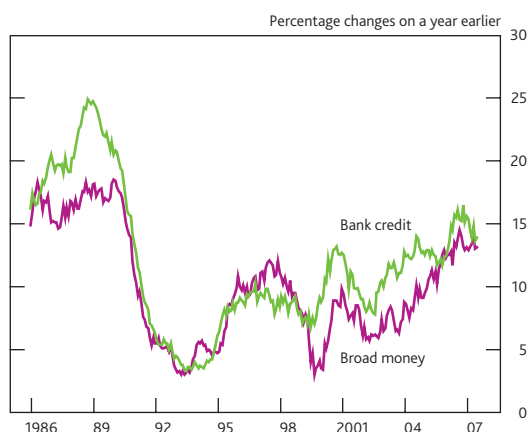
December 2006 that it was planning to proceed with the exercise. This article discusses why such a survey may be useful in principle, describes the main features of the survey, and outlines how the results of similar, but more established credit surveys in the United States and the euro area have been used to improve the analysis of movements in credit markets.

The merits of a Credit Conditions Survey

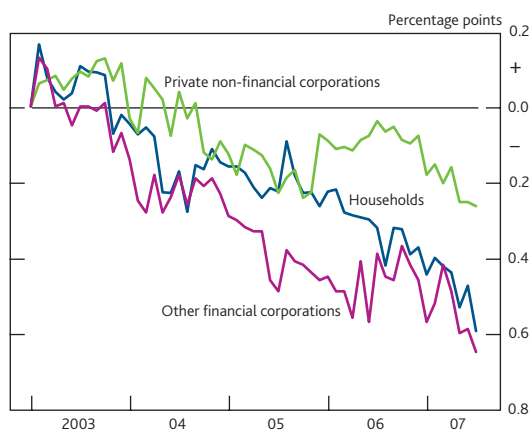
Analysing trends in credit markets presents a number of challenges. First, in order to understand developments in credit markets, it is important to assess the causes of those movements.⁽¹⁾ For example, although the aggregate data suggest that annual growth in bank credit has remained rapid in recent years (**Chart 1**), it is unclear whether this strength was associated with stronger *demand* or stronger *supply*. If changes in the quantity of credit are associated with changes in *demand* from borrowers, the implications for activity and inflation can be different than if they are associated with changes in *supply* by lenders. In addition, changes in underlying drivers in the credit markets may be short-lived, or may be more persistent, with different implications for economic activity.

Second, although it is relatively easy to monitor the interest rates charged by lenders on different types of lending, information on factors such as fees and other non-price terms and conditions (including direct quantity constraints) is far less readily available. Changes in these factors may, in principle,

(1) See for example King (2007) and Tucker (2007).

Chart 1 Broad money and bank credit^(a)

(a) Monthly data. Broad money is defined as M4, while bank credit is defined as M4 lending (excluding the effects of securitisations and loan transfers).

Chart 2 Changes in effective interest rate spreads on loans between January 2003 and July 2007^(a)

Sources: Bank of England and Bloomberg.

(a) Effective retail interest rates on the stock of outstanding loans relative to an appropriate funding rate. For floating-rate products, that is assumed to be Bank Rate. For fixed-rate products, Libor and swap rates of similar maturities are used (averaged over the relevant horizon and lagged one month). Prior to 2004, the shares of each product within the total borrowing for each sector are held constant due to lack of data.

serve to offset or amplify movements in interest rate spreads, such as the marked decline in the spreads on both household and corporate credit between January 2004 and July 2007 (Chart 2).

Finally, changes in credit conditions may take time to feed through into the aggregate credit data. For example, there has been considerable turbulence in financial markets since the beginning of August, a process which is still under way. These developments may cause some lenders, *ceteris paribus*, to reduce the supply of credit they provide. The demand for credit may also be affected. But in either case, it is still too early to assess the implications of these events on the aggregate data.

These issues all complicate the assessment of movements in credit markets, such that policymakers need to use judgement to distinguish between alternative underlying explanations.

One way to inform these judgements is to seek information from market participants directly. The Bank's Markets area holds regular discussions with market participants as part of its Market Intelligence exercise. And Bank staff have conducted regular bi-annual rounds of meetings with the largest UK banks and building societies for many years. The conclusions of these discussions have been highlighted regularly in the MPC minutes, the *Inflation Report* and the *Financial Stability Report*.

More recently, the Bank decided to supplement its Market Intelligence activities with a regular quarterly Credit Conditions Survey. By including a wider sample of lenders than in the bi-annual round of meetings, and by conducting the survey on a quarterly basis, the survey should produce better quality information, enhancing the Bank's analysis of monetary and credit conditions. In addition, by formalising these discussions using a structured set of questions, the Bank will be able to publish aggregate results of the survey, which should be useful to market participants, economists and commentators more widely. At the same time, the publication of the survey results will improve the transparency of monetary policy.

The Bank of England Credit Conditions Survey

The survey will be conducted on a quarterly basis so the results can be drawn upon in the MPC's quarterly projections and the Bank's *Inflation Report*. The survey comprises three questionnaires, covering the lending activities by UK banks, building societies and other (non-bank) specialist lenders in three distinct markets: secured lending to households and small businesses, unsecured lending to households and small businesses, and lending to the corporate sector.⁽¹⁾

Lenders with a market share of 1% or more⁽²⁾ in the secured, unsecured and corporate lending markets are invited to complete their respective questionnaires.⁽³⁾ Because the survey aims to assess credit conditions on new lending, the samples for the secured and unsecured lending surveys are chosen based on lenders' market shares in gross lending flows. Due to a lack of data, the corporate sample is based on lenders' market shares in the outstanding stock of corporate lending.⁽⁴⁾

Based on these market share thresholds, between ten and fifteen lenders would typically be asked to complete each of

(1) These questionnaires are reproduced in Annexes 1–3. The questionnaires and a compilation guide offering assistance on how to complete the survey, are available from the Bank's website at www.bankofengland.co.uk/publications/other/monetary/creditconditions.htm.

(2) To avoid volatility in the sample from quarter to quarter, the sample is selected based on average market shares over the previous twelve months. In general, lenders will be invited to join the sample if this average market share remains above 1% for two consecutive quarters. Once they have been included, lenders will continue to be surveyed until this average market share drops below 0.8%.

(3) As a result, some lenders may be asked to complete all three questionnaires, while others may be asked to complete just one or two.

(4) The Bank does not receive a gross lending measure for corporates comparable to that used for households.

the three surveys, with around 30 lenders being involved in the exercise overall. The survey would typically capture 75%–85% of the lending in each of the three markets.

The Bank ran the full survey for the first time in 2007 Q2. The survey covered the period 21 May to 14 June. The Q3 survey was conducted between 20 August and 13 September. As previously announced, the Bank will publish the results of the first and second rounds of the survey together, so as to aid interpretation of the results. The first report, covering the results of the Q2 and the Q3 surveys, will be published on 26 September 2007. Thereafter, the Bank will publish the results of each survey at the end of the relevant quarter. The publication dates for the next four quarters will be released with the first report.

What does the survey ask?

A full list of the questions in each of the three questionnaires is reproduced in Annexes 1–3. All the questions ask about both how trends have changed over the past three months (relative to the previous three months), and how they are expected to change over the next three months (relative to the latest three months). As well as providing a forward-looking indicator of credit market developments, this enables comparison of the aggregate outturns with expectations three months earlier.

There are a few questions that are common to all three questionnaires. They each ask about changes in borrowers' demand for credit and changes in the amount of credit lenders are willing to supply, including which factors are perceived to have been driving these movements. These questions should shed light on the relative influence of demand and supply factors on aggregate bank credit.

The interaction of demand and supply will determine the price of lending. However, as mentioned earlier, the interest rates lenders charge on their products may understate the 'true' price of credit due to fees and other non-price terms. As a result, each questionnaire asks about how both price and non-price terms are changing. For example, the secured lending questionnaire includes questions about maximum loan to value and loan to income ratios; the unsecured lending questionnaire includes questions about credit card limits and minimum monthly repayments; and the corporate lending questionnaire includes questions about collateral requirements and loan covenants.

The terms and conditions on which lenders choose to lend may also be affected by the magnitude of any losses they experience on their existing loans. As such, each questionnaire asks about the proportion of lenders' loans that are in default. However, this information is not sufficient to analyse the impact of defaults on lenders' balance sheets; even if default rates rise, the losses lenders face given each default may be smaller. As a result, each questionnaire also asks about loss given default rates.

Some questions are only aimed at assessing household conditions. For example, when processing a household credit application, lenders typically use the information they have to 'score' the applicant before reaching their decision on whether to lend to them or not. These credit scoring criteria can change over time as lenders improve their models (eg by using new information about the applicants). For a given set of characteristics, changing credit scoring criteria will affect the degree to which borrowers have access to credit. However, changes in credit scoring criteria alone are insufficient to assess the ability of households to obtain credit — for example, there may be a change in the quality of credit applicants. As a result, the secured and unsecured lending questionnaires include questions assessing how both credit scoring criteria and approval rates are changing over time.

Other survey questions are specific to particular markets. For example, the secured lending questionnaire asks about both demand for, and spreads on prime, buy-to-let and 'other' secured lending for house purchase. And the corporate lending questionnaire asks questions about demand for, and terms on, lending to medium-sized private non-financial corporations (PNFCs), large PNFCs and other financial corporations (OFCs). Finally, the secured and corporate lending questionnaires ask about lenders' use of tools such as securitisation.

Summarising the responses

Lenders are asked to provide a qualitative answer to each question. For example, when asked about trends in demand for credit, respondents are asked whether the level of demand is 'up a lot', 'up a little', the 'same', 'down a little' or 'down a lot'. In presenting the aggregate results, individual lenders' responses will be weighted together by lenders' market shares, and aggregated to produce net percentage balances.⁽¹⁾ So for example, a positive net percentage balance in response to a question on demand would mean that lenders, on balance, had experienced an increase in the demand for credit. Alternatively, a negative net percentage balance in response to a question on credit scoring criteria would mean that lenders, on balance, had changed criteria such that credit was less readily available. The report will include the weighted aggregate net percentage balances for each question along with a short descriptive summary of the results.

The time-series results will be suitable for econometric analysis once an adequate back run of data has been established. But even in the near term, the results will be useful for monetary policy analysis. The next section briefly describes some similar surveys run by the US Federal Reserve, the Bank of Japan and the European Central Bank (ECB), and

(1) Each lender is assigned a score based on their response. Lenders who report that credit conditions have changed 'a lot' are assigned twice the score of those who report that conditions have changed 'a little'. The scores are weighted by lenders' market shares, and the aggregate result is scaled to lie between ± 100 .

describes some of the ways the results of the US and ECB surveys have been used.

International credit conditions surveys

The US Federal Reserve's Senior Loan Officer Opinion Survey has been running since 1967, although the survey questions, sample size and composition have changed significantly over time. The more recent surveys have tended to cover around 60 domestic lenders, and 20 agencies of foreign banks in the United States.⁽¹⁾

The Bank of Japan's survey⁽²⁾ was introduced in 2000, and covers around 50 major Japanese banks. The ECB introduced its survey in 2003.⁽³⁾ The ECB survey is conducted in each member country by the respective national central bank, and the results are then collated and analysed at the aggregate level. The country-level samples vary in size given the different degrees of concentration of the banking sector in each economy, but around 90 lenders participated in the most recent surveys.

While there are many similarities between the Bank's survey and these international counterparts, there are also some key differences. For example, the UK credit market is significantly more concentrated, such that, despite having the smallest sample, the Bank's survey would usually have the highest coverage (Table A).

The international surveys are primarily backward looking, whereas each question in the Bank's survey has a forward-looking element. And the Bank's survey includes more detailed questions on some markets that other surveys do not regularly cover. For example, the Bank's survey asks about the demand for, and spreads on, prime and buy-to-let secured lending, and the demand for loans by various OFCs.

Table A Comparison of international credit conditions surveys

	Sample size (approximate)	Market coverage as a percentage of total lending (approximate)
US Federal Reserve	80	60% ^(a)
ECB	90	40% ^(b)
Bank of Japan	50	75% ^(c)
Bank of England	30	75%–85%

Sources: Bank of Japan Senior Loan Officer Opinion Survey on Bank Lending Practices at Large Japanese Banks, ECB Bank Lending Survey, and Federal Reserve Board Senior Loan Officer Opinion Survey.

(a) See Lown and Morgan (2006).

(b) See Berg *et al.* (2005).

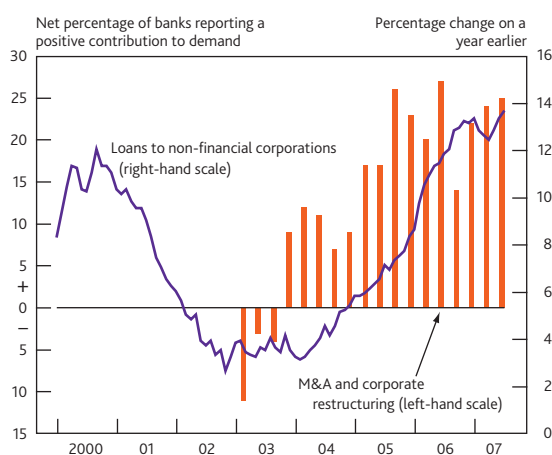
(c) In 2005.

Research using other credit conditions surveys

Results from the international credit conditions surveys can be used to provide insights into short-run economic developments overseas. For example, annual growth in euro-area lending to non-financial corporations accelerated

since 2005, reaching 13.6% in July 2007. In part that strength in corporate lending was likely to reflect the recovery in euro-area demand growth over that period. But results from the ECB Bank Lending Survey suggest that demand for corporate loans to finance merger and acquisition (M&A) activity and corporate restructuring was strong between 2005 Q3 and 2007 Q2 (Chart 3). These results support other evidence that suggested that there had been strong demand for lending for M&A purposes. For example, in its August *Monthly Bulletin*,⁽⁴⁾ the ECB reported that the growth rate of corporate lending in June 2007 was associated with stronger growth in short-term lending, which was often used as bridge financing for M&A transactions.

Chart 3 Euro-area lending and survey measure of M&A and corporate restructuring



Sources: ECB Bank Lending Survey and Thomson Datastream.

Overseas credit conditions surveys have also been used to ask topical questions designed to shed light on specific one-off events, and assess their implications for short-run economic developments. The US Federal Reserve has, on many occasions, added such questions to its Senior Loan Officer Opinion Survey. For example, in the 2007 Q2 and Q3 surveys, following the deterioration of the performance of sub-prime loans in the United States, the Federal Reserve replaced their usual question on secured lending standards with questions about standards in each of the prime, non-traditional and sub-prime sectors. Chart 4 shows how US lenders reported a tightening in standards on secured lending for the past three quarters. The results of the Q2 and Q3 surveys showed that tighter conditions had been concentrated primarily outside the prime sector of the mortgage market.

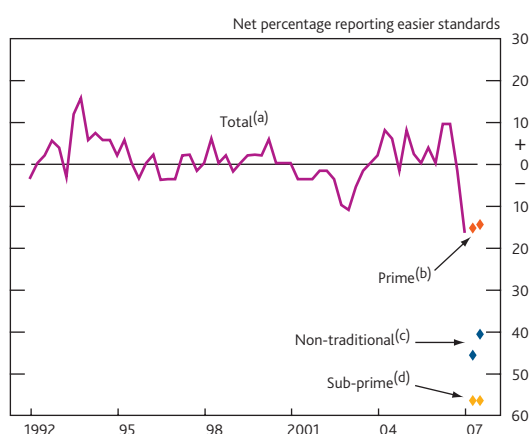
In a similar vein, the Bank may, on occasion, add topical questions to the UK survey, tailored to improve the Bank's understanding of specific periods or events in credit markets.

(1) For further information, and the results since 1990 Q2, see the Federal Reserve's website at www.federalreserve.gov/boarddocs/snloansurvey/.

(2) See www.boj.or.jp/en/theme/research/stat/dl/zan/loos/index.htm.

(3) For more information see Berg *et al.* (2005) and www.ecb.int/stats/money/lend/html/index.en.html.

(4) Available from www.ecb.int/pub/mb/html/index.en.html.

Chart 4 US secured lending standards

Source: Federal Reserve Board Senior Loan Officer Opinion Survey.

- (a) This regular question was replaced with separate questions about prime, non-traditional and sub-prime loans for the 2007 Q2 and 2007 Q3 surveys. The responses to those questions are shown as diamonds.
- (b) Borrowers with relatively strong, well-documented credit histories, high credit scores, and low debt to income ratios.
- (c) Includes adjustable-rate and interest-only mortgages, as well as mortgages with limited income verification.
- (d) Borrowers with poor or incomplete credit histories, low credit scores or high debt to income ratios.

For example, given recent developments in financial markets, the Bank decided to include an additional question in each of the questionnaires in the Q3 survey. The results will also be published on 26 September.

The survey results could also be used in econometric analysis. Due to its extensive back run, there is a body of empirical time-series evidence using the results of the US survey. Many of these studies have found that these results contain valuable information about movements in the quantity of credit as well as in other macroeconomic variables, including output growth.

Some of the literature investigates the link between credit and the business cycle. Asea and Blomberg (1998) show that, over the business cycle, banks in the United States systematically changed their lending standards. They found that periods of easier lending standards, which tended to coincide with periods of economic expansion, intensified aggregate business cycle fluctuations. Schreft and Owens (1991) and Lown and Morgan (2006) both found evidence that US slowdowns were typically preceded by either decreased willingness to lend or tightening credit standards, as measured by the US Federal Reserve's survey. Lown, Morgan and Rohatgi (2000) found that credit standards had explanatory power for changes in US inventory investment, a component of demand that tends to be associated with movements in the business cycle.

Other studies have analysed the effects of changes in credit standards on credit quantities and output. Lown, Morgan and Rohatgi (2000) showed that the US survey measure of credit standards helped predict aggregate output and lending growth, even after controlling for changes in interest rates and spreads on US Government Treasury bills. In their subsequent

study, Lown and Morgan (2006) investigated the causality between credit standards, bank lending and economic output. They found evidence that tighter credit standards led to lower levels of output and bank lending. They extended their analysis to include additional variables relating to macroeconomic conditions and corporate and banking sector financial health, which they argued might be identified with either loan demand or loan supply. Their results showed that shocks to credit standards, as measured by the Senior Loan Officer Opinion Survey, played a role in explaining movements in aggregate output and loan activity.

Lown and Morgan also found that higher levels of lending tended to lead to tighter standards, perhaps because lenders or their regulators concluded that standards were too loose. That in turn pushed down on lending activity and overall output, which in turn eventually led to easier standards. They interpreted this result as providing evidence for a credit cycle.

Finally, the US survey data have been used to explain movements in components of aggregate demand. For example, Duca and Garrett (1995) found that the survey measure of lenders' willingness to offer consumer loans (used as a proxy for non-price credit conditions) helped predict both consumer lending and spending on durable goods. Lown, Morgan and Rohatgi (2000) also showed that credit standards helped predict movements in US equipment and software investment and US industrial production.

In time, once a significant time series has been collected, the results of the Bank's survey could be used in similar analysis for the UK economy.

Conclusions

In order to meet its Core Purposes of Monetary and Financial Stability, it is important for the Bank to understand trends and developments in the demand for and supply of credit, as well as the terms on which credit is provided. In an effort to improve its understanding of changes in the credit market, the Bank launched a quarterly Credit Conditions Survey in 2007 Q2. The survey gathers information about both past and expected trends in each of the secured and unsecured household and the corporate lending markets.

As with similar surveys conducted by the US Federal Reserve, the Bank of Japan and the ECB, the qualitative responses will be weighted together based on respondents' market shares, to produce aggregate quantitative net percentage balances. These balances, along with a short descriptive summary of the results, will be published on a quarterly basis. The first report, which will cover the results of both the Q2 and Q3 surveys, will be published on 26 September. Thereafter, the Bank will publish the results of each survey at the end of the relevant quarter.

Bank of England Credit Conditions Survey — secured lending conditions to households and small businesses

SECURED LOAN DEMAND: HOUSEHOLDS

[illegible]

Latest 3 months

Up a lot Up a little Same Down a little Down a lot N/A

☐ ☐ ☐ ☐ ☐ ☐

Next 3 months

Up a lot Up a little Same Down a little Down a lot N/A

☐ ☐ ☐ ☐ ☐ ☐

[illegible]

Latest 3 months

Up a lot Up a little Same Down a little Down a lot N/A

☐ ☐ ☐ ☐ ☐ ☐

Next 3 months

Up a lot Up a little Same Down a little Down a lot N/A

☐ ☐ ☐ ☐ ☐ ☐

[illegible]

Bank of England Credit Conditions Survey — unsecured lending conditions to households and small businesses

1. How has demand for unsecured lending from HOUSEHOLDS changed over the LATEST 3 MONTHS relative to the previous 3 months? And what is your expectation for the NEXT 3 MONTHS relative to the latest 3 months?

UNSECURED LOAN DEMAND: SMALL BUSINESSES

UNSECURED CREDIT SCORING CRITERIA: HOUSEHOLDS

UNSECURED LOAN APPROVALS: HOUSEHOLDS

UNSECURED LOAN TERMS: HOUSEHOLDS

	Latest 3 months						Next 3 months						
	Much narrower	A little narrower	Same	A little wider	Much wider	N/A	Much narrower	A little narrower	Same	A little wider	Much wider	N/A	
Spreads on credit card lending:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Spreads on non-credit card lending:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Credit card limits:	Much lower <input type="checkbox"/>	A little lower <input type="checkbox"/>	Same <input checked="" type="checkbox"/>	A little higher <input type="checkbox"/>	Much higher <input type="checkbox"/>	N/A <input type="checkbox"/>	Much lower <input type="checkbox"/>	A little lower <input type="checkbox"/>	Same <input checked="" type="checkbox"/>	A little higher <input type="checkbox"/>	Much higher <input type="checkbox"/>	N/A <input type="checkbox"/>	
	Much higher <input type="checkbox"/>	A little higher <input type="checkbox"/>	Same <input checked="" type="checkbox"/>	A little lower <input type="checkbox"/>	Much lower <input type="checkbox"/>	N/A <input type="checkbox"/>	Much higher <input type="checkbox"/>	A little higher <input type="checkbox"/>	Same <input checked="" type="checkbox"/>	A little lower <input type="checkbox"/>	Much lower <input type="checkbox"/>	N/A <input type="checkbox"/>	
Minimum proportion of balance paid:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Much shorter <input type="checkbox"/>	A little shorter <input type="checkbox"/>	Same <input checked="" type="checkbox"/>	A little longer <input type="checkbox"/>	Much longer <input type="checkbox"/>	N/A <input type="checkbox"/>	Much shorter <input type="checkbox"/>	A little shorter <input type="checkbox"/>	Same <input checked="" type="checkbox"/>	A little longer <input type="checkbox"/>	Much longer <input type="checkbox"/>	N/A <input type="checkbox"/>	
Maximum maturities on loans:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Bank of England Credit Conditions Survey — corporate lending conditions

1. How has demand for lending from PRIVATE NON-FINANCIAL CORPORATIONS changed over the LATEST 3 MONTHS relative to the previous 3 months? And what do you expect over the NEXT 3 MONTHS relative to the latest 3 months?

	Latest 3 months						Next 3 months					
	Up a lot	Up a little	Same	Down a little	Down a lot	N/A	Up a lot	Up a little	Same	Down a little	Down a lot	N/A
Medium corporates:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large corporates:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How has demand for lending from OTHER FINANCIAL CORPORATIONS changed over the LATEST 3 MONTHS relative to the previous 3 months? And what do you expect over the NEXT 3 MONTHS relative to the latest 3 months?

[illegible]

3. What have been the main drivers of any changes in the demand for borrowing over the LATEST 3 MONTHS relative to the previous 3 months? And what do you expect over the NEXT 3 MONTHS relative to the latest 3 months?

	Latest 3 months						Next 3 months					
	Up a lot	Up a little	Same	Down a little	Down a lot	N/A	Up a lot	Up a little	Same	Down a little	Down a lot	N/A
Mergers & Acquisitions:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Capital investment:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inventory finance:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Balance sheet restructuring:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Commercial real estate:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4a. How has the availability of credit you provide to the CORPORATE SECTOR IN AGGREGATE changed over the LATEST 3 MONTHS relative to the previous 3 months? What are the prospects for the NEXT 3 MONTHS relative to the latest 3 months? Within this, how has the availability of credit you provide to the COMMERCIAL REAL ESTATE SECTOR changed over the LATEST 3 MONTHS relative to the previous 3 months? What are the prospects for the NEXT 3 MONTHS relative to the latest 3 months?

[illegible]

4b. Which of the following possible factors have been/are likely to be important reasons for change in AGGREGATE corporate sector lending?

[illegible]

	Latest 3 months						Next 3 months						
	Much narrower	A little narrower	Same	A little wider	Much wider	N/A	Much narrower	A little narrower	Same	A little wider	Much wider	N/A	
Spreads over Libor:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Commissions/fees:	<input type="checkbox"/> Much lower	<input type="checkbox"/> A little lower	<input type="checkbox"/> Same	<input type="checkbox"/> A little higher	<input type="checkbox"/> Much higher	<input type="checkbox"/> N/A	<input type="checkbox"/> Much lower	<input type="checkbox"/> A little lower	<input type="checkbox"/> Same	<input type="checkbox"/> A little higher	<input type="checkbox"/> Much higher	<input type="checkbox"/> N/A	
Collateral requirements:	<input type="checkbox"/> Much higher	<input type="checkbox"/> A little higher	<input type="checkbox"/> Same	<input type="checkbox"/> A little lower	<input type="checkbox"/> Much lower	<input type="checkbox"/> N/A	<input type="checkbox"/> Much higher	<input type="checkbox"/> A little higher	<input type="checkbox"/> Same	<input type="checkbox"/> A little lower	<input type="checkbox"/> Much lower	<input type="checkbox"/> N/A	
Maximum size of credit lines:	<input type="checkbox"/> Much lower	<input type="checkbox"/> A little lower	<input type="checkbox"/> Same	<input type="checkbox"/> A little higher	<input type="checkbox"/> Much higher	<input type="checkbox"/> N/A	<input type="checkbox"/> Much lower	<input type="checkbox"/> A little lower	<input type="checkbox"/> Same	<input type="checkbox"/> A little higher	<input type="checkbox"/> Much higher	<input type="checkbox"/> N/A	

CORPORATE LOAN DEFAULTS

7. Has there been any change in the default rate on lending to PRIVATE NON-FINANCIAL CORPORATIONS over the LATEST 3 MONTHS relative to the previous 3 months? What do you expect over the NEXT 3 MONTHS relative to the latest 3 months?

	Latest 3 months						Next 3 months					
	Up a lot	Up a little	Same	Down a little	Down a lot	N/A	Up a lot	Up a little	Same	Down a little	Down a lot	N/A
Medium corporates:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Large corporates:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CORPORATE LOAN LOSS GIVEN DEFAULT

8. Has there been any change in Loss Given Default on lending to PRIVATE NON-FINANCIAL CORPORATIONS over the LATEST 3 MONTHS relative to the previous 3 months? What do you expect over the NEXT 3 MONTHS relative to the latest 3 months?

[illegible]

CORPORATE LENDING RISK MANAGEMENT

9. Has there been any change in your use of risk management tools over the LATEST 3 MONTHS relative to the previous 3 months? What do you expect over the NEXT 3 MONTHS relative to the latest 3 months?

	Latest 3 months						Next 3 months						
	Up a lot	Up a little	Same	Down a little	Down a lot	N/A	Up a lot	Up a little	Same	Down a little	Down a lot	N/A	
Use of cash securitisations:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Use of derivatives/ synthetic securitisations:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Target hold levels:	Much higher <input type="checkbox"/>	A little higher <input type="checkbox"/>	Same <input type="checkbox"/>	A little lower <input type="checkbox"/>	Much lower <input type="checkbox"/>	N/A <input type="checkbox"/>	Much higher <input type="checkbox"/>	A little higher <input type="checkbox"/>	Same <input type="checkbox"/>	A little lower <input type="checkbox"/>	Much lower <input type="checkbox"/>	N/A <input type="checkbox"/>	
Loan tenors:	Much shorter <input type="checkbox"/>	A little shorter <input type="checkbox"/>	Same <input type="checkbox"/>	A little longer <input type="checkbox"/>	Much longer <input type="checkbox"/>	N/A <input type="checkbox"/>	Much shorter <input type="checkbox"/>	A little shorter <input type="checkbox"/>	Same <input type="checkbox"/>	A little longer <input type="checkbox"/>	Much longer <input type="checkbox"/>	N/A <input type="checkbox"/>	

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Proposals to modify the measurement of broad money in the United Kingdom: a user consultation

By Stephen Burgess and Norbert Janssen of the Bank's Monetary and Financial Statistics Division.

The concept of money traditionally relates to goods or assets that are generally accepted as media of exchange. In practice, there is considerable disagreement about how money should be measured. To ensure its measure of broad money remains relevant, the Bank regularly reviews the theoretical and practical basis of its definition of M4, as part of its long-term research programme. This article explains the Bank's analysis undertaken over the past year, in which a key issue has been to question whether the present boundary between the money-creating and the money-holding sectors is still appropriate. The Bank proposes to move that boundary in a few places, to address some changes that have taken place in the global financial system in recent years. In most other respects, the Bank's measure of broad money will be unaffected, as there are no compelling reasons for further modifications. The Bank welcomes readers' views on the proposals discussed in this article, by the end of December.

Introduction

Over the past year, as part of a long-term research programme on monetary aggregates, the Bank has been examining the theoretical and practical basis of its current definition of M4. The aim has been to assess whether its measure of broad money remains relevant. In a world of rapidly changing financial systems, it is necessary to review regularly which financial instruments should be considered as 'money' and which ones should not. An important step in the measurement of money is to determine which institutions are able to issue or create it and which ones are holding it. 'Money-creating' organisations issue liabilities that are treated as media of exchange by others. The rest of the economy can then be referred to as 'money holders'. So a key issue in the Bank's analysis has been to re-assess the boundary between the money-creating and the money-holding sectors.⁽¹⁾

The objective of this article is to explain in which respects the Bank proposes to modify its measure of broad money in the future. The proposals would draw the boundary between the money-creating and the money-holding sectors differently, leading to an improvement in the definition of broad money. Implementing the proposals would require some changes to the Bank's data-collection process, which would inevitably take some time. The Bank intends to keep other elements within its current definition of broad money unchanged, as the benefits of altering them would not outweigh the costs of making

relatively minor changes. Before making the proposed modifications, the Bank would like to obtain readers' views on the issues discussed in this article. Details on how to respond are given at the end of the article.

The concept of money

Traditionally, the *concept* of money has referred to any good or asset that meets three requirements: it serves as a unit of account, is a store of value and — most crucially — is generally accepted as a medium of exchange for goods and services. In the absence of money, economic transactions would generally only occur if there was a so-called 'double coincidence of wants', so barter would be the typical alternative way to trade. David Hume emphasised the medium of exchange role of money in his 1752 essay *Of money*, where he wrote: 'Money is not, properly speaking, one of the subjects of commerce, but only the instrument which men have agreed upon to facilitate the exchange of one commodity for another.'

In principle, many goods or assets could be accepted as media of exchange. As Keynes (1936) pointed out, the usefulness of an asset as money depends on its liquidity — that is, the ease with which that asset can be used as payment in exchange for other goods and services, without incurring significant loss:

(1) Broadly speaking, at present, the money-creating sector covers UK banks and building societies, whereas the money-holding sector consists of UK households and private companies.

'It is an essential difference between money and all (or most) other assets that in the case of money its liquidity premium exceeds its carrying cost, whereas in the case of other assets their carrying cost much exceeds their liquidity premium.'

Keynes considered both wheat and houses as examples of assets that could in principle be used as media of exchange. Although wheat may be a reasonably liquid asset, it has a high carrying cost, associated with storage and transportation, and is perishable. Houses are generally illiquid assets, requiring significant effort and cost to convert them into other assets, and have prohibitively high carrying costs. So neither is particularly suitable as a medium of exchange.

Friedman (1956) spelt out in more detail what type of liquidity services money provides to its holders: 'Money may yield a return in the form of money, for example, interest on demand deposits. It will simplify matters, however, and entail no essential loss of generality, to suppose that money yields its return solely in kind, in the usual form of convenience, security, etc.' So the key liquidity characteristics of assets that serve as money can be summarised as follows: they need to be generally accepted as means of exchange for goods and services, they should be non-perishable, and provide convenience and security in carrying out transactions. Which specific assets are ultimately used as money largely depends on national and historical circumstances.⁽¹⁾ Nevertheless, the above criteria are, in principle, still applicable to modern economies with a wide range of financial assets of varying degrees of liquidity.

Defining money in practice

Money plays an important role in the economy and in the Bank's monetary policy analysis (for details on the relationship between money and inflation, see Berry *et al* (2007) on pages 376–88 in this *Quarterly Bulletin*). That analysis benefits from having a definition of money that captures the theoretical concept as closely as possible. Despite the strong consensus about money as a *concept*, there has traditionally been little agreement about its measurement *in practice*. As the Bank's then Deputy Governor explained in 1973: '...no matter what concept of money we adopt, it cannot in practice be measured directly' (Bank of England (1973)). In economies in their early stages of financial development, a narrow measure of money, such as the amount of currency in circulation, usually gives a reasonably comprehensive picture of those assets that can be used as media of exchange in transactions. Employees in such economies are typically paid in currency (in the form of banknotes and/or coins) and use cash to pay for their expenditure.

As financial systems become more sophisticated, the range of financial assets accepted as means of exchange for transactions expands. Correspondingly, it becomes more

difficult to determine which assets should be included in the definition of money and which should not. In response, many developed countries have broadened their measures of money to include some financial assets (eg time deposits) that are held for savings as well as transactions purposes. As a result, most definitions of broad money, except so-called Divisia measures, have gone beyond capturing the pure medium of exchange role of financial assets. Divisia measures have been designed specifically for that purpose, as they attempt to weight the component assets of a broad money aggregate according to an estimate of the extent to which they provide transactions services.⁽²⁾

Although interest rates on financial assets may help to draw a distinction between broad money and illiquid assets — by providing an estimate of the degree to which these assets are used as media of exchange — substitution between the two types of assets is likely to take place.⁽³⁾ So any definition of money (including Divisia) is arbitrary, to an extent, and can only be an imperfect approximation to the underlying concept. Many countries have undertaken various redefinitions of their broad monetary aggregates over the past three decades, largely reflecting the difficulty in finding a measure of money that captures its medium of exchange role.⁽⁴⁾

UK broad money definitions

The UK experience in this respect is typical (see the box on page 404 for a history of broad money definitions in the United Kingdom). On several occasions, the definitions of the various monetary aggregates were amended in response to changes in the financial system. For example, as restrictions on access to building society shares and deposits were lifted in the 1980s, building society deposits became very similar to bank deposits. Building society shares and deposits were therefore included in the new M4 aggregate, having not been part of the earlier M3 measure. This increased substitutability culminated in the first building society (Abbey National) converting to bank status in 1989, and M3 was discontinued not long after.

Another striking example also occurred in the 1980s. Previously clear distinctions between short-term bank deposits (which were often non interest-bearing and used for transactions purposes) and longer-term bank deposits (mainly used for saving) became blurred, as many savings accounts began to offer instant withdrawal and chequing facilities, making them more likely to be used for transactions purposes.

(1) For example, the inhabitants of the Pacific island of Yap have used limestones (brought in from the neighbouring island of Palau) as means of exchange for several centuries.

(2) The lower the interest rate on a component asset, the more transactions services that asset provides. See Hancock (2005) for details about the construction of the Bank's measure of Divisia money.

(3) This is particularly true in technologically advanced financial systems, where savings accounts can be transferred into cash easily and at low cost, and current accounts earn interest close to the rate on savings accounts. In other words, interest rates then become less useful as an indicator of the degree of 'moneyiness' of financial assets.

(4) For a detailed history of UK and US monetary aggregates, see Clews *et al* (1990) and Anderson and Kavajecz (1994) respectively.

History of UK broad money aggregates

The definitions of UK broad money aggregates have changed frequently since 1970, in response to innovations and structural changes in the financial system.⁽¹⁾ The institutions considered to issue 'money', those holding it, and the types of financial instrument considered 'money' have all changed over time.

M3

- M3 was introduced in 1970 alongside the narrower measures M1 and M2. It comprised notes and coin in circulation with the public, and all public and private sector deposits with UK banks. There was no explicit maturity cut-off, no currency restriction, and public sector entities and building societies were considered to be money holders. In 1977 £M3 was introduced, excluding foreign currency deposits from M3.
- In 1982 the UK banking sector (and hence the M3-issuing sector) was redefined. The new 'monetary sector' comprised: all recognised banks and licensed deposit takers; banking institutions in the Channel Islands and the Isle of Man which had agreed to comply with UK monetary control arrangements; the National Girobank; the trustee savings banks; and the Banking Department of the Bank of England.
- In 1984 the public sector was excluded from the M3-holding sector.
- In 1987 M3 and £M3 were renamed M3c and M3 respectively.
- In 1989 the first conversion of a building society (Abbey National) into a bank caused a major break in the M3 series, which was therefore discontinued in 1990, along with M1. The broader measure of money, M4, included both bank and building society deposits and was not affected by the conversion.

M4

- M4 was introduced in 1987; its definition has changed little since its inception. It covers private sector holdings of sterling notes and coin, sterling deposits with banks and building societies, and sterling shares issued by building societies. (Deposits are understood to include both certificates of deposit and other debt securities of up to and including five years' original maturity issued by banks and building societies.)
- A broader aggregate, M4c, which included similar foreign currency assets, was introduced in 1990, but discontinued in 1991.

- The UK monetary sector was redefined in 1997. Banks in the Channel Islands and the Isle of Man were reclassified as non-residents and therefore excluded from the money-issuing sector.

PSL1 (Private Sector Liquidity 1)

- The components of PSL1 were published between 1980 and 1987 in a statistical annex to the *Quarterly Bulletin*, as a broader measure of private sector holdings of liquidity. PSL1 included time deposits with banks with an original maturity of up to two years, as well as instruments that were not issued by monetary financial institutions (MFIs), such as bank bills, Treasury bills and certificates of tax deposit, and was discontinued in 1987.

PSL2 (Private Sector Liquidity 2)/M5

- Like PSL1, the components of PSL2 were published in the *Quarterly Bulletin* between 1980 and 1987. The PSL2 aggregate comprised PSL1, as well as private sector holdings of building society deposits, with a one-year maturity cut-off, and private sector holdings of short-term National Savings instruments. Building society term shares, SAYE (Save As You Earn) deposits and some long-term deposits were excluded, as were building societies' holdings of bank deposits and money market instruments.
- PSL2 was broadened in 1986 in the light of increasing flexibility in the withdrawal terms on building society term shares. All building society term shares and SAYE deposits were added, and the two-year maturity cut-off on time deposits with banks (which was maintained for PSL1) was eliminated.
- In 1987 PSL2 was renamed M5. Liquid assets previously considered to be non-money were now included in this wider definition of money.
- In 1991 M5 was discontinued. Following a consultation,⁽²⁾ the Bank decided to publish the non-M4 components of M5 separately, so that users could construct their own broader monetary aggregates if they wished to. These series are still published as 'Liquid assets outside M4' in Table A7.1 of the Bank's *Monetary and Financial Statistics* publication.

(1) For more details on the evolution of these and other (narrower) monetary aggregates, see Bank of England (2003).

(2) See Clews *et al* (1990).

Ultimately, all these bank deposits were included in M4, and narrower aggregates such as M1 were discontinued. The narrow monetary aggregates that remained (M0, which was discontinued in 2006, and notes and coin) did not contain any bank deposits held by the private sector at all.

The United Kingdom currently has one broad money aggregate, M4. Broadly speaking, M4 measures the amount of cash (in sterling) held by the public, together with their sterling deposits held at banks and building societies. The Bank defines M4 as the UK private sector's⁽¹⁾ holdings of:

- sterling notes and coin in circulation;
- sterling deposits with UK-resident banks and building societies;
- sterling holdings of certificates of deposit, commercial paper and debt securities of up to and including five years' original maturity issued by UK-resident banks and building societies; and
- claims on UK-resident banks and building societies arising from sale and repurchase agreements in sterling.

Building blocks of broad money definitions: a re-assessment of UK M4

It is clear that M4, like its predecessors, cannot and does not aim to measure all sources of liquidity in the UK economy. Like any definition of broad money, it is based on three building blocks: the type of institutions creating or issuing money; the type of people and institutions holding money; and the characteristics of financial instruments considered to be money. By defining each of these elements in a particular order, the range of financial instruments included in broad money can be narrowed down. This section considers the three elements in turn, to assess whether the current M4 definition is still appropriate, in a financial environment that has changed markedly in recent years. The analysis below brings out a few proposals for change, which are further explained in subsequent sections.

The money-creating sector

Although the first element in any definition of broad money is to determine which institutions are considered to be creators of money, international statistical standards provide little guidance on the precise definition of this sector. The International Monetary Fund (2006) defines the money-creating sector as those financial institutions that issue liabilities that are included in the national definition of broad money — in other words, as those institutions whose liabilities are used as means of exchange in the economy. The box on page 406 describes the current definitions of the money-creating sector and of broad money in some major economies. Given the current definition of M4, the money-creating sector in the United Kingdom consists of

resident banks (including the Bank of England) and building societies⁽²⁾ — which together form the so-called monetary financial institutions (MFIs) sector.⁽³⁾

The distinguishing feature of banks and building societies in the United Kingdom is that they have been authorised by the Financial Services Authority to accept deposits. In other words, the UK money-creating sector is defined on an *institutional or legal* basis. Such a definition provides clarity from the outset with respect to the institutions from which data need to be collected to construct broad monetary aggregates. But an institutional definition may also appear arbitrary and rigid from an economic point of view, as various other financial intermediaries may undertake activities that are similar to those of MFIs. In particular, some other intermediaries may issue liabilities that are in practice close substitutes for money but, because they do not (and may not want to) have permission to accept deposits, they fall outside the current UK definition of the money-creating sector.

In economies that have adopted a *functional* definition of the money-creating sector, such as the euro area and the United States, such financial intermediaries are part of the money-creating sector. The functional approach focuses on the specific roles of the liabilities issued by different types of financial intermediaries, rather than the intermediaries' legal status. So in principle, any financial institution issuing liabilities with similar characteristics to bank deposits (in the sense of being easily transferable into a medium of exchange) could be part of the money-creating sector. Those liabilities would then be included in the national broad money measure.

For example, the European Central Bank's functional definition of the money-creating sector covers all financial institutions whose business is to receive deposits *and/or close substitutes for deposits*, and to grant credits and/or to invest in securities. The main practical difference with the UK definition is that money market funds (MMFs) are classified as MFIs (and therefore money creators) in the euro area. MMFs are financial intermediaries that do not have a licence to receive deposits, and they issue shares or units that — just like some deposits — can easily be converted into means of exchange, although their nominal value can fluctuate. So units or shares issued by MMFs are part of the euro area's broad money

(1) This refers to the non-bank, non building society private sector, which comprises households (including unincorporated businesses) and companies (excluding public corporations).

(2) Coins in circulation are a liability of the central government and (as far as they are held by the UK private sector) are part of M4, so to that extent the central government is also part of the money-creating sector. But in general, the public sector (defined in a broad sense as central government, local government and public corporations except the Bank of England) is neither part of the money-creating nor the money-holding sector, so its bank deposits are excluded from M4.

(3) All banks resident in the United Kingdom report statistical data to the Bank of England: if their business exceeds specific minimum thresholds (available at www.bankofengland.co.uk/statistics/reporters/defs/newrepthresholds.pdf) they report on a monthly basis; banks with business below these thresholds report on a quarterly basis and in less detail. Building societies currently report to the Financial Services Authority, but from January 2008 they will report their statistical data directly to the Bank and become subject to the same reporting thresholds as banks.

Current definitions of broad money in four major economies

Table 1 compares the definitions of the main broad money aggregates currently compiled in other major economies with that adopted in the United Kingdom. Despite trends towards international harmonisation in many other areas of statistics, international statistical standards generally leave national authorities free to define broad money as they see fit. For instance, the International Monetary Fund's *Monetary and Financial Statistics Manual* (2000) '...does not contain prescriptions for national definitions of money, credit and

debt, which are left to the discretion of the national authorities' (paragraph 283). So there is no 'global' definition of broad money, mainly because financial institutions and instruments differ considerably between countries, making the use of national definitions more appropriate.

UK M4 excludes all financial instrument holdings by non-residents and all assets not denominated in sterling. The boundary of the money-creating sector is more flexible in the euro area, the United States and Japan than it is in the United Kingdom. In Japan some financial institutions are neither issuers nor holders of money.

Table 1 Current definitions of broad money in four major economies^(a)

	United Kingdom (M4)	United States (M2) ^(b)	Euro area (M3)	Japan (M3 + CDs) ^(c)
Money creators	Banks and building societies licensed by the Financial Services Authority to receive deposits.	All depository institutions: this includes banks, non-bank thrift institutions ^(d) and money market mutual funds.	Banks and other credit institutions, money market funds ^(e) and central government (Post Office, national savings and Treasury accounts only).	All banks and credit co-operatives, including Shinkin banks, ^(f) Shoko Chukin Bank, Norinchukin Bank and Japan Post.
Money holders (including residency concept)	Private sector (UK residents other than public sector and money creators). Non-residents' holdings are excluded.	All US residents except money creators and federal government. Non-residents' holdings are excluded.	All non-MFIs resident in the euro area, except central government. State and local governments, public corporations and social security funds are included.	Individuals, non-financial corporations, local and municipal government and public corporations. 'Non-financial corporations' includes securities brokers and other institutions that are considered financial corporations in the United Kingdom, but it excludes insurance companies and investment trusts. Non-residents' deposits at Japanese money-creating institutions are included.
Currency concept	National currency only.	National currency only.	Both euro-denominated and foreign currency-denominated instruments are included.	Both yen-denominated and foreign currency-denominated instruments are included.
Types of instrument included (including maturity cut-offs)	Currency in circulation, all deposits (including repos) ^(g) and holdings of certificates of deposit, holdings of other debt securities of up to and including five years' original maturity issued by MFIs.	Currency in circulation, demand deposits, savings deposits, time deposits (under US\$100,000) and retail money market mutual funds (under US\$50,000). Repos and debt securities are excluded. There is no maturity cut-off.	Currency in circulation, all deposits and debt securities with original maturity of up to and including two years, repo agreements and money market fund shares.	Currency in circulation, deposits and certificates of deposit of any maturity. Repos, debt securities and commercial paper are excluded.

(a) Similar information for all OECD countries is available in Organisation for Economic Co-operation and Development (2007).

(b) This is now the broadest measure of money published by the US Federal Reserve Board. Publication of the broader measure, M3, was discontinued in March 2006. For the precise definition of M2 see www.federalreserve.gov/releases/h6/Current/h6.pdf.

(c) Japan also has a broader money measure (L), which is not considered here. The money-creating sector is broader for M3 + CDs than for M2 + CDs and M1. See www.boj.or.jp/en/type/stat/dlong/fin_stat/money/notice/notest31.htm#cdab0020 for the precise definition of M3 + CDs.

(d) These are similar to building societies in the United Kingdom.

(e) For more information about the European Central Bank's specification of the money-issuing sector for the euro area, see European Central Bank (1999) and Lim and Sriram (2003).

(f) These are co-operative regional financial institutions serving small and medium enterprises and local residents. There is also a Shinkin Central Bank.

(g) Sale and repurchase agreements.

measure (M3), but not of UK M4. Accordingly, any bank deposits held by MMFs are excluded from euro-area M3 (as they reflect inter-MFI business), but included in UK M4. If the United Kingdom were to adopt a functional definition of the money-creating sector — thereby adding MMFs — the impact on M4 would be limited. The inclusion of MMFs' shares issued to the UK private sector would raise the level of M4 by around 0.25% (end-July 2007 data), which would be partly offset by the removal from M4 of bank deposits held by the MMF sector.

At present, most individual MMFs would probably have private sector business below the minimum reporting thresholds for UK MFIs (see footnote 3 on page 405), so they would only report a narrow range of data to the Bank on a quarterly basis.⁽¹⁾

(1) Although shares issued by MMFs account for a larger proportion of broad money in other economies (such as the euro area and the United States) than in the United Kingdom, MMFs are among the so-called 'tail reporters' in several euro-area countries. That means they only provide a limited range of data, in some cases at an annual frequency only.

Because a functional definition of the money-creating sector provides more flexibility than an institutional definition, it is, in theory, better at ensuring that broad money measures maintain their relevance as proxies for all financial instruments that act as media of exchange. But in practice, determining which financial institutions to incorporate in a functional definition of the money-creating sector also involves some pragmatic decisions. In addition, when the services provided by some financial institutions change, a functional definition may lead to breaks in time series of monetary data. The US experience with broad monetary aggregates in the 1980s and 1990s helps to illustrate this.⁽¹⁾ Until around 1980, the US money-creating sector was defined on an institutional basis, consisting of commercial banks and non-bank thrifts (similar to UK building societies). Since then, the definition has moved to a functional basis, as money market mutual funds were added to the money-issuing sector. But as some of these funds changed their investment policy, their shares became less substitutable for bank deposits and so less useful as media of exchange. That was particularly the case for institutional money market funds (with initial investments of US\$50,000 or more), which were included in US M3, but not in M2. Consequently, US broad money has been redefined frequently, culminating in the discontinuation of M3 in March 2006, when its level was around 50% higher than that of M2.⁽²⁾

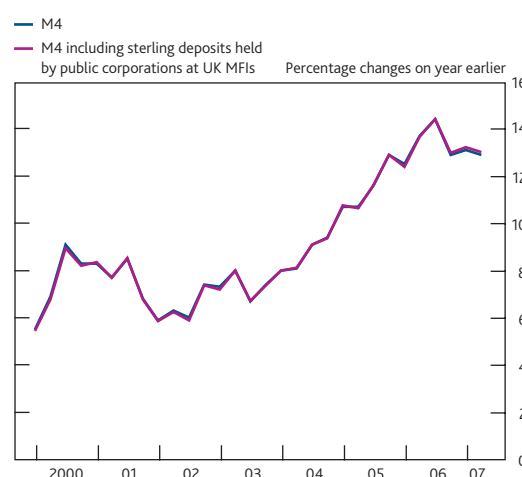
Overall, taking into account the additional costs for reporters and the limited additional benefits to users of moving to a functional definition of the UK money-creating sector, it is the Bank's view that the principle of an institutional approach to the money-creating sector remains appropriate.

The money-holding sector

Once the money-creating sector has been defined — whether on a functional or an institutional basis — a decision regarding the people and institutions which are considered to be holders of money is needed. MFIs are generally defined as lying outside the money-holding sector, as one bank's liability to another bank (so-called interbank lending) cancels out across the whole MFI sector. Although the money-holding sector can be determined as all people and institutions that are not MFIs, it tends to be defined more narrowly in practice. The UK money-holding sector is currently defined as the UK *private* sector other than MFIs, covering: households (including unincorporated businesses, such as sole traders); non-profit institutions serving households (eg charities and universities); non-financial corporations; and all financial corporations except banks and building societies. Some so-called 'other financial corporations' (OFCs) specialise in financial activities that closely resemble those undertaken by banks and building societies. That raises questions about the appropriate boundary between the money-creating and the money-holding sectors, which are explored in more detail in the next section.

Under the current UK definitions of money creators and money holders, the public sector and non-residents are excluded from both.⁽³⁾ But the behaviour of public corporations in particular does not appear to be significantly different from that of private sector corporations. Using data on MFIs' business with public corporations, **Chart 1** shows that inclusion of public corporations in the money-holding sector would have made no material difference to the annual growth rate of broad money in the past decade or so. Despite this negligible impact, the Bank proposes to consider public corporations as part of the money-holding sector in the future, as that treatment now appears more appropriate, without imposing any additional costs on reporting banks or building societies. Under this proposal, MFIs' lending to public corporations would become part of M4 lending,⁽⁴⁾ which is the credit counterpart to M4.

Chart 1 Adding public corporations to money-holding sector^(a)



(a) Quarterly data. Data are not seasonally adjusted.

Non-residents' sterling deposits held at UK MFIs (around £530 billion at end-July 2007) are less likely to be used as a medium of exchange in the United Kingdom than private sector residents' deposits. It is possible that they have some influence: for example, reflecting an increasingly globalised financial system, several hedge funds and other financial institutions are now managed from London on behalf of UK

(1) See Anderson and Kavajecz (1994) for an historical overview of US monetary aggregates.

(2) The Federal Reserve Board argued that: 'M3 does not appear to convey any additional information about economic activity that is not already embodied in M2 and has not played a role in the monetary policy process for many years. Consequently, the Board judged that the costs of collecting the underlying data and publishing M3 outweighed the benefits.' (See www.federalreserve.gov/releases/h6/discm3.htm.)

(3) As noted in the box on page 404, public sector deposits were excluded from broad money (M3) in 1984, to make the M3-holding sector consistent with the holding sectors for narrower measures of money. At that time, it was thought to be unclear whether the economic behaviour of public sector institutions was related to their money holdings in the same way as private sector entities' behaviour. At end-July 2007, public sector sterling deposits were nearly £55 billion (or just over 3% of the level of M4) (see also footnote 2 on page 405). The box on page 406 shows that other economies (eg Japan and the euro area) treat some public sector institutions as money holders.

(4) M4 lending measures bank and building society lending to the UK private sector.

residents, with the institutions themselves remaining non-resident. But since it is not clear to what extent these institutions' deposits at UK MFIs may be used as media of exchange in the UK economy, the Bank intends to continue to exclude non-residents from the money-holding (and the money-creating) sector.

Financial liabilities included in broad money

Despite the United Kingdom's institutional definition of the money-creating sector, functional considerations determine to some extent which liabilities are included in the definition of money. There are three dimensions to consider, namely: the currency, maturity, and geographical origin of these liabilities.

At present, the definition of UK M4 covers MFIs' liabilities in sterling only (as far as these are held by the money-holding sector). Although foreign currency deposits can easily be exchanged into sterling, their nominal value in sterling fluctuates as a result of exchange rate movements, making them less likely to be used as a medium of exchange in the UK economy. The Bank therefore sees no reasons to change the currency coverage of its measure of broad money.

Of the MFI sector's sterling liabilities, only those with an original maturity of five years or shorter are included in the definition of M4, reflecting the assumption that longer-term liabilities are used for savings rather than transactions purposes. So MFIs' debt instruments of over five years' original maturity and shares are excluded from the definition, the latter because money is generally assumed to be of fixed nominal value (at least if held to maturity). The five-year original maturity cut-off for debt securities may be somewhat arbitrary, as evidenced by the two-year maximum in the euro-area's definition of M3. Moreover, the *residual* maturity of debt securities (ie the time left until they reach maturity) is probably a better indicator of the likelihood that they will be used as a medium of exchange, but in practice it is easier for banks and building societies to classify their liabilities by original rather than by residual maturity. On balance, the Bank sees no compelling reasons to move away from the current five-year maturity cut-off point, nor from using the concept of original maturity in its definition of broad money.

Finally, sterling deposits held by the UK private sector at non-resident banks are not included in M4. That reflects the fact that such banks are not UK money creators, as well as uncertainty regarding the potential use of these deposits as media of exchange in the domestic economy. A practical reason for excluding such deposits from M4 is that any data would only become available with a delay of around five months, whereas the current M4 data are available before the end of the month following that to which they refer. For these reasons, the Bank intends to continue to exclude liabilities of non-resident banks from its definition of broad money, in line with the treatment in most other countries.

Proposals to change the boundary between the money-creating and the money-holding sectors

As outlined above, OFCs currently form part of the UK money-holding sector, in addition to households and private non-financial corporations. The OFC sector covers organisations undertaking a wide range of financial activities (see **Table A** for the contributions of various OFC categories to the recent growth in OFCs' sterling bank deposits).⁽¹⁾ For example, finance leasing companies provide funding for the purchase of tangible or real assets by households or other companies. Securities dealers typically assist other companies in issuing new securities, by underwriting the issues or arranging their sale to investors, or trade on their own account in existing securities. Deposits held by insurance companies and pension funds form an integral part of their investment portfolios and can be used to purchase other financial assets.

Table A Contributions to annual growth in OFCs' sterling bank deposits (percentage points)^(a)

OFC category	2004	2005	2006	2007
Securities dealers	0.0	2.5	4.2	3.7
Finance leasing and factoring companies	0.5	0.4	0.1	0.0
Institutional investors ^(b)	6.1	7.9	1.8	5.2
Mortgage housing and credit corporations, non-bank credit grantors	3.1	0.5	2.6	-0.3
Bank holding companies	1.2	1.0	2.0	1.0
Other activities auxiliary to financial intermediation	8.7	9.6	-1.2	-1.5
Credit unions and financial intermediaries not classified elsewhere	-0.4	9.1	16.2	19.4
All OFCs (per cent)	19.3	30.9	25.7	27.4

(a) Figures are for the final quarter of each year, except 2007, which shows data for Q2. Contributions may not sum to totals due to rounding. Data are not seasonally adjusted.

(b) Insurance companies and pension funds; money market funds; investment and unit trusts; and fund managers.

The OFC sector also includes companies that are created or structured to facilitate the smooth functioning of the financial system. These OFCs mainly provide intermediation services to banks and building societies, effectively replacing transactions that would otherwise be undertaken between MFIs directly (ie inter-MFI business). That may argue for excluding these OFCs from the money-holding sector, and therefore removing their deposits, in line with inter-MFI deposits, from the monetary aggregates. Broadly speaking, three different types of OFCs can be considered for exclusion from the money-holding sector: central clearing counterparties; special purpose vehicles and limited liability partnerships used for securitisations; and bank holding companies.

(1) This breakdown by OFC category is only available for sterling deposits held at banks, not for M4 as a whole. Deposits held at building societies and debt instruments of five years' original maturity or shorter issued by MFIs are not included in the table, but their impact on OFCs' M4 is generally small (see Golcher and Walls (2005)).

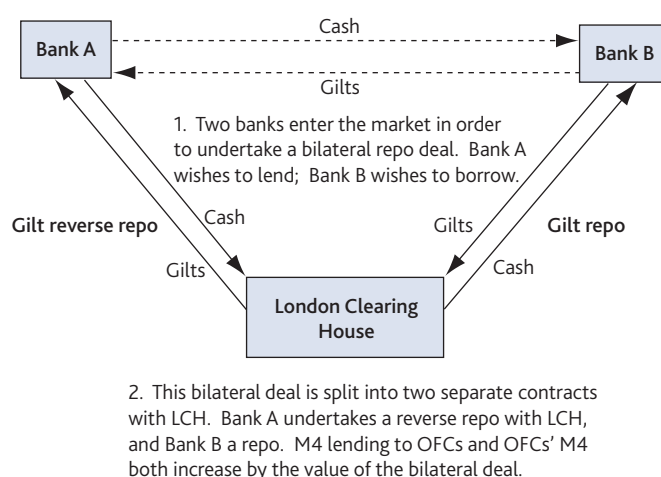
Central clearing counterparties

Central clearing counterparties mainly serve to facilitate the settlement of bilateral securities transactions (eg the sale and purchase of equities, bonds or other securities between two parties).⁽¹⁾ The LCH.Clearnet Group is the leading central clearing counterparty in Europe. Its UK operation (commonly known as the London Clearing House (LCH)) has been acting as an intermediary in the gilt repo market since August 2002,⁽²⁾ through its RepoClear service. This service allows banks to net off their gilt repo and reverse repo transactions with LCH (essentially bank deposits and loans secured by collateral included in M4 and M4 lending respectively), thereby reducing both sides of their balance sheets. In addition, because banks deal with one counterparty only, rather than many different ones, their settlement risk and trading costs are likely to be lower.

Any organisation wishing to trade via RepoClear has to become a member. Currently, most members are banks resident in the United Kingdom, with the remainder consisting of banks resident in other countries and UK OFCs (such as securities dealers). So the majority of RepoClear's business is likely to reflect intermediation between UK banks. Before the introduction of RepoClear, banks would undertake gilt repos in a single transaction directly with other banks. That would reflect pure interbank lending, which should not and did not affect the monetary aggregates. Because LCH is currently treated as part of the (money-holding) OFC sector, its intermediary role in such gilt repo transactions affects both M4 and M4 lending. A typical transaction involving LCH is shown in **Diagram 1**. When two banks, which are both members of LCH, agree a gilt repo transaction, that transaction is replaced by two separate transactions: a reverse repo from Bank A to LCH (which leads to a rise in M4 lending), and a repo from Bank B to LCH (raising M4). So even though banks are the ultimate counterparties at both ends of these transactions, they are recorded in the monetary statistics as business between banks and the OFC sector. If banks were able to look through such transactions, they would be recorded as interbank business, without any impact on the monetary aggregates. The fact that banks cannot look through transactions with LCH is not an issue in cases where LCH acts as intermediary between a UK bank and a UK OFC as the ultimate counterparty: that type of business is (and should be) captured in M4 and M4 lending data.

In light of the above analysis, the Bank thinks that there are good reasons to exclude central clearing counterparties from the money-holding sector, at least as far as their business reflects interbank activities. That would require such central clearing counterparties to start reporting data to the Bank of England, in line with banks and building societies. Further work is, however, needed to assess the feasibility of this

Diagram 1



proposal, as there are likely to be various legal and practical constraints, as well as cost considerations.

Special purpose vehicles used for securitisations and covered bond limited liability partnerships

A second candidate group for exclusion from the money-holding sector consists of securitisation special purpose vehicles (SPVs) and covered bond limited liability partnerships (LLPs). They are also classified as OFCs and have played a growing role in the financial system in recent years — in particular SPVs. Banks (and, to a lesser extent, building societies) have used such vehicles as a source of funding for assets they have originated and as a mechanism to transfer risk off their own balance sheets, thereby freeing up their own capital for other uses.⁽³⁾ SPVs are separate bankruptcy-remote legal entities set up by a bank (and often operated by that bank under a service agreement), which typically issue bonds or shorter-term paper to investors to fund assets transferred from the originating bank's balance sheet. These bonds are secured by these assets, with the originator often retaining a residual equity stake. This whole process is referred to as securitisation. By transferring assets to the SPV, the bank frees up capital to support further lending and is typically able to fund the assets more cheaply than if they were held on its own balance sheet. The box on page 410 explains the different securitisation structures operating in the UK financial system as well as some typical SPV transactions in more detail.

In recent years, UK banks and building societies have increasingly chosen to use limited liability partnerships (LLPs) for funding and risk transfer of assets. The main difference between securitisations through SPVs and LLPs is that, in the

(1) See also Gieve (2007).

(2) The market for sale and repurchase of UK government bonds (gilts).

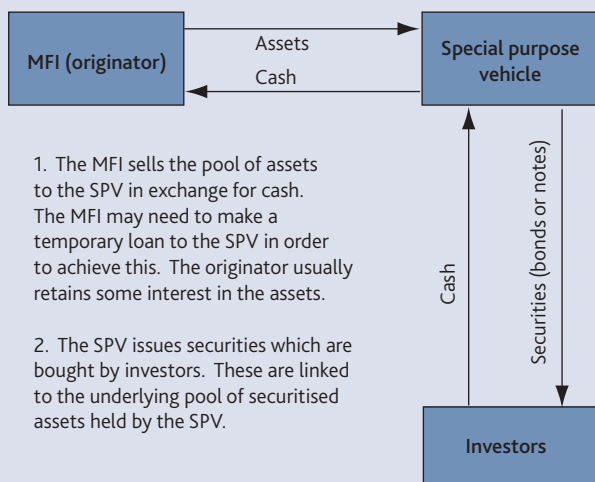
(3) In principle, SPVs can also be created to hold assets that have been removed from the balance sheets of non-financial corporations or government units, but in the United Kingdom most SPVs hold assets that were originated by MFIs. More recently, SPVs have also been set up to deal with securitisations where the assets remain on the bank's balance sheet.

Examples of effects of securitisation SPVs on monetary aggregates

Securitisation of assets in the United Kingdom has grown rapidly in recent years, with total gross issuance of asset-backed securities by MFIs increasing from around £15 billion in 2000 to around £120 billion in 2006. Securitisation activity has led to significant restructuring of MFI balance sheets. Because M4 and M4 lending are compiled directly from the consolidated balance sheet of MFIs, both have been affected by these developments. This box explains the broad mechanics of securitisation, setting out the potential impact on the monetary data.

In a conventional ('true sale') securitisation, the MFI creates a special purpose vehicle (SPV), to which it transfers a portfolio of assets: these may be residential mortgages, credit card loans, corporate loans, or more exotic assets (**Diagram A**). The SPV issues bonds or notes to investors, which are linked to the reference pool of assets, and passes on the cash raised to the originating MFI. This achieves a maturity transformation for the MFI, replacing some illiquid assets with cash, as well as reducing its market risk and entitling it to regulatory capital relief.

Diagram A



Securitised assets can be reported on or off the originator's balance sheet: the treatment depends on a combination of the structure used and the accounting standards applied in reporting the balance sheet.⁽¹⁾ Take the case when the securitised assets are reported off the balance sheet. In this instance, M4 lending is reduced because the assets (which would have counted as M4 lending if they had remained on the balance sheet) have left the consolidated balance sheet of the MFI sector and been transferred to the SPV (which is an OFC). In contrast, there is no corresponding

impact on M4: any bonds issued by the SPV do not count as 'money' since SPVs are not part of the money-creating sector. That is the case even though in practice there may be little difference between these bonds and similar bonds issued by MFIs themselves, which are included in money when their original maturity is shorter than five years. In this respect, there is an asymmetry in the impact that securitisation has on the monetary data.

When securitised assets are left on the originator's balance sheet, broad money may be affected. In these so-called synthetic securitisations, the originating MFI chooses not to undertake a true sale of the securitised assets, usually to avoid legal costs associated with a true sale. Although the assets remain on the MFI's balance sheet, the main aim of such securitisations is to achieve risk transfer and therefore obtain regulatory capital relief for the MFI. The SPV issues credit-linked notes or bonds, and the risk transfer from the MFI to the SPV is carried out using credit derivatives, usually a credit default swap.⁽²⁾ The SPV may place the proceeds from the issuance of the credit-linked notes on deposit with the MFI, thus affecting M4 directly. That deposit may be used to pay the SPV's liabilities to the holders of the notes as they fall due.

(1) One important aspect to note here is the recent shift in banks' reporting from UK Generally Accepted Accounting Principles (GAAP) to International Financial Reporting Standards (IFRS). Within IFRS, IAS 39 has a tendency to encourage greater recognition of securitised assets on the balance sheet. As a result, there has been some grossing up of MFI balance sheets as IFRS reporting has become more common in the United Kingdom over the past few years.

(2) Through a credit default swap, the originating bank transfers its credit risk on a portfolio of assets to the SPV, without the assets themselves being transferred to the SPV. The bank effectively obtains an insurance policy from the SPV, which makes a payment to the bank when so-called credit events take place, such as some (or all) of the assets going into arrears or defaulting.

latter structure, the banks themselves (rather than the SPVs) continue to hold the assets and issue the so-called covered bonds which are secured against them. The LLP effectively only comes into operation in case the issuing bank defaults, thereby providing additional security to investors in the bonds.

Due to their close relationship with banks, securitisation SPVs and covered bond LLPs undertake many transactions with banks, which directly feed through to the money and credit aggregates in the United Kingdom. Viewed in isolation, securitisation SPVs can affect the monetary aggregates in four main ways. First, the transfer of loans from the originating bank's balance sheet to that of an SPV leads to a fall in M4 lending. Second, an SPV may place the interest receipts on the assets purchased from its bank on deposit (raising M4), until the SPV's interest payments to bondholders are due. Third, an SPV or a covered bond LLP can fund (part of) the purchase of bank assets with a loan from the same bank (included in M4 lending), which would partly offset the fall in M4 lending caused by the transfer of the assets to the SPV.⁽¹⁾ Once the SPV has issued its bonds, the loan can be repaid. Finally, in so-called synthetic securitisations, assets are not transferred from a bank's balance sheet to that of an SPV. Instead, an SPV issues bonds to investors, and gains credit exposure via a credit default swap with its parent bank.⁽²⁾ The SPV may then hold the proceeds of the bond issuance in the form of a high-quality liquid asset, for example a bank deposit (leading to a rise in M4), which can be used to pay interest on the bonds.

In general, although both securitisation SPVs and covered bond LLPs purchase loan portfolios from banks, the Bank's analysis over the past year or so has shown that neither undertake any independent lending activity. They do not transform portfolios of assets, nor do they directly provide financial services to units other than the banks or building societies they deal with. The Bank proposes to exclude securitisation SPVs and covered bond LLPs from the money-holding sector. Further work on the practical feasibility of this proposal will be necessary.

Bank holding companies

This OFC category covers holding companies which are not themselves part of the UK banking sector, but whose main subsidiaries are UK banks. The main purpose of these holding companies is to control the activities of their bank group members, and they generally do not undertake much business outside their group. Deposits held by such holding companies at their bank subsidiaries probably reflect transfers of funds around the group. It is not clear that they reflect an immediate intention to finance transactions. The Bank therefore proposes to exclude bank holding companies from the money-holding sector.

The impact of OFCs that intermediate between MFIs

Overall, the Bank's review of the definition of M4 undertaken over the past year suggests that these three types of OFCs should be excluded from both the money-holding and the money-creating sectors. That would bring the UK approach more in line with that adopted in Japan (see the box on page 406). Currently, separate data on deposits held by central clearing counterparties, securitisation SPVs and covered bond LLPs are not available. But the Bank does collect quarterly data on bank deposits from (and bank lending to) over 40 financial and non-financial industries; bank holding companies are identified as a separate industry.⁽³⁾ That industrial breakdown can be used to give a rough guide to the importance of deposits held by OFCs that intermediate between MFIs.

Banks' business with central clearing counterparties (including LCH) is covered in the industrial category 'other activities auxiliary to financial intermediation', which consists of 'financial corporations that engage in activities closely related to financial intermediation, but do not act as intermediaries themselves' (International Monetary Fund (2006)). For illustrative purposes, this article assumes that *all* deposits held by companies in the 'other activities auxiliary to financial intermediation' category represent deposits reflecting interbank business by central clearing counterparties. But because not all gilt repos between banks and LCH ultimately reflect interbank business, this is likely to be an overestimate. Further work would be needed to ensure that the Bank obtains better estimates of central clearing counterparties' deposits that reflect interbank intermediation.

Securitisation SPVs and covered bond LLPs are also not distinguished as a separate industry in the Bank's current data-collection systems. Those entities involved in the transfer of mortgages are part of the industrial category 'mortgage and housing credit corporations'. Similarly, SPVs and LLPs that engage in securitisations of consumer credit are part of the category 'non-bank credit grantors'.⁽⁴⁾ So again, for illustrative purposes, this article assumes that all deposits held by mortgage and housing credit corporations, as well as by non-bank credit grantors, capture the intermediary role of SPVs and LLPs. In contrast, the Bank has good data on deposits held by bank holding companies, as they are a

(1) A similar effect occurs when the bank transferring assets off its balance sheet to an SPV maintains a small ownership in the portfolio. That ownership is usually obtained via an investment in the SPV.

(2) See Tucker (2007) and the box on page 410 for more elaborate analysis of such synthetic securitisations.

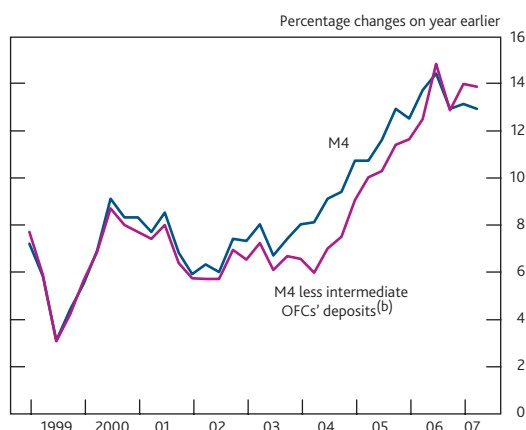
(3) See www.bankofengland.co.uk/statistics/abl/current/index.htm for the latest statistical release of these data.

(4) Due to the smaller size of securitisations of corporate loans in the United Kingdom, SPVs used for these securitisations are likely to form only a small part of 'other financial intermediaries not classified elsewhere'. So that category is not considered further in this article.

separate category in the Bank's industrial deposit breakdown already.

On the basis of these illustrative assumptions, **Charts 2** and **3** give a rough guide to the impact of deposits held by those OFCs that intermediate between MFIs on aggregate and OFCs' M4 respectively. Overall, the profile of accelerating M4 and OFCs' M4 over the past two years would still apply, though annual growth would generally have been slower if all deposits held by these OFC categories had been excluded from M4.

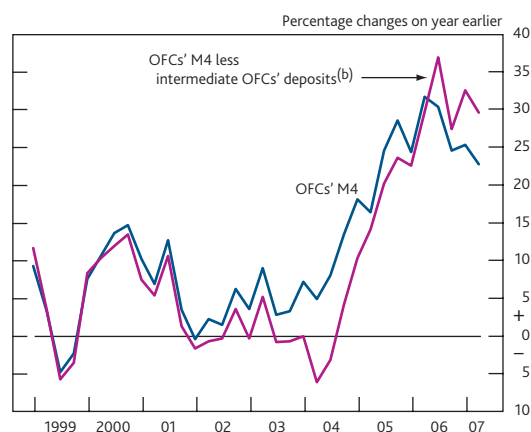
Chart 2 Impact of specific OFCs on broad money^(a)



(a) Quarterly data. Data are not seasonally adjusted.

(b) Aggregate M4 excluding bank deposits held by: other activities auxiliary to financial intermediation; mortgage and housing credit corporations; non-bank credit grantors; and bank holding companies.

Chart 3 Impact of specific OFCs on OFCs' M4^(a)



(a) Quarterly data. Data are not seasonally adjusted.

(b) OFCs' M4 excluding bank deposits held by: other activities auxiliary to financial intermediation; mortgage and housing credit corporations; non-bank credit grantors; and bank holding companies.

If, following the analysis over the past year and feedback from readers, the Bank decides to exclude the above three types of OFCs from the money-holding sector, the Bank would aim to collect separate data for them. That would imply significant changes to the Bank's data-compilation system. The Bank would assess any changes to the reporting burden against the benefits of collecting separate data for these OFCs.⁽¹⁾ Inevitably, that process would take some time to implement.

Conclusion

This article has explained that, although there is a broad consensus about the theoretical concept of money, measuring it in practice is not straightforward, as evidenced by frequent changes in the definition of money over time. To maintain its relevance, money should be defined in a way that approximates the theoretical concept of a medium of exchange as closely as possible. In a rapidly evolving financial system, there is a need to review regularly which financial instruments should be considered money and which ones should not. An important step in that process is to consider the boundary between the money-creating and the money-holding sectors. This article proposes to move that boundary by excluding some OFC categories from the money-holding sector and by adding public corporations to it, although additional work would be required before such changes could be implemented in the future. Other changes to the Bank's measure of broad money are not warranted at present, on cost-benefit grounds. **Table B** summarises the main issues discussed in this article, together with the Bank's proposals for dealing with them.

Table B Summary of Bank's proposals to modify its definition of broad money

Issue	Bank's proposal
1) Definition of the money-creating sector	Maintain the institutional approach to the definition, because moving to a functional approach would have a small impact on the data, which would not justify the additional cost.
2) Public corporations: money holders	Public corporations to become part of the money-holding sector, as they do not behave differently from private sector corporations.
3) Non-residents: money holders	Continue to exclude non-residents from the money-holding sector, since it is not clear whether their deposits at UK MFIs are to be used as media of exchange in the UK economy.
4) Non-resident banks: money creators	Continue to exclude non-resident banks from the money-creating sector, as that sector covers UK-resident institutions only. Deposits held by the UK private sector at non-resident banks are less likely to be used for transactions in the UK economy, and would mean longer time lags in data collection.
5) Currency coverage of broad money	Continue to exclude foreign currency deposits from broad money, given uncertainty about their use for UK transactions.
6) Maturity cut-off for liabilities in broad money	Maintain the five-year maturity cut-off point for sterling liabilities, as the benefits of making changes are unlikely to outweigh the costs.
7) Residual or original maturity of liabilities in broad money	Continue to use the original maturity concept, as the benefits of making changes are unlikely to outweigh the costs.
8) Central clearing counterparties: money holders	Exclude central clearing counterparties from the money-holding sector, subject to further work and legal constraints.
9) Securitisation SPVs and covered bond LLPs: money holders	Exclude securitisation SPVs and covered bond LLPs from the money-holding sector, subject to further work.
10) Bank holding companies: money holders	Exclude bank holding companies from the money-holding sector.

The Bank of England would like to receive feedback from readers of the *Quarterly Bulletin* on the proposals presented in

(1) For details of the Bank's statistical cost-benefit assessment framework, see Bank of England (2006).

this article, as well as on other issues discussed here. Readers are invited to send their views to: the Head of the Monetary and Financial Statistics Division, Bank of England, Threadneedle Street, London EC2R 8AH, or via email to: qbmoney@bankofengland.co.uk, by the end of December at

the latest. Depending on the feedback received, the Bank will organise a workshop to discuss the proposals in 2008. Readers interested in attending such a workshop should contact the Bank at the address above.

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Asset pricing implications of a New Keynesian model

Summary of Working Paper no. 326 Bianca De Paoli, Alasdair Scott and Olaf Weeken

Macroeconomic models are widely used for policy advice. They are designed so that the behaviour of the model economy broadly matches that observed in economic data. But in many cases their implications for asset prices are not well understood. In particular, even though risk is an aspect of everyday life, these models tend to be silent about risk premia, ie the extra return investors require on risky assets, such as shares, to provide over and above the return obtainable from a riskless asset. Given the prominence of such models in policy advice, it is important that we develop a better understanding of their implications for asset prices. This paper investigates how asset prices are linked to the sources of economic uncertainty and the structure of the macroeconomy.

The model analysed in this paper is a typical macroeconomic model, a so-called New Keynesian model. It depicts optimising households and firms operating in goods and labour markets that exhibit some monopolistic behaviour. Also, in this framework, rigidities prevent real variables, such as consumption, labour and investment, and nominal variables, such as prices, from instantaneously adjusting to economic disturbances. In contrast to the optimising behaviour of households and firms, the central bank is assumed to follow a simple rule in which it adjusts a short-term interest rate to bring inflation back to target. The model represents a so-called closed economy in which households do not trade goods or assets with the outside world. Households can invest in a domestic equity index, nominal and real bonds of different maturities and a risk-free asset. Households use these financial assets to smooth consumption over time, selling assets to finance consumption when times are bad and

purchasing assets when times are good. There are two sources of uncertainty considered in the paper: a temporary increase or decrease in productivity and a temporary deviation by the central bank from its usual behaviour. Contrary to many works in the literature, the model is solved in a way that takes account of the effects of uncertainty on the economy, thus capturing the different risk premia associated with the assets under consideration. This implies that the size and sign of these risk premia depend on how well an asset helps households to smooth consumption and the quantity of risk present in the economy. Assets that are expected to pay well in bad times when growth is expected to be low are more highly valued than assets that are expected to pay well in good times. This is the familiar result that risk premia depend on the comovements between economic variables and asset returns.

The paper demonstrates how risk premia are linked to the two sources of uncertainty and the rigidities in the model. In particular, the paper highlights that because different economic shocks imply different comovements between asset returns and growth, the source of shocks will be an important determinant of risk premia. It also demonstrates how the size of these premia depend on how the economy deals with uncertainty, which in turn depends on the form of economic frictions and rigidities present in the economy. For example, real rigidities that prevent goods and labour markets adjusting after shocks will increase risk premia regardless of the source of the shocks. On the other hand, nominal rigidities, that slow down price adjustment to shocks, increases risk premia when the economy is hit by productivity shocks, but reduces risk premia in the presence of monetary policy shocks.

A model of market surprises

Summary of Working Paper no. 327 Lavan Mahadeva

The bulk of evidence suggests that some combination of improvements in the monetary policy making institutions (more transparency, enhanced credibility and stronger accountability), consolidation in fiscal policy, a more benign international economic environment and technological improvements in the dissemination of data releases has reduced interest rate volatility in the United Kingdom in the 1990s. But it is difficult to isolate the role of transparency by itself in reducing interest rate volatility. Still, arguably, the incidence of market surprises is greater than one might expect given the extent of these improvements. Might this be because transparency affects surprises differently when it has improved from low levels than when further improvements are made at high levels of transparency? To help answer this question, this paper presents a theory to link improvements in transparency to how well financial markets predict policy rates.

In the paper, policymakers may have a different interpretation to private agents as to what an economic shock means for interest rates, even though data is commonly available. There is then a role for policy announcements (both the interest rate decision and the surrounding explanations) to act as a beacon communicating information to agents about the policymakers' preferences. Policymakers take account of this feature when they determine first, how to set interest rates and second, in choosing how transparent they want to be in explaining that decision.

What determines how transparent policymakers want to be with their explanations? The paper shows that policymakers are more likely to be transparent in their explanations if they follow a transparent objective. The paper describes an improvement from a bad regime where policymakers are allowed to follow their own secret, unpredictable inflation objective to a good regime where the inflation target is publicly known and fixed. Policymakers in bad regimes will be inclined to also be less transparent in explaining their actions while policymakers in good regimes have a strong incentive to be transparent about their explanations.

Improving transparency in objectives typically lowers the volatility of market interest rates and implies less market surprises. But the paper also shows that this happens at a decreasing rate; improvements in transparency from already high levels have less effect on reducing the likelihood of market surprises than when transparency is improved from very low levels. At high levels of transparency, agents rely more on the cleaner signal and this results in greater sensitivity of agents' expectations. This feeds back onto interest rates offsetting the effects of greater transparency. In general, though, improving transparency leads to more precisely formed inflation expectations. In this sense greater transparency is good for welfare.

Cash-in-the-market pricing and optimal resolution of bank failures

Summary of Working Paper no. 328 Viral Acharya and Tanju Yorulmazer

The idea that rescuing troubled banks can create incentives for excessive risk-taking is widely spread. However, empirical evidence suggests that regulatory actions taken in response to banking problems vary significantly. In many episodes, regulatory actions appear to depend on whether the problems arise from idiosyncratic reasons specific to particular institutions or from aggregate reasons with potential threats to the whole system. When faced with individual bank failures, authorities usually seek a private sector resolution, whereas government involvement is an important feature of the resolution process during financial crises that affect a significant portion of the banking industry, that is, during crises that are systemic in nature. We argue in this paper that this difference in regulatory actions arises from the fact that resolution options open for an isolated failure of a single institution are different from those available when facing a systemic failure. When only a few banks fail, these banks can be acquired by the surviving banks. However, when the crisis is systemic, that is, for a large number of failures, the liquidity of surviving banks may not be enough for them to acquire all failed banks at the full price. This may lead to the price of failed banks' assets being determined by the available liquidity in the market, resulting in 'cash-in-the-market' pricing of failed banks' assets. Furthermore, during systemic crises, it is more likely that investors outside the banking sector, who are liquidity endowed but potentially not the most efficient users of these assets, end up purchasing some failed banks' assets, leading to social welfare losses associated with the misallocation of banking assets.

Thus, when the banking crisis is systemic in nature, there are 'too many (banks) to liquidate' and bailing out some of the failed banks by the authorities may be optimal in order to avoid allocation inefficiencies. However, this bailout policy may be suboptimal, because it may induce banks to herd by lending to similar industries or betting on common risks such as interest and mortgage rates, in order to increase the likelihood of being bailed out. This in turn increases the likelihood of experiencing systemic banking crises in the first place. We show in this paper that other regulatory options such as the provision of liquidity to surviving banks to be used in acquiring failed banks' assets can mitigate this problem. We show that this policy is equivalent to the bailout policy, but gives banks incentives to differentiate, rather than to herd.

In this paper, we formalise these ideas in a framework wherein the optimal bank failure resolution policies and the cash-in-the-market pricing are endogenously derived. We consider a variety of resolution policies that broadly cover the entire spectrum of policies employed by regulators to resolve bank failures. In particular, failed banks may be closed, in which case their assets are sold to surviving banks and outsiders at market-clearing prices, or failed banks may be bailed out, in which case their owners are allowed to continue operating the banks. The regulator may also provide liquidity to surviving banks to be used in acquiring failed banks' assets. We show that by virtue of assisting surviving banks in acquiring more failed banks, the liquidity provision policy increases the anticipated surplus for banks in states with cash-in-the-market prices. In turn, this mitigates banks' incentives to herd.

The impact of yuan revaluation on the Asian region

Summary of Working Paper no. 329 Glenn Hoggarth and Hui Tong

This paper aims to analyse how an appreciation of the yuan affects the exports of other Asian countries, by controlling for the rapid change in the structure of China's exports.

China has increasingly been acting as a 'world factory' since the early 1990s. Because of this, if China's exports fall following a yuan appreciation, then its demand for upstream intermediate and capital goods may decline as well, even if these imported goods become less expensive. Therefore, it is possible that yuan appreciation will have a much smaller positive impact (or perhaps even a negative one) on the trade surplus of high-income Asian capital-goods exporters than on low-income Asian consumer-goods exporters — a hypothesis that this paper will examine.

There is extensive empirical research on how exchange rate movements affect the trade balance in general and those of Asia and China in particular. But the literature so far has shared a limitation: the estimation tends to be based on a relatively long historical period (25 years or more). But there has been a significant change in the structure of international trade, and of Asian trade in particular, over this period. This paper aims to fill this gap by using a panel estimation that uses

a large data sample that controls for the change in the commodity structure of trade.

Bilateral export and import equations are estimated between China and nine Asian countries: India, Indonesia, Japan, Korea, Malaysia, Pakistan, the Philippines, Singapore, and Thailand since the early 1990s. Competition between China and these countries in third markets is also estimated.

Three related empirical models are examined: China's own exports, China's imports, and the competition between Asian countries and China in third markets. The results are consistent with the supply-chain story, whereby China imports capital goods from advanced Asian countries to facilitate the production of consumer goods exported to third markets. When the yuan appreciates, China's exports fall, which then reduces China's demand for upstream capital goods. Consequently, exporters of mainly capital goods to China, such as Japan and Korea, are found to be adversely affected by a yuan appreciation. There is also little evidence that Asian countries benefit from yuan's appreciation in their exports to third markets.

Escaping Nash and volatile inflation

Summary of Working Paper no. 330 Martin Ellison and Tony Yates

This paper builds on a story Tom Sargent told in his book *The conquest of American inflation*. That book seeks to explain the rise and fall of inflation in the United States and provides a cautionary tale for those who are confident that inflation will not rise again in the future. The story involves a monetary authority that sets policy believing, incorrectly, that higher inflation can buy permanently lower unemployment. The monetary authority takes a model like this to the data and updates its estimates of this long-run trade-off. In the model, inflation is high when high inflation appears to buy lower unemployment: when the benefits of high inflation appear greatest. Inflation is low when it appears to the central bank that unemployment is unrelated to inflation. Unbeknownst to the policymaker in this model, only surprises in inflation — differences between what was expected by the private sector in the model, and the outcome — affect unemployment. Periodically, unobserved shocks come along that offset ‘mistakes’ that the central bank makes setting inflation, and this makes it look to the central bank as though inflation has no effect on unemployment. So the central bank chooses low inflation.

Our modification to this story is to adapt Sargent’s model to explain why the volatility of inflation seems to be high when the level of inflation is high, and *vice versa*, a matter on which the original model is necessarily silent. We add a shock to the model which the central bank sees, but to which the private sector cannot react, and which the central bank seeks to offset using its inflation policy. This shock brings the model a little closer to reality, since it is likely that monetary policy has in the past sought to help stabilise inflation and the macroeconomy. In our model, at times when the central bank thinks the benefits to high average inflation are greatest, it also thinks it can use inflation to stabilise unemployment more effectively, and therefore chooses not only high inflation, but also volatile inflation. Conversely, when it appears to the monetary authority that high inflation does not buy any

reduction in long-run unemployment (when the trade-off appears to be vertical), it chooses not only low inflation, as in the original Sargent model, but also more stable inflation, since it sees no point in trying to use inflation to offset the shock to unemployment.

We also document that escapes from high and volatile inflation to low and stable inflation in our model are less likely if the variance of the observed shock to unemployment is high. A rough intuition for this effect is that the more variable is the observed shock to unemployment, the more variable the central bank chooses inflation to be. This generates larger inflation surprises, and those surprises translate into larger movements in unemployment. What the central bank sees is a strong correlation between inflation itself and unemployment, making the long-run trade-off look promising for the central bank, and that reinforces its belief in the benefits of high and volatile inflation (which it incorrectly thinks will translate into low unemployment). The only thing that can undo this correlation in the model is the unobserved shock to unemployment. If this shock is large enough, then from time to time, it can offset the effect of an inflation surprise on unemployment and eliminate the correlation the central bank sees between inflation and unemployment. But the more variable is the observed shock relative to the unobserved shock, the less powerful the latter is in wiping out this correlation. If we were to take this model to the real world, then this feature would suggest that part of the reason inflation became lower and more stable was because the volatility of observed shocks to the supply side fell.

Taken literally, the model has the rather gloomy prediction for the future that there will forever be bouts of high and volatile inflation. But what our model misses out, like the Sargent model it derives from, is the revolution in the institutional design and economic understanding underpinning monetary policy that took place in recent decades.

Wage flexibility in Britain: some micro and macro evidence

Summary of Working Paper no. 331 Mark E Schweitzer

Increased wage flexibility was often cited as the main reason behind weaker inflationary pressures in the 1990s. Wage flexibility can be defined as either a micro or macroeconomic concept; each is quite distinct, although potentially related. For example, in a Phillips curve an increase in macroeconomic wage flexibility is often captured by a larger wage response for a given unemployment rate. On the other hand, increased microeconomic wage flexibility is usually identified by the lack of evidence for wage rigidities, such as limited evidence of a spike in the distribution of wage changes at zero. An abundance of zero wage changes in the data might indicate an inability to adjust wages in a timely manner.

This paper uses data from the British New Earnings Survey from 1975–2000 to derive both macro and micro measures of wage rigidities. Because the data span a 26-year period, the behaviour of micro and macro flexibility measures can be compared over time. In addition, we can investigate whether there is any evidence that the behaviour of either measure of flexibility has shifted over time.

To keep the analysis simple, we consider whether there has been a one-off shift in wage flexibility. Regional wage rates do not appear to have been more responsive to regional unemployment levels in the 1990s than in earlier years. Instead, estimates focusing on the 1990s reveal no statistically significant aggregate wage response to regional unemployment levels. The overarching conclusion is that macroeconomic tests leave much to explain, but the estimates have revealed some patterns that are worth trying to reconcile with other sources of evidence.

In individual-level wage data, there is evidence of so-called nominal wage rigidity. In contrast to previous findings, the evidence is generally stronger for the latter half of the sample period. The degree of nominal wage rigidity is somewhat smaller than found in related research using data for the United States over the full sample period, but the estimates over the recent past are similar. The evidence of nominal rigidities is somewhat surprising in the light of the popular view that the UK labour market has become gradually more flexible.

Speeches



The Governor's speech⁽¹⁾ to CBI Wales/CBI Cymru, Cardiff

Chairman, First Minister, Ladies and Gentlemen,

Two years ago I spent a few days walking along Offa's Dyke. Up on the ridge, between Hay and Pandry, there is a magnificent 360° view. The patchwork quilt of green fields in England lies to the east. But the eye is drawn to the rugged and spectacular scenery of the Black Mountains in 'Wild Wales' to the west. The landscape, however, is not everything because as George Borrow wrote in 1862:

'Wales has something beyond wonderful scenery, its eventful history, and its illustrious men of yore to interest the visitor. Wales has a population, and a remarkable one.'

It is a population that has had to adapt to great changes in the world economy over the past century and continues to do so today. You need only look outside at the Cardiff Bay development to see the way the Welsh economy has changed.

When you take a flight, the aircraft may well have wings made in Wales. Your car might have a Welsh engine and be insured in Cardiff. And when you holiday in France your morning croissant has probably been baked in an oven made in Swansea.

What happens in Wales matters for the UK economy. That is why the Bank of England has a team who live and work in Wales. Last year our Agents — Adrian and Ian — drove 30,000 miles to talk face-to-face with you. The rugged scenery is, I suspect, less appealing to them as they wind their way — slowly — through the valleys and mountains. When you talk to them, you are speaking to the Monetary Policy Committee at only one remove before it sets interest rates.

On this occasion, I am not in Wales to enjoy the scenery. I am here to listen to your views at first hand. But tonight I want to explain.

Over the past year Bank Rate has risen four times to reach 5½%. A year ago, few expected that to happen — markets thought that by now Bank Rate would be only 4¾%. Market expectations of where Bank Rate will be at the end of this year have risen from 5% in the middle of last year to 6% now. So what has happened over the past twelve months?

The right place to start is with inflation — that is, after all, the Bank of England's target. A year ago inflation was bang on the 2% target. The latest figure — for April — is 2.8%. In recent months inflation has been volatile, rising to above 3% in March, when I had to write an open letter to the Chancellor, and subsequently falling back. The number for May, to be published tomorrow, is awaited with interest. Many column inches have been devoted to these short-run movements. But, because it takes some time before changes in Bank Rate affect inflation, it is important that the Monetary Policy Committee look through this short-run volatility and try to understand where inflation might be heading in the medium term.

That poses a real challenge. None of us can foresee the future. To assess the likelihood of different possible outcomes for inflation, we examine all the available information — official statistics, business surveys, and reports from around the country, including those from our team in Wales. Then we make a judgement about the outlook for inflation.

That judgement cannot be made on the basis that just because certain developments seem to have forecast inflation in the past they will do so again. Such correlations are not stable over time. We have to try to discover the driving forces behind the mosaic comprising all the different pieces of information that we examine each month. To understand what is likely to happen in the economy, we have to behave like the child who cannot stop asking 'why?' Why is output growing so steadily? Why did recorded employment fall last quarter? Why are money and credit rising so rapidly? Why have oil prices picked up? And each answer inevitably provokes another question 'why?' So setting interest rates is not straightforward.

Our job, in fact, is rather like taking part in a 'spot the ball' competition. Although the *Western Mail* and the *South Wales Echo* stopped running such competitions in 1992 — at the same moment that the inflation target was being introduced — I am sure many of you will remember that in those competitions the key piece of information, the location of the ball or, in our case, the outlook for inflation, is missing. You are shown the position of the players from which you have to deduce the position of the ball. That is no easy matter. To pinpoint the ball you need to ask: why is that player jumping?

(1) Given on 11 June 2007. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech311.pdf.

Or why is that player looking there? Only when you have identified the factors to which the players are responding can you try to spot the ball itself. And obviously in our case there is rather more than guesswork involved.

In essence, each month the Monetary Policy Committee is trying to identify the changes in the driving forces to which the economic data are responding. Those changes are described, somewhat obscurely by economists, as 'shocks'. That is not to say they are necessarily sudden, violent upheavals. 'Shocks' are forces that stop the economy running with clockwork regularity. They are the answer to the question 'why?'

The Monetary Policy Committee is constantly engaged in an exercise of 'spot the shock'. Without understanding why the economy is moving in the way that it is, we cannot gauge correctly where it might be going and hence set the right course for interest rates. There is no mechanical link between any piece of data and inflation — despite the impression often created by newspaper headlines. Policy cannot be set by a simple scorecard. There is no substitute for asking the question 'why?'

One of the achievements of Alan Greenspan during his time as Chairman of the Federal Reserve Board was his recognition that when output growth picked up in the United States in the late 1990s it reflected an increase in supply capacity as productivity growth rose in the wake of the application of IT to business processes generally. This 'supply shock' meant that output could expand faster without generating inflation.

'Spotting the shock' is a perpetual challenge for us. The shocks we have identified are the reasons we raised Bank Rate four times over the past year. We spotted them by asking three questions, all beginning with 'why'. So let me give you those questions and our answers.

The first question is why total output has grown steadily at an annualised rate of around 3% for 18 months — the longest run of stable output growth since 1997 and much stronger than most commentators anticipated, even though interest rates and the sterling exchange rate have risen. And why are business surveys even more upbeat? Notwithstanding a slowdown in the United States, the world economy, especially the euro area, our largest export market, has been surprisingly buoyant. World GDP growth over the past three years has averaged over 5% a year, the strongest such period since the late 1960s. And business investment has expanded at the fastest rate for almost a decade. These upside demand 'shocks' have not — at least so far — been offset by a slowing in consumer spending.

Given past relationships, we might expect some upward pressure on inflation. But we should be cautious. Like the United States in the late 1990s, we have experienced our own

positive 'supply shock' in the form of a significant wave of inward migration, especially from the accession states, of people looking for work. That has reduced the risk of a rising demand for labour leading to faster wage inflation.

But despite greater availability of labour, businesses have not over the past year expanded employment sufficiently to prevent stronger demand from increasing capacity pressures. The Bank's Agents report that capacity utilisation is now at an unusually high level. These pressures encourage businesses to raise prices. And that is exactly what the business surveys suggest has been happening. A position in which growth is above its long-run average and businesses are already operating with pressures on capacity is unlikely to be one without inflationary risks. That is one reason why the Monetary Policy Committee has raised interest rates over the past year.

The second question is about money and credit. The quantities of broad money and bank lending are now around 14% higher than a year ago — rates of growth last seen in 1990 when inflation was more than 8%. But again, we should be cautious. If credit becomes cheaper and more widely available, thereby increasing the stock of money (a 'money supply shock'), households and businesses will increase their spending on goods and services and on assets, both financial and real, and this will push up on inflation. But if they wish to hold more money in their portfolios — a 'money demand shock' — then the extra money will have few, if any, implications for inflation.

So why have money and credit been growing so rapidly? Given the pace of their expansion, it is likely that there has been both a demand and a supply shock. The supply shock is that banks have become increasingly willing to provide finance. Credit has been readily available and the spread between interest rates paid by households and businesses and interest rates available in the money market has fallen. That is one factor behind the rapid growth of business investment spending over the past year.

In light of the greater availability of credit, any person or family that borrows at a variable rate should recognise that the interest rate they will pay in the future may vary. Obvious though the point may seem, it is unwise to borrow so much that the repayments are affordable only if interest rates remain at their initial levels. Indeed, wider and cheaper availability of credit was a 'shock' that boosted spending, and so was a further reason why the Monetary Policy Committee raised interest rates over the past year.

The third, and most important, question is about inflation. Why has it picked up so sharply over the past year? Are those changes temporary or more persistent? The recent rise in inflation to over 3% does look temporary. The pickup in the months leading up to March this year reflected in part a rise in

domestic gas and electricity prices. And the fallback in inflation which has already begun, and which is likely to continue for several months, is in part the result of cuts in domestic gas and electricity prices which have already been announced.

Those shocks are relatively easy to identify. But it is much harder to know where inflation would have been without them. Sharp rises in the prices of energy and food have squeezed spending on other goods and services, putting downward pressure on those prices. That is why measures of 'core inflation' that strip out certain prices can be highly misleading. Even accounting for the temporary influences, more persistent inflationary pressures have picked up. Some of that stems from the shocks to demand and credit supply that I described earlier. And against that background, expectations of inflation over the next year, on which price and wage decisions are based, have drifted up. That is the third reason why the MPC has raised Bank Rate.

Those are the shocks we have spotted. A boost to supply from inward migration has not compensated for a positive shock to both domestic and overseas demand. And it would be optimistic in the extreme to suppose that the rapid growth of money and credit could be dismissed solely as a positive shock to the demand for money. So there has been some underlying upward pressure on inflation that is in part hidden by the volatility in domestic energy prices.

That is the past. What about the future? Our central view is that inflation will fall back this year as the rises in domestic gas and electricity prices last year drop out of the annual comparison and the recent cuts in prices feed through to household bills. Looking through those temporary effects, if inflation is then to remain around the 2% target businesses will need to expand employment to relieve pressures on their capacity. And they will need to do so with only a limited

impact on pay. Average earnings seem so far to have been subdued, although the two main official measures of pay growth are sending conflicting signals and the Committee awaits an explanation of their divergence.

Faster employment growth and lower domestic energy bills will, by boosting real incomes, add to consumer spending. With continued robust growth of the world economy, the past rises in Bank Rate will need to slow domestic demand. And inflation expectations will need to fall back in line with the 2% target.

The Monetary Policy Committee will be watching closely indicators of capacity pressures, pricing intentions and inflation expectations. If these indicators remain elevated, the MPC may need to take further action. There is no simple or self-evident answer to the question of what path of interest rates will be necessary to bring inflation back to the 2% target and keep it there.

By now you must be asking your own 'why?' question — why is he keeping us from such a splendid dinner? So I will not detain you. I have tried to explain this evening why interest rates have gone up. Each month we try to spot the shocks, evaluate their implications for inflation, and set interest rates to meet the 2% target. We do that to provide a backdrop of macroeconomic stability so that you can focus on the really important questions for your businesses. Why is that product selling better than this one? Why is my competitor changing his prices? And, most important, why did the Wallabies run the Welsh defence ragged in Brisbane, where Wales lost by almost as big a margin as England did to South Africa?

I don't have the answers to those questions. But, of one thing I can assure you, in terms of the economy we will never stop asking 'why?'

The Governor's speech⁽¹⁾ at the Mansion House

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

Chancellor, this will be your last Mansion House Dinner with the Merchants and Bankers. And I want to start by warmly congratulating you on your record-breaking period in office, and on the imminent assumption of the leadership of your party and country. It has been a remarkable decade for the British economy.

Your decision to grant independence to the Bank of England ten years ago is widely and rightly regarded as a fundamental improvement to the conduct of economic policy in this country, and we in the Bank are grateful to you for giving us the opportunity to demonstrate the benefits of an independent central bank. Your reform illustrates the key principle that institutions matter. Individuals, however talented, cannot consistently perform well if the institutional structure in which they operate is badly designed.

For too long the UK economy lurched between success and failure rather in the way that the national cricket team has recently. Getting the institutions right was a crucial part of the 1997 reforms. Perhaps there is a lesson here for the ECB — the England and Wales Cricket Board. And I welcome the changes that you announced last week to make appointments to the Monetary Policy Committee subject to a more transparent process with a more systematic timetable.

Behind the design of our monetary institutions is a simple principle. I described it last October in a lecture at Kirkcaldy. It is that the value of paper money depends on trust. Trust that it will hold its value. Trust that others will accept it as a means of payment.

In particular, our banknotes must be trusted by the public — cash still accounts for over 60% of the number of transactions. In March the Bank launched a new series of banknotes with enhanced security features. As an economist, I was pleased that a pioneer of the dismal science should appear on our banknotes. Adam Smith, who appears on new £20 notes, was a thinker who recognised the importance of institutions.

Imagine my concern, therefore, when, after 3½ years as Governor, I read the following report from the Wolverhampton Crown Court. 'A judge demanded to know why police failed

for three and a half years to arrest a wanted Birmingham man — when all the time he was living at home. Adam Smith, suspected of passing forged £20 notes, had a fixed address in Edgbaston and was picking up benefits.' So I hope the introduction of one Adam Smith will hinder the activities of the other.

I am proud of the new £20 notes, but I cannot say the same of our £5 notes. There has been much, and in my view justified, criticism of their availability and condition. Over the past ten years, the value of Bank of England notes in circulation has doubled, from around £20 billion to around £40 billion. But none of that is accounted for by the £5 note for which the value in circulation has remained constant for fifteen years at some £1 billion. And the average lifetime of the note has doubled. As a result, many more notes are noticeably soiled and scruffy.

ATMs account for over 60% of all cash obtained by the public. Few issue £5 notes. It is more economical for banks to stock ATMs with £10 and £20 notes. The problem is not at the production end — we have an ample supply of new £5 notes waiting to be used. We want to see them in circulation. There is a need for an adequate supply of low-denomination notes that can be used for small transactions where cash is the predominant means of payment. Such mutual convenience is a public good, and may not correspond to the private interest of commercial banks.

That is why we must not let this situation continue any longer. The public need £5 notes. The solution may involve some alteration in the incentives for banks to obtain different denomination notes from the Bank of England, new arrangements to increase the availability of notes to retailers, and an improvement in the durability of the notes that we print. So the Bank will be initiating discussions to see what methods might ensure greater access by the public to new £5 notes.

Your reforms, Chancellor, encompassed not just monetary policy — through the Bank of England Act — but also financial regulation — through the creation of the FSA and the 1997 Memorandum of Understanding between the Bank, FSA and

(1) Given on 20 June 2007. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech313.pdf.

Treasury. There was, however, some unfinished business in that Memorandum. The Bank of England was given responsibility for the oversight of payment systems. But it was given no formal powers to discharge that responsibility. Instead it relies heavily on the influence afforded by its operational role at the centre of the high-value payment system. But that influence extends only so far.

The time has come to deal with the imbalance between responsibilities and powers. The 'plumbing' of the financial system represented by payment and settlement systems may not be as glamorous as the trading activity which attracts so many bright young people to work in the financial sector, but it is absolutely crucial to maintaining stability. To have responsibility without power is the misfortune of the bureaucrat. The solution, in my view, does not mean more powers for the Bank, but narrower responsibilities. Proposals are under active discussion among the tripartite partners, and they give me confidence that the imbalance will soon be resolved.

Financial stability more generally is a topical concern in financial markets. More than one banker and merchant in the City has said to me recently, 'I cannot recall a time when credit was more easily available'. How worried should we be? Let me begin with the implications for the stability of markets and institutions before turning to monetary policy.

Securitisation is transforming banking from the traditional model in which banks originate and retain credit risk on their balance sheets into a new model in which credit risk is distributed around a much wider range of investors. As a result, risks are no longer so concentrated in a small number of regulated institutions but are spread across the financial system. That is a positive development because it has reduced the market failure associated with traditional banking — the mismatch between illiquid assets and liquid liabilities — that led Henry Thornton and, later, Walter Bagehot to promote the role of the Bank of England as the 'lender of last resort' in a financial crisis.

But the historical model is only a partial description of banking today. New and ever more complex financial instruments create different risks. Exotic instruments are now issued for which the distribution of returns is considerably more complicated than that on the basic loans underlying them. A standard collateralised debt obligation divides the risk and return of a portfolio of bonds, or credit default swaps, into tranches. But what is known as a CDO-squared instrument invests in tranches of CDOs. It has a distribution of returns which is highly sensitive to small changes in the correlations of underlying returns which we do not understand with any great precision. The risk of the entire return being wiped out can be much greater than on simpler instruments. Higher returns come at the expense of higher risk.

Whether in banking, reinsurance or portfolio management, risk assessment is a matter of judgement as much as quantitative analysis. Ever more complex instruments are designed almost every day. Some of the important risks that could affect all instruments — from terrorist attacks, invasion of computer systems, or even the consequences of a flu pandemic — are almost impossible to quantify, and past experience offers little guide.

Be cautious about how much you borrow is not a bad maxim for each and every one of us here tonight. Ignore the unsolicited emails that rain down on us offering unwanted credit. I received one last week that began, 'We have the solution, Mervyn, for your bankruptcy'.

The development of complex financial instruments and the spate of loan arrangements without traditional covenants suggest another maxim: be cautious about how much you lend, especially when you know rather little about the activities of the borrower. It may say champagne — AAA — on the label of an increasing number of structured credit instruments. But by the time investors get to what's left in the bottle, it could taste rather flat. Assessing the effective degree of leverage in an ever-changing financial system is far from straightforward, and the liquidity of the markets in complex instruments, especially in conditions when many players would be trying to reduce the leverage of their portfolios at the same time, is unpredictable. Excessive leverage is the common theme of many financial crises of the past. Are we really so much cleverer than the financiers of the past?

Concerns about the rate at which credit is being created extend to monetary policy. As I said last week in Cardiff, it would be optimistic in the extreme to suppose that the rapid growth of money and credit could be dismissed solely as a positive shock to the demand for money. The spread between interest rates paid by households and businesses and interest rates available in the money market has fallen. This has been one of the factors behind the strength of demand in the UK economy over the past year. Despite greater availability of labour, businesses have not expanded employment sufficiently to prevent stronger demand from increasing capacity pressures. Such pressures encourage businesses to raise prices. And that is exactly what the business surveys suggest has been happening. That underlying upward pressure on inflation has in part been hidden by the volatility of domestic energy prices. But it is why we have raised interest rates four times and by 1 percentage point in all over the past year.

Our central view remains that inflation will fall back this year as the rises in domestic gas and electricity prices last year drop out of the annual comparison, and the recent cuts in prices feed through to household bills. But it is important to look through those temporary effects to the outlook further ahead. The discussion within the Monetary Policy Committee is

explained in the minutes of our June meeting which were published this morning. As ever, there is room for differences of judgement as to the appropriate level of Bank Rate — as shown by the differing views within the MPC. But every member of the Committee is determined to bring inflation back to target and keep it there — or as close to the target as possible — indefinitely.

In the long run, it is of the utmost importance that the right institutions to secure both monetary and financial stability are in place. I believe they are. Chancellor, you are now moving on. Our country continues to benefit from the institutional arrangements you introduced in 1997. As that great political commentator Niccolo Machiavelli noted, 'nothing brings a man greater honour than the new laws and new institutions he establishes'. I encourage you to be equally bold in your next job.

Institutions outlast us all. Over time, they are adapted as we learn the lessons of the past in the light of a changing present to meet our future needs. Lord Mayor, you know the importance of learning, and the Chancellor has emphasised again this evening the role of education in shaping Britain's place in the world economy. Both the Chancellor and I have been enthusiastic about the theme of your mayoralty: 'City of London — City of Learning'. And all of us here tonight would like to pay tribute to your work since you became Lord Mayor, and to thank both the Lady Mayoress and yourself for the splendid hospitality which you have extended to us all this evening.

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

London, money and the UK economy

In this speech,⁽¹⁾ Sir John Gieve, Deputy Governor for financial stability, discusses the impact of London's growth as an international financial centre, the effect of financial innovation on the interpretation of economic data, and the significance of the growth in money and credit for the economy. He argues that internationalisation, IT and the growing role of capital markets favour the clustering of financial activity so we should expect London to continue to grow in the long term relative to the financial industry worldwide and to the rest of the UK economy. He notes that the growth of the City and the new financial markets is making the interpretation of some of the core statistics used to monitor the economy more difficult because of the growing importance of bonuses, the difficulty of measuring the output of financial firms, and the impact of the growth in structured finance on monetary growth. After allowing for these effects, he concludes that there have been shifts in the supply of money and credit in recent years and explains that he voted for a further increase in the Bank Rate in June partly because he was not convinced that current rates would be sufficient to bring credit growth and nominal demand back to their long-term sustainable path.

Introduction

The past year has been one of rapid growth and record profits for much of the financial sector worldwide. The strength of the world economy has provided a favourable wind but the spectacular growth of derivative markets and the spate of leveraged buyouts have also fuelled the growth. And, of course, London has been at the centre of the story.

In a speech in March I discussed the renewed ascent of London as a centre of international finance and concluded that it was based on powerful economic forces which were likely to persist.⁽²⁾ I showed how the leading position London built up in the days when Britannia ruled the waves gave it a strong comparative advantage based on language, law, time zone and, above all, by a concentration of expert labour. This allowed London to maintain an important role in international finance even while Britain's overall economic and political position was eroded. In the past 20 years we have seen a resurgence in the City which has established a strong position not just in traditional markets like foreign exchange, where its share is around 30% of trading, but in new products, with a share in OTC derivatives markets over 40%.⁽³⁾ The rapid growth of hedge funds in the West End is the latest example of the innovation that this cluster of financial skills has produced. You know something must be happening when the Mayor of New York commissions a review of the threat London poses to New York's position.

London's recent growth certainly has a cyclical element but it also reflects two more structural changes — the removal of barriers to international capital movements and the advances in information technology. These have led to a growing role for international capital markets compared to national banking and to a growing concentration of those markets in a few hubs among which London and New York are dominant. And this finance revolution is still under way. It is far more advanced in the United States than in Europe, and in Europe than in Asia. In the absence of disasters therefore London, as the pre-eminent centre outside the United States, can look forward to a long period of fast growth and expect its share of the UK economy to increase.

This evening I want to discuss the implications of that trend for the UK economy and for economic policy. On the first, is London a goose laying golden eggs for the rest of the country or is it more of a cuckoo in the nest? On the second, how does the growth of London and financial markets generally impact on the Bank's core functions of setting monetary policy and maintaining financial stability. Finally I discuss the impact of

(1) Given at Hart Brown Lecture, University of Surrey, on 26 June 2007. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech314.pdf.

(2) Gieve, J (2007), 'The City's growth: the crest of a wave or swimming with the stream?', given to the London Society of Accountants, 26 March. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech306.pdf.

(3) I use 'the City' here loosely to cover not just the Square Mile but the whole of London's wholesale financial sector including in Canary Wharf and the West End. A fuller exposition would also give more attention to successful regional centres including Edinburgh.

financial developments on the growth of money and credit and the significance of that for the broader economy.

London's impact on the wider economy

In principle, when one sector of an economy enjoys rapid growth, we would expect to see three broad developments:

- rewards earned by factors which are specific to the booming industry rise;
- unless there are sufficient unemployed resources available, productive resources shift into the booming industry; and
- employment in other tradable goods industries falls.

The results were illustrated by the Dutch experience with gas in the 1960s and by the UK experience with North Sea oil in the early 1980s.⁽¹⁾ In both cases, part of the mechanism was a rise in the real exchange rate and consequent pressure on other sectors.

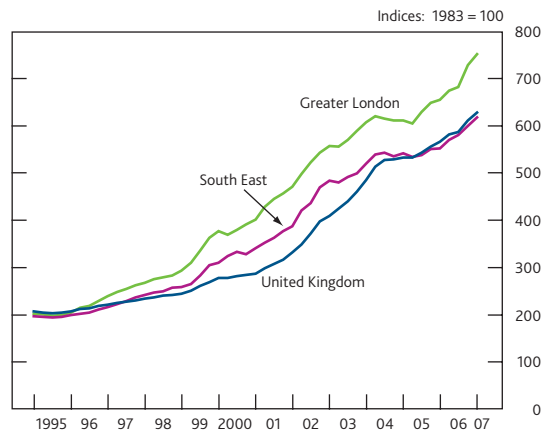
Is that happening now in the United Kingdom? It is much harder to identify the impact of the City than the impact of the discovery of gold or oil. London's position has developed gradually and the statistics rarely separate the group of wholesale financial markets and supporting legal, accounting and other services that make London special from a broader group including retail banking and insurance and business services. But there is some evidence that all three factors are at work.

The story seems clearest with the specific factors of production. The cost of commercial property in London, for example, has grown rapidly. According to Jones Lang LaSalle Research, in the City average capital values are over \$25,000 per square metre, above both Paris and New York. And the costs in the West End, the main home of the new hedge fund industry, are almost twice as high. There is no doubt that the success of London's financial centre is helping to fuel demand for office space from Canary Wharf to Mayfair.

And of course it is not just commercial property in London that has been booming. House price inflation in London has outstripped the rest of the United Kingdom (**Chart 1**), and in Kensington and Chelsea average house prices have risen by almost 40% since the start of 2005, compared with 20% for Greater London as a whole. ECA International published a survey comparing average monthly rents for a 70-square metre unfurnished flat in the largest cities and showed London over €2,100, compared with New York around €1,750 and Paris below €1,500.

The figures on output also show that London has been growing relative to the rest of the country (**Chart 2**), and that has reflected the growth of financial and business services compared with other tradable sectors throughout the United Kingdom (**Chart 3** and **Chart 4**). And despite the fall in

Chart 1 House prices



Source: Halifax.

Chart 2 Gross value added per head

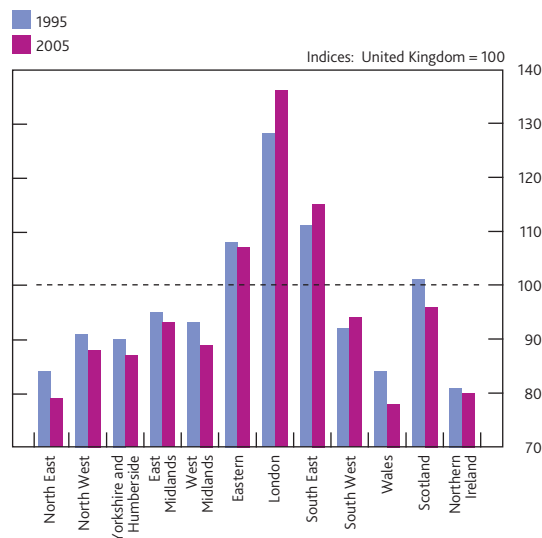
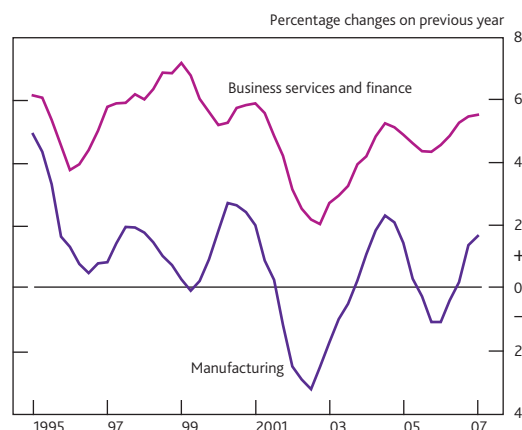
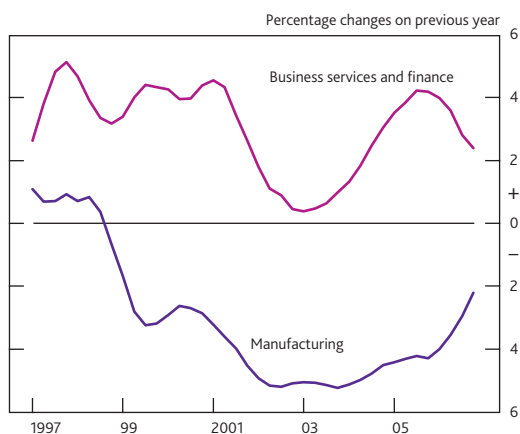


Chart 3 Output growth



oil production in the North Sea, we have seen a rise in the real exchange rate by over 15% when comparing the period

(1) The United Kingdom is a net exporter of financial services, running a surplus in 2006 of £26 billion (or 2% of GDP) on financial services and insurance. North Sea oil production peaked in 1999, and in 2006 was nearly 40% below this peak.

Chart 4 Employment growth

1987–97 to 1997–2007, although of course the financial sector would not have been the only factor behind that rise.

More immediately, the GDP figures in May showed that financial intermediation grew by 6% in the six months to 2007 Q1 — an annual rate of over 13%. That is not the same as the City of course; but there is every reason to think the City has been growing at least as fast as the rest.

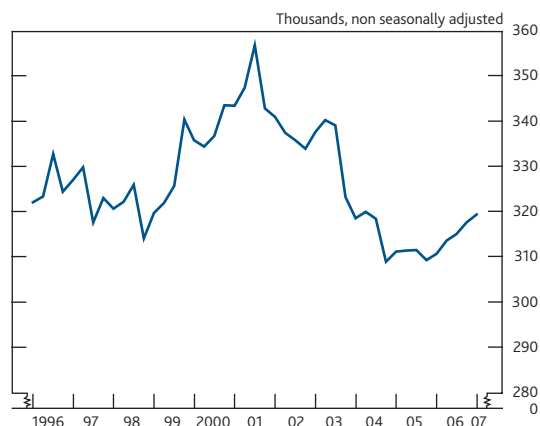
However, while the success of the City is currently one factor in these trends, it is not the whole story. For a start, there is a lot more to London than finance. There are other successful industries and, on the other hand, London is home not just to the wealthiest boroughs but also to some of the poorest and most deprived areas in the country. As a result it has one of the highest regional rates of unemployment overall. Second, employment and profits in the City have been highly cyclical.

On scale first, a recent estimate put the total number employed in 'City' jobs, including supporting professions like lawyers and accountants as well as bankers and asset managers, at around 340,000. That amounts to about 9% of the total in London; significant but still lower than the number in distribution or in government services. And the growth of employment will continue to be the net result from the expansion of activity and from the economies made possible by IT and by the relocation particularly of back-office work to cheaper areas elsewhere in the United Kingdom or abroad.

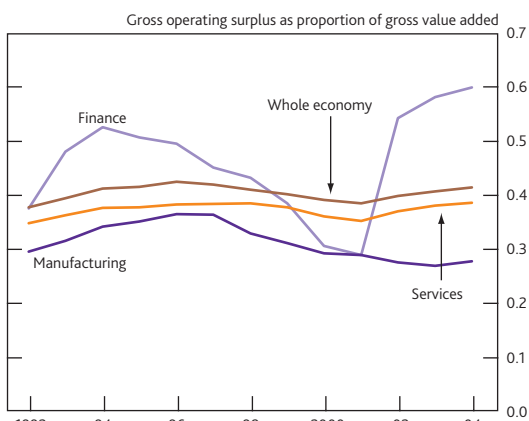
The jobs figures understate the importance of the sector in the economy because on average pay may be twice as high in the financial sector as in the rest of the economy; 9% of wages and salaries in the year to March compared to 4% of employment. And within London its share is even greater. The average earnings of someone working in London's financial intermediation sector in 2006 were around £90,000. On that basis, the financial sector might account for around 20% of remuneration in London. However it is still far from the only game in town. For example, the Work Foundation's fascinating new report on the creative industries suggests that their

growth has contributed at least as much as the City to London's overall performance.

Moreover, while the trend is upwards, there is a marked cycle in the financial sector. Over the past ten years, for example there has been a striking swing in employment with rapid growth during the dotcom boom followed by a sharp fall and subsequent recovery (**Chart 5**).

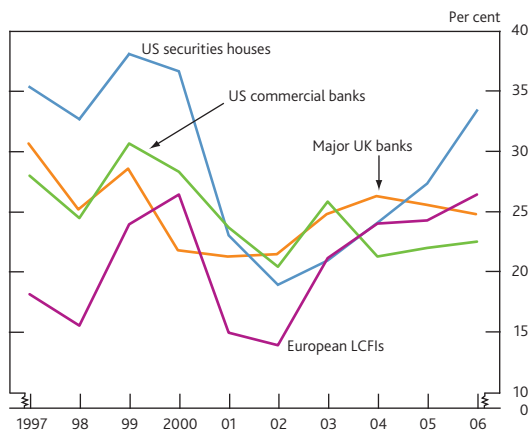
Chart 5 London jobs in finance

That reflects a strong cycle in financial sector profits (**Chart 6**) which is an international phenomenon — indeed, in the past ten years major European financial firms and US securities dealers saw an even bigger cycle in their profitability than major UK financial firms (**Chart 7**).

Chart 6 Profit margins by sector

Note: Average for whole economy 1992–2004 = 0.4; average for financial intermediation sector = 0.45.

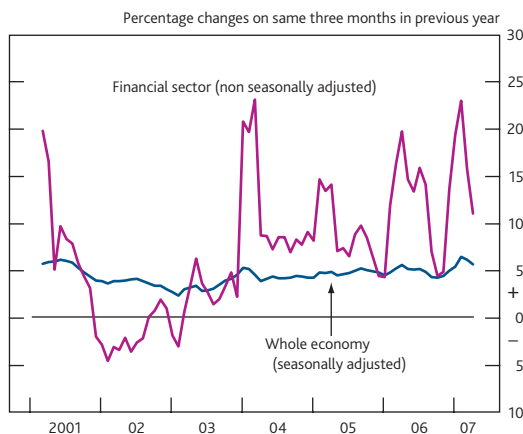
The same is true for earnings (**Chart 8**). This reflects the importance of bonuses which account for around 20% of remuneration in the financial sector compared with around 5% across the economy as a whole. The figures in the City itself can be considerably higher. A figure of 50% is common in investment banking, in which a rough rule of thumb is that firms distribute about half their pre-bonus profits to staff. It is estimated that 4,200 workers in the City received bonuses worth more than £1 million in 2006/07.

Chart 7 Pre-tax return on equity^{(a)(b)}

Sources: Bloomberg, published accounts and Bank calculations.

(a) Data for major UK banks, excluding building societies.

(b) Pre-tax return on equity calculated as operating income as a proportion of total common equity.

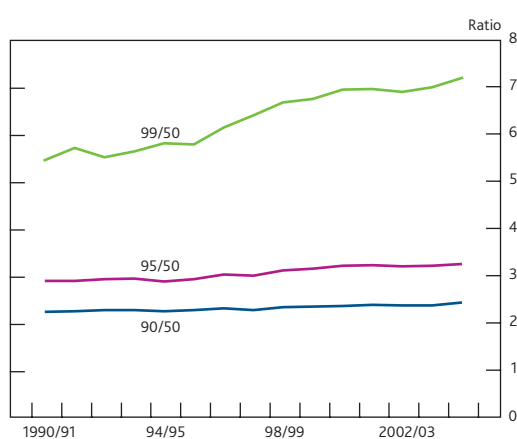
Chart 8 Earnings growth^(a)

(a) Average weekly earnings data, including bonuses.

Of course the growth in those bonuses is contributing to the widening inequality of incomes at the top of the earnings distribution. **Chart 9** compares the 90th, 95th and 99th percentile with the median and shows that the main change is at the top. If we break that top percentile down further, we see a more dramatic widening. This is not just true of the City or of the United Kingdom. The average CEO in the United Kingdom earns around 100 times more than the average worker, but there is an even wider gap in the United States, with the average pay of CEOs over 250 times that of the average worker in 2005, having risen from around 100 times in 1995.

In 1999 Eddie George likened the change in the City since Big Bang to Wimbledon.⁽¹⁾ The United Kingdom still prospered by providing the venue even though most of the players were foreign.

Today, I think the Premiership may provide an even better analogy. That is partly because foreigners now own an increasing number of the venues as well as supplying many of the players. That is a striking illustration of Britain's openness to foreign ownership which sets it some way apart from most

Chart 9 Pre-tax income inequality^(a)

Source: HMRC, based on Survey of Personal Incomes.

(a) 90/50 ratio shows ratio between 90th and 50th percentile. Survey only covers individuals who have some liability to pay income tax.

other countries both in Europe and America. But it is also because both the City and the Premiership have become the centres of global industries with a dramatic impact on revenues and on earnings.

One of my first footballing heroes was Johnny Haynes, the David Beckham of his day as a passer of a football. In the 1960s he became the first player to earn £100 per week (roughly £1,500 in today's terms) in the British game which was then about four times the average male wage. Top Premiership players now earn more than 200 times the average wage.

What has changed is the fact that pay is now being set in a world market. We have in the Premiership as in the City some of the best paid people in an international industry which is developing rapidly. We have imported the top of the world earnings scale and at a time when the stretch at the top worldwide is increasing very fast.

Just as in the Premiership, the stars of the City — the people who have not just the talent but the recent experience and networks to perform at the top level today — can command a high proportion of the returns from being at the hub of the industry. The growth of hedge funds and private equity can be seen in part as a move by the small group who have sufficient expertise in new instruments and markets to take more of the returns on ownership.⁽²⁾

(1) George, E (1999), 'Before the Millennium: From the City of London', speech at City University, 7 December, available on the Bank's website at www.bankofengland.co.uk/publications/speeches/1999/speech65.pdf.

(2) Even for a footballer, being at your peak at the right time and place is critical to earnings. But with football, like athletics, it is obvious that the best have outstanding talent. It is harder to believe that all the high earners in the City are intrinsically more intelligent or determined than others whether in universities, hospitals or factories. But the demand for the best paid reflects not just talent but experience. There may be many people who could run a trading floor given the right training but there are inevitably only a few who can demonstrate current success in doing so. Experience, like status and talent, is a 'positional good'.

To sum up so far, internationalisation and technology favour the clustering of financial markets in London so we should expect London to continue to prosper relative to the financial industry worldwide and to the rest of the UK economy. That will tend to reinforce the trends of recent years with:

- a continuing shift of resources into the financial markets and into London itself;
- a continuing pressure for higher rents and rewards for those with the right combination of talent and experience; but also
- a strong cycle in profits, pay and employment.

Implications for economic policy

That leads straight on to the first implication for policymakers. As London strengthens its position in financial markets, the cycle in international finance will have direct effects not just through the shifts in interest rates and asset prices but through jobs and pay in an important sector of the London economy. Any international financial crisis will be important not just because of its knock-on effects on the core banks and markets on which British industry and households depend but because of its direct impact on the real economy.

The growth of the City also affects the interpretation of some of the core statistics we use to monitor and assess how the economy is developing, including those on output, earnings and, above all, money and credit.

First, our GDP numbers don't pick up the financial sector very fully. In most sectors the contribution to GDP is roughly the sum of pay and profits. Measuring the output of the financial sector is more difficult. In the financial sector some types of banking activity are excluded from the final GDP figures. In 2008, the ONS plan to expand the GDP figures to include what is called Financial Interpretation Services Directly Measured and reflects those activities of banks which they cover by their net interest income.⁽¹⁾ That will improve estimates of GDP, but they will continue to exclude income that banks earn through proprietary dealing. This is probably right as a matter of national accounting principle but dealing in securities is a part of what some international banks do. As a result changes in the level of activity in the City may not be fully captured in the GDP figures which most economic models, including the Bank's, use as their summary statistic for the real economy.

Second, the growing importance of bonuses in the financial sector can make it harder to interpret statistics on earnings. City bonuses are generally paid at the start of the year. As **Chart 8** shows this leads to big peaks and troughs. At times when changes in earnings growth are of great interest, as they have been in recent months, it is difficult to identify the underlying path.

The difficulty is partly a technical issue of how to smooth out the monthly variations. Do we spread the bonuses backwards over the past twelve months on the grounds that they are deferred pay conditional on profits in that period (with the consequence that you don't know the true earnings figure for any month until over a year later)? Do you spread them forward because they will tend to be spent over the coming year? Or do you do a bit of both? To that uncertainty we can add the fact that there are several different measures of earnings growth including two — the AWE and AEI — which are telling a somewhat different tale.⁽²⁾

There is also a more conceptual challenge. Are bonuses to be treated as part of the cost of labour or are they a form of profit sharing? The economic implications may be quite different. In practice they are probably a bit of both; bonuses are much higher when profits are good, but they are unlikely to disappear entirely in tough times (witness the concept of the 'guaranteed bonus'). But estimating how they divide up is not easy.

Money and credit

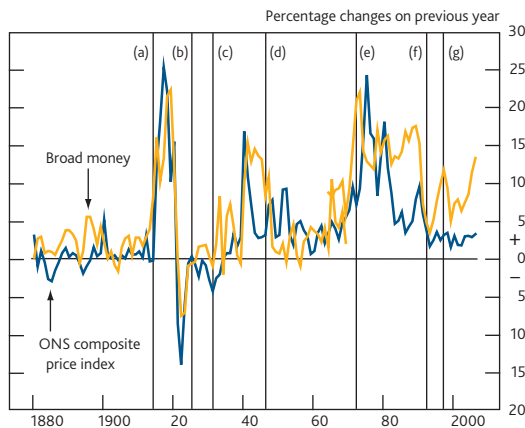
The third area in which the development of financial markets is complicating the interpretation of statistics is money and credit. And again that is an area of keen attention at the moment. The question is whether the recent growth of the money supply is telling us something about the prospects for inflation and the economy that we are not getting from other variables — like consumption, interest rates, prices, or inflation expectations.

Chart 10 shows monetary growth over 130 years in the United Kingdom against consumer inflation. The association is obvious. But even in the days of the gold standard when the Bank had a more direct control of the money supply, money growth and inflation diverged for periods (eg in the late 19th century and in the late 1920s). More recently, the growth of money in the 1970s did act as a leading indication for inflation. But in the early 1980s the relationship appeared to break down despite, or possibly because of, the fact that the monetary authorities were explicitly targeting the monetary aggregates as a means of controlling inflation.

Part of the explanation of the divergence was that the 1980s were a period of rapid financial innovation following the removal of exchange controls and of pricing, income and dividend policies. This changed the amount of money people were willing to hold for a given amount of money spending (which in economics is known as the velocity of circulation).

(1) Akriditis, L (2007), 'Improving the measurement of banking services in the UK National Accounts', *ONS Economic and Labour Market Review*, May.

(2) I have used the AWE in this speech, even though it is the more recent and less well established of the two, because it is designed to handle outliers at the top and bottom of the ranges better and the City has a disproportionate number of outliers.

Chart 10 Broad money growth and inflation

- (a) Collapse of classical gold standard (1914).
- (b) Gold standard is re-introduced (1925).
- (c) Gold standard is abandoned (1931).
- (d) Beginning of Bretton Woods (1946).
- (e) Floating of the pound (1972).
- (f) Inflation targeting (1992).
- (g) Bank of England independence (1997).

So the increase in money growth did not lead to a pickup in inflation.

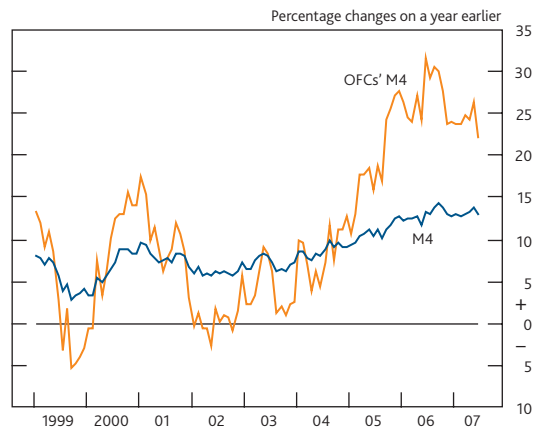
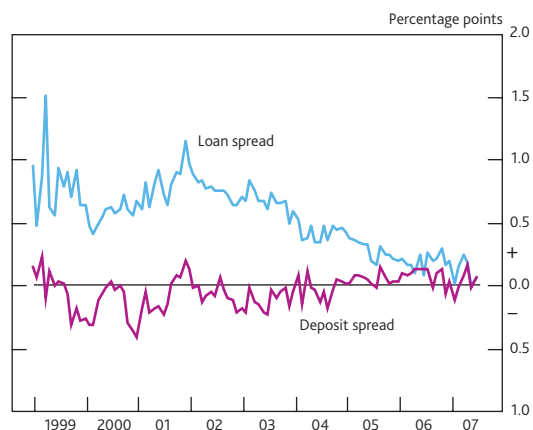
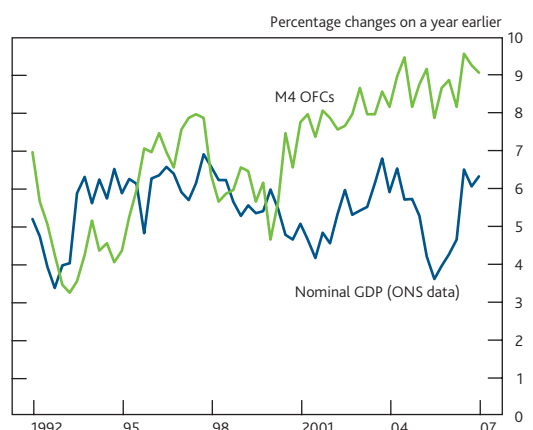
Even so the acceleration of monetary growth at the end of the 1980s did foreshadow the upturn of inflation at the end of the Lawson boom.

The chart shows that since 1992 the rates of growth in broad money and inflation have diverged again and that broad money growth has picked up sharply since 2003. A key question is whether this reflects a further spurt in financial innovation or is telling us that we should expect increasing growth of money spending and inflation.

There are good grounds for attributing part of the increase to structural changes in the financial markets which have led 'other financial companies' (OFCs) to hold more deposits with the banks for a given level of economic activity.⁽¹⁾

It is within this OFCs sector that the growth in money has been the most rapid (Chart 11). The view that much of this growth reflects structural changes of this sort is supported in my view by the way the spread between deposit and loan rates of interest has vanished in the past few years (Chart 12). Of course that might be the product of competition between banks to lend more and attract more deposits; it also seems plausible that much of this lending is more about balance sheet restructuring than making a profit.

However, deposits associated with special purpose vehicles and intragroup only account for part of the growth. Even if we strip out all OFC deposits the growth rate of money has still been strong compared with the growth rate of money spending (Chart 13). In my final section I want to discuss what we should make of this.

Chart 11 Annual M4 growth**Chart 12** OFC interest spreads**Chart 13** M4 and nominal GDP growth

(1) The clearest example is the service offered by London Clearing House (LCH), where dealers effectively transact with each other (via gilt repo transactions) across the balance sheet of LCH, which results in an increase in both OFCs' deposits with and borrowing from banks. Similarly, in the case of a synthetic securitisation of corporate bonds, a special purpose vehicle is set up to issue securities to investors and holds a cash deposit at a bank from which it makes payments if any of the securitised loans default. Both of these examples result in an increase in measured deposits at banks, but neither presages more nominal spending.

The significance of the money supply

In the Treasury in the 1980s, I was a close observer of the attempts to find a monetary aggregate as an intermediate target to guide policy. We were looking for both a predictable relationship between the policy instrument, interest rates, and the measure of money and a predictable relationship between that and our final objective, inflation. I remember the frustrations when both links proved unreliable. I am in no doubt that we are better off focusing directly on our final target, inflation.

However, I was struck, returning 18 months ago to the economic debate, how the place of money in our debates had changed. Our model, like most others, is 'new Keynesian'. As a result, the discussion sometimes seems to resemble the discussions of 'demand management' in the 1970s more than the monetarist debates of the 1980s. But, if anyone was in any doubt, monetarism was not dead but only resting. And it has recently taken wing again as persistent monetary growth and rising asset prices have given us food for thought.

At times the discussion of money can seem detached from the rest of the policy debate. Having listed all the other aspects of the economy factors — like world growth, consumption, financial markets and the labour market — 'money' emerges as though it was a separate determinant impacting directly on inflation or inflation expectations like Heineken 'refreshing the parts other beers cannot reach'.⁽¹⁾ But money is very much part of the real world and we don't need any hidden or ghostly mechanisms to see how it feeds through credit, asset prices and consumption in the wider economy.

We need to start as the Governor has said by trying to distinguish supply shocks from demand shocks.⁽²⁾ Where growth in money is driven by the wish of consumers or companies to increase their holdings of money for a given level of spending, there need be no effect on nominal GDP or inflation. As I have discussed there is clear evidence of changes in demand of that sort in the financial sector. But that is not the whole story. So, have there been increases in supply of money and if so how will they feed through into the economy?

What does a supply shock look like? It is easiest to visualise in a closed economy in which the money supply is mainly notes issued by the monetary authorities. One can imagine then a direct increase in supply — a helicopter drop of extra notes. In that world people would really find themselves with extra cash in their pockets and would be expected to go out and spend some or all of it. With more money chasing the same goods, we would see a direct impact, first on money spending, then on inflation.

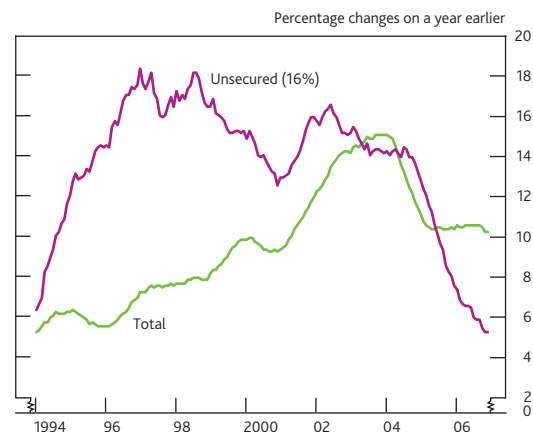
In the modern world the nearest equivalent to helicopter drops has been the monetary financing of government deficits. But

monetary financing is not a problem we face at the moment, indeed it is not allowed within the EU under the Maastricht Treaty.

So what we need to be concerned about today is the creation of extra money through the banking system and the way that happens is through the granting of credit to willing borrowers who borrow to spend on assets, investment or consumption. The supply changes we need to spot are changes in banks' willingness to lend. And we don't have to look far to find some.

Take, for example, the growth of consumer credit in the United Kingdom (**Chart 14**). We see rapid growth in the late 1990s and early years of this century followed by a sharp decline as banks began to see defaults rising.

Chart 14 Lending to individuals



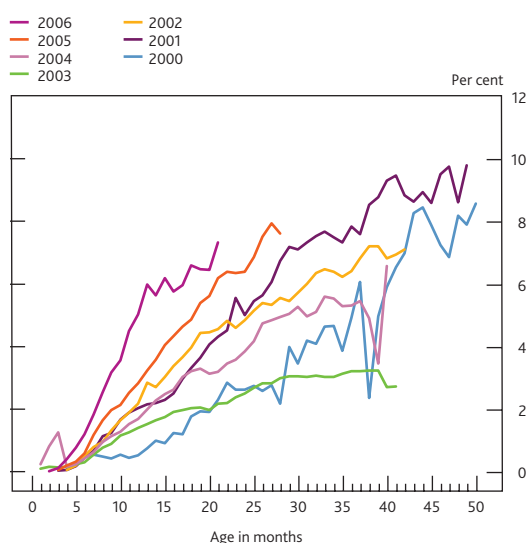
Another recent example is the sub-prime market in the United States. **Chart 15** shows the arrears rates on successive cohorts of loans, marking very clearly the reduction in credit quality in 2006 as the market overshot.

In both cases the figures and the market explanations confirm that these movements reflect at least in part changes in the supply curve for credit. The borrowers were willing but the banks were also pushing the supply by reducing costs and conditions (culminating some said in NINJA mortgages — for those with no income, no job and no assets).

So I have no doubt that we have seen some supply changes to credit. Next we need to distinguish the sustainable changes from the cyclical. Sustained changes either in the economy or in financial sector technology may justify some increase in supply. For example, we have seen a long period of low and

(1) Ryle, G (1949), *The concept of mind*, Hutchinson, London. Ryle was criticising as incoherent a dualist view of mind and body in which the mind is instrumental in determining action but is wholly distinct from the physical realm.

(2) King, M, speech to CBI Wales, 11 June 2007, available on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech311.pdf.

Chart 15 US sub-prime arrears^(a)

Source: JPMorgan Chase & Co.

(a) Year refers to year of securitisation.

stable inflation and unemployment and that is expected to continue. That reduces some of the risks to lenders and borrowers and may increase both the demand and supply of credit and the value of assets on a lasting basis. The development of information technology allows banks to collect and analyse more information about borrowers which should allow them to target credit better and justify a change in supply. Finally the development of derivative markets has allowed the risks in loans to be split into their separate components and distributed to the people best placed to bear them. Again that should lower the supply curve for credit.

All these factors were at play in the consumer credit and the sub-prime markets but, despite the new sophistication of credit scoring and the derivatives markets, they both also showed all the classic signs of a credit cycle. Banks competed for business by lowering the costs and conditions on lending while the economy expanded, defaults were few, and profits appeared high. They overdid it, defaults started to rise, losses were taken and they toughened their terms again. The speed and severity of that cycle can have implications for financial stability as well as the stability of the broader economy. It is for that reason that there is a wide acceptance that there may be a case for monetary policy to 'lean into the wind' in a cyclical upswing.⁽¹⁾ That has been one factor in my support for the four interest rate rises of the past year.

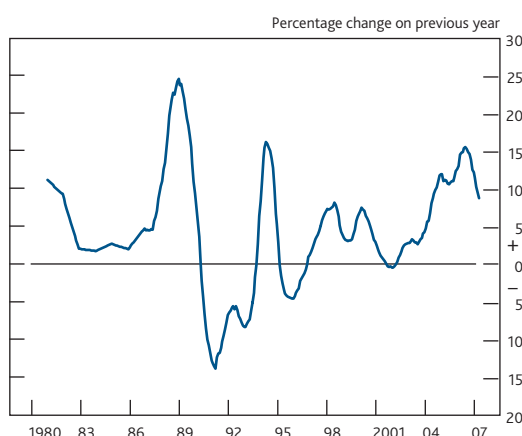
If there is evidence of a cyclical, unsustainable, element in the supply of credit and asset prices the next questions are:

- where are we in the cycle, and
- is the present stance of monetary policy sufficient to bring it back to a sustainable trend or, given the lags in the impact of interest rate changes, is it set to exacerbate the downturn?

Current conjuncture

So where are we now? The consumer credit market in the United Kingdom and the sub-prime and broader housing markets in the United States have turned down and, while the sub-prime saga is still not played out, it still seems unlikely that it will have severe knock-on effects on the broader economy.

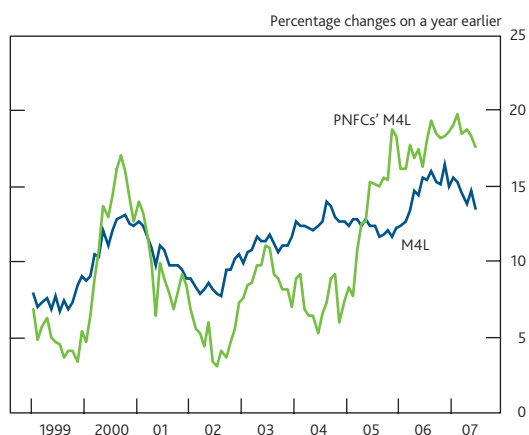
Elsewhere, the commercial property in the United Kingdom looks to be at or close to its peak (**Chart 16**). The housing market is showing some glimmers of a slowdown in activity but prices are still rising fast, especially in London; indeed the rate of increase of house prices is higher today in nearly every region than it was last autumn. And there is no sign of a slowdown in corporate lending. Overall, lending to PNFCs is accelerating (**Chart 17**), investment is high, and on a global basis we are seeing spectacular growth in the LBO market (**Chart 18**) and the emergence of lower prices and conditions with so-called 'covenant lite' loans.

Chart 16 Commercial property capital values growth

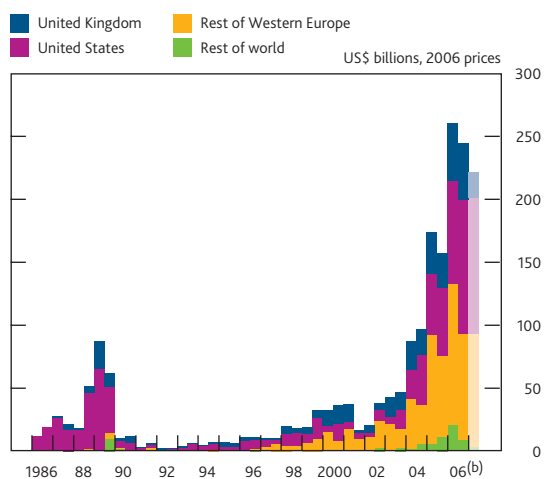
Against that background the question is whether we have done enough. In reaching a judgement, of course, we need to take account of the full range of information on the real and nominal economy. We know that the full impact of past increases in rates has yet to come through. Yet we cannot be sure how much of a restraint current rates will be at this point in the cycle. It is not surprising therefore that there are different views on the MPC or that those views change in response to more information.

My stance in recent months has reflected a judgement on the balance of risks taking account of both probabilities and likely impacts. The risks we face are: first, that we may increase interest rates too fast or push them up too far, with an unnecessary loss of growth; and second, that we may raise

(1) Bean, C (2003), 'Inflation targeting: the UK experience', speech at the Annual Conference of the German Economic Association, 1 October, available on the Bank's website at www.bankofengland.co.uk/publications/speeches/2003/speech203.pdf.

Chart 17 Annual M4L growth^(a)

(a) Excluding the effects of securitisation.

Chart 18 Real LBO loan issuance^(a)

Sources: Dealogic, US Bureau of Economic Analysis and Bank calculations.

(a) Bi-annual syndicated lending deflated by US GDP deflator.

(b) Shaded area contains data up to 5 April 2007.

rates too slowly with a cost in higher inflation and potentially higher interest rates and a sharper slowdown in the end.

I voted for a further increase earlier this month partly because I was not convinced that current rates would be sufficient to bring credit growth and nominal demand back to their long-term sustainable path. I also felt that the impact of moving too slowly on the credibility of the regime and thus the future prospects for the economy was of greater concern, given the robust rate of growth, than an unnecessary slowdown in activity. In reviewing the position again in future months I will be watching the trends in the growth of credit and money carefully.

Uncertainty, policy and financial markets

In this speech,⁽¹⁾ John Gieve, Deputy Governor for financial stability, discusses the range of uncertainty facing monetary policy makers, emerging lessons from the US sub-prime market and the significance of sovereign wealth funds and other influential investors. He argues that the degree of uncertainty in the current economic environment is a return to normality after two years of exceptional predictability in monetary policy both in the United Kingdom and elsewhere. On financial markets, he argues that developments in the US sub-prime market have brought out vulnerabilities in the new structured credit markets and the move to an 'originate and distribute' model of banking, including potential misalignment of incentives, the changing way that exposures impact on bank balance sheets, the way market liquidity can dry up in stressed conditions and the difficulty of valuing instruments. Finally, he notes that the growth of sovereign wealth funds over time would tend to increase the price of riskier assets, like equities and corporate and emerging market bonds, compared to government bonds, and that the switch of reserve-rich countries from lenders to owners of financial or real assets is also likely to lead to political tensions and pressures for protectionism.

Introduction

When I took on this job last year, interest rates had moved only twice in 24 months — once up by 25 basis points and once back down again. Elsewhere we had seen, both in the United States and the European Union, two years in which rates had been on a well signalled upwards path, while interest rates in Japan remained anchored to zero. The 'Great Stability' seemed to have reached its zenith of total predictability.

However, one of the things that struck me from the outset in the MPC was that the predictability outside was not matched by any complacency or self certainty inside. There was a vigorous debate under way about the state of the economy and the policy response. At that stage, some members of the Committee doubted that the economy and employment would recover from the slowdown in 2005 without a further reduction in rates, while others, notably David Walton, saw emerging dangers on the other side.

The economy has strengthened since then and we have had to raise interest rates five times in the past year. One thing that has not changed is the vigour of the internal debate. This is not (only) because economists are famously argumentative. As someone once noted, economics is the only field in which two people can get a Nobel prize for saying opposing things! Instead, the level of debate reflects genuine and unavoidable uncertainty about the economy which was disguised by the

stability of rates but never went away. The fact is that we can never be sure we have interpreted the past correctly — there are always alternative plausible interpretations — and we know the future will contain surprises.

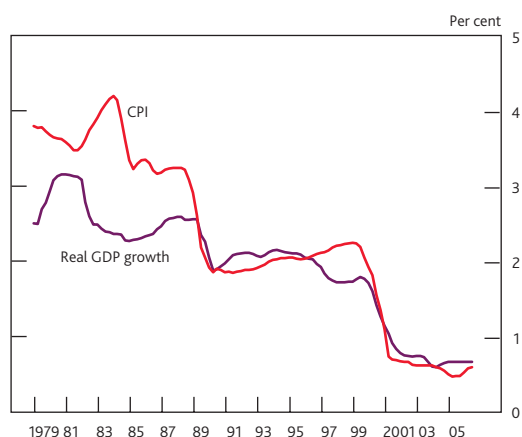
I want to start today by discussing that range of uncertainty. I will then look at three uncertainties affecting financial markets at the moment: the losses in the US sub-prime market, the significance of influential investors including sovereign wealth funds, and the state of the credit cycle.

The range of uncertainty

The past ten years have become known as the 'Great Stability'. Certainly that has been true for the United Kingdom. The last quarter was the 60th of uninterrupted positive growth and it was a touch above the average for the past ten years. On inflation too we saw this month another step back towards target and in ten years we have only seen one month when the CPI has been more than 1 percentage point away from target (**Chart 1**).

For anyone, like me, who was in the Treasury through the late 1970s and 1980s, this looks like the promised land; a degree of stability we did not think was attainable. Looking back we can

(1) Given at the Barbican Centre on 24 July 2007. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech321.pdf.

Chart 1 Volatility of GDP and CPI

Sources: Bank of England, ONS and Thomson Datastream.

see that it was the pains and problems of those decades culminating in being forced out of the ERM that produced a broad political consensus on a new approach to monetary policy and the independence of the Bank. And my predecessors can take great credit for the success of recent years. We have also been benefiting from benign world conditions with the emergence of low-cost producers in the Far East and strong world GDP growth, which has been over 5% in the past three years, the strongest three-year period of growth since 1968–70, and there is every reason to hope that this benign trend will continue.

However, it is important not to exaggerate this stability or to forget the substantial uncertainties that still exist. The past decade has seen some big and unanticipated changes. Since 1999, oil prices have risen from below \$20 a barrel to over \$70 a barrel, the US Fed funds rate has varied between 1% and 6.5%, and the stock market has experienced its post-dotcom boom, bust and recovery, with the FTSE All-Share falling from its 2000 high of over 3200 to below 1660 in 2003 before now recovering to over 3400. We have seen 9/11 and the onset of a new form of international terrorism, the explosive growth of new financial instruments and new players to exploit them,

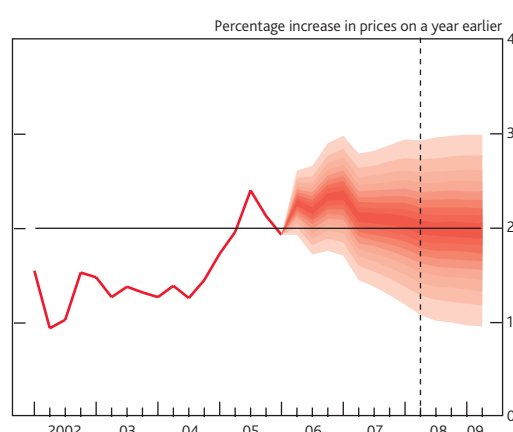
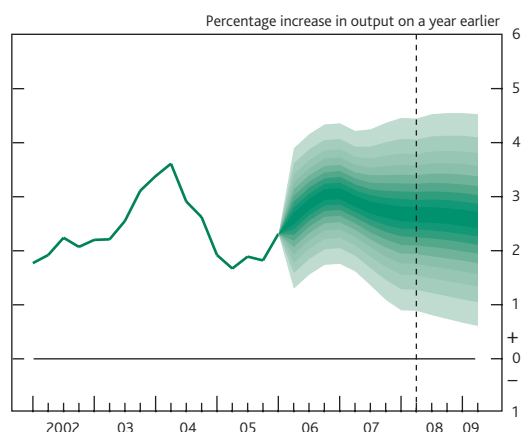
and we have seen the emergence of China and India into major forces in the world economy.

But uncertainties arise not just because there will always be unexpected events, changes of technology and taste. We also continually review and update our views on the underlying relationships between countries, firms and people. And of course we are constantly learning more about the past not least as the statistics get revised.

We try to emphasise those uncertainties by always publishing our forecasts in the form of fan charts which show not just a central projection but a probability distribution around it.

If you go back a year to May 2006, our central projections for 2007 Q2 were for growth of about 3% and inflation of around 2%. But we also showed about a one in four chance that growth would be a percentage point or more away and that inflation would be half a percentage point from the central projections (**Chart 2**). It follows that there is also a range of uncertainty around the right path for interest rates. The story of the past year has been that growth has been stable (between 0.7% and 0.8% each quarter) and kept quite close to that central projection but only on the basis of substantially higher interest rates than our forecasts were based on; inflation has been higher than we projected again despite the successive rises in rates.

You might expect this range of uncertainty to be reflected in a range of independent forecasts, but you would be disappointed. Most forecasters operate models much like ours and, of course, they use the same data. It is perhaps not a great surprise then that their central projections tend to cluster in a remarkably narrow range. For example, take the forecasters who were surveyed by Reuters prior to the July MPC meeting last year. At that point there were only two out of 47 who expected interest rates to rise above 5% by now and only one expected them to be below 4.25%. Fast forward to the most recent survey and you will see that none of the 52

Chart 2 GDP and CPI fan charts from May 2006 *Inflation Report*

expect rates to go above 6% in the next year and only two expect rates to go below 5.5%. To gauge the real range of uncertainty you need to look beyond the central forecasts at the full probability distribution of possible outcomes. The fact that most forecasters agree on the prospect does not mean it is likely to happen.

Central banks need to be particularly cautious in putting weight on market expectations and outside forecasts because they are based at least in part on judgements about what we will do. In my view it is sensible for independent forecasters to assume that we will do our job and keep inflation low; but we can't take comfort from the fact that most external forecasters therefore expect inflation to return and stay around target — it's our job to justify their faith and keep their confidence. We must avoid chasing our own tail.

Of course, the uncertainty of the future and of the past is a factor in our decisions on interest rates. When we are feeling our way in trying to assess the pressure of demand in the economy, it can often be sensible to move rates gradually so that we can gather more information as we go on the effect of past rises. But, of course, we all know that if we get behind the curve, gradualism could compound the problems. The pace as well as the direction of any change is therefore a matter for discussion in most MPC meetings.

Looking at the economy today there are as wide a range of uncertainties as ever, for example about the level of slack in the labour market, the pricing pressures in companies, the future path of oil prices and the strength of monetary growth. I want to discuss three which arise from developments in financial markets, and which are relevant to both the Bank's core purposes: monetary stability and financial stability.

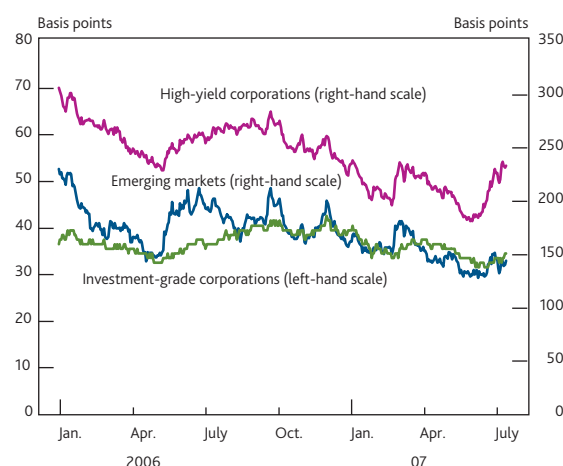
Sub-prime and the credit markets

Let's start with the credit markets. The backwash from defaults in the US sub-prime market has been seen not just in the recent problems faced by some hedge funds⁽¹⁾ exposed to this sector but in credit markets more widely. Credit spreads have widened especially for riskier bonds (**Chart 3**), the covenant-lite loans on offer a few weeks ago are off the table, and the leveraged loans in the warehouses are reported to be moving more slowly. And this has happened at a time when long-term interest rates have been rising.

We have seen shocks to credit markets in the past two summers which were swiftly reversed. Could recent events be the beginning of a more lasting change?

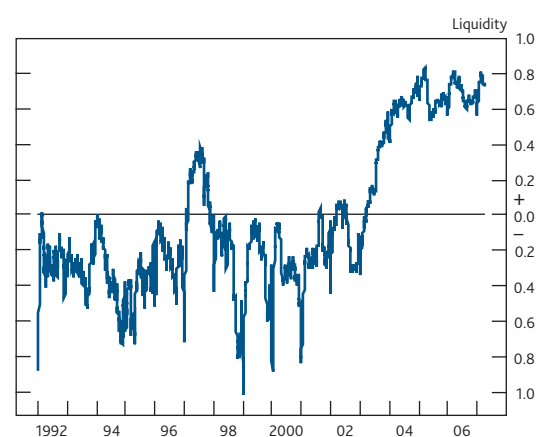
There are some good reasons for doubting it. First the underlying economic and corporate fundamentals remain encouraging. Not only is world growth running at over 5% but it seems better balanced with the recovery of Germany and

Chart 3 Corporate bond spreads



Japan and slightly lower growth in the United States (although one of the explanations for the rise in longer-term risk-free rates has been a more optimistic view on US growth prospects). In the corporate sector overall, gearing is not unusual, pension deficits have diminished, and profitability is high. Defaults in the prime housing market in the United States have not shown dramatic increases. Losses on mortgage lending in the United Kingdom are still very low and there seems no prospect of a significant rise in unemployment that led to sharp rises in repossessions and defaults in the past. Equity markets remain strong at multiples of earnings which are little above average. Again, within financial markets, liquidity remains high overall (**Chart 4**).

Chart 4 Financial market liquidity^(a)



Sources: Bank of England, Bloomberg, Chicago Board Options Exchange, Debt Management Office, London Stock Exchange, Merrill Lynch, Moody's Investor Service, Thomson Datastream and Bank calculations.

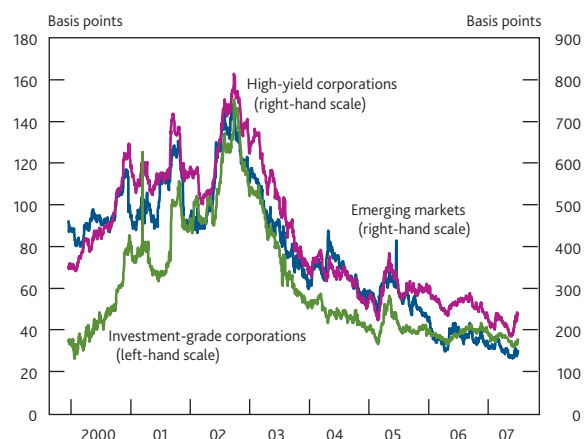
(a) Simple, unweighted mean of the liquidity measures, normalised on the period 1999–2004. Data shown are an exponentially weighted moving average. The indicator is more reliable after 1997 as it is based on a greater number of underlying measures.

Against that background, there is a risk of becoming alarmed by good news. In our latest *Financial Stability Report* we identified the low risk premia in credit markets as the principal

(1) In particular, the High-grade Structured Credit Enhanced Leverage Fund and the High-grade Structured Credit Fund both managed by Bear Stearns Asset Management (BSAM).

vulnerability in financial markets because of the risk it carried of a swift and disorderly return to more normal levels. The rise since then has not been large in a longer context (**Chart 5**) but in itself it is a healthy correction. At the same time we have seen a fall in the dollar over recent months which should tend to reduce the risk of a sudden correction of global imbalances, another of the key vulnerabilities we have been monitoring in recent years.

Chart 5 Corporate bond spreads



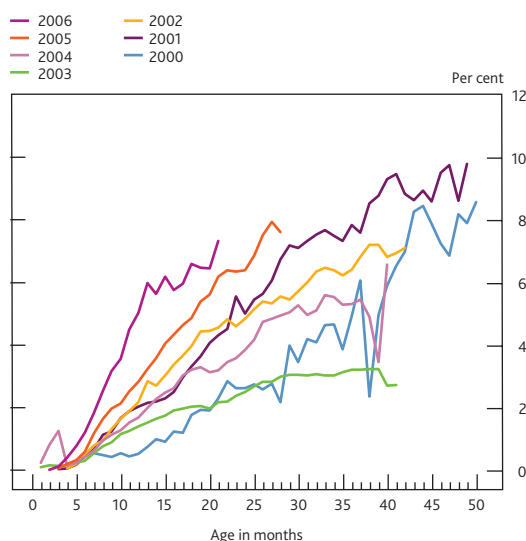
But the story of the sub-prime market is not yet over and it certainly does point to some vulnerabilities in modern financial markets which need to be factored into financial firms' risk management.

First, this was a layered market in which many originators had an incentive to maximise volumes, where the loans were then securitised and the securities were in turn combined into CDOs for onward distribution.

One risk in such markets is that there is a loss of information along the chain and that incentives become misaligned; in particular the quality of credit monitoring and credit assessment declines. It is difficult to avoid the conclusion that occurred in 2006 in the sub-prime markets. **Chart 6** shows the arrears on successive tranches of loans and shows that the quality declined over time particularly in 2005 and 2006.

Second, the new derivatives markets change the way in which credit losses hit balance sheets. In the world of on balance sheet lending, when defaults begin to turn up, there can be scope for rescheduling and for discussing with your accountants what provisions are prudent. We saw that impact on a few of the big banks earlier this year. In the securitised markets, the pace can look slower to begin with but then comes in a rush. **Chart 7** shows the spreads on different tranches of the ABX index, the main benchmark index for sub-prime securities. What is remarkable here first is how slow the spreads were to move at all. Of course, the predicted losses on particular tranches do not move smoothly with rising

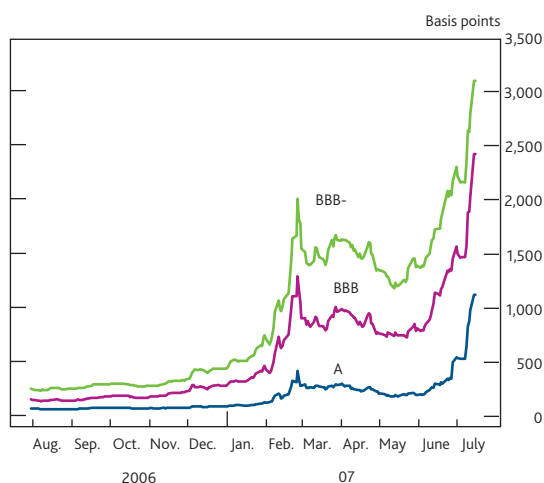
Chart 6 US sub-prime arrears^(a)



Source: JPMorgan Chase & Co.

(a) Year refers to year of securitisation.

Chart 7 Spreads on ABX index



defaults, but throughout 2006 the economic press was a buzz with worry about the US housing market; sentiment changed several times on whether the housing downturn would lead to a general recession. Throughout this period the originators continued to write new sub-prime loans and the prices of the ABX scarcely quivered.

But since January the story has been quite different with two dramatic hikes in the spreads first of BBB and then of the A-rated index. In total, the spread for BBB has gone from 500 basis points at the turn of the year to over 3,000 basis points. Each of these steps has left casualties. Many of the originators were forced into bankruptcy at the start of the year and in the past few weeks we have seen Bear Stearns' announcement that two of its funds have lost all or nearly all of their investors' money. I suspect the speed and scale of the changes were outside most stress-test simulations. And while the most dramatic changes may have happened there will now be a long period as the implications work through the ratings

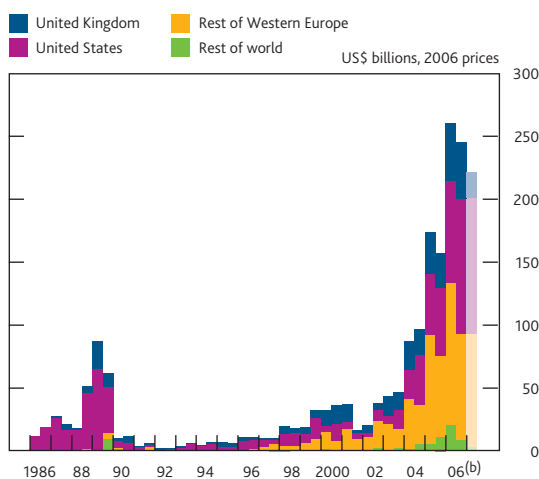
of other derivatives and the full range of instruments are marked to market.

A related lesson is about liquidity in new markets. The worry has been that at times of stress, liquidity would dry up and it would be impossible to trade out of positions. That would not just lock firms into losses but would disrupt strategies which require continuous dynamic hedging — for example, strategies such as constant proportion portfolio insurance (CPPI). Again that has been a feature of recent weeks. It has been widely reported that a couple of the lenders to the BSAM funds put their collateral on the market but were not able to sell as much as they wanted.

That is connected to the fourth lesson, the vulnerability of valuations in sophisticated derivatives. These are not widely traded so valuations are usually based not on market prices but on models which draw in turn on correlations established over the recent past. This is a fundamental and unavoidable feature of new products and markets. There simply has not been a full cycle's experience to draw on.

When we published our *Financial Stability Report* in April we drew attention to the sub-prime history as a warning of what could go wrong in bigger and more central credit markets. Developments since then underline that message. If some of the price moves in the sub-prime CDOs have spread to CLOs based on leveraged loans and buyouts, that is hardly a surprise given recent growth in that market (**Chart 8**).

Chart 8 Real LBO loan issuance^(a)



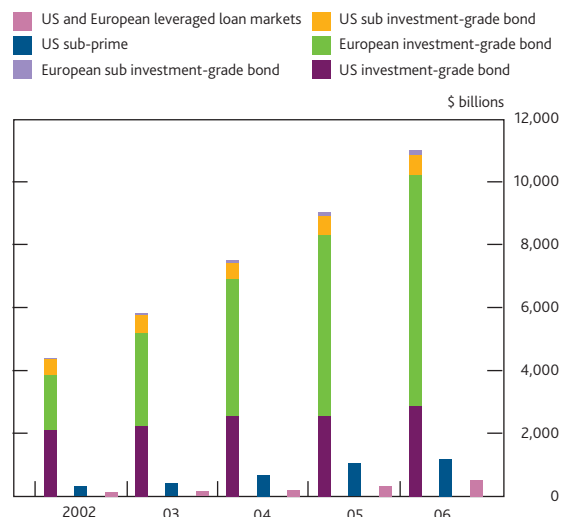
Sources: Dealogic, US Bureau of Economic Analysis and Bank calculations.

(a) Bi-annual syndicated lending deflated by US GDP deflator.
(b) Shaded area contains data up to 5 April 2007.

There are signs that the speed with which the pipeline of leveraged deals is being warehoused has slowed down at least temporarily and the terms of some of the lending has tightened a little. But that said there are some significant differences between the sub-prime and corporate loan markets. First corporate profits remain robust and there has

not been the step up in defaults that ushered in the sub-prime crisis. Second while the total size of the corporate bond market dwarfs the sub-prime mortgages market that is not true of the leveraged corporate loan market (**Chart 9**).

Chart 9 Corporate bond, leveraged loans and sub-prime markets



The weight of money — pension funds and sovereign wealth funds

A second development in financial markets in the news at present is the growth of sovereign investors and of 'sovereign wealth funds' in particular. While these have long been established in Singapore, Norway and the Middle East, the decision of China with its huge foreign exchange reserves to diversify its investments is new. The question is what effect, if any, the growth of influential investors like these is having and may have in future on relative prices in financial markets.

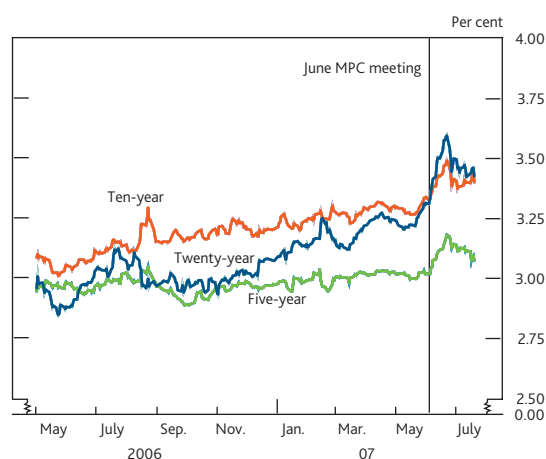
Economists tend to assume that asset markets are efficient so that any deviation from fundamental value represents a profit opportunity that will be quickly eliminated through the actions of rational traders who are constantly on the lookout for such opportunities. Underpriced assets are bought while overpriced assets are sold short, thereby bringing prices back in line with their fundamental value. In this way, investment flows and trading activity should not impact prices, unless they reflect information about the fundamentals. In practice the position can be more complicated.

In the United Kingdom, demand for long-term gilts from pension funds is widely thought to have had a significant impact especially on indexed gilt prices. Trustees have become more concerned in recent years to reduce the volatility of funds' valuations, since changes now appear on the sponsoring

companies' balance sheets. There has been a wide move towards liability driven investment (LDI) and to matching their long-term liabilities either by buying more index-linked bonds or by buying equivalent hedges in the derivative markets. The narrowing of pension fund deficits as equity markets have improved may have strengthened the trend since funds may now want to 'lock in' the improved position. Even a relatively small shift in pension funds' strategies would represent a large increase in demand relative to the size of the inflation-linked bond market. During 2005 and 2006, anecdotal evidence suggested that UK pension demand for gilts (and associated hedging by dealers) was a contributory factor in driving long-horizon sterling nominal and real interest rates lower. Indeed, this may have been one reason why UK long-term real interest rates fell by more over this period than overseas rates.

Assessing the impact on gilts prices is important for the Bank because we commonly use the differences between indexed and conventional gilts to estimate longer-term market inflation expectations. And these calculations have shown an increase in forward inflation breakevens especially in the past few months as nominal long-term rates have increased (Chart 10). If that reflects a genuine increase in investors' expectations of future inflation in the long term that would imply a loss of credibility in the UK regime.

Chart 10 Breakeven inflation forward rates

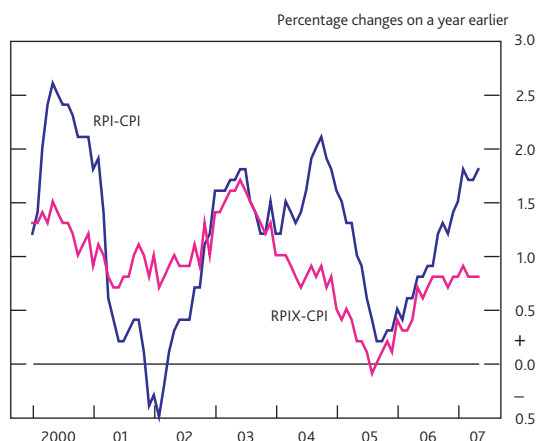


However, there are few signs from surveys and market intelligence that UK long-run inflation expectations have picked up. Market contacts cite the sheer weight of institutional demand in the relatively illiquid index-linked gilt market as a more likely explanation why the price of long-dated index-linked gilts has not fallen by as much as conventional bonds over recent months.

The comparisons are complicated by the fact that the measure of inflation that is used to index gilts is the RPI while our target is set for the CPI and the gap, which largely reflects the impact of interest rates and house prices on the RPI is significant, is

about 0.7% on average and variable (Chart 11). But even making an adjustment for that, the rise in inflation breakevens is significant.

Chart 11 Inflation gaps



Of course, if inflation at long horizons is not generally expected to increase as the forward rates at face value might indicate, why don't some other investors with different risk appetites sell short the overpriced index-linked bond? One answer may be that there are significant market frictions. For example, trading long-horizon forward inflation requires an investment period of many years, over which market volatility must be endured, and most speculative players have significantly shorter investment horizons. Second, transaction costs (bid-offer) are typically higher in index-linked than conventional instruments, partly because the risks in holding inventory are not predictable and are not easily hedged.⁽¹⁾

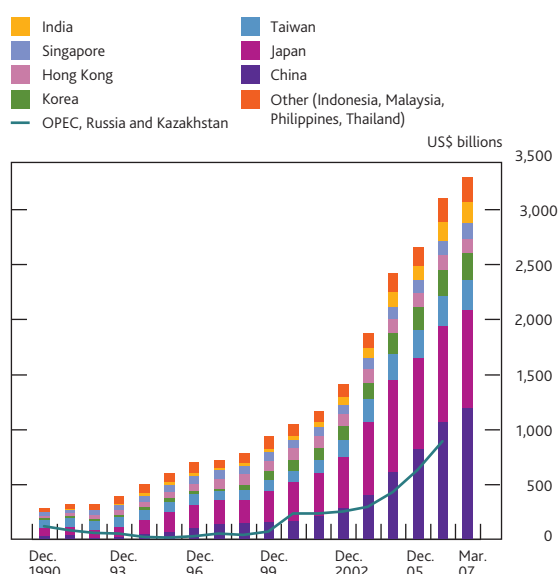
It may be that, against the background of more volatile realised inflation over the past year the rise in breakeven inflation rates reflects an increase in inflation risk premia, the compensation required to bear unexpected changes in future inflation. And the marginal buyers of index-linked bonds (typically insurance companies and pension funds) have become more willing to pay a premium for these assets because they better match their liabilities. Rather like entering into an insurance contract, these investors may be willing to pay a higher price for index-linked securities because the pay-offs may be received in states of the world when they are most valued. Such institutional factors probably account for some part of the measured rise in forward inflation rates. Nonetheless the stability of inflation expectations will remain a key concern for the MPC.

(1) Partly because of the strength of this institutional demand (and their tendency to buy bonds then hold them to maturity), inflation-linked markets are significantly less liquid than their nominal counterparts. DMO data show that as a proportion of the market capitalisation of bonds outstanding, turnover in the IG market is about 1/6th that of the conventional gilt market.

Sovereign investors

In a global context, another influential set of investors in financial markets over recent years have been holders of official foreign exchange reserves and sovereign wealth funds (SWFs). A by-product of large current account surpluses, the funds available for investment have ballooned over the past few years — foreign assets held by sovereigns globally currently stand at US\$7–\$8 trillion, of which around US\$5½ trillion is held as international reserves. This is around five times higher than the level seen in the early 1990s, and could well be an understatement. The growth in foreign assets has been particularly rapid in Asian countries (especially China) and oil and gas exporting economies, including Russia (Chart 12).

Chart 12 Official exchange reserves



It is difficult to be precise about the size of SWFs because they are not recorded explicitly in most official statistics. But recent estimates suggest that their foreign assets are in the range of \$2–\$2½ trillion and they are rising rapidly.

There is no consensus on the effects that this recycling of foreign exchange reserves is having on global financial markets. The market for US Treasuries is exceptionally deep and liquid, but with foreign official investors⁽¹⁾ accounting in aggregate for around 30% of the total US Treasury debt market, some academic studies suggest that they may have kept the nominal yield on the ten-year US Treasury a hundred basis points lower than they would have been otherwise.⁽²⁾

The perception that official buyers may well have different aims and risk appetites to other commercial investors could give them more influence in the markets. And, as with UK

pension funds, they may genuinely alter the risk and term premia in some markets.

Within these accumulating reserves, the growth of SWFs will alter, at least at the margin, the asset mix of official balance sheets. Over time that will tend to increase the price of riskier assets, like equities and corporate and emerging market bonds, compared to government bonds. The impact will be greater if there are concentrations of investment in particular asset classes or countries. More widely, the switch of reserve-rich countries from lenders to owners of financial or real assets is also likely to lead to political tensions and pressures for protectionism.

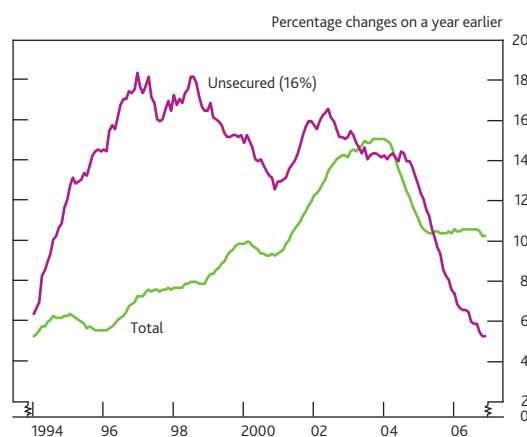
The credit cycle and monetary policy

The knock-on effects of defaults in the US sub-prime market and the impact of big investors on asset prices are factors we need to assess not just in trying to understand the financial sector and the stresses it faces but in gauging the state of the economy more widely.

The story of the sub-prime market illustrates a wider point. In traditional banking markets in the past there has been an observable tendency for banks to overshoot both in offering credit at the top of the cycle and retrenching afterwards. That feeds through into asset prices and can have an impact on the wider economy. Despite the sophistication of the new capital markets, a very traditional cycle seems to have been alive and kicking in sub-prime.

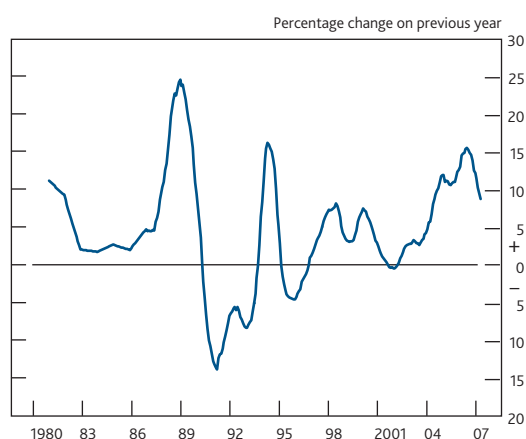
A similar story could be told about the credit card and other unsecured lending over the past few years. The growth rate rose in the late 1990s until defaults began to build up over the past two years and the banks and other lenders tightened up terms and conditions sharply (Chart 13). The path of

Chart 13 Lending to individuals



(1) The definition of the official sector in the US Treasury survey also includes public bodies such as oil stabilisation funds.

(2) See 'International capital flows and US interest rates', *NBER Working Paper no. 12560*, October 2006.

Chart 14 Commercial property capital values growth

commercial property prices in recent years suggests the same has been happening there (**Chart 14**).

In both cases there were genuine and lasting changes in technology and the costs of supply as the development of IT improved credit scoring and allowed the distribution of securitised risk to a wider range of investors. However, there are clear signs, at least in unsecured credit for households, that the lenders overshot. It seems likely that something similar has been going on in some leveraged loan deals. The position in the biggest markets — the mortgage market and mainstream corporate lending — are less clear.

How far recent growth rates in money supply and in asset prices reflect a credit supply cycle and, if so, where we are in the cycle are questions we have been discussing on the MPC. If we could be confident of the answers there would be a

strong case for using monetary policy to help stabilise growth and inflation by 'leaning into the wind' — that is, raising rates a little faster or further than we would otherwise have done on the upswing and reducing them quicker on the downswing. In practice the diagnosis is rarely clear-cut. The sub-prime losses and the impact of large investors are two factors complicating matters at the moment.

Conclusion

The old Chinese curse — 'may he live in interesting times' — might be designed for central bankers. Our job is to keep things stable and boring. But there are limits in a rapidly changing world to what is possible. My argument is that the uncertainties today are a return to normality after two years of exceptional predictability in monetary policy both in the United Kingdom and elsewhere.

A particular area of uncertainty at present is in the credit markets. The dangers of combining a traditional credit cycle with the new derivatives markets have emerged in the US sub-prime sector. The US housing market is in its downswing and there are some signs that the same is true in the United Kingdom of unsecured credit and commercial property. The position of the bigger UK sectors is less clear-cut. The shift in pension fund priorities and the growth of sovereign wealth funds are further clouding the picture.

It is our job on the MPC to work through these issues and reach a judgement on them. Our target is to reduce inflation to 2% and keep it there. I can assure you that we will do whatever is needed to achieve that.

Central banking and political economy: the example of the United Kingdom's Monetary Policy Committee

In this speech,⁽¹⁾ Paul Tucker, Executive Director for Markets and Monetary Policy Committee member, explores the political economy context in which modern-day central banks work. He reviews how in the United Kingdom political economy considerations have shaped key features of today's monetary policy framework from the operational independence, rather than goal independence, of the Bank of England to the design of the institutional structures within which the MPC operates and is held accountable, including, in particular, policy-rate decisions being taken on the basis of one member-one vote. Against that backdrop, he addresses some topical issues in monetary policy strategy and communication: whether to publish individually attributed paragraphs in the MPC minutes or a planned path for the Bank's policy rate. Finally, he considers the context behind the different approaches among central banks, and individual policymakers, to the role of money. And he explains his own view that while it is useful to recover the concept of shifts in the supply of broad money, careful attention to the underlying drivers of any such shifts is essential; and that any role of money over and above that of credit and asset prices needs to be disentangled.

Over the next couple of days, this conference will take forward debates on many of the strategy issues preoccupying monetary economists and policy practitioners. The role of inflation targets and communication in anchoring inflation expectations. The place of money in central bank analysis and policy frameworks. Whether to be transparent about any expectations policymakers form about the path of their policy rate.

After more than a decade in which monetary authorities across the world have generally succeeded in maintaining price stability, it is hard to know whether these continuing debates — and, more important, the variations in central bank practices that underlie them — are vital or peripheral. Time will tell. Some architectural features of monetary regimes are plainly important and, unsurprisingly, are broadly shared: central bank independence; a definition of price stability that, with credibility, can act as a nominal anchor; a forward-looking 'reaction function'. Within that broad canvas, the remaining variance in central bank practice may owe something to differences in the governance structure for their decision-taking, and to the genesis of those differences.

Alan Blinder has deftly set out⁽²⁾ a spectrum of decision-taking structures ranging from one individual, the Governor; through

committees that are more or less collegial, with either a clear leader or a more collective approach; to committees, such as the Bank of England's MPC, that are individualistic. Blinder and others identify advantages in a committee approach of some kind, essentially on the grounds, based on analysis or experiment,⁽³⁾ that committees will generally make better decisions.

That may leave out something rather important. Which is that in some countries a committee structure has been a precondition for achieving central bank independence in the first place. And that is a useful reminder of the political economy conditions in which monetary regimes are constituted and operate. Context matters, including possibly to some of the issues on your conference agenda. The United Kingdom's post-war journey to monetary credibility illustrates that rather neatly.

(1) Given at the Inflation Targeting, Central Bank Independence and Transparency Conference, University of Cambridge on 15 June 2007. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech312.pdf.

(2) See Chapter 2 in Blinder, A S (2004), *The quiet revolution: central banking goes modern*, Yale University Press.

(3) Lombardelli, C, Proudman, J and Talbot, J (2005), 'Committees versus individuals: an experimental analysis of monetary policy decision making', *International Journal of Central Banking*, May.

Environmental preconditions for independence: ideas and values

For a long time, price stability simply was not the core objective of macroeconomic policy. A Bank of England piece in the late 1960s⁽¹⁾ described government's twin goals as having been to improve trend growth and maintain high employment, to which was subsequently added balance of payments sustainability. When, in the mid-1970s, the United Kingdom suffered the indignity of having to borrow from the IMF, the Cabinet split over the Fund's stability-oriented programme.⁽²⁾ And the Thatcher government, elected shortly afterwards, failed to command broad-based support for a medium-term framework for reducing inflation explicitly founded on 'monetarism', which became a loaded term, widely perceived across UK society as part of an ideology. In other words, sound money or price stability was not viewed as an objective that could be shared across the democratic political spectrum.⁽³⁾

This was, perhaps, apparent in the famous 1981 letter of the 364 economists which stressed that 'the time has come to reject monetarist policies'.⁽⁴⁾ Whatever the merits or demerits of its conjunctural points, the letter made no mention of an objective of low and stable inflation, or of the fiscal sustainability that is a precondition for monetary stability. Indeed, it is striking that, in this country, price stability was not energetically promoted by the mainstream academy. Rather, the case was made by what seems to have been a relatively small group of public intellectuals,⁽⁵⁾ together with a few academics and officials. Drawing on the work of US macroeconomists, UK policymakers reached four broad conclusions that have endured: that macroeconomic policy should not assume that there was a long-term trade-off between inflation and output; that microeconomic policy should be assigned the task of improving the supply side of the economy; that only monetary policy could achieve and maintain price stability; and that medium-term fiscal discipline was needed for any monetary regime to be credible.⁽⁶⁾ Elements of that were controversial at the time. And views within the official sector on the acceptable rate of inflation covered a broad spectrum. By the early-mid 1980s, some were apparently prepared to settle for inflation of around 5%, or at least were concerned about the output costs of further disinflation. Others, notably Eddie George, argued that inflationary expectations could be stabilised effectively only if inflation were lowered below that.⁽⁷⁾ While affirming a commitment to reduce inflation further,⁽⁸⁾ politicians did not resolve these debates by articulating a medium-term goal for inflation. Money was believed to be more controllable than inflation so, during this period, objectives, targets/indicators and instruments tended to be considered together, a monetary target being expected to deliver all three. Ministers were, in consequence, drawn into highly technical debates, rather than focusing primarily on articulating high-level macroeconomic

objectives. But both money targeting and, subsequently, exchange rate targeting failed in the United Kingdom. That meant that attempts by politicians to deliver effective monetary policy by binding themselves to a policy rule based on an intermediate target had failed. So attention gradually turned to broader institutional solutions, leading ultimately to 'operational independence' for the Bank.

In terms of the political economy, there were perhaps two crucial developments during the first half of the 1990s. First, there was much greater transparency. An inflation target was announced by government, making the objective clear and performance in achieving it easy to monitor. The Bank's analysis of the inflation outlook was published in the quarterly *Inflation Report*; and its advice to the Chancellor on the level of interest rates was published in the minutes of the 'Ken and Eddie Show'. This revolution helped to establish the legitimacy of what the monetary authorities were trying to achieve; helped to demonstrate the Bank's competence; and showed that differences of view about the level of interest rates could be disclosed without the ceiling coming down.

Second, a lot more was done, by the Bank and others, to establish support for the goal of price stability — not as a political tenet but as a technical prerequisite for a well-functioning economy. This ran through the speeches of Robin Leigh-Pemberton, Eddie George and Mervyn King in the late 1980s and early 1990s, as well as in Bank research. Analytically, energised by the current Governor when Chief Economist, the Bank put resources into analysing the costs of inflation, and into contributing to the so-called time-consistency literature on the central importance of mechanisms to underpin trust in a monetary authority's declared commitments.⁽⁹⁾ And in more public spheres, Eddie George's speeches in the early 1990s repeatedly

(1) 'The operation of monetary policy since the Radcliffe report: text of paper presented at a conference "Radcliffe — ten years after"', *Bank of England Quarterly Bulletin*, Vol. 9, No. 4, 1969.

(2) Burk, K and Cairncross, A (1992), 'Goodbye, Great Britain': the 1976 IMF crisis, Yale University Press.

(3) I say democracy, because enemies of democracy have seen debauching the currency as a means to their ends. For example, 'The best way to destroy the capitalist system is to debauch the currency' is attributed to V I Lenin by J M Keynes in *The economic consequences of the peace* (1920, page 235).

(4) See 'Letter to *The Times* from 364 academic economists', April 1981.

(5) Notably Samuel Brittan and Peter Jay. See, for example, Sir Samuel Brittan's 1981 paper 'How to end the "monetarist" controversy: a journalists reflections on output, jobs, prices and money', London: IEA.

(6) See Lawson, N (1984), 'The British experiment', The Fifth Mais Lecture at City University Business School, June.

(7) These differences of emphasis emerged during the review of macroeconomic policy objectives and instruments discussed in Chapter 36 of Lord Lawson's book *A view from Number Eleven*.

(8) See Nigel Lawson's 1984 Mais Lecture, *op cit*.

(9) In 1992, Governor Leigh-Pemberton gave a lecture entitled: 'The case for price stability'. As well as reviewing the costs of inflation, the lecture reprised the early-1980s debate on the rate of inflation the authorities should settle for (see Note 9), in a section entitled 'Why not settle for 5%?'. These issues were also the centrepiece of the Bank's tercentenary conference in 1994 on the future of central banking. See Fischer, S (1994), 'Modern central banking', in Capie, F, Goodhart, C, Fischer, S and Schnadt, N (eds), *The future of central banking: the tercentenary symposium of the Bank of England*, Cambridge University Press. See also Briault, C (1995), 'The costs of inflation', *Bank of England Quarterly Bulletin*, February. And Haldane, A (ed) (1995), *Targeting inflation: a conference of central banks on the use of inflation targets organised by the Bank of England*, March.

stressed the emergence of a consensus, domestically and internationally, about macroeconomic policy goals and means. Price stability was not just an end in itself but a precondition for macroeconomic stability more generally: for sustainable growth in output and employment and, thus, for the 'good things in life'. A precondition, but *not* a sufficient condition. The Bank took care to stress that, however effective, monetary policy could not deliver economic prosperity on its own. It was a necessary condition. And it could avoid the costs of inflation, including random and unacceptable redistributions of wealth between savers and borrowers resulting from unexpected surges in inflation caused by the authorities choosing to loosen monetary conditions.

Two observations might be made about the case the Bank was making. First, there is a conviction that the long-term health of the real economy *is* affected by the monetary regime. In the jargon, money neutrality but not 'superneutrality' which, put broadly, holds that monetary regimes are irrelevant to the long-run performance of the real economy.⁽¹⁾ The way I think about this is that low and stable inflation can bring two (related) benefits to the real economy. Relative price signals will be clearer, aiding the efficient allocation of resources. And greater macroeconomic stability will reduce risk, reflected in lower risk premia and so in a lower effective cost of capital for firms and households, as well as possibly in longer investment horizons.

Second, some of the arguments might have seemed to shade into a 'moral' case for price stability, which has recently been excoriated by Willem Buiter⁽²⁾ on the grounds that it has typically come packaged with central bankers presenting themselves as akin to spiritual leaders who are above needing to explain their actions to the public. Well, I don't think we had much truck with central banking as religion, and from the early 1990s the Bank could reasonably claim to have been in the vanguard of transparency. But there did run through our corridors a sense of outrage that homes, livelihoods and businesses could be destroyed by quite unnecessary lurches from boom to bust; and that the economy's progress was being arrested by the lack of sustained and credible nominal stability. In other words, central bankers seemed not to believe research results suggesting that the welfare benefits of macroeconomic stabilisation were small.⁽³⁾ Caring passionately about the benefits of price stability is part of what makes us — a bunch of 'conservative central bankers'⁽⁴⁾ — suitable for the job.

Environmental conditions for independence: institutions

One might think that would be it; that independence would follow from a consensus being established around those ideas and values. Not at all, and for good reasons in the UK context.

I recall⁽⁵⁾ various arguments being advanced through the 1980s and into the 1990s against independence for the Bank.

Mostly, they had their roots in the Bank comprising unelected officials, without a democratically elected minister as its head. Thus, the then Governor was told in the very early 1990s that if the Bank ever combined responsibility for bank supervision with monetary policy it would be 'an overmighty citizen'. More important, a number of commentators argued that it was a real obstacle to independence that the Bank would not be able to account for its monetary stewardship on the Floor of the House of Commons. In a Parliamentary system of democracy, it is Ministers who are accountable.⁽⁶⁾

Those circumstances are specific to the United Kingdom. Other conditions and histories act as constraints elsewhere. For example, in Germany, the institution that became the highly independent Bundesbank was established as part of the country's reconstruction after WWII and so before its new democracy was embedded. It had 'goal independence'. And in the United States, while there is hesitation over giving the Federal Reserve an inflation target, as great weight is placed by Congress on the 'dual mandate', there is not concern about the scope or mechanics of the FOMC's accountability to Congress. Every member of the executive arm of the government is unelected except the President. The central bank is no outlier.⁽⁷⁾ But in the United Kingdom it really was a novelty — in a way, a constitutional departure, foreshadowed perhaps only by the judiciary⁽⁸⁾ — to give such a politically sensitive lever to a body of unelected technicians.

The institutional obstacles to Bank of England 'independence' therefore needed institutional solutions. Responsibility for bank regulation was transferred from the Bank in 1997. The

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- (1) Blanchard, O and Fisher, S in *Lectures on macroeconomics*, MIT Press 1989, state that 'money is said to be neutral if changes in the level of nominal money have no effect on the real equilibrium. It is said to be superneutral if changes in money growth have no effect on the real equilibrium' (note 8, page 207). Given the relationship between money growth and inflation in the very long run, that means that the rate of inflation has no effect on the real equilibrium. In practice, high rates of inflation have proved highly variable, injecting uncertainty into the economy, which can have real effects.
 - (2) Buiter, W H (2006), 'How robust is the new conventional wisdom in monetary policy? The surprising fragility of the theoretical foundations of inflation targeting and central bank independence', paper presented at the 2006 Central Bank Governors' Symposium 'Challenges to monetary theory', at the Bank of England.
 - (3) For example, Lucas, R E (1987), 'Models of business cycles', 1985 Yrjö Jahnsson Lectures, Basil Blackwell, Oxford.
 - (4) For the genesis of this term in the literature, see Rogoff, K (1985), 'The optimal degree of commitment to an intermediate monetary target', *Quarterly Journal of Economics*, November, Vol. 100, No. 4.
 - (5) From the vantage point of being Private Secretary to Governor Leigh-Pemberton (1989–92), and later as an official implementing policy and then heading the Bank's Monetary Assessment and Strategy Division.
 - (6) Thus, a whole chapter of Lord Roll's pamphlet on the case for independence was devoted to solutions to this problem. 'Independent and accountable: a new mandate for the Bank of England', report of an independent panel chaired by Eric Roll, Centre for Economic Policy Research, 1993.
 - (7) In another example, Ulrich Kohli has discussed how the SNB's consensual approach to monetary policy making is 'to do with' the culture flowing from Switzerland's multi-cantonal federal political structure. See Kohli, U (2005), 'Comment on "The monetary policy committee and the incentive problem: a selective survey"' by Fujiki, H, at conference on 'Incentive mechanisms for economic policymakers', Institute for Monetary and Economic Studies, Bank of Japan, May.
 - (8) The parallel with the judiciary was made in the early 1990s in a speech by Governor Leigh-Pemberton, drawing on work by Ralph Dahrendorf.

pathway to resolution of the 'democratic deficit' problem had potentially been opened up in the 1980s by the St John Stevas reforms of Parliamentary Committees which led, over time, to a Treasury Committee with a high reputation and standing, supported by access to expert advice. In the 1997 reforms, the sphere of politics was carefully delineated. The goal of price stability is set by Parliament in legislation; and, within that framework, the Chancellor of the day sets the Bank its target for inflation. So the democratically elected executive arm of government is accountable to Parliament for the policy regime; and the Bank is accountable to the government and to the Parliamentary Select Committee for its operation of that regime. Hence, 'operational independence', not goal independence.

The goal was chosen to be a *symmetric* point inflation target, providing reassurance to the country that the Bank would not pursue a bias towards disinflation. And the credibility of the regime was underpinned by a framework for fiscal policy designed, among other things, to maintain a prudent debt/GDP ratio, and so avoid making inflation a tempting prospect down the road.

There was one other vital element of the system's design, also addressing the problem of interest rates being decided by unelected officials at the Bank. As Eddie George and Mervyn King have now both disclosed, in the run-up to the May 1997 election, the Bank pulled together its thoughts on a possible new monetary regime.⁽¹⁾ The Bank's hope was that it might be granted independence if a Committee established to advise the Chancellor on interest rates, which had featured in the Labour Party Manifesto, was seen to do a good job. In the event, the incoming government did not need the intermediate stage of an advisory committee. It created the MPC. The appointment to the Committee of four outside experts ensured that daylight would be brought into the Bank, and underlined the architectural role of democratically elected ministers.⁽²⁾ It also meant that the Committee would reach its decisions on a 'one person/one vote' basis, with that going for the five Bank executive members too.

This is what I have been leading up to: an 'individualistic' committee was a necessary condition for operational independence in the United Kingdom.

In terms of solving the time-consistency problem and establishing credibility, the UK system does not rely on handing monetary policy, lock, stock and barrel, to a group of 'conservative central bankers'; in terms of the literature familiar to this conference, the system is as much Walsh as Rogoff.⁽³⁾ The regime is based on combining an objective set by democratically elected politicians, with clear accountability mechanisms. One of those mechanisms was triggered for the first time recently when CPI inflation rose to 3.1% in March, requiring the Governor, on behalf of the Committee, to write

an open letter to the Chancellor about what we thought was going on and what we planned to do to get inflation back to our target of 2%. As well as providing transparency to commentators and the markets who are in the business of forming views about our future actions, the letter has proved a useful focus for public debate, which has almost universally underlined UK society's continuing commitment to price stability. The 'open letter' mechanism is important to the political economy of monetary policy in the United Kingdom.

A one member/one vote committee

The open letter was an instance of the MPC acting as a collective, represented by the Governor. Much of the time, most obviously when reaching our monthly decisions on Bank Rate, we are in one person/one vote mode.

Although now well established, a committee that truly adheres to one person/one vote, and at the same time pursues its mandate with dedication and integrity, needs nurturing and skilful maintenance. After all, four of the MPC's nine members also have executive duties for which they report to the Governor of the day. And the four other, 'external' members expect to renew their careers outside central banking after a few years of service to the MPC, and so might be thought to have an interest in maintaining an appropriate profile. But — maybe alone among central banks, I'm not sure — no one doubts that the MPC *does* decide Bank Rate by a free vote. That this should be so owes a great deal to the culture of the Committee itself; a culture engendered by its first Chairman and his successor as Governor, but also by the rest of the membership. This is buttressed by the way in which the Bank's Court of non-executive directors approaches its statutory responsibility of reviewing the MPC's processes, involving annual bilateral meetings with each MPC member. And, externally, it is similarly underpinned by the Treasury Select Committee holding us individually accountable for our monthly votes, which are published as part of the minutes of our meetings.

This establishes very powerful incentives for each member to reach their own considered view. There is no free-riding in the

(1) See transcript of interview on 1 May 2007 of Mervyn King by Giles, C and Daneshku, S for the *Financial Times* on the occasion of the 10th anniversary of the Bank of England's operational independence (published 11 May 2007); and transcript of interview on 30 March 2007 of Lord George by Giles, C and Daneshku, S for the *Financial Times* on the occasion of the 10th anniversary of the Bank of England's operational independence (published 4 May 2007). As a further gloss on that piece of history, I should perhaps disclose that, working to Eddie, Mervyn and the then DG, Howard Davies, I was the Bank official who 'held the pen' during that work.

(2) As stated in Balls, E and O'Donnell, G (2002), 'Reforming Britain's economic and financial policy', 'The role of the Chancellor in appointing the four outsiders was part of the delicate constitutional balance that was struck in a move towards a legitimate model of central bank independence consistent with British style accountability to Parliament.' (page 99).

(3) Walsh, C E (1995), 'Optimal contracts for central bankers', *American Economic Review*, Vol. 85, No. 1, sets out how a contract between government and the monetary authority can give the latter the incentive to pursue society's macroeconomic goals in a time-consistent manner. Rogoff's 'conservative central banker' relies on the central bank being more averse to inflation than society as a whole.

MPC; and our policy debates are full and free. That lies at the very heart of the MPC's operation, performance and communications.

Indeed, it might be wondered whether the tone of some of the public scrutiny could set up incentives to cast minority votes with the aim of demonstrating independence of thought and action.⁽¹⁾ That, of course, would be perverse. Each member wants their individual decisions to matter — to the current Bank Rate, and to the expected path of policy and so the monetary conditions embodied in the money market yield curve. One votes in a minority when one disagrees with the immediate decision and the strategy it might convey. Occasionally, doing so, with the reasons disclosed in the minutes, can be an effective way of influencing monetary conditions.

The make-up of the MPC's majorities and minorities shifts around over time. There are no 'blocs' on the Committee. And there is no distinction between 'internals' and 'externals' in that respect. Indeed, apart from the defining characteristic that the internals have full-time executive responsibilities at the Bank, the main distinction to date is that internal members tend to serve for longer; an average of around five and three quarter years, compared with just over three years for the external members.⁽²⁾ That seems to me to be consonant with the political economy considerations behind the design of the Committee. The internal members provide a bedrock of accumulated policy expertise and commitment. The externals, coming from outside the Bank and turning over more frequently, keep the debate and the process fresh.

Three issues around the communication of monetary strategy

Against that background, how does the MPC's constitution, and in particular our one person/one vote decision-making structure, affect our approach to some of the issues on your conference agenda?

Communication of decisions: how individualistic should we be?

The MPC has employed four main communication mechanisms: the announcement of our monthly decision on Bank Rate; the minutes of those meetings, including details of our individual votes; the quarterly *Inflation Report*, containing projections for output and inflation; and public testimony, to Parliament and via speeches, interviews etc.

This differs in various respects from the practice of some other, more consensual central banks.⁽³⁾ For example, we do not routinely include an explanatory statement in the notice of our monthly decision, preferring to do so only when Bank Rate changes or when we judge that the reasons for a 'no change'

decision cannot wait until the minutes are published a fortnight later. And when we do include an explanatory statement, it is kept as short and simple as possible. That is obviously different from the ECB and, in degree, from the FOMC.

These choices reflect different circumstances and structures; in the MPC's case, our 'one person/one vote' governance. I can assure that members of the Committee, including the Chairman, do not know what we will decide until it is decided. Ours is not a system that lends itself to the tabling of a draft statement around which views will coalesce. Rather, any statement has to be crafted to reflect the view of the majority that emerged at that particular meeting, not an easy task at speed.

We are, in fact, very conscious of the distinction between collective and individual statements. We try to be clear about which communications are collective, on behalf of a majority or the Committee as a whole, and which are made by an individual member speaking for themselves. The *Inflation Report* projections, for example, represent a 'best collective view' or centre of gravity in the Committee, admittedly not a well-defined term. Individual views, when departing from that best collective view, have occasionally been published. At the *Inflation Report* press conference, the Governor, Charlie Bean and I are speaking for the Committee, not for ourselves. By contrast, we speak as individuals when we give testimony to Parliament or set out our views in speeches.

That this should be understood is, of course, terribly important given that the effectiveness of the regime depends on the *Committee* decisions and 'policy reaction function' that emerge from our individual deliberations. Conscious of the need to maintain a delicate balance between centripetal and centrifugal forces, most past and current members — including me — have opposed incorporating individually labelled paragraphs into the minutes. To do so would put beyond doubt each month where each of us stands, but it would also affect the dynamic interactions among Committee members. My reluctance to go down that route stems from a concern that we would slip towards a degree of individualism where members were no longer listening to each other. It would not be possible for members to polish their statements after the meeting, as they would then be able to tweak their text, ever so slightly of course, in the light of the market reaction to our decision and so on. So highly polished statements would be

(1) See Gerlach-Kristen, P (2003), 'Insiders and outsiders at the Bank of England', *Central Banking*, Vol. 24, No. 1.

(2) To date, the time on the Committee served by externals has ranged from a minimum of 1.4 years to a maximum of 8.9 years. For internals, the corresponding range is from 2.25 years to 11 years. These ranges are calculated by including the unexpired parts of the terms of existing Committee members, but do not include the terms of Howard Davies and David Walton.

(3) For example, Weber, A (2007), 'Monetary policy strategy and communication', speech at the Deutsche Bundesbank/Federal Reserve Bank of Cleveland conference on 'Monetary policy strategy: old issues and new challenges', Frankfurt, May.

brought to the meeting, with perhaps even a degree of competition in the depth of the analysis or the beauty of the prose. But the very point of a committee is that we should listen to each other, and then make up our own minds.⁽¹⁾ That includes trying to persuade one's colleagues. Over the years,⁽²⁾ I have definitely seen occasions where individual members have altered their position during the course of a meeting.

In summary, the political economy case for one person/one vote does not entail the equivalent of postal voting, which I believe would impair the quality of our discussions and so, probably, of our decisions.

Communication of the Committee's reaction function: whether to publish an expected path of Bank Rate

Central bankers know that expectations matter. So they know that delivering their goals requires more than being able to set the overnight money market rate from one policy meeting to the next. It matters where agents — businesses, households, financial markets — expect the policy rate to be set in the future. More than that, it matters that agents have a broad understanding of how the monetary authority will react to unforeseen developments in the economy; their 'reaction function'.

That being so, some central banks have started publishing their expected future path of rates, or a range for the future path.

This could have advantages. For example, absent a clear agreement and statement of the strategy being pursued by the Committee, differences among members about the monthly decision can occasionally stem from judgements about how the precise timing of Bank Rate changes would affect perceptions of the Committee's future course and so monetary conditions.

But in my book, there are two reasons for not publishing a planned policy path — both related to the political economy context in which the MPC operates.

First, in a one person/one vote system, I very much doubt that a sufficiently stable majority could be relied upon to exist to vote, as a majority, for the entire future path of rates (and then to stick to it if conditions had not changed). And I am not convinced that communication would be aided by publishing a path made up of segments supported by majorities comprising different groups of members. In those circumstances, it would be hard to make sense of how individual statements related to the supposedly collective expected path.

Second, any such statements would be conditional on a whole host of judgements about what was going on in the economy and about how the economy works. I doubt that, in the United Kingdom, our communication with the public and

Parliament would be judged a success if we announced a path, only to have to explain that we had departed from it because conditioning assumptions A, B ... or X and Z had been invalidated by the passage of time. Getting across the conditionality might be hard, but also very important: there could be disquiet if the public felt that it had been misled. There is a premium, in our polity, of keeping the debate focused on the outlook for inflation.

As I have said to the Select Committee,⁽³⁾ I would not myself say 'never'. I think we must learn from experience elsewhere.

But that does not mean sitting on our hands. The real need is to convey our reaction function, which publishing a path for Bank Rate would not obviously accomplish. We need to communicate how we are likely to react to the different types of shock that can drive the economy away from its steady-state path. A complete specification is not feasible. We do not have a 100% correct model of the economy. And policy cannot sensibly be described by a simple mechanical rule but, rather, is determined by the judgement of policymakers, with the composition of the one person/one vote committee evolving over time. But at any particular time, some possible shocks — and so sources of risk to the inflation outlook — seem more important than others. As the Governor has announced,⁽⁴⁾ the MPC is therefore planning to do more to explain our collective assessment of risks.

Communications about the transmission mechanism, and the place of money within it

Grasping our reaction function requires an understanding of how we think the economy works.

In its early years, the MPC published a collective document on the monetary transmission mechanism.⁽⁵⁾ And, as part of its evidence to the Select Committee's 'Ten years on' inquiry, we recently submitted a collective document on how the economy has developed over the past decade.⁽⁶⁾

Much of it is uncontroversial. One issue has, though, come to the fore recently: money. Money is a good example of how the political economy context affects the outward form of policy regimes. In the euro area, it was vital for the ECB to do what it could to inherit the credibility of the Bundesbank, and

(1) See section on 'Does discussion help?' in Lombardelli, Proudman and Talbot, *op cit*, page 199.

(2) Before I was a member of the MPC, I was on the secretariat, so I have attended nearly every MPC meeting since 1997. Many members of the Committee do, more or less loosely, base their remarks on the Thursday morning around some notes but as contributions to a debate rather than as definitive, publishable individual statements.

(3) See response to question 285 in oral evidence to the House of Commons Treasury Select Committee inquiry on 'The Monetary Policy Committee of the Bank of England: ten years on', April 2007.

(4) King, M A (2007), 'The MPC ten years on', lecture to the Society of Business Economists, May.

(5) 'The transmission mechanism of monetary policy', a paper by the Monetary Policy Committee, April 1999.

(6) 'The Bank of England's submission regarding the economic context', memorandum submitted in evidence to the Treasury Select Committee inquiry on 'The Monetary Policy Committee of the Bank of England: ten years on', April 2007.

so it was understandable that the special place of money in the Buba's communication strategy was adopted by the ECB. I had first-hand evidence of this when I was a member of the Monetary Policy Sub-Committee of the EMI during the mid-late 1990s (and so before the United Kingdom had decided not to join EMU). A colleague from one of the national central banks said to me after one of the deliberations, 'Of course you guys have the better arguments about monetary strategy, but we will back the Bundesbank. Their policy record has been outstanding for a quarter of a century. Yours has been good since 1992, around five years, which just isn't long enough'.

In the United Kingdom, it was almost the other way round given the series of failed attempts to base monetary policy on a money target during the 1980s. Not only in terms of the substance but also in terms of building and maintaining support for the regime, the United Kingdom has been much better served by an objective expressed in terms of a target for inflation. It is easier to explain.

But that leaves open the question of what role money should play in our analysis. Some commentators *want* money to be important in the transmission mechanism because, after all, inflation is a monetary phenomenon; others feel that it can be placed to one side on the grounds that it is essentially endogenous and, after all, the dual of the quantity of money — interest rates — is in our models (more or less). This is an area where, given our individualistic governance structure, views on the Committee cannot be expected to be monolithic.

My own view is that it is useful to recover the concept of shifts in the *supply* of broad money.⁽¹⁾ But such shifts do not have much in common with the proverbial helicopter drop; households and firms are not forced to hold the extra money, but respond to the terms and conditions on deposits offered by banks. The consequences for the macroeconomic outlook therefore depend on the nature of the underlying shock. For example, if a shock — say to the monetary regime — caused perceptions of macroeconomic risk to decline, there could plausibly be shifts in *both* the supply of and demand for credit. Other things being equal, bank balance sheets — and so broad money — would expand, but it might be hard to judge the extent of any inflationary impulse coming through a 'shock' to the supply of broad money over and above that stemming from a relaxation in credit constraints and higher asset prices. Also, although a 'counterparts' approach to the monetary aggregates would incline one to think that shocks to the supply of credit would flow into broad money, changes in the 'technology' of banking and financial intermediation might in some conditions make the connection tenuous. After all, the intermediation of credit occurs via capital markets and not just across bank balance sheets. That could matter, for example, if an increase in the supply of credit happened to occur at much the same time as an increase in incentives or the means for

banks to securitise — ie sell — the loans they originate. In the limiting case, a big positive shock to the supply of credit could coincide with shrinking bank balance sheets and so negative broad money growth. That is, of course, not at all what we have seen recently.⁽²⁾ But the thought experiment underlines two things.

First, we need to attend carefully to the underlying drivers. As part of that effort, the Bank has recently launched a new Credit Conditions Survey, which should enrich our grasp of what is going on. Reflecting changes in the structure of the financial system, we have included questions on demand for credit from hedge funds and structured finance vehicles, as well as on the terms and conditions on bank lending to households and firms. Second, we need to be careful in distinguishing the implications of credit conditions and asset prices from any extra role played by the rate of growth in banking sector liabilities (broad money). It is plausible that we are capturing all that we need to via the incorporation of asset prices — and so, at one remove, credit conditions — in mainstream macroeconomic models and analysis. But we cannot be sure, not least because banking intermediation does not feature in those models, and nor do risk premia. As I have said before,⁽³⁾ we must look at money, as it can be an 'amber light', but analysis of the monetary aggregates, which means the analysis of the banking sector balance sheet, often needs to be especially detailed. Sitting at the juncture of the real and financial economies, central banks should be especially well placed to undertake that analysis.

To be clear, those are my individual views. Our governance structure provides constructive incentives for each of us to reveal our views on issues of this kind — to each other, and in public.

Conclusion

Much of the world economy has been enjoying a period of sustained macroeconomic stability. Reforms under a series of governments to enhance the flexibility of product and labour markets have helped our economies to absorb shocks. But few people doubt that stability requires credible monetary institutions.

The practice and theory of monetary policy has travelled a long way over the past fifteen years or so. As performance has improved, so more refined questions have emerged about the

(1) See Goodhart, C A E (2007), 'Whatever became of the monetary aggregates?', Peston Lecture at Queen Mary College, London, and King, M A (2007), 'The MPC ten years on', lecture to the Society of Business Economists, May.

(2) See Tucker, P M W (2007), 'Macro, asset price, and financial system uncertainties', Roy Bridge Memorial Lecture to the ACI — Financial Markets Association, *Bank of England Quarterly Bulletin*, Vol. 47, No. 1, page 127 for discussion on growth in financial sector money holdings, and page 129 for discussion of the composition of balance sheets of large banks.

(3) See Tucker, P M W (2006), 'Reflections on operating inflation targeting', speech at the Graduate School of Business, University of Chicago, July.

optimal conduct and communication of policy. Many of those issues will feature in this conference. My purpose this morning has been to cast those questions in the context of the political economy conditions in which individual central banks are constituted and operate, using the United Kingdom's MPC as an example. Central bank independence is a solution to a political economy problem — time inconsistency. Precisely how that problem is resolved may legitimately vary from country to country. In the United Kingdom, it was achieved only after democratically elected politicians had done some of the politically contentious heavy lifting in bringing inflation down, and after a period in which the case for price stability

had been made. The monetary regime introduced in 1997 was necessary to embed credibility. Its detailed design properly reflected UK circumstances. Circumstances elsewhere differ, and so details in central banking practices vary.

But not every central bank practice everywhere may be optimal, and what is feasible for each country's monetary system alters over time. We therefore need to learn from each other, without imagining that all design features travel safely: learning without proselytising. Academic research plays a huge role in keeping us intellectually honest, and so in progressing those debates.

Promoting financial system resilience in modern global capital markets: some issues

In this speech,⁽¹⁾ Nigel Jenkinson⁽²⁾ and Mark Manning⁽³⁾ argue that structural change in financial intermediation and the global financial system has exposed new vulnerabilities. Market participants and policymakers alike need to update their approach to risk assessment and take appropriate steps to identify and contain emerging threats. A well-functioning and resilient operating environment is essential here, with the financial market infrastructure a critical component of this. In an increasingly complex and globally integrated financial system, vigilance, flexibility and international co-ordination among policymakers is likely to become ever more important.

The changing nature of risks

Spurred by rapid innovation, we are currently witnessing a period of major structural change in financial intermediation and the global financial system. Financial market activity is growing at a tremendous pace. For example, over the past five years, the credit derivatives market has grown spectacularly from around \$1 trillion notional amount outstanding in 2001 to around \$20 trillion in 2006⁽⁴⁾ (**Chart 1**) and the issuance of leveraged loans has increased almost threefold (**Chart 2**). The balance sheets of the major global financial institutions (the so-called large complex financial institutions or LCFIs) have more than doubled since 2000, fuelled by an increase in trading assets⁽⁵⁾ (**Chart 3**). Turnover in the UK and US foreign exchange markets has risen by around 50% in only the last couple of years. And capital market integration is rising rapidly as barriers to cross-border flows have come down. Taking a longer sweep, over the past 35 years cross-border asset holdings have risen more than sixfold in terms of world GDP⁽⁶⁾ (**Chart 4**).

Financial innovation has delivered considerable benefits. New products have improved the ability to hedge and share risks and to tailor financial products more precisely to user demand. That has enabled financial intermediaries and users of financial services to manage financial risks more effectively, and has lowered the costs of financial intermediation. And innovation and capital market integration have facilitated the wider dispersal of risks, which may have increased the resilience of the financial system to weather small to medium-sized shocks.

Innovation has also delivered new challenges and vulnerabilities. Dependence on capital markets and on sustained market liquidity has increased, as banks and other

intermediaries place greater reliance on their ability to 'originate and distribute' loans and other financial products, and to manage their risk positions dynamically as economic and financial conditions alter. In turn that places additional pressure on the robustness of financial market infrastructure to handle large changes in trading volumes and to cope with periods of strain. And the greater integration of capital markets means that if a major problem does arise it is more likely to spread quickly across borders. So as highlighted by a number of academics and authorities,⁽⁷⁾ the flip side to increased resilience of the financial system to small and medium-sized shocks may be a greater vulnerability to less frequent but potentially larger financial crises.

Benign economic and financial conditions in recent years have kept credit losses at low levels. Combined with buoyant returns from capital market activity, the profitability of major financial institutions has been strong. And capital levels are high. But as highlighted in *Financial Stability Reports* by the Bank of England and others, this benign environment has encouraged an increase in risk-taking and a 'search for yield' which has lowered the compensation for bearing credit risk and market risk to very low levels. The vulnerability of the system as a whole to an abrupt change in conditions has consequently increased.

(1) Given at the conference 'Law and economics of systemic risk in finance', University of St. Gallen, Switzerland on 29 June 2007. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech315.pdf. We are very grateful to Joanna Perkins for her input on legal risks, and to Andrew Bailey, Ian Bond, Victoria Cleland, Andrew Mason, Ben Norman, and Alan Sheppard for their comments.

(2) Executive Director, Financial Stability, Bank of England.

(3) Senior Manager, Financial Resilience Division, Bank of England.

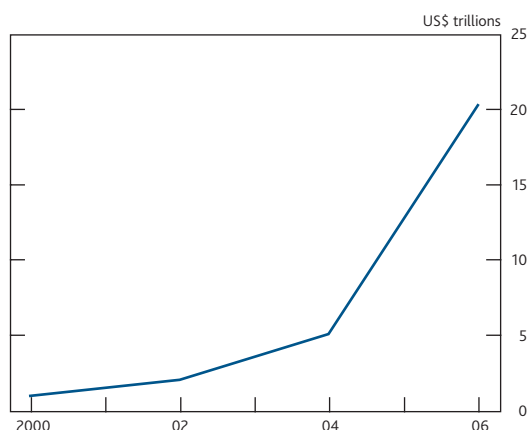
(4) British Bankers' Association (2006).

(5) Bank of England (2007, page 31).

(6) Lane and Milesi-Ferretti (2006).

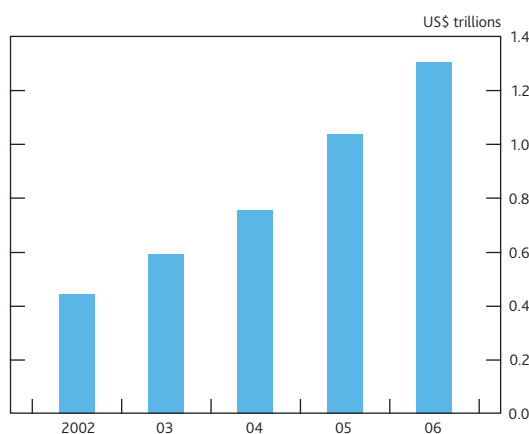
(7) Gieve (2006).

Chart 1 Global credit derivatives market (notional amounts outstanding)



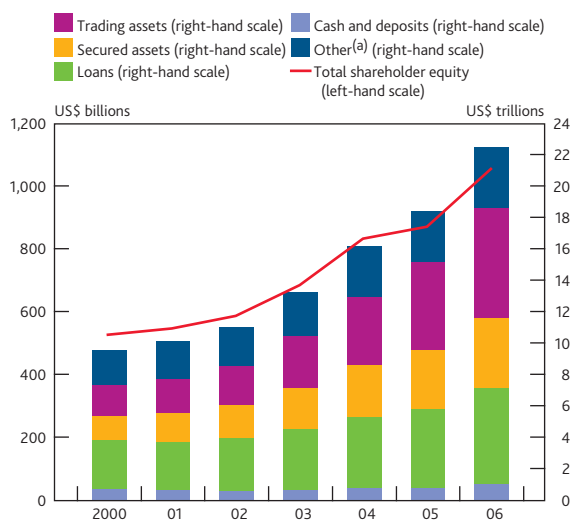
Source: British Bankers' Association.

Chart 2 Global leveraged lending issuance



Source: Dealogic.

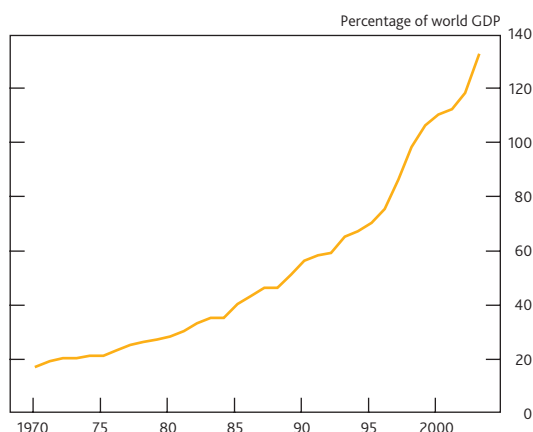
Chart 3 LCFIs' total assets



Sources: Bloomberg, SEC filings, published accounts and Bank calculations.

(a) Other includes (among other items) receivables, investments, goodwill and property.

Chart 4 Global external asset holdings



Source: Lane and Milesi-Ferretti (2006).

Against this background, we would like to focus on some of the implications for the management and reduction of risks to the financial system as a whole. More specifically, how can the public policy goal of promoting systemic stability be best achieved? We will not provide a fully comprehensive answer to this question but will touch briefly on four aspects: improving the assessment of vulnerabilities that might threaten stability; developing appropriate buffers for capital and liquidity within the financial system that take due account of the changing nature of risks; strengthening the core market infrastructure; and lowering legal uncertainty.

Systemic stress testing

As financial markets evolve and new vulnerabilities are exposed, it becomes increasingly important that both market participants and the public authorities improve their understanding and assessment of threats to financial stability, and take steps, where appropriate, to contain and lower them.

The Bank of England has been active in the development of models to identify and assess potential sources of major vulnerability to the UK financial system⁽¹⁾ and is, with the Financial Services Authority, engaged in a dialogue with practitioners, both to understand better current approaches to measuring risks under stressed conditions and to encourage improvements and the sharing of best practice in stress-testing techniques.

Recent distress in the US sub-prime lending market, and the collapse of the hedge fund, Amaranth, have exposed weaknesses in risk management, including in the management of contingent, or off balance sheet, exposures. Although developments in the sub-prime market of course continue to

(1) Haldane, Hall and Pezzini (2007).

unfold, the impact on conditions in broader financial markets has to date been relatively contained. But, in a more severe stress scenario, perhaps in a more significant market such as corporate credit, or one in which several areas of vulnerability were exposed in combination, the impact could have more serious consequences for the financial system.

This highlights the potential value of a more rigorous assessment of tail-end risks. In particular, stress tests by financial institutions should attempt to incorporate the behavioural responses of other firms which may have a substantial impact on market conditions. For instance, scenarios should take account of the extent to which many firms might respond to a common shock in a similar way, with potential implications for market prices or market liquidity. The likely amplification of price moves as financial institutions attempt to exit 'crowded' trades and liquidity dries up is an important example.

Indeed, given the importance of market liquidity for the efficient execution of banks' dynamic hedging strategies and for their activities in the wholesale funding and credit risk transfer (CRT) and securitisation markets, it is essential that stress tests factor in extreme, yet plausible, scenarios for liquidity conditions in these markets, recognising that market liquidity can evaporate very quickly, particularly for complex structured financial instruments. And it is also essential to factor in increased liquidity needs linked to contingent calls, associated, for instance, with funding margin payments.

Capital and liquidity buffers

A sizable buffer of capital and liquidity can help a bank to withstand a shock that threatens its solvency or would otherwise leave it with insufficient liquidity to meet its obligations as they fall due. But a bank's private choice as to the size of its capital or liquidity buffer may not be aligned with the socially optimal choice, as firms will not naturally take account of (or 'internalise') the implications of their distress or failure on the financial system more broadly — for example through the possibility of contagion to other firms and impairment of the financial intermediation system. That provides the justification for prudential regulation.

We will not dwell here on the value and importance of capital adequacy standards in containing systemic risks — enough has been written on the Basel Accord and Basel II, such that this is well understood.

However, consistent with our earlier comments on stress testing and the importance of modelling behavioural responses, it is crucial the authorities understand banks' likely responses to changes in minimum capital requirements over

the business cycle. In this regard, the Bank and the Financial Services Authority (FSA) have recently developed a framework for monitoring the potential for procyclicality in credit conditions. The Basel Committee on Banking Supervision and the Committee of European Banking Supervisors are working on similar frameworks internationally.

Capital adequacy standards are usefully complemented by 'large exposures' rules. In particular, the application of such rules recognises the importance of addressing the risks from an unforeseen event that could cause a bank to incur serious loss, and that major problems could spill over from one bank to another given the network of interconnections. A European Union-wide review of the Large Exposures Directive is under way, offering the opportunity to improve the resilience of the financial system to such spillovers, including in the interbank market.

Rather less has been written about liquidity buffers and prudential liquidity standards. Given their balance sheet structure, funding liquidity is a key risk for banks: the transformation of short-term liabilities into long-term assets leaves them structurally vulnerable to liquidity pressures. Banks therefore need to position themselves so as to be able to withstand extraordinary demands on their liquidity. If capital markets work efficiently, a solvent bank in need of liquidity should, in principle, always be able to rely on the market to obtain funds. However, in practice, the interbank market may not always work perfectly; asymmetric information and co-ordination failures are among the most severe potential frictions. Banks may, therefore, find themselves unable to access normal sources of funding liquidity. The measures to which a bank in this situation would have to resort, such as large-scale asset sales, could have major adverse spillover effects through the system, as could the most extreme case of an outright failure to meet obligations as they fall due. Liquidity buffers may help in this regard: a bank holding a buffer of assets that is reliably liquid under conditions of stress, perhaps with a core component that is eligible as collateral at the central bank, should always be able to access liquidity in a way that avoids precipitating severe market disruption.

The trends described at the outset are also important here. First, a shift to greater reliance on wholesale funding and greater involvement in capital market activity more broadly perhaps makes banks more exposed to funding liquidity pressures than in the past: they are at the mercy of nimble wholesale lenders. And with internationally active banks managing multi-currency balance sheets, a local approach to liquidity regulation is becoming less relevant. It is for this reason that the Basel Committee on Banking Supervision decided to convene a Liquidity Working Group to take stock of prudential approaches internationally and to explore whether there is a case for greater consistency.

The critical role of infrastructure

The financial market infrastructure — exchanges and the systems used to clear and settle market trades or cash obligations — also plays a critical role here. Market participants rely on such infrastructure to implement their desired portfolio allocation; to execute risk management strategies; to raise liquidity, both in normal course and in times of stress; and to manage contingent exposures and cash flows. It is therefore important for financial stability that these systems function efficiently and continuously, and do not introduce unnecessary costs, risks or frictions to trading and post-trade processes. Frequent interruptions to pre or post-trade processing, or excessive costs in accessing core components of the market infrastructure, can impose significant welfare costs. Under such circumstances, agents may be forced to deviate from their desired portfolio allocations and risk exposures, or indeed may be prevented from meeting their obligations as they fall due. And with credit risk transfer markets growing rapidly, there has been an expansion in the range of transactions for which robust, resilient and well-designed infrastructure is essential.

Market failures in infrastructure provision and single points of failure

It is instructive to consider why providers of the market infrastructure and their members might, left to their own devices, invest too little in resilience and risk mitigation. The answer lies in the microeconomics of infrastructure provision, and, in particular, the presence of market characteristics such as *network externalities*, *increasing returns to scale* and *co-ordination failures*.

By *network externality*, we refer to the incremental benefit derived by existing owners of a particular good or service when another party purchases that good or service. For instance, the broader the participation in a particular exchange or trading facility, the more extensive the trading opportunities and the deeper the liquidity; as a result, the greater the potential benefits from membership of that exchange. Equally, in the case of post-trade infrastructure — clearing and settlement systems — the greater the volume of transactions cleared or settled, the greater the potential for netting exposures and/or cash flows (or in gross payment and settlement systems, the more efficiently liquidity can be recycled).

Increasing returns to scale reflect the fact that infrastructure provision is, by and large, a fixed-cost business: once an investment has been made in the information technology supporting the trade, clearing or settlement of a given volume of transactions, the marginal cost of each transaction up to the capacity of the system is very low.

But these market characteristics imply a tendency towards natural monopoly in the provision of infrastructural services

and hence dependence on a single, non-substitutable provider: often termed a 'single point of failure'. A monopolist provider of infrastructure services may face insufficient incentive to innovate — including in risk reduction — and, importantly, may not fully internalise the potential effects of a disruption to its services on the financial system as a whole, thereby undervaluing system resilience from a public policy perspective.

But couldn't the users of the infrastructure ensure that the monopoly provider invested more heavily in risk mitigation? And with many infrastructures being user-owned co-operatives, would there not be a natural mechanism for this?

Perhaps — and indeed there is evidence of effective risk mitigation among user-owned providers; for example, the throughput guidelines on payment flows to lower liquidity risk in CHAPS, the UK high-value RTGS payment system, was led by member initiative. But such risk mitigation may still not be enough to meet social welfare goals fully.

First, the effects of a disruption are likely to be felt beyond what may be a narrow group of direct users of the infrastructure. That is, the effects may be systemic; for instance, there may be an interruption to the flow of liquidity via dependent markets or systems, or among participants relying on the system indirectly, perhaps through a correspondent banking relationship.

Second, users may place insufficient value on systemic stability because material operational failures are low-probability events and difficult to anticipate. Their assessment horizon may also be shorter than the social optimum.

And, crucially, *co-ordination failures* may be a factor: users of a particular infrastructure, many of whom may compete in underlying markets, need to co-ordinate their actions if they are to influence decisions on the future strategy of the infrastructure provider. Investment in the reduction of operational risk will be one such decision. Difficulties in organising effective bargaining among users may leave them unable to co-ordinate, particularly in the face of differences in their information, expectations or preferences. Potential welfare-increasing actions may, therefore, not be carried out.

These market failures may justify intervention by the public authorities: either via a continuous oversight or regulatory regime; via targeted intervention; or maybe even via public ownership, as is often the case in respect of large-value payment systems and sometimes with securities settlement systems. An alternative strategy when faced with a monopoly provider might be to promote (or even set up) alternative, competing suppliers, to improve market contestability while

ensuring adequate interoperability and substitutability across systems. Of course, given the existence of network externalities and increasing returns to scale, the cost of this form of risk mitigation may well be higher than the cost of regulating a natural monopoly on an ongoing basis.

Most typically, public intervention would seek to address the vulnerability stemming from single points of failure by the imposition of minimum standards of resilience on monopoly (or near-monopoly) systems, either to reduce the *probability* of operational failure; or to mitigate the *impact* of such failure by improving contingency arrangements — for instance, via increased investment in back-up facilities. Steps might also be taken to improve general risk management practices and mitigate the risk of exit of a key infrastructure; financial resilience and business risk is an important consideration here.

A regulator or overseer might also (or alternatively) seek to narrow the gap between the choices of a monopoly provider and the social optimum by encouraging more effective and inclusive governance arrangements. User as opposed to external ownership might be promoted, though, as previously noted, this might not be enough. Other measures might include steps to clarify the scope of the system's activities, admissions criteria, voting rights, transparency, and the role of external stakeholders.

For instance, in the United Kingdom, overall governance of payment systems is carried out via the newly formed Payments Council. This body is headed by a governing board comprising a (non-voting) independent Chair, four independent directors, and eleven directors from the payments sector. The board is expected to consult with key stakeholders before determining strategy, and before making important decisions. Transparency is also enhanced via the publication of an annual report, with a separate contribution by the independent directors, and the publication of board minutes.

Finally, we should not underestimate the importance of users themselves building resilience within their own operations to single points of failure in infrastructures. For the very same reasons that monopoly infrastructure providers may tend to underinvest in resilience from a public policy perspective, even where run as user-owned co-operatives, financial institutions might also need supervisory encouragement to invest in workaround measures to deal with disruptions at the level of the core infrastructure.

Other sources of systemic risk

The existence of single points of failure is not the only manifestation of systemic risk in infrastructures, as the behaviour of agents within the systems can lead to problems spilling over to other participants given the interconnections and strategic interactions. For example, if a large net provider of liquidity to a real-time gross settlement payment system

were to face severe operational difficulties which left it unable to make payments, other banks within the system might find themselves short of liquidity, and, *in extremis*, some might be unable to meet their own payment obligations. Behavioural responses, such as payment delays and liquidity hoarding, might then exacerbate the problem within the payment system, potentially also spilling over to activity in other systems and financial markets. And, where a system is integral to the implementation of monetary policy, a disruption could directly affect a central bank's ability to set overnight rates and maintain confidence in the currency.

Although this variant of systemic risk does not originate directly in infrastructures, system design can, nonetheless, help mitigate the impact. Features of the design and operation of an infrastructure can help to lower risks of this type — for example, by introducing collateralisation and loss-sharing rules, net sender limits and throughput guidelines to promote efficient liquidity recycling — so that failures do not give rise to financial contagion. Again, left to their own devices, users will lack an incentive to take into account fully the costs imposed outside of the system and they again face a co-ordination challenge in effectively implementing system design or rule changes to reduce such effects.

Infrastructure robustness and the changing nature of risks

Some of the financial market trends identified earlier have placed additional pressure on potential shortcomings in the financial infrastructure, attracting the interest of the public authorities and, in some cases, prompting targeted intervention. We would like to discuss two of these: financial market innovation; and the global linkages and system interdependencies that arise from the emergence of large cross-border banking groups.

Financial market innovation

Taking the first of these, over-the-counter (OTC) derivatives markets have grown rapidly in recent years, particularly in the credit sector, driven in part by the shift towards an 'originate and distribute' model of banking finance and by greater recourse to credit risk transfer to manage and hedge risks, as well as increasing activity by insurance companies, hedge funds and institutional investors in this sector. The infrastructure for OTC derivatives has, however, lagged behind.

Notwithstanding the emergence of new automated vendor services in recent years, OTC derivatives trades continue to be cleared and settled on a predominantly bilateral basis. Hence, a party to such a transaction is dependent upon the ongoing creditworthiness, liquidity and operational robustness of its counterparty over the life of the contract. A sound legal basis for the trade is, of course, also critical. Rising volumes (and values) and the development of new, and often more complex, products have placed a strain on existing arrangements,

exposing capacity constraints in existing procedures. Questions have also been raised over the risk implications of deficiencies in post-trade processes, most notably in the assignment of credit derivatives contracts.

With the Bank of England having, in late 2004, acknowledged emerging back-office strains,⁽¹⁾ the United Kingdom's Financial Services Authority raised the profile of the issue with a 'Dear CEO' letter in February 2005.⁽²⁾ The Bank of England's Paul Tucker also raised the issue in June 2005,⁽³⁾ calling for collective action across the industry to improve operational processes. The Counterparty Risk Management Policy Group⁽⁴⁾ echoed this sentiment in its July 2005 report. Such collective action was facilitated by the Federal Reserve Bank of New York (FRBNY) shortly after, with a group of fourteen dealers and their regulators encouraged to set targets for the reduction of processing backlogs in credit derivatives and to put in place mechanisms for speedier post-trade processing going forward. The dealers were encouraged to embrace existing automated services for the delivery and matching of confirmations, and the industry was propelled rapidly towards the adoption of a Protocol for communicating trade assignments. The group was also encouraged to work with vendors, notably the Depository Trust and Clearing Corporation (DTCC), to implement solutions providing a framework for ongoing processing efficiency and data integrity. The result was the launch, in November 2006, of DTCC's Trade Information Warehouse.

In parallel, the Basel Committee on Payment and Settlement Systems has been investigating developments in the OTC derivatives space more generally, updating work carried out in 1998 to map the landscape and identify risk issues. The Committee published a report in March 2007.⁽⁵⁾

The report recognises that the clearing and settlement infrastructure has been strengthened significantly in recent years, noting, in particular, the progress in automating and centralising key post-trade functions. But the report also highlights that there is more to be done. For instance, while processing backlogs in credit derivatives have been reduced substantially, they remain sizable in other product lines. Recognising that the group convened by the FRBNY has been effective in resolving co-ordination problems, the report argues that momentum from the credit initiative should be carried across to other products. An initiative is already under way in this regard, with the FRBNY group having been expanded to 17 firms and a broader range of products. Firms are currently working towards targets for backlog reduction. Automation is a key element of this initiative, although it is recognised that there needs to be interoperability between core vendor services if the benefits are to be realised.

One implication is that further public intervention might be required should co-ordination problems undermine the incentives to deliver such interoperability. And, as the OTC

derivatives market becomes more dependent upon centralised providers of post-trade services, public authorities will need to consider whether established international standards for operational reliability of infrastructures should be applied to emerging new systems.

Global linkages and system interdependencies

The rapid growth of capital market integration and of large cross-border banking groups (often termed large complex financial institutions or LCFIs) and the increased international linkage between infrastructure providers also has significant implications for the assessment and reduction of systemic risk arising in or from the financial infrastructure. Specifically in an Anglo-Swiss context, for instance, we have seen Switzerland's SWX Group establish in London back in 2001 the recognised investment exchange, virt-x, as a cross-border trading platform, which offers central counterparty (CCP) clearing with both LCH.Clearnet Ltd and SIS x-clear AG, and settlement through CrestCo Ltd, Euroclear Bank and SIS SegalInterSettle AG. The Swiss CCP, x-clear, also plans to join LCH.Clearnet Ltd in clearing trades executed on the London Stock Exchange.

Infrastructure providers have responded positively to the demands of an increasingly internationally oriented customer base by offering settlement links — which facilitate cross-border collateral and liquidity management — and clearing links — which allow margin offset with respect to positions held in related assets in different centres.

Cross-border mergers between infrastructures are also becoming more common. For example, in recent years, the United Kingdom's central counterparty for derivatives, London Clearing House (LCH) Limited merged with Clearnet SA, while the Euroclear Group acquired CREST, the securities settlement system for the United Kingdom and Ireland. The Euroclear Group now provides domestic securities settlement services in five European countries as well as international settlement services. Such tie-ups are of course an international response to the microeconomics of infrastructure provision outlined above, exploiting economies of scale and network externalities. But, at the same time, they introduce common business risks and cross-border dependence on core systems, thus providing another channel for problems to spill across borders. Such cross-border linkages consequently add a layer of complexity to supervisory arrangements, making international co-ordination among the public authorities essential.

Linkages arising at the user level are again important here. As banks operate in multiple markets, there is increasing scope for

(1) Bank of England (2004).

(2) Financial Services Authority (2005).

(3) Tucker (2005).

(4) Counterparty Risk Management Policy Group II (2005).

(5) Bank for International Settlements (2007).

shocks to propagate across borders. That may arise from the increased centralisation of banks' liquidity risk management. To the extent that banks use the foreign exchange markets to recycle surplus liquidity in one system to meet a shortfall in another, or else take advantage of settlement links between securities settlement systems to transfer collateral across borders, liquidity risk may be reduced. But, to the extent that banks respond to the availability of mechanisms for reallocating liquidity between systems by reducing their aggregate holdings, a bank may be more vulnerable to simultaneous liquidity demands across markets or to operational disruption to such mechanisms.

The Basel Committee on Payment and Settlement Systems has again been looking closely at issues arising from international integration of banks and infrastructures. In recent years, the Committee has published a report exploring mechanisms for the cross-border use of collateral, and in the context of a broader report on central bank oversight of payment and settlement systems, has established a set of principles for international co-operative oversight.⁽¹⁾ Work is also continuing to map more formally the nature of international interdependencies between systems, and thus of cross-border risks.

Legal certainty

No matter how safe and resilient the market infrastructure, a sound legal basis for transactions is essential if the financial markets are to fulfil their role in effectively allocating scarce capital.

Financial markets operate within legal systems that not only regulate the behaviour of participants for the good of the markets as a whole, but also safeguard the property and contractual rights of those participants. Prospective market participants will have greater confidence to invest or to seek finance if they feel confident, first, that the regulatory obligations and sanctions imposed upon them are predictable and, second, that the contractual rights/obligations which they acquire/undertake can be identified with certainty.

Furthermore, market discipline is likely to be enhanced if participants' legal/contractual rights and obligations are precisely defined; the introduction of an ambiguity into the law can unsettle financial markets or exacerbate existing instabilities. Legal/contractual uncertainty is therefore a potential source of systemic risk. Two aspects of legal certainty are particularly crucial:

(1) Contractual certainty

One key element of a stable legal framework is contractual certainty. Systems of contract law that show respect for formal agreements help to drive down commercial risk and therefore to promote the efficient allocation of capital. And

uncertainty as to the enforceability of contracts is likely to be particularly damaging to financial markets. Against this background, contracts are becoming longer and more complex as financial innovation continues apace: the documentation for a structured finance product can often run into several hundred pages, thus raising the important issue of 'documentation' risk.

(2) Legal and regulatory stability

Another key element is legal and regulatory stability. This is very important to the financial markets, where the ability to form complex plans with a degree of confidence as to the stability over time of external influences (such as legal rules) impacts directly on risk, price and, ultimately, the efficient allocation of capital. A stable planning environment is conducive to investment and, therefore, market growth. Examples of harmful consequences of ambiguities in legal/regulatory frameworks include uncertainty as to the extent and scope of regulatory obligations or sanctions, and uncertainty as to how old laws will apply to dynamic and fast-changing market practices.

The Financial Markets Law Committee (FMLC)

In recognition of this, a number of countries have established groups of experts to promote greater legal certainty in financial markets. In the United Kingdom, the Financial Markets Law Committee was established in 2002. Its objective is to identify issues of legal uncertainty which might give rise to material risks, and to consider how such issues might best be addressed. The Committee seeks to meet this objective, first, via liaison with industry and market participants to identify those areas of legal uncertainty with potentially adverse impacts, and, second, by working with market experts to propose solutions.

One area in which the FMLC has been active in recent years is in encouraging the development of a smoothly functioning legal framework for cross-border transfers of intermediated securities. In 2005, the Committee undertook a thorough analysis of the advantages and disadvantages of harmonisation of the private international law in this area, as reflected in the Hague Convention. It was, and still is, widely accepted that such harmonisation would contribute to legal certainty by facilitating a clear identification of the law governing the holding and transfer of indirectly held securities. This is particularly important in the context of the cross-border use of collateral: a key element of banks' global liquidity management strategies. In late 2005, the FMLC published a paper that undertook a full analysis of the Convention and expressed strong support for its central propositions.⁽²⁾

(1) Bank for International Settlements (2005 and 2006).

(2) Financial Markets Law Committee (2005).

The FMLC's work in this (and other) areas has been well received and has contributed to the decision-making process for government at the national and supranational level. Indeed, overall, the Committee has had some notable successes in addressing and ameliorating legal uncertainty in the financial markets context.

Concluding remarks

To conclude, the rapid structural change in global financial markets is providing considerable benefits to users of financial services, by lowering the costs of financial intermediation and improving the ability to manage and hedge financial risks and tailor financial products. But recent developments also provide new challenges and sources of vulnerability as financial

markets become increasingly integrated, and as participants place increased reliance on sustained market liquidity to manage their risks. While financial institutions are in a strong financial position, risk-taking has increased and the vulnerability of the financial system as a whole to a sharp change in conditions has risen. Against this background, and given the considerable uncertainty regarding how many new complex financial products would perform in more strained market conditions, it is important to improve the analysis and understanding of tail-end risks through systemic stress tests. Risk management practices should also be strengthened ensuring that financial institutions retain strong buffers of capital and liquidity, and that investment in the financial and legal infrastructure keeps pace with market developments and thus ensures that it remains robust and resilient.

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UK monetary policy: good for business?

In this speech,⁽¹⁾ Andrew Sentance,⁽²⁾ a member of the Monetary Policy Committee, discusses business attitudes to monetary policy, drawing on his experience as a business economist and as a member of the MPC. He highlights some important changes over the past two decades, and argues that business has become more supportive of the monetary policy framework as low inflation has become a more established feature of the business climate in the United Kingdom, with an associated dampening of the economic cycle. Regional and sectoral variations in the impact of monetary policy also appear to have diminished. He concludes by discussing current monetary policy issues, focusing particularly on the influence of international economic developments on UK monetary policy.

Good evening, ladies and gentlemen. About six months ago, I gave my first public speech as a member of the Monetary Policy Committee at an event hosted by Bloomberg. So to demonstrate that MPC members are even-handed in their treatment of major media organisations, I am delighted this evening to speak at this event hosted by Dow Jones! I would like to thank our hosts for organising this event and for their hospitality this evening.

For most of my career I have observed monetary policy from a business perspective — or more precisely from a number of different business perspectives: at the CBI from 1986 to 1993; at London Business School in the mid-1990s; and then for nearly nine years working as Chief Economist at British Airways until last year.

I am now viewing the impact of monetary policy on business from the other side of the fence — as a policymaker. But in my current role, it remains vitally important to have a good insight into business trends and how they are changing, both in response to the decisions we take on interest rates and external factors. To help us in this task, we have access to a vast array of data, including business surveys from the CBI, the British Chambers of Commerce and other organisations. But there is also no substitute for gaining a direct understanding of how economic conditions are changing through face-to-face contacts with businesses around the country.

One of the strengths of the way the Monetary Policy Committee operates is that this direct contact and feedback from business is built into our processes. First of all, we benefit at our monthly meetings from the reports compiled by the Bank's Agents, who maintain a network of around 8,000 business contacts across the country. These reports are

presented by one of the Agents to the MPC in our monthly cycle of meetings, alongside all the other official data and business surveys we look at, and they are also now available to external commentators via the Bank's website.⁽³⁾ In addition, Monetary Policy Committee members each undertake a regular programme of visits to business contacts throughout the country, including company visits, lunch and dinner meetings with groups of business contacts and larger business briefings.

Given my business background, I have been particularly keen to get around the country to get a feel for business conditions on the ground in my short time as a member of the MPC. So in the past nine months, my travels have taken me to Scotland, Northern Ireland and seven of the nine English regions, notching up a total of over 40 company visits and business briefings. It has been particularly interesting to contrast the business mood with the situation when I was last 'out and about' in the British economy in this way — in my capacity as the CBI's Economics Director in the late 1980s and early 1990s.

This evening I want to talk about three things which have struck me in particular as I have talked to business executives around the country over the past nine months. First, the current business attitude to monetary policy is strongly

(1) Hosted by Dow Jones at Tower 42, London on 10 July 2007. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech317.pdf.

(2) I would like to thank Andrew Holder and Ben Westwood 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) The work of the Bank's regional Agencies is described in Eckersley and Webber (2003). The Agents' monthly reports have been published on the Bank of England website since January 2005 and their scores since January 2006. The Agents' scores are discussed in Ellis and Pike (2005).

supportive of the present framework based on an independent central Bank targeting low inflation. This is in stark contrast to the strong business criticism of UK monetary policy I frequently heard in the late 1980s and early 1990s, and I will discuss the reasons for this welcome change. Second, there have been very significant changes in the structure of British business, particularly in the manufacturing sector, as companies have adapted to global competition — and I will discuss some of the implications this has for the conduct of monetary policy. Third, I am particularly struck by the way in which changing trends in the international economy are affecting UK business conditions at present, and contributing to the monetary policy challenges we are currently facing. At the end, I will return to the issue posed in the title of this evening's talk: ensuring UK monetary policy remains good for business.

Business attitudes to monetary policy

The current framework for monetary policy — in which the Monetary Policy Committee of the Bank of England sets interest rates to meet a low inflation target — has now been in place for over a decade. Some elements of the framework — such as the inflation target itself and the production of regular *Inflation Reports* — go back further still, to the early 1990s.⁽¹⁾ This has produced a period of stability in the framework for monetary policy that business has not experienced since the 1960s. It has also provided a long enough period for business to see the framework in operation at different phases of the cycle and in response to a range of shocks to the economy.

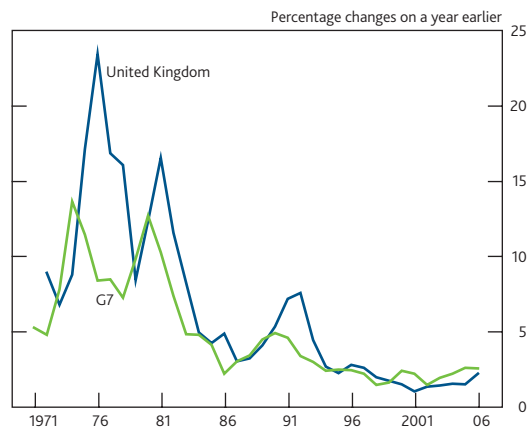
As I have talked to businesses throughout the country over the past nine months, I have been struck by the strong degree of support for this framework, and the job that the Monetary Policy Committee is doing. Individual businesses and business organisations will inevitably express differences of judgement on individual monetary policy decisions, which we saw to some extent in the reaction to this month's interest rate rise. However, aside from these tactical differences, I detect a strong desire in the business community to see the current monetary framework continue and for it to work well. This supportive stance is reflected in the submissions that business organisations such as the CBI have made to the Treasury Select Committee in its review of the operation of the Monetary Policy Committee over its first ten years.⁽²⁾

In my view, there are three factors which underpin this positive and supportive approach to the current framework and institutions of monetary policy from the UK business community.

First and foremost, monetary policy has delivered what was promised on the tin — a prolonged period of low inflation, as **Chart 1** shows. In the 1970s and the 1980s, business

executives could read about the benefits of a low inflation world in an economics textbook. But this was not the business environment which they experienced in their daily lives. At no point between 1970 and 1990 did any measure of the UK inflation rate even touch 2%, let alone average 2% in a year or over a period of years.⁽³⁾ **Chart 1** also shows that UK inflation was higher than in our peer group of major economies until the mid-1990s, since when we have had a broadly comparable inflation rate to the average of the G7 economies.

Chart 1 UK and G7 inflation

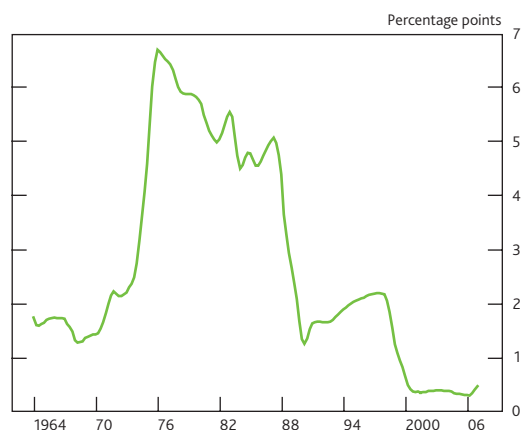


Note: Inflation measured by CPI; consumer expenditure deflator for United Kingdom before 1976.

Sources: OECD and ONS.

One of the benefits of achieving low inflation is that a low inflation rate is likely to be more stable and more predictable.⁽⁴⁾ As **Chart 2** shows, this has indeed been our experience over the past decade. The recorded volatility of the inflation rate has been reduced by a factor of about ten since

Chart 2 Volatility of UK inflation



Note: Rolling standard deviation of four-quarter RPIX inflation (RPI before 1976) over previous eight years.

(1) The Bank's first *Inflation Report* was published in February 1993.

(2) See CBI (2007).

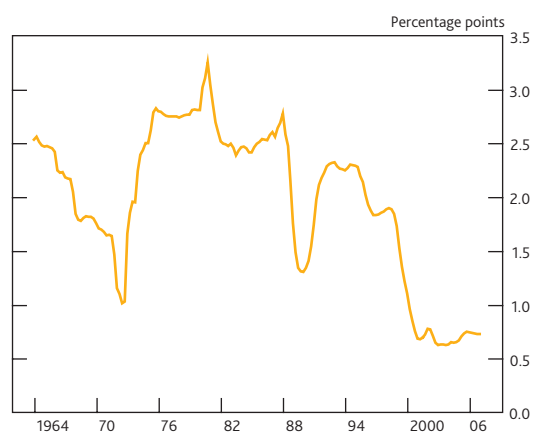
(3) The low point for RPI inflation was 2.4% in July/August 1986, and for RPIX and CPI inflation 3.2% and 2.2% respectively in May 1986. Other inflation measures reached a low point in the same year.

(4) See Bank of England (2004) for a fuller discussion of the benefits to business of low inflation.

the high inflation era of the 1970s and 1980s. This brings a number of benefits to business. Firms can have more confidence planning into the future and the signals provided by changes in relative prices are clearer in a low inflation world — reducing the risk of bad business and investment decisions. The additional risk and the arbitrary redistribution of income created by inflation surprises should also be much reduced in a world of low and stable inflation.

As well as reducing the volatility of inflation, the current monetary framework has also been associated with more macroeconomic stability in the real economy, as **Chart 3** shows, we have seen a significant reduction in growth fluctuations in recent years.⁽¹⁾ This is a second factor which underpins business support for the Monetary Policy Committee and our current monetary arrangements.

Chart 3 Volatility of UK GDP growth



Note: Rolling standard deviation of four-quarter GDP growth over previous eight years.

Again, this corresponds to what economic analysis would suggest. A policy of consistently targeting low inflation means that changes in the framework or conduct of monetary policy should not themselves be a source of additional economic volatility. And it should be simpler for monetary policy to respond to shocks in an environment where inflation is under control.

The three major recessions we have experienced in the United Kingdom in the post-war period have all been preceded by inflationary episodes. On all three occasions, the policies needed to bring inflation back under control contributed to the length and depth of the recessions which followed. When a rise in inflation becomes embedded in the expectations of firms and individuals, a large amount of slack may then need to be created to force price and wage expectations to adjust back down again. For this reason, the Monetary Policy Committee is very keen to ensure that inflation expectations do not begin to creep up in response to a temporary rise in inflation such as we have seen recently, as it could be very costly to bring them down again.⁽²⁾

Though economic growth has been remarkably stable in recent years, the ability of monetary policy to reduce the volatility of the real economy depends on the nature and scale of the shocks we experience — either from external global factors, or from structural shifts affecting supply or demand within the United Kingdom. As the Governor pointed out in a recent speech,⁽³⁾ correctly identifying shocks and the appropriate response is a major challenge for monetary policy makers. In addition, while monetary policy can help stabilise the economy as a whole, it cannot shield individual businesses or sectors from structural change driven by changing patterns of demand, technology or changing competitive forces. My own experience working in the airline industry earlier this decade bears this out!

In addition to this track record of economic stability, I believe there is a third reason which underpins business support for the current UK monetary policy framework. Over the period since the early 1990s, monetary policy has become a lot more business-like. In the 1970s and 1980s, there were frequent shifts in the monetary framework and the processes which led to interest rate decisions were opaque and unpredictable. There were significant improvements in the early 1990s, with the setting of a clear inflation target, a more transparent process for setting interest rates and a bigger role for the Bank of England. The transparency and predictability of policy were further enhanced and consolidated by the granting of operational independence to the Bank in 1997 and the establishment of the Monetary Policy Committee. The evolution of the processes of the MPC and the successful conduct of monetary policy over the past decade should have added further to the confidence in our current arrangements.

Some would like us to take that a step further, by providing stronger guidance to the public and the markets on future interest rates. I am not sure this would be desirable or practical, particularly in a Committee which reaches its decisions by voting rather than by seeking to come to a consensus. However, as the Governor outlined in his recent speech to the Society of Business Economists,⁽⁴⁾ we will continue to develop our existing communication channels — including the *Inflation Report* and the minutes — to provide insights into the issues which the Committee feels are important to future interest rate decisions. Speeches (like this one) and interviews by individual Committee members should also be helpful in addressing this communications challenge.

(1) See Bank of England (2007), for example, on the ongoing academic debate over the contribution of good macroeconomic policy to the relative stability enjoyed by most industrialised countries since the early 1990s. Benati (2005) assesses recent UK macroeconomic stability more formally and concludes that the inflation-targeting regime has been characterised by the most stable macroeconomic environment in recorded UK history.

(2) Bean (2006) discusses how there may have been some flattening of the trade-off between output and inflation, which would increase the difficulty of bringing inflation back to target.

(3) See King (2007b).

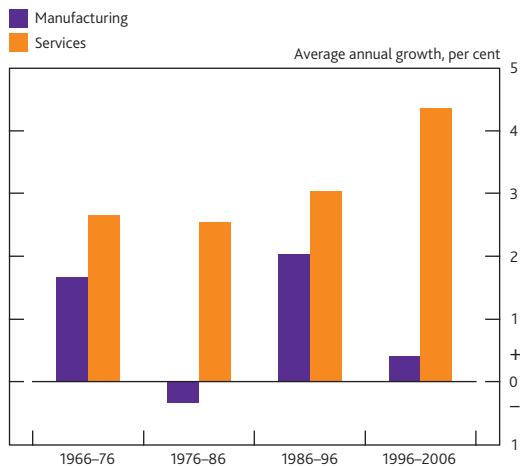
(4) See King (2007a).

Structural change in UK business

I mentioned earlier that good monetary policy does not shield individual businesses from the impact of structural change. Since the 1990s, we have seen very significant shifts in the structure of the UK economy driven by global competition, particularly affecting the manufacturing sector.

The past decade has seen an exceptional divergence between the growth performance of manufacturing and services in the UK economy. As **Chart 4** shows, output growth in the manufacturing sector over the past decade has been very modest — and not much better than the performance recorded in the decade from the mid-1970s to the mid-1980s, which included the massive shake-out of the early 1980s. That period saw a loss of over 1½ million manufacturing jobs in the United Kingdom. The decline in manufacturing employment over the past decade — at over 1¼ million — has not been far short. Proportionately, the employment reduction over the two periods has been very similar — with a reduction of manufacturing employment of around a quarter in both episodes.

Chart 4 UK manufacturing and services growth



However, while the shock to manufacturing in the early 1980s reflected mainly UK-specific factors, the more recent trend of sluggish growth and falling employment has been global in origin. The development of low-cost manufacturing bases in China, and to a lesser extent Eastern Europe and Turkey, has caused a shift in the location of manufacturing production across the global economy.

The sectoral pattern of manufacturing growth, shown in **Chart 5**, shows these forces at work. Output has fallen most strongly in low value-added manufacturing such as textiles and in electronic goods where Asian producers have developed a strong comparative advantage. By contrast, higher value-added sectors — such as chemicals (which includes the pharmaceutical industry), machinery and transport equipment

— have seen continued growth. This global shift in production has affected all the mature industrialised countries.⁽¹⁾ However, there has been an added dimension for the United Kingdom, in that the trend over the past decade was also preceded by a significant appreciation in the exchange rate, in real and nominal terms, as **Chart 6** shows.

Chart 5 UK manufacturing growth since 2000

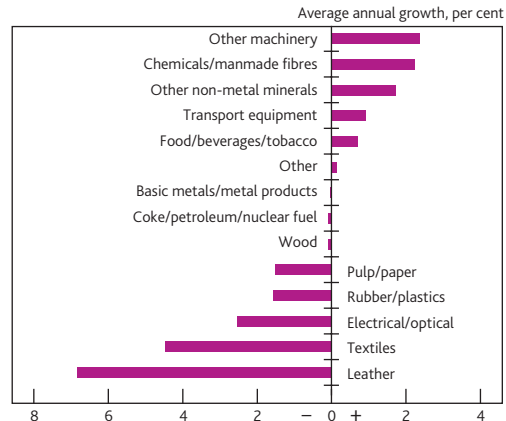
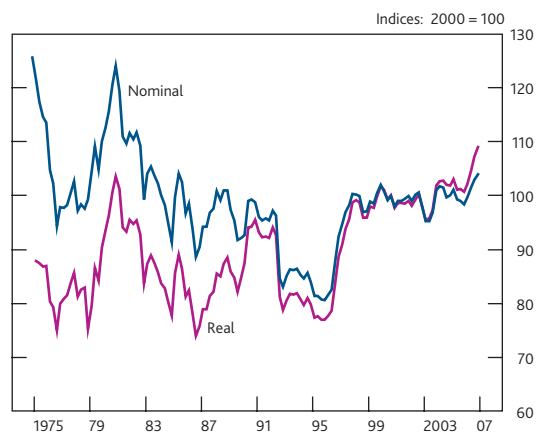


Chart 6 Real and nominal sterling exchange rates



Note: Real exchange rate calculated using CPI.

Sources: Bank of England and IMF.

I joined the CBI in the mid-1980s after the last big shake-out in manufacturing in the early 1980s, which was also associated with a sharp appreciation of the exchange rate. The impact was felt particularly severely in the traditional manufacturing regions of the United Kingdom. In 1986, unemployment reached a peak of close to 16% in the North East of England and 13% in the North West, compared to an unemployment rate of less than 7% in the South East of England. The result was to create a mood of pessimism, and indeed bitterness, in the traditional manufacturing regions of the United Kingdom.

Even though manufacturing output and employment have been squeezed to a similar extent over the past decade, the

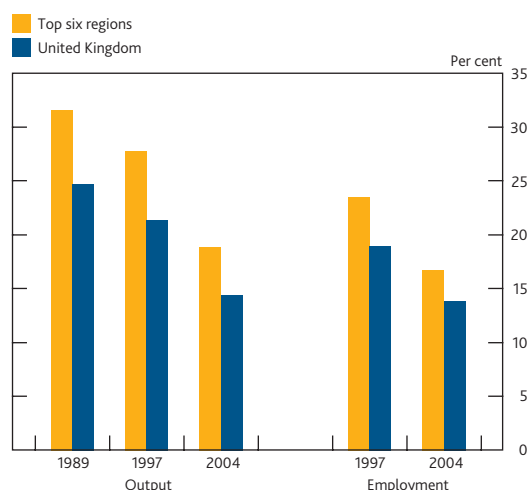
(1) Besley (2007) discusses the United Kingdom's long-term structural shift from manufacturing towards services and the implications for monetary policy.

current mood in manufacturing industry in response to the more recent structural change is quite different. The current generation of manufacturers has become used to living with the pressures of competitive international markets and have developed strategies for coping with them. One of the key strategies they employ is outsourcing lower value-added activities to lower-cost locations — such as China, Eastern Europe and Turkey, which is becoming commonplace for manufacturers these days. Another is a high level of automation — such as the radiator manufacturer I visited in the North East with just five workers manning its main high volume production line. Many successful UK manufacturers have established strong positions in niche markets where they are less vulnerable to competition from lower-cost producers. So while the location of manufacturing production has shifted, UK manufacturing companies themselves have continued to adapt and thrive, which has created a very different mood in the manufacturing sector to the situation two decades ago.

There has also been a much better process of adjustment — both nationally and at the regional level — to these shifts in global competition. This has been particularly helpful in the UK regions which have traditionally been most dependent on manufacturing production and jobs. The increased flexibility of labour markets and the more stable macroeconomic background associated with low inflation has helped service sector job creation to offset the loss of employment opportunities in the manufacturing sector.⁽¹⁾

As **Chart 7** shows, the result is that the structure of employment and output in the traditional manufacturing regions of the United Kingdom is now much closer to the pattern for the nation as a whole. This is a helpful development for the conduct of monetary policy, as manufacturing is one of the more volatile sectors of the economy. As the industrial structure of the UK regions has

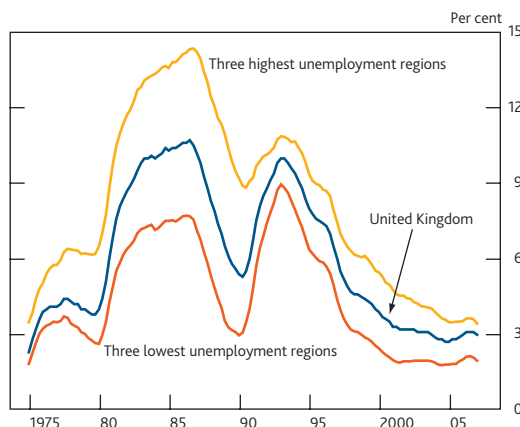
Chart 7 Manufacturing share of UK output and employment



Note: Top six regions by share of manufacturing in total output: North East, North West, Yorkshire and the Humber, East Midlands, West Midlands and Wales.

become more homogeneous, the range of unemployment rates has also narrowed. The gap between the regions with the highest and lowest unemployment rates has dropped from close to 10 percentage points in the mid-1980s and early 1990s to around 3 percentage points at present, as **Chart 8** shows.

Chart 8 Regional unemployment rates



Note: Highest regions, based on 1990, are Northern Ireland, North East and Scotland; lowest regions are South East, Eastern England and South West.

This has created a very different feel as I have travelled round the country to my experience two decades ago. The differences in business mood, unemployment experience and industrial structure, which were so noticeable then in the traditional industrial regions of the United Kingdom, are now much less apparent.

Current business conditions

These changes in industrial structure also help to explain an important feature of the current picture of the UK economy. While there are some variations across the regions of the United Kingdom, the picture presented by the Agents' reports is fairly consistent across the different parts of the country. There are some idiosyncratic features — such as the rapid increases in property prices in Northern Ireland. And the buoyancy of global financial markets is having a bigger impact on the London economy than elsewhere.⁽²⁾ But across manufacturing, services and construction, the picture for the first half of this year is of healthy growth across the United Kingdom as a whole.

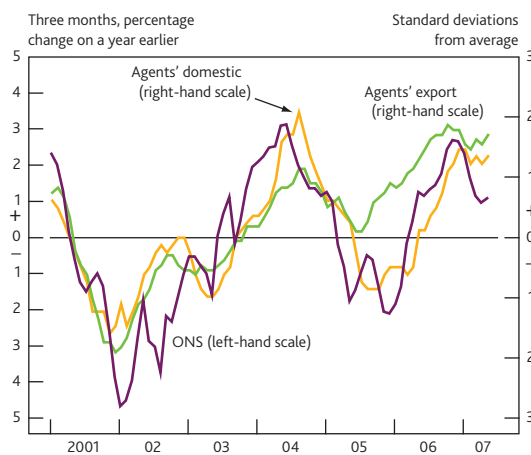
Economic growth in the year to the first quarter of 2007 was a solid 3%, above the recent trend, and most of the evidence

(1) See Blanchflower (2007) for a recent discussion of labour market developments. Sentence (2007a) discusses how favourable supply-side factors and improved macroeconomic management have allowed UK unemployment to fall significantly since the mid-1990s.

(2) See Gieve (2007) for a discussion of this issue. The fact that the financial services industries have tended to be one of the more volatile sectors of the economy could be an issue for the London economy and for other financial centres (eg Edinburgh and Leeds) in the future.

suggests that growth remained firm in the second quarter. Indeed, the picture presented by business surveys and the Bank's Agents' reports are stronger than that suggested by the official statistics, particularly in the manufacturing sector, as **Chart 9** shows. This stronger tone from the business surveys and the Agents' reports could be an indication that recent official data on economic growth is understating the strength of activity and demand. That would also be consistent with survey data showing that capacity pressures have been increasing within firms over the past year, and would be an added reason for concern about the inflationary impact of current demand conditions.

Chart 9 Alternative views on manufacturing



A key ingredient in this healthy economic picture is the current strength of the global economy. Though the US economy slowed last year and in the first quarter of this year, strong demand in Asia and a pickup in European growth are providing continuing impetus to global demand. The economies of the Middle East are also strong, and oil money is flowing back into world markets through healthy export growth and through asset markets.

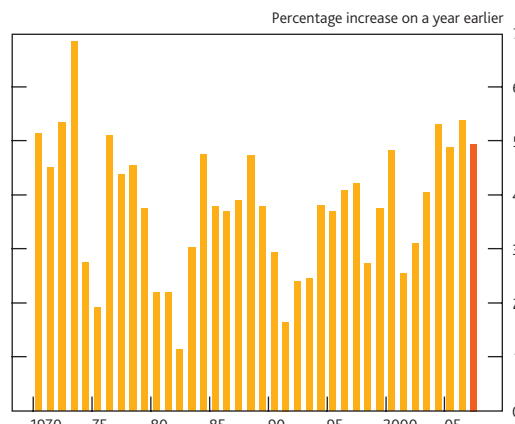
Chart 10 shows that this is the fourth calendar year of world growth at around 5%, using the IMF's data and forecasts. We have to look back over 30 years to find a period of such strong and persistent expansion in the global economy.

A couple of years ago, this strong global growth was a welcome addition to UK demand, offsetting a slowdown in consumer spending and against a backdrop of subdued investment. However, these two key elements of domestic demand have turned around over the past two years. Consumer spending is now growing roughly in line with historic trends, while business investment is enjoying a strong recovery, as **Chart 11** shows.

This pickup in demand in itself would provide a good reason for some tightening in monetary policy. However, we have also seen a dramatic change in the global inflation

environment over the past few years. In the earlier years of this decade, particularly in the period 2001 to 2003, the global economy was weak and there was a considerable amount of excess capacity in global markets. At this time, therefore, global pricing pressures were exerting a strong downward influence on UK inflation.⁽¹⁾ That situation has turned around quite dramatically in recent years. Robust global demand is now putting upward pressure on a wide range of energy and commodity prices, including the price of oil and many foodstuffs. This upward pressure on inflation is being experienced in many countries, and it is particularly affecting the prices of goods.

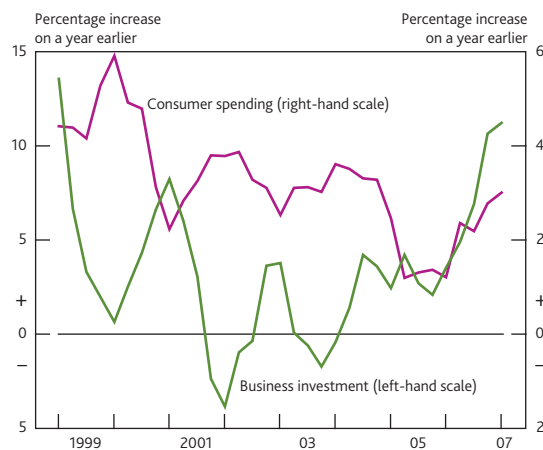
Chart 10 World GDP growth



Note: 2007 figure is forecast.

Source: IMF World Economic Outlook.

Chart 11 Consumer spending and business investment



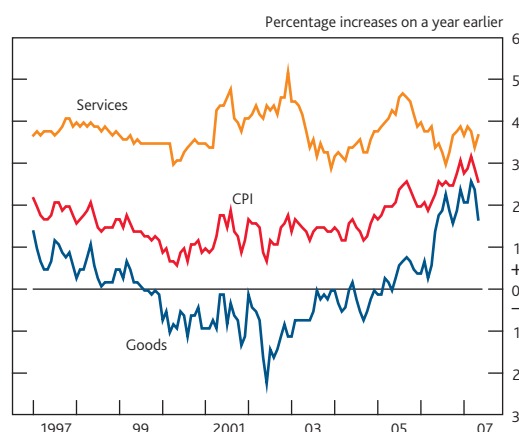
Note: Business investment smoothed over two quarters.

As **Chart 12** shows, for most of the period that the MPC has been in charge of monetary policy, goods prices were flat or falling, offsetting the fact that services inflation was running at 3%–4%, and therefore helping to keep overall inflation on target. However, goods price inflation has now replaced

(1) See Bean (2006), for example, for a discussion of the impact of globalisation on industrialised countries' inflation processes.

deflation, as energy prices have picked up, and the recent official data and business surveys show more inflation in the pipeline in the manufacturing sector. Falling gas and electricity prices (counted as 'goods' in the CPI) may help to moderate inflation in the short term, though recent oil price movements remind us that further upward shocks to energy prices are also possible. To bring inflation back to target over the medium term, we either need to see goods price inflation fall back again, or an offsetting fall in services inflation.

Chart 12 Goods and services inflation



UK monetary policy: good for business?

To achieve either result, we are likely to need some slowdown in demand growth. The challenge for monetary policy is to gauge the right level of interest rates to achieve the necessary degree of restraint to keep inflation at its target level over the medium term.

Across the Monetary Policy Committee there has been a spectrum of opinion on the pace and the extent of policy tightening needed over the past year. As my voting record shows, I have been one of those most anxious to raise interest rates earlier rather than later. This was contrary to the expectation when I was appointed to the Committee that I would — in the words of *The Times* newspaper — 'take on the mantle of the leading dove' because of my business background.

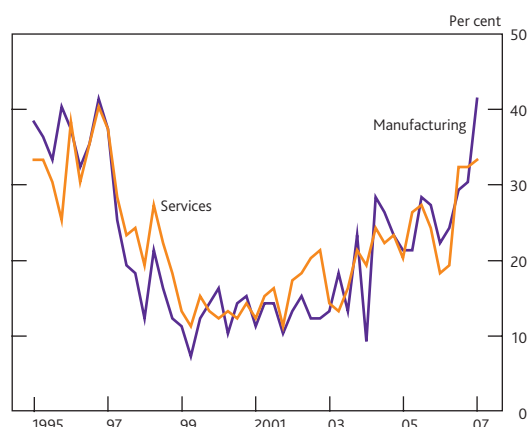
However, as I have argued earlier in this speech, the business interest lies in the lasting stability which comes from low inflation over the medium term. My concern over the nine months I have been on the Committee has been to respond to strengthening demand and a rise in inflationary pressures in a timely way. Failure to do that would create the risk that there might need to be even higher interest rates and a more pronounced slowdown further down the track. At the same time, the consistently healthy picture presented by the business surveys and the Agents' reports across a wide range of business sectors, coupled with the buoyancy of the global

economy, have suggested so far that the risk of overkill in restraining demand in the short term was low.

Within the business community, I sense no desire to take risks with inflation — given the damage it has created in the past and the benefits we have seen from our recent experience of much greater price stability. Indeed, many of the business contacts I have met around the country have emphasised the need for the Monetary Policy Committee not to let inflation 'get out of the bag' once again.

Survey evidence supports this view of rising business concern about inflation, which has coincided with the increased inflationary impetus we have seen from the global economy over the past few years. **Chart 13** — based on responses to the British Chambers of Commerce surveys around the country — shows that this concern is particularly noticeable in the recent responses from manufacturers, who are more heavily exposed to the impact of rising energy and commodity prices.

Chart 13 Business concerns about inflation



Note: Balance of businesses reporting that inflation is more of a concern than three months ago.

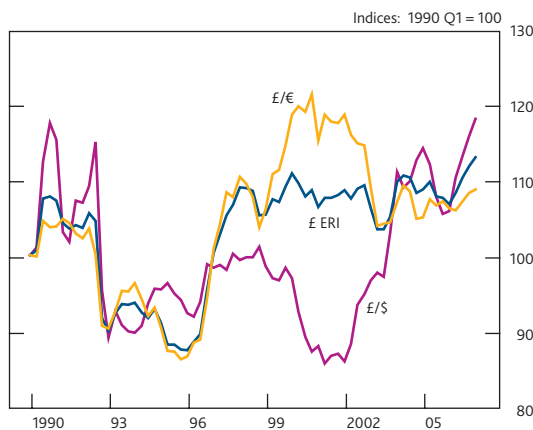
Source: British Chambers of Commerce.

In the past there have been concerns that monetary tightening would be 'bad for business' because it would bear disproportionately on the manufacturing sector and on the traditional industrial regions. These concerns have often surrounded the impact that a strong or sharply appreciating exchange rate would have on manufacturers and exporters. This was certainly a big issue in the late 1980s, leading the CBI and other business organisations to support ERM membership as the appropriate framework for monetary policy. Exchange rate concerns were also a feature of the early days of the MPC, in the wake of the appreciation of the pound, particularly against the European currencies, in 1996 and 1997.

The pound has once more been in the headlines, recently reaching a 26-year high against the dollar. However, as **Chart 14** shows, the United Kingdom's trade-weighted exchange rate basket has been more stable and is currently

around 4% to 5% above its average for the period since 1997 (ie while the MPC has been in charge of monetary policy). Against the euro, which is the most significant currency for UK exporters, the pound has been stable at around the current rate since 2002 and is actually 10% or so weaker than around the turn of the decade. In addition, increased flexibility which manufacturers have gained by outsourcing and focusing their businesses on high value-added and niche markets should reduce the direct impact of exchange rate movements. A strong pound against the dollar can also help businesses offset rising costs from dollar-based suppliers.

Chart 14 Movements in sterling since 1990

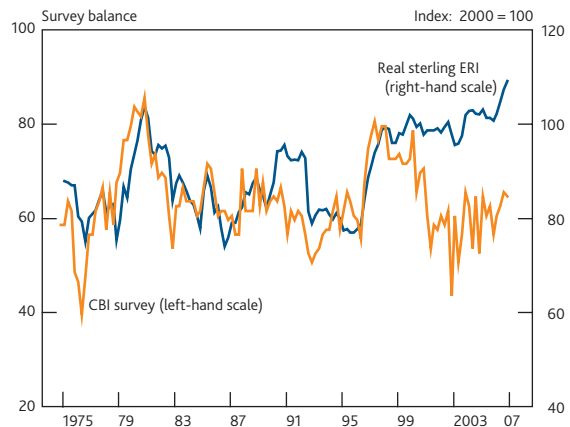


Note: ECU exchange rate shown before 1999.

Sources: Bank of England and Eurostat.

So while exchange rate movements are always a source of concern to some businesses, survey-based measures — such as the CBI measure of prices as a constraint on export orders shown in **Chart 15** — indicate a relatively subdued impact of recent currency movements on export competitiveness.⁽¹⁾ Indeed, based on historical trends, the chart suggests we should have expected to see much more concern being registered by manufacturers at the current level of the exchange rate. This muted response may reflect strong global demand helping to offset the negative impact of the exchange rate on competitiveness. But it is also likely to reflect some of the structural changes in manufacturing which have taken place over the past decade, which mean that exporters are now better able to compete at current exchange rate levels.

Chart 15 Are prices constraining UK exports?



Note: Real exchange rate index calculated using CPI.

Sources: CBI and IMF.

If I have detected a concern about the uneven sectoral impact of recent monetary tightening in the business community, it is that activities linked to the UK consumer spending and the housing market will bear a disproportionate share of a future slowdown in demand. However, it is important to see this in context. Over the decade from the mid-1990s to the mid-2000s, the consumer side of the economy enjoyed an exceptional period of strong growth. As I pointed out in a speech earlier this year,⁽²⁾ a period of rebalancing of the sources of UK growth may now need to take place, with a larger contribution from the world economy and investment and hence a relatively smaller contribution from the consumer. Against this background, consumer-facing businesses should be prepared to adjust to a period of slower consumption growth, particularly in relation to the strong trend over the past decade.

So, to return to the question I posed in my title this evening. The job of monetary policy is to keep the temperature of the economy about right, once we have taken account of shocks to demand, supply, costs and prices. The benefits which business should look for from the successful conduct of monetary policy lie not in a temporary respite from higher interest rates, but in achieving a sustained climate of low inflation and economic stability. In that respect, the record of the MPC has been a good one to date, and if we can keep the economy on the same steady track, UK monetary policy should continue to be 'Good for business'.

(1) The *CBI Quarterly Industrial Trends* survey asks manufacturers whether prices are expected to limit export orders over the next three months. The responses to this question should indicate the extent to which businesses are concerned about the impact of the exchange rate on their competitiveness in export markets.

(2) Sentence (2007b).

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Consumption and interest rates

In this speech,⁽¹⁾ Professor Tim Besley,⁽²⁾ a member of the Monetary Policy Committee, considers the relationship between interest rates and consumer spending, and the factors that may determine how consumption evolves over the medium term. Professor Besley argues that there are a number of reasons why short-term disposable income changes explain changes in consumption. Access to credit is one such factor. He urges caution in assessing the link between house prices and consumption growth and cites evidence that 'consumption growth of renters is associated with house price growth just as strongly as the consumption growth of owners'. But there may be a role for housing collateral in affecting overall credit conditions available to households allowing them greater flexibility to smooth through fluctuations in their disposable income. He concludes that reading the trends in consumption in recent months and trying to form a judgement where things are going is fraught with difficulty. It is logical to expect some weakening of consumption growth to reflect the monetary tightening that has taken place. But there is considerable uncertainty about the speed at which this will happen and it could be some time before the data give us a clear picture of the trend.

Ladies and Gentleman, thank you for coming. I would like to begin by thanking my host today — the Centre for Economic Policy Research (CEPR). The CEPR is the premier network of academic economists in Europe, serving as an interface between academia and the policy community. Straddling these two worlds as I do now, I can think of no better organisation to host an event like this and I am grateful for the efforts of CEPR staff in making this happen. I would also like to take this opportunity to acknowledge the contribution of Richard Portes — founder and President of CEPR — who has kindly agreed to chair this meeting. Richard deserves immense credit for his commitment to building up CEPR which has strengthened the economics profession in Europe enormously.

The topic of my speech today is a key part of the transmission mechanism of monetary policy in the United Kingdom — how changes in Bank Rate affect consumption. Having raised Bank Rate by 125 basis points since last August, a key judgement that I make as an MPC member is how consumers will respond to monetary tightening. Consumption comprises 64% of GDP and the health of consumption is generally a good indicator of the strength of the economy. Strong consumption relative to potential supply is also a factor in determining inflationary pressure in the economy. In this speech, I plan to spell out how I have been thinking about the link between consumption and interest rates. I will also give an indication of some of the factors that I believe will shape how consumption evolves in the medium term.

In thinking about any economic issue, I am a firm believer in beginning from economic first principles. My relatively brief experience on the MPC has only served to reinforce this. The MPC is updated daily on a myriad of surveys and data sources. But the trick is to find ways of joining up the facts revealed this way and to find a coherent and consistent view of what is going on behind the data. Basic principles of economics are the glue that we need for this exercise to hold together.

When it comes to consumption, the path-breaking work by the late Milton Friedman more than 50 years ago encouraged us to believe that consumption decisions would reflect some element of forward-looking behaviour. Friedman's key insight was that we should expect an individual's consumption to depend upon some measure of what he called 'permanent income' as opposed to tracking current disposable income. To the extent that this is true, we should expect consumption to respond to current developments in the economy only insofar as these have a bearing on the longer-term prospects for those individuals. This is relevant at present when consumers (like monetary policy makers) are trying to gauge

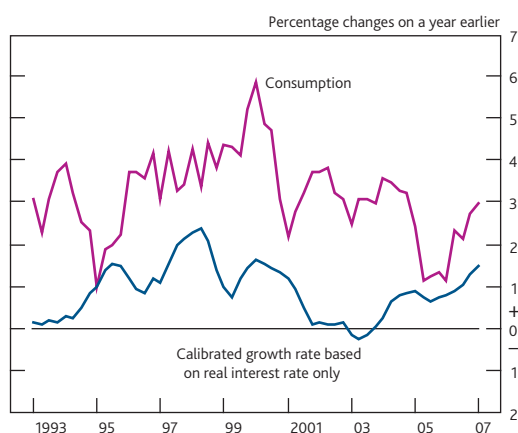
(1) Given at a discussion meeting held by the Centre for Economic Policy Research on 19 July 2007. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2007/speech320.pdf.

(2) I would like to thank Neil Meads and Paolo Surico for research assistance and advice. I am also grateful to Charlie Bean, John Gieve, Andrew Hauser, Andrew Holder, Sally Reid, Andrew Sentance, Paul Tucker and Andrew Wardlow 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.

how the economy is evolving. In principle, permanent income consumers ought to ride out short-term 'shocks' and to respond mainly to longer-term developments in their circumstances.

In its purest version, this view would lead us to expect *real* interest rates, ie the nominal interest rate less *expected* inflation, to affect the path of consumption. This is because the real interest rate determines the relative price of consumption today compared to some future date. Thus a higher interest rate will tend to encourage more future consumption and hence a higher growth rate of consumption.⁽¹⁾ Quite a bit of research has gone into trying to investigate how far this is true, with somewhat mixed success. **Chart 1** uses some of this research to give a 'back of the envelope' sense of how well such a theory calibrates to the data on aggregate consumption in the United Kingdom for the period between 1993 and today.⁽²⁾ While the fit is far from perfect, the chart suggests that there are episodes where movements in the real interest rate do seem to explain movements in consumption growth. But it is evident that we need to incorporate a broader range of factors to explain consumption over the past.

Chart 1 Simple estimate for annual consumption growth



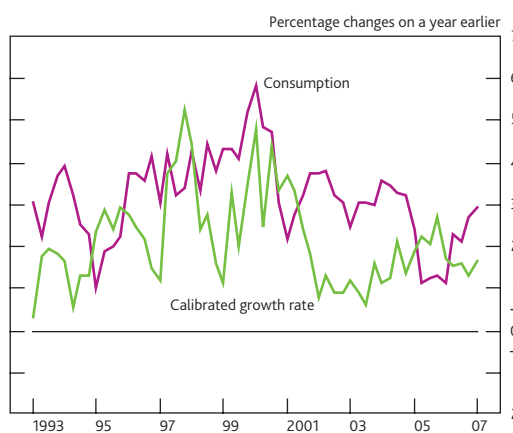
There are good theoretical reasons to doubt the *in extremis* version of the permanent income view and empirical evidence abounds to support this.⁽³⁾ The main unsurprising fact which motivates modifications of the basic permanent income theory is that short-term disposable income changes do appear to explain changes in consumption. But there are a number of possible reasons for this. Here, I will focus mainly on the role of access to credit as a factor.

Individuals who lack the ability or willingness to borrow will be less able to smooth through short-term fluctuations in their economic circumstances. This will tend to accentuate the effect of short-term factors in consumer behaviour. This implies that fluctuations in disposable income will have a pronounced effect on consumption. It also focuses attention

on credit conditions in mediating the effect of shocks into consumption.

Before discussing this in more detail, it is useful to get a 'back of the envelope' feel for how far allowing for sensitivity of consumption to disposable income can help us to explain the pattern of consumption growth in the United Kingdom over the past. To this end, **Chart 2** adds to our calibration an estimate of the sensitivity of consumption growth to the growth in disposable incomes which is typical of what the literature has found.⁽⁴⁾⁽⁵⁾ Allowing for this has the predictable consequence that we now do a lot better in explaining consumption in the United Kingdom as a whole. Even so, some puzzling episodes remain. But, while acknowledging that trying to access the success of a theory by staring at charts like this is rather subjective, I would say that the simple 'two-variable' model — the real interest rate and disposable income changes — accounts remarkably well for the variation of aggregate consumption growth in the United Kingdom between 1993 and the first quarter of 2007. So when we look forward at the prospects for consumption, we should certainly be looking at factors that will affect these.

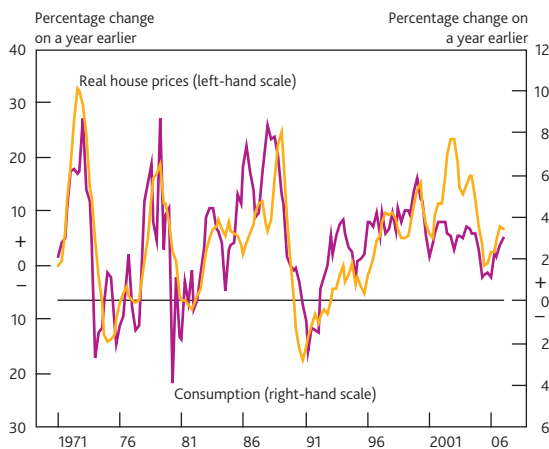
Chart 2 Estimate for annual consumption growth including income sensitivity



- (1) The correlation between real interest rates and consumption growth depends upon the relative weight of income and substitution effects. We assume that the substitution effect is dominant.
- (2) Consumption is the annual growth rate of private consumption. The real interest rate is measured as the difference between the three-month Treasury bill rate and the Consensus inflation expectation two years ahead. The parameter on the real rate is set to 0.67, which roughly falls in the middle of the range of estimates from microeconomic studies on the behaviour of UK consumers. The discount factor corresponds to an equilibrium value of 3% for the annual real interest rate.
- (3) See Browning, M and Lusardi, A (1996), 'Household saving: micro theories and micro facts', *Journal of Economic Literature*, Vol. 34, pages 1,797–855, for an overview of the literature.
- (4) See for instance Campbell, J and Mankiw, G (1989), 'Consumption, income, and interest rates: reinterpreting the time series evidence', *NBER Macroeconomics Annual*, Vol. 4, pages 185–216.
- (5) Real household disposable income is defined as the sum of gross balance of primary income, net social transfers and contributions, net of taxes and deflated by the consumption expenditure deflator (see www.statistics.gov.uk/pdfdir/qna0607.pdf, table J2).

Friedman's theory also gives a role for household wealth to affect consumption. This might lead us to expect that increases in asset prices will feed through to consumption, and therefore provide a link between consumption growth and house price inflation. **Chart 3** illustrates the positive association between house prices inflation and consumption growth that we have observed between 1971 and the first quarter of 2007. Casual reasoning about the direction of causation between house price growth and consumption growth is seductive. But there are good reasons to be cautious in interpreting this relationship.

Chart 3 Real house prices^(a) and consumer spending



Sources: Nationwide and ONS.

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

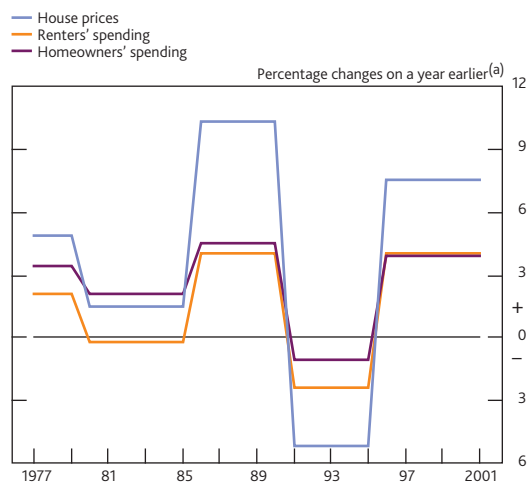
For many individuals, owning a house is an important source of wealth. But equally, it is the main source of indebtedness, accounting for the lion's share of the increase in personal debt over the past fifteen years. To be precise, 84% of the increase in outstanding household debt between January 1993 and May 2007 is attributable to the rise in secured mortgage debt. However, increases in house prices over this period mean that household capital gearing (the ratio of household debt to household wealth) has risen only modestly.

In moving to an economy-wide picture, it is also important to acknowledge that there is no such thing as a typical household. In general, housing activity transfers wealth from young (indebted) households to older cohorts (trading down the property ladder). While households as a whole do not gain in wealth, there may be some impact upon consumption given that the younger cohorts may have a higher propensity to consume.⁽¹⁾ Furthermore, the Council of Mortgage Lenders (CML) indicates that the median percentage of income required by first-time buyers, typically the most indebted and highly geared, to cover mortgage interest payments is around twice as large as aggregate household income gearing. Thus we do not expect interest rates to impact all households in the same way and we need to aggregate across differing households to get a joined-up picture.

When considering the link between housing and consumption, allowing causation to run from house prices to consumption makes little economic sense. House prices depend on the forces of supply and demand and to understand the housing market it is essential to analyse these. Households ought to base their housing demand on their longer-term income prospects (their permanent income) and their demand will also be affected by their access to opportunities to finance their housing purchases. But these are exactly the same economic forces that I have argued should drive consumption. So it is not surprising that consumption growth and house price inflation move together to some extent. But the relationship is not causal.

To illustrate this, **Chart 4** looks at the relationship between house prices and consumption for two groups of consumers — owners and renters.⁽²⁾ This shows that the consumption growth of renters is associated with house price growth just as strongly as the consumption growth of owners. If the main effect of housing on consumption is through its effect on household wealth, we should not expect to see this.

Chart 4 House prices and consumer spending by tenure group



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

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

But even if the wealth channel of housing is not hugely important, there may be a role for housing collateral in affecting credit conditions available to households allowing them greater flexibility to smooth through fluctuations in their disposable incomes to the extent that they are not borrowing

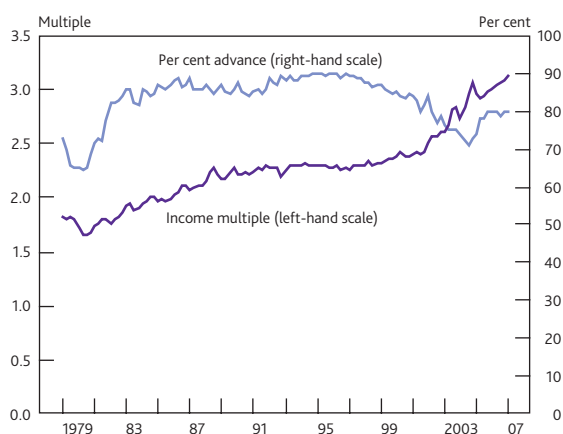
(1) Younger consumers are also more likely to be credit constrained.

(2) If a common factor, such as income expectations, is driving house prices and consumer spending then we might expect the spending of renters as well as homeowners to move with house prices (see Attanasio, O, Blow, L, Hamilton, R and Leicester, A (2005), 'Consumption, house prices and expectations', *Bank of England Working Paper no. 271*, and Benito, A, Thompson, J, Waldron, M and Wood, R (2006), 'House prices and consumer spending', *Bank of England Quarterly Bulletin*, Summer, pages 142–54). Evidence from the ONS Family Expenditure Survey appears to support this assertion.

to the limit. Housing wealth may therefore affect how individuals can smooth out shocks and hence how far they consume on the basis of long or short-term economic factors.

We should expect more generally for credit conditions to play an important role in affecting consumption. The Bank of England puts a large amount of effort into monitoring credit conditions in its new quarterly Credit Conditions Survey.⁽¹⁾ Since 1994, we have seen fairly relaxed credit conditions in the UK economy with strong growth in household indebtedness.⁽²⁾ Over this period, household income gearing has increased significantly although it remains well below the levels of the late 1980s. However, if we look at the amount borrowed as a multiple of income when a household buys a house, we do find a steady drift upwards over time from a multiple below two to above three. Moreover, this drift up has accelerated somewhat since the early part of this decade. This is illustrated in **Chart 5**. That said, the percentage of the purchase price advanced has not increased markedly suggesting that, at current housing values, collateral exposure is not greater than it was previously.

Chart 5 Loan to income multiples for house purchase



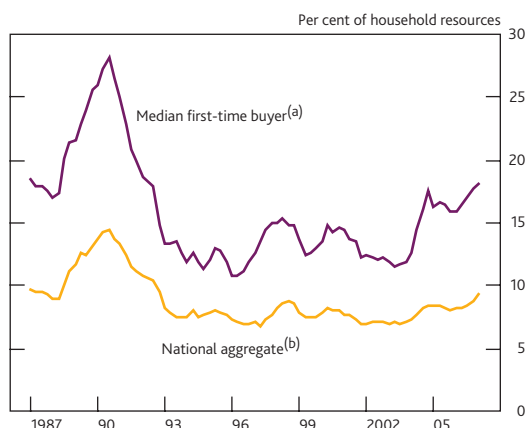
Source: Council of Mortgage Lenders.

In a wider sense, the availability of credit does appear to be linked to the strong asset price inflation that we have witnessed, particularly in the past three years when we have also seen strong growth in monetary aggregates. I do not think that we can ignore these developments as indicators of the general state of liquidity which may influence the future path of demand in general and among consumers in particular.

Looking at household balance sheets does lead us to expect a link between *nominal* interest rates and consumption. To get a feel for this, **Chart 6** looks at household income gearing, which has drifted up in recent years to around 9% of personal disposable income.⁽³⁾ Given the sensitivity of consumption to personal income, we should expect the 125 basis points increase that we have seen since last August to have some impact on consumption through this channel. But how much

this will be true and over what period depends crucially on what future path of interest rates is expected by consumers and how far they can smooth their adjustment over time.⁽⁴⁾

Chart 6 Household income gearing



Sources: Council of Mortgage Lenders and ONS.

(a) Mortgage interest payments only.

(b) Interest payments only not adjusted for MIRAS.

In formulating a view on this, we have to track a moving target. There have been marked structural changes in the UK mortgage market making past relationships between interest rates and consumption a possibly poor guide to the future. So we need to go back to first principles and try to assess what is relevant at the current time.

Until the late 1980s, the vast majority of mortgage loans were taken out on the standard variable rate (SVR). As the mortgage market became more competitive, we saw an increase in (typically time-bound) discounting where consumers could benefit by shopping around. But more recently still, the mortgage market has come to be dominated by two main products — tracker mortgages and fixed-rate deals. We have also seen a growth in offset mortgages which provide a flexible basis for 'saving' against mortgage balances. We know very little about the choice between mortgage products from an economic point of view and more research is needed for the United Kingdom.⁽⁵⁾

(1) Recently the Bank of England has moved from a bi-annual to a quarterly survey of credit conditions covering all lenders with an estimated share of more than 1% of gross lending flows over a twelve-month period (see www.bankofengland.co.uk/publications/other/monetary/credit-conditions-survey.pdf).

(2) See Fernandez-Corugedo, E and Muellbauer, J (2006), 'Consumer credit conditions in the United Kingdom', *Bank of England Working Paper no. 314*, and Aron, J and Muellbauer, J (2006), 'Housing wealth, credit conditions and consumption', *mimeo*, University of Oxford.

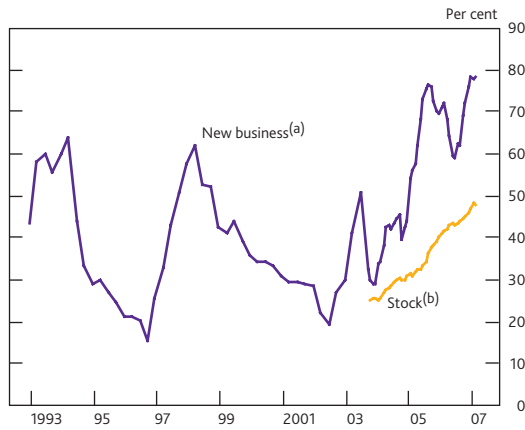
(3) Note that this measure of gearing only includes interest payments, ie no repayment of principal. There is also no attempt to make adjustments for MIRAS in the earlier periods of the data.

(4) See Cromb, R and Fernandez-Corugedo, E (2004), 'Long-term interest rates, wealth and consumption', *Bank of England Working Paper no. 243*.

(5) Vickery, J (2006) finds that US consumers' choice between fixed and variable-rate deals is quite price-sensitive with a 10 basis point increase in fixed-rate mortgage interest rates reducing the fixed-rate product market share by about 10% ('Interest rates and consumer choice in the residential mortgage market', *mimeo*, Federal Reserve Bank of New York).

Data from the CML indicate that in May 2007, 78% of new loans for house purchase and remortgaging were fixed rates, 5% discounted, 15% tracker, 1% capped, 2% SVR. The pattern over time for fixed-rate mortgages is illustrated in **Chart 7**.

Chart 7 Proportion of fixed-rate mortgages



(a) Council of Mortgage Lenders.
(b) Bank effective rates.

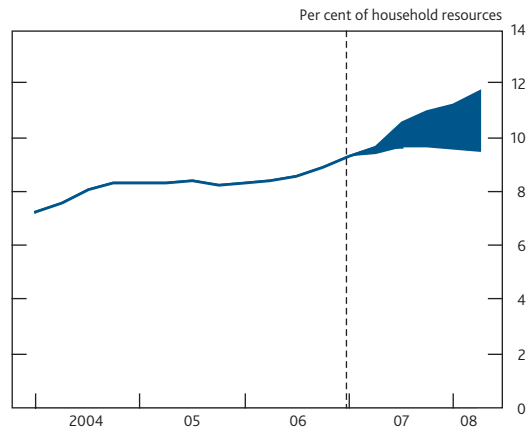
In making any assessment of the impact of interest rates going forward, we need to understand how consumers with mortgages will respond as fixed-rate deals unwind. With rising house prices, they may choose to borrow further to smooth their consumption or they may react abruptly to changes in their disposable income. There is a great deal of uncertainty about how this will play out. Equally, we need to understand what consumers believe about the future path of interest rates since this will also affect their behaviour.

I have been working with my staff in the External MPC Unit to make an assessment of the range of plausible estimates of the effect of interest rate changes on disposable income going forward. As with the well-trodden path of producing fan charts in the Bank's assessment of inflation and growth prospects, it is important also to think of a range rather than a central projection when assessing the impact of rates on consumer behaviour. In this case, we generate the range from different scenarios reflecting different possible assumptions about behaviour. A feeling for the kind of estimates that we have found is given in **Chart 8**.

This chart shows that we anticipate households' income gearing to increase somewhat over the near term. This increase is due to a number of factors including increased interest rates faced by individuals rolling off of existing fixed-rate mortgages onto new mortgage deals. However, the largest driver of any increase in income gearing is likely to be the rate at which households continue to accumulate liabilities (debt) and the results turn out to be quite sensitive to the assumptions that are made about this. **Chart 8** reflects a broad range of uncertainty over the continued build-up of household debt and the future path of effective interest rates

on this debt faced by households. Other uncertainties, not reflected in the chart, include the evolution of household interest income, which will offset some of the negative cash-flow impacts noted above. It is also necessary to form a view of whether some mortgage holders will choose to extend the terms of their mortgages.

Chart 8 Range of estimates for future path of household income gearing^(a)



Source: Bank calculations.

(a) Based upon a range of assumptions for the future development of household debt against recent observed outturns, and observed relationships between Bank Rate movements and effective household interest rates.

Thinking hard about this type of calculation makes one suspicious of efforts to present a single scenario which does not acknowledge the range of plausible assumptions that could be made. There are a number of key uncertainties that lie behind **Chart 8** and which I will be monitoring over the coming months. These fall into two broad categories:

- 1 The evolution of the ratio of household debt to income which will be influenced by:
 - changes in household incomes;
 - developments in the housing market; and
 - credit conditions and credit availability.
- 2 Changes in effective interest rates which are affected by:
 - the mortgage rates which mortgage holders roll onto following the end of existing fixed-rate mortgage deals;
 - the proportion of new and existing mortgages on fixed versus variable rates; and
 - the evolution of quoted mortgage and unsecured lending rates.

As we learn more about these things, we will be able to gain a better understanding of how consumers are responding to monetary tightening.

But based on **Chart 8** and plausible assumptions about the relationship between disposable income growth and consumption growth of the kind discussed above, we might

reasonably expect that the recent rise in Bank Rate will have a dampening effect on consumption growth of around 1 percentage point by the third quarter of 2008. But there are risks in both directions.

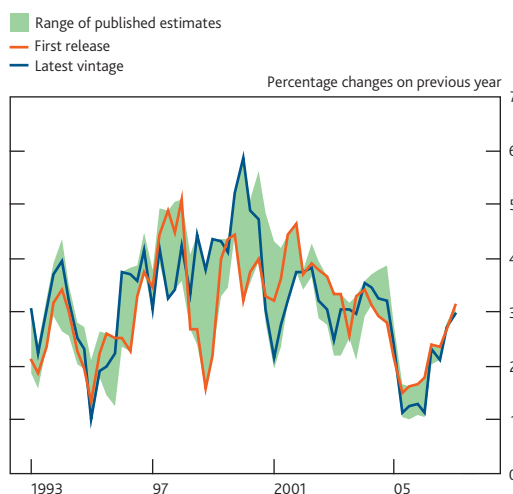
However, this number should be taken in context as I have quantified only one among many influences on the evolution in disposable incomes over this period and other factors may work in the opposite direction. For example, there will be countervailing effects due to increases in the disposable incomes of net savers and the increase in disposable incomes due to cuts in utility prices. Similar calculations suggest that the disposable incomes of savers will increase by around 0.5 percentage points by the third quarter of 2008.

As we monitor this picture, we need to be cautious in reading too much into volatile monthly retail sales data. Today's Office for National Statistics release suggested a 0.2 percentage point increase in retail sales in the month of June. However, I do not put much weight on the month-on-month variation. This is too easily influenced by weather and other idiosyncratic events. The official data are also prone to revisions. The average absolute revision to three-month on three-month growth rates between the first and latest release of data for those three months (over the period January 1993 to December 2006) is 0.26 percentage points.

We also need to be wary of looking solely at headline retail sales since retail goods consumption comprises only 40% of total consumption. Since 1997, the correlation coefficient between annual retail sales volumes growth (end-quarter observations) and real consumption growth has been just 0.32 percentage points.

The reason why retail sales gets so much attention is that data on overall consumption are generally available with a much greater lag and are equally prone to significant revisions. The average absolute revision to quarterly growth between *Quarterly National Accounts* and the latest published data covering the period 1992–2004 (so all data that have passed through at least two *Blue Book* rebalancing exercises) is 0.4 percentage points. Such uncertainty in the data is something that the MPC is acutely aware of and there is important work going on at the Bank that helps the MPC in seeing how the data will likely evolve. To get a feel for the quantitative significance of this, I refer you to **Chart 9** which gives you a sense of the observed range of estimates for the growth rate of annual consumer spending between first releases and the latest vintages of the data.

Chart 9 Range of published estimates for annual consumer spending growth



Overall, it should be clear that reading the trends in consumption in recent months and trying to form a judgement about where things are going is fraught with difficulty. It is an area where it is necessary to form a judgement and I hope that this speech has given you a clue as to how I am thinking about this.

Since joining the MPC, I have been pushing for higher rates. I have justified this decision by referring to evidence of a strong global economy, low levels of spare capacity in firms, strong growth of money and credit and elevated pricing intentions of firms which together have created a balance of medium-term risks to the upside of the inflation target. My apparent desire to raise rates, perhaps more quickly than some of my colleagues on the MPC, has been fuelled by a belief that we would be better placed to bring inflation to target in the medium term by doing more sooner. Moreover, the peak of rates may eventually be lower by moving earlier.

I have emphasised in this speech that it is logical to expect some weakening of consumption growth to reflect the monetary tightening that has taken place. But there is considerable uncertainty about the speed at which this will happen and it could be some time before the data give us a clear picture of the trend. In broad terms, the pace and extent of the adjustments made by consumers depend upon how they use their available opportunities for smoothing their response. The sooner households begin to acknowledge the consequences of higher rates, the greater is the chance of a smooth adjustment towards a level of consumption consistent with maintaining the inflation target in the medium term.

Appendices



Bank of England speeches

Speeches made by Bank personnel since publication of the previous *Bulletin* are listed below.

[Uncertainty, policy and financial markets](#)

(Reproduced on pages 437–44 of this *Bulletin*.)

Speech by Sir John Gieve given at a Market News event at the Barbican Centre in London on 24 July 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech321.pdf

[Consumption and interest rates](#)

(Reproduced on pages 471–76 of this *Bulletin*.)

Speech by Tim Besley to the Centre for Economic Policy Research and the Economic and Social Research Council at Chartered Accountants' Hall on 19 July 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech320.pdf

[‘The meaning of internal balance’ thirty years on](#)

Speech by Charles Bean, Chief Economist and member of the Monetary Policy Committee, at the James Meade Centenary conference on 13 July 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech319.pdf

[Developing a framework for stress testing of financial stability risks](#)

Speech by Nigel Jenkinson, Executive Director, Financial Stability at the ECB Conference on Stress Testing and Financial Crisis Management in Frankfurt on 12 July 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech318.pdf

[UK monetary policy: good for business?](#)

(Reproduced on pages 462–70 of this *Bulletin*.)

Speech by Andrew Sentance to an audience hosted by Dow Jones in London on 10 July 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech317.pdf

[Entrepreneurship in the UK](#)

Speech by David Blanchflower at the Max Planck Summer Institute in Berlin on 9 July 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech316.pdf

[Promoting financial system resilience in modern global capital markets: some issues](#)

(Reproduced on pages 453–61 of this *Bulletin*.)

Speech by Nigel Jenkinson, Executive Director, at the conference ‘Law and Economics of Systemic Risk in Finance’, University of St Gallen, Switzerland on 29 June 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech315.pdf

[London, money and the UK economy](#)

(Reproduced on pages 428–36 of this *Bulletin*.)

Speech by Sir John Gieve at the University of Surrey, Guildford on 26 June 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech314.pdf

[Mansion House Dinner](#)

(Reproduced on pages 425–27 of this *Bulletin*.)

Speech by Mervyn King, Governor, at the Lord Mayor's Banquet for Bankers and Merchants of the City of London at the Mansion House on 20 June 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech313.pdf

[Central banking and political economy: the example of the United Kingdom's Monetary Policy Committee](#)

(Reproduced on pages 445–52 of this *Bulletin*.)

Speech by Paul Tucker at a conference on Inflation Targeting, Central Bank Independence and Transparency at the University of Cambridge on 15 June 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech312.pdf

[Speech by Mervyn King, Governor](#)

(Reproduced on pages 422–24 of this *Bulletin*.)

To a CBI Dinner, Wales on 11 June 2007.

www.bankofengland.co.uk/publications/speeches/2007/speech311.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)

Spring 2005

- Dealing with data uncertainty
- Indicators of short-term movements in business investment
- Divisia money
- Inside the MPC
- The role of central banks in payment systems oversight
- The Governor's speech to the CBI Dinner in Manchester (S)
- The Governor's speech on the International Monetary System (S)
- Why monetary stability matters to Merseyside (S)
- Monetary policy in an uncertain world (S)
- Why has inflation been so low since 1999? (S)
- The housing market and the wider economy (S)

Summer 2005

- The impact of government spending on demand pressure
- How important is housing market activity for durables spending?
- The inflation-targeting framework from an historical perspective
- Monetary policy news and market reaction to the *Inflation Report* and *MPC Minutes*
- Addendum to *Report on modelling and forecasting at the Bank of England*
- Public attitudes to inflation
- Chief Economist Workshop April 2005: exchange rate regimes and capital flows
- Implementing monetary policy: reforms to the Bank of England's operations in the money market
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2004
- Monetary policy: practice ahead of theory
- The Mais Lecture 2005: speech by the Governor (S)
- Inflation targeting in practice: models, forecasts and hunches (S)
- Monetary policy, stability and structural change (S)
- How much spare capacity is there in the UK economy?
- Communicating monetary policy in practice (S)
- Monetary policy in the United Kingdom — the framework and current issues (S)

- A matter of no small interest: real short-term interest rates and inflation since the 1990s (S)

Autumn 2005

- Assessing the MPC's fan charts
- Long-run evidence on money growth and inflation
- The determination of UK corporate capital gearing
- Publication of narrow money data: the implications of money market reform
- The Governor's speech at Salts Mill, Bradford (S)
- The Governor's speech at the Mansion House (S)
- Monetary policy making: fact and fiction (S)

Winter 2005

- Introducing the Agents' scores
- Do financial markets react to Bank of England communication?
- Financial stability, monetary stability and public policy
- Share prices and the value of workers
- Stabilising short-term interest rates
- The Governor's speech to the CBI North East annual dinner (S)
- UK monetary policy: the international context (S)
- Economic stability and the business climate (S)
- Challenging times for monetary policy (S)
- Monetary policy challenges facing a new MPC member (S)

Spring 2006

- New information from inflation swaps and index-linked bonds
- The distribution of assets, income and liabilities across UK households: results from the 2005 NMG Research survey
- Understanding the term structure of swap spreads
- The information content of aggregate data on financial futures positions
- The forward market for oil
- The Governor's speech in Ashford, Kent (S)
- Reform of the International Monetary Fund (S)
- Global financial imbalances (S)
- Monetary policy, demand and inflation (S)
- Has oil lost the capacity to shock? (S)

Summer 2006

- House prices and consumer spending
- Investing in inventories
- Cost-benefit analysis of monetary and financial statistics
- Public attitudes to inflation
- The Centre for Central Banking Studies
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2005

- Uncertainty, the implementation of monetary policy, and the management of risk (S)
- Reflections on operating inflation targeting (S)
- Cost pressures and the UK inflation outlook (S)
- The UK current account deficit and all that (S)
- A shift in the balance of risks (S)
- What do we now know about currency unions? (S)

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)

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. 317 Corporate debt and financial balance sheet adjustment: a comparison of the United States, the United Kingdom, France and Germany (December 2006)
Peter Gibbard and Ibrahim Stevens

No. 318 Does Asia's choice of exchange rate regime affect Europe's exposure to US shocks? (February 2007)
Bojan Markovic and Laura Povoledo

No. 319 Too many to fail — an analysis of time-inconsistency in bank closure policies (February 2007)
Viral Acharya and Tanju Yorulmazer

No. 320 The real exchange rate and quality improvements (April 2007)
Karen Dury and Özlem Oomen

No. 321 Comparing the pre-settlement risk implications of alternative clearing arrangements (April 2007)
John P Jackson and Mark J Manning

No. 322 An affine macro-factor model of the UK yield curve (April 2007)
Peter Lildholdt, Nikolaos Panigirtzoglou and Chris Peacock

No. 323 Forecast combination and the Bank of England's suite of statistical forecasting models (May 2007)
George Kapetanios, Vincent Labhard and Simon Price

No. 324 Housing equity as a buffer: evidence from UK households (May 2007)
Andrew Benito

No. 325 Inter-industry contagion between UK life insurers and UK banks: an event study (May 2007)
Marco Stringa and Allan Monks

No. 326 Asset pricing implications of a New Keynesian model (June 2007)
Bianca De Paoli, Alasdair Scott and Olaf Weeken

No. 327 A model of market surprises (June 2007)
Lavan Mahadeva

No. 328 Cash-in-the-market pricing and optimal resolution of bank failures (June 2007)
Viral Acharya and Tanju Yorulmazer

No. 329 The impact of yuan revaluation of the Asian region (July 2007)
Glenn Hoggarth and Hui Tong

No. 330 Escaping Nash and volatile inflation (July 2007)
Martin Ellison and Tony Yates

No. 331 Wage flexibility in Britain: some micro and macro evidence (July 2007)
Mark E Schweitzer

External MPC Unit discussion papers

The MPC Unit discussion paper series reports on research carried out by, or under supervision of, the external members of the Monetary Policy Committee. Papers are available from the Bank's website at:

www.bankofengland.co.uk/publications/other/externalmpcpapers/index.htm.

The following paper has been published recently:

No. 17 The impact of the recent migration from Eastern Europe on the UK economy (April 2007)
David G Blanchflower, Jumana Saleheen and Chris Shadforth

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/redbookfeb07.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. The price of the book is £10.

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.

Quarterly Bulletin

The *Quarterly Bulletin* provides regular commentary on market developments and UK monetary policy operations. It also contains research and analysis and reports on a wide range of topical economic and financial issues, both domestic and international.

Summary pages of the *Bulletin* from February 1994, giving a brief description of each of the articles, are available on the Bank's website at:

www.bankofengland.co.uk/publications/quarterlybulletin/index.htm.

Individual articles from May 1994 are also available at the same address.

The *Bulletin* is also available from National Archive Publishing Company: enquiries from customers in Japan and North and South America should be addressed to ProQuest Information and Learning, 300 North Zeeb Road, PO Box 998, Ann Arbor, Michigan 48106-0998, United States of America; customers from all other countries should apply to The Quorum, Barnwell Road, Cambridge, CB5 8SW, telephone 01223 215512.

An index of the *Quarterly Bulletin* is also available to customers free of charge. It is produced annually, and lists alphabetically terms used in the *Bulletin* and articles written by named authors. It is also available at:

www.bankofengland.co.uk/publications/quarterlybulletin/contentsandindex.htm.

Bound volumes of the *Quarterly Bulletin* (in reprint form for the period 1960–85) can be obtained from Schmidt Periodicals GmbH, Ortsteil Dettendorf, D-83075 Bad Feilnbach, Germany, at a price of €105 per volume or €2,510 per set.

Inflation Report

The Bank's quarterly *Inflation Report* sets out the detailed economic analysis and inflation projections on which the Bank's Monetary Policy Committee bases its interest rate decisions, and presents an assessment of the prospects for UK inflation over the following two years. The *Inflation Report* is available at:

www.bankofengland.co.uk/publications/inflationreport/index.htm.

The *Report* starts with an overview of economic developments; this is followed by five sections:

- analysis of money and asset prices;
- analysis of demand;
- analysis of output and supply;
- analysis of costs and prices; and
- assessment of the medium-term inflation prospects and risks.

Publication dates

Copies of the *Quarterly Bulletin*, *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 2007 are as follows:

Quarterly Bulletin

Q1	19 March
Q2	18 June
Q3	24 September
Q4	17 December

Inflation Report

February	14 February
May	16 May
August	8 August
November	14 November

Financial Stability Report

26 April
25 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	2007					
	<i>QB, FSR and IR package</i>	<i>QB and IR package</i>	<i>IR and FSR package</i>	<i>QB only</i>	<i>IR only</i>	<i>FSR only</i>
United Kingdom						
First class/collection ⁽¹⁾	£31.50	£27.00	£13.50	£21.00	£10.50	£5.25
<i>Students/schools</i> (concessionary rate UK only)	<i>£10.50</i>	<i>£9.00</i>	<i>£4.50</i>	<i>£7.00</i>	<i>£3.50</i>	<i>£1.75</i>
<i>Academics</i> (concessionary rate UK only)	<i>£21.00</i>	<i>£18.00</i>	<i>£9.00</i>	<i>£14.00</i>	<i>£7.00</i>	<i>£3.50</i>
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

(1) Subscribers who wish to collect their copy (copies) of the *Bulletin*, *Inflation Report* and/or *Financial Stability Report* may make arrangements to do so by writing to the address given below. Copies will be available to personal callers at the Bank from 10.30 am on the day of issue and from 8.30 am on the following day.

Readers who wish to become **regular subscribers**, or who wish to purchase single copies, should send to the Bank, at the address given below, the appropriate remittance, payable to the Bank of England, together with full address details, including the name or position of recipients in companies or institutions. If you wish to pay by **Visa, MasterCard, Maestro or Delta**, please telephone +44 (0)20 7601 4030. Existing subscribers will be invited to renew their subscriptions automatically. Copies can also be obtained over the counter at the Bank's front entrance.

The **concessionary** rates for the *Quarterly Bulletin*, *Inflation Report* and *Financial Stability Report* are noted above in *italics*. Academics at UK institutions of further and higher education are entitled to a concessionary rate. They should apply on their institution's notepaper, giving details of their current post. **Students and secondary schools** in the United Kingdom are also entitled to a concessionary rate. Requests for concessionary copies should be accompanied by an explanatory letter; students should provide details of their course and the institution at which they are studying.

These publications are available from Publications Group, Bank of England, Threadneedle Street, London, EC2R 8AH; telephone +44 (0)20 7601 4030; fax +44 (0)20 7601 3298; email mapublications@bankofengland.co.uk or fsrenquiries@bankofengland.co.uk.

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The Bank of England's website is at www.bankofengland.co.uk.

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