Quarterly Bulletin

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Foreword

Every three months, the Bank of England publishes economic research and market reports in its *Quarterly Bulletin*. This quarter, the *Bulletin* explores the United Kingdom's apparently surprising ability to generate net investment income from net debt. It assesses the costs of defaults on sovereign debt. And it examines the United Kingdom's export performance by industry. As usual, the *Bulletin* also reviews the latest movements in sterling and global financial markets.

The UK international investment position, by Simon Whitaker, examines how the United Kingdom can generate positive net investment income, despite its overseas asset holdings apparently being less valuable than its liabilities. This is an ability that the United Kingdom shares with the United States. Moreover, this net investment income position is estimated to have improved in recent years at the same time as the United Kingdom has become more indebted.

The article highlights two points. First, official data imply that there has been a decline in the yield that the United Kingdom pays on bonds and equities issued to overseas investors, relative to the yield that the United Kingdom earns on its holdings of bonds and equities issued by the rest of the world. That is broadly consistent with the decline in UK interest rates relative to world interest rates since the early 1990s. Second, the composition of UK external assets is estimated to have shifted towards foreign direct investment (FDI). These FDI assets generate a higher yield than the lower risk liabilities that the United Kingdom has been accumulating.

Looking ahead, the accumulation of net debt should eventually correct, either by an improvement in the United Kingdom's trade performance or an increase in the market value of assets relative to liabilities. Although both would require an adjustment of the exchange rate, the article explains that the scale of this adjustment could be smaller than sometimes assumed. One reason is that capital gains from a depreciation can allow a net external debt position to stabilise, even in the face of ongoing net trade deficits, though there are considerable uncertainties around these data.

Costs of sovereign default, by Bianca De Paoli, Glenn Hoggarth and Victoria Saporta, assesses the impact of defaults on sovereign debt by emerging market economies over the past quarter of a century. The article provides an overview of the size and types of costs that have been associated with these defaults, and presents new evidence. It concludes with a number of policy suggestions to improve debt crisis prevention and management and the role played by the IMF.

UK export performance by industry, by Ana Buisán, David Learmonth and María Sebastiá-Barriel, examines the United Kingdom's trade performance. The UK export market share has declined steadily for a number of years. Operating in a small open economy, many UK exporters appear to have only a limited ability to vary their prices from those of their competitors — even if their costs change substantially. So a dominant influence on their market share is likely to have been

the appreciation of the sterling exchange rate in the latter half of the 1990s. But some industries have been able to exploit non-price advantages, in particular technological intensity, to increase their market shares. As the article explains, such factors are likely to explain differences in UK export performance across UK industries — and between high and low-tech industries, in particular.

Finally, the regular *Markets and operations* article reviews developments in global capital markets since the previous *Bulletin*. Financial markets were more settled in July and August, following the period of increased volatility and falls in equity and commodity markets between mid-May and mid-June. Market intelligence gathered from the Bank's contacts suggests that the short-lived period of increased volatility mainly reflected position adjustment by leveraged investors rather than a widespread repricing of risk. Real long forward rates fell despite increases in official interest rates in many economies. Credit markets were resilient and more generally key elements of the 'search for yield' remained intact.

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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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Author of articles can be contacted at forename.surname@bankofengland.co.uk

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

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Recent economic and financial developments

Markets and operations

This article reviews developments since the Summer *Quarterly Bulletin* in global financial markets. It summarises asset price movements in conjunction with market intelligence gathered from market contacts, and evaluates these in the context of the Bank's core purposes. The article also outlines changes in market structure and reviews the Bank's official operations.⁽¹⁾

Global financial markets

Overview

Financial markets were more settled following the sharp increase in market volatility and falls in many asset prices between mid-May and mid-June. Realised and implied volatility in a number of asset classes fell back towards the levels observed in 2006 Q1 and much of 2005. Overall, the fall-out from the turbulence in financial markets in May and June appears to have been limited. Some market contacts have suggested that the events were simply a 'blowing off of the speculative froth' that had been building up earlier in the year, with the period of heightened volatility mainly reflecting adjustment to traders' and short-term investors' positions.

Indeed, it would appear that a number of the key elements of the 'search for yield' — described in previous editions of the *Bulletin* and *Financial Stability Report* — remained largely intact. In particular, the repackaging of credit risk through collateralised debt obligations (CDOs) backed by assets such as commercial real estate loans, home equity loans and leveraged loans continued unabated. And demand to invest in the leveraged loan market remained high, with some contacts suggesting that leverage had reached unsustainable levels. More generally, credit markets were resilient and credit spreads remained narrow, despite further increases in official interest rates across the major economies.

Recent developments in global capital markets

Having fallen sharply in May and June, global equity prices gradually recovered albeit to levels below their local peaks reached earlier in the year (**Chart 1**). The swings in emerging market economy (EME) equity markets were particularly large.

Implied volatility of the major equity indices rose sharply in May and June. And heightened investor uncertainty also manifested itself in primary equity markets, with a sharp slowdown in US initial public offering (IPO) volumes. In the period June to August, 29 IPOs worth around \$6¹/₄ billion were withdrawn or postponed in the United States, compared with



Sources: Bloomberg, Morgan Stanley Capital International Inc. (MSCI) and Bank calculations. (a) The MSCI Emerging Markets index is a capitalisation-weighted index that monitors the performance of stocks in emerging markets.

fourteen deals worth around \$2 billion in the previous five months. Implied equity market volatility subsequently declined, although perceived downside risks to US and UK equity markets remained greater than earlier in the year (Chart 2).

As with equity markets, most (non-energy) commodity prices gradually recovered following sharp falls in May and June (Chart 3). However, markets for a number of individual commodities remained volatile. In particular, copper prices were affected by a strike at Escondida, the world's largest copper mine, and nickel inventories reportedly reached historically low levels. In oil markets, the temporary partial shutdown of BP's Prudhoe Bay oil field and tensions in the Middle East added to price volatility. And oil prices fell markedly in August offsetting earlier rises.

Many EME currencies depreciated quite sharply against the US dollar from mid-May to mid-June (Chart 4), partly as a by-product of speculative exposures to EME equity and credit

This article focuses on global capital markets. The data cut-off for this article is 1 September.

markets being cut and the funds repatriated. Subsequently, most of these currencies recovered, albeit to differing degrees. Some investors may have sought temporary shelter from



Chart 2 Implied equity market asymmetry^(a)

(a) Implied asymmetry is measured by the skewness of the distribution of returns implied by option prices. A negatively skewed distribution is one for which large negative deviations from the mean are more likely than large positive deviations. Measures shown are six-month skews.

Chart 3 Selected commodity prices







Source: Bloomberg.

volatility in EME markets by holding US dollar-denominated assets. In turn, this could have contributed to a slight appreciation of the dollar in May and June (Chart 5).

Chart 5 Cumulative changes in exchange rate indices



Relatedly, the temporary increase in market volatility appeared to prompt a short-lived 'flight to quality' as investors reduced their positions in risky assets and switched to safer instruments. Perhaps reflecting this, government bond yields fell somewhat as volatility spiked. They then declined further during July and August (Chart 6), largely accounted for by falls in long-term real interest rates.





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

Yields on EME bonds rose and EME spreads to US Treasuries widened during May and June. Spreads on sovereign EME bonds subsequently narrowed and returned close to the historically low levels reached earlier in the year, whereas spreads on EME corporate bonds remained wider (Chart 7).

In contrast to EME markets, industrial country credit markets were less affected by the period of heightened uncertainty in financial markets. Premia on major credit default swap (CDS) indices and investment-grade corporate bond spreads did widen, but only modestly (Chart 8). There was a more

Sources: Chicago Mercantile Exchange, Euronext.liffe and Bank calculations.





Chart 8 International credit default swap indices



Source: Bloomberg

sustained widening in spreads on high-yield corporate bonds, although they remained at lower levels than were observed through most of 2005 (Chart 7).

Interpreting moves in global capital markets

The general pattern of developments across a number of asset markets — a sharp sell-off in May and June and a subsequent partial recovery in prices — perhaps indicates that global markets experienced a common disturbance, the effects of which were relatively short-lived. Consistent with this, realised and implied correlations within major equity indices increased significantly, before falling back (**Chart 9**). Likewise, there was a rise in the proportion of the variation in global equity, commodity and bond markets explained by a common 'principal component'⁽¹⁾ during May and June, consistent with a common shock (**Chart 10**). More recently, the degree of comovement in asset markets has declined suggesting greater differentiation across assets.

It is difficult to be categorical about the underlying trigger for the recent swings in financial markets. But the predominant





Chart 10 Common component in asset prices^(a)



Sources: Bloomberg and Bank calculations

(a) Proportion of variation in global equities, emerging market equities, commodities and ten-year US Treasury yields explained by a common component over a one-month rolling window.

views among market contacts suggest a combination of three broad inter-related factors: higher official interest rates, concerns about the outlook for inflation and/or growth, and some repricing of risk.

Further increases in official interest rates

A widely cited influence was the continued withdrawal of monetary accommodation globally, which may have been buoying up asset markets (Chart 11).⁽²⁾ Sixteen of the 19 OECD central banks have increased official interest rates since late May.

In Japan, the ending of the zero interest rate policy resulted in a sharp fall in the level of current account deposits held by

⁽¹⁾ Principal component analysis is a statistical technique that can be used to simplify correlation matrices so that only the most important sources of information are retained. For an introduction, see Jackson, J (1991), A users guide to principal components, John Wiley & Sons.

⁽²⁾ See box in February 2006 *Inflation Report* for a description of how excess global liquidity might stimulate demand for financial assets.





⁽a) The series for both the OECD and G7 are weighted averages of official interest rates The weights reflect the relative size of each economy in the two country groupings, based on nominal GDP levels in US dollars for 2005.

commercial banks at the Bank of Japan. Some commentators argued that this was a catalyst for asset price corrections as so-called 'carry trades', involving borrowing in yen at a zero interest rate to invest in other assets, were unwound. More recently, anecdotal evidence suggests that many 'carry trade' positions may have been re-established, perhaps reflecting revisions to market participants' expectations about the pace of future policy tightening in Japan.

More generally, the increases in international official interest rates have raised the cost of very short-term borrowing. However, it is more difficult to measure the amount of global liquidity and different measures give conflicting signals. In some economies there are signs of a slowing in aggregate money growth, but not universally; and many companies and institutional investors around the world have maintained large liquid asset holdings.

Investor concerns about global inflation and/or growth

A number of commentators have highlighted the recent pickup in consumer price inflation in many countries, which at least partly reflected the pass-through of high energy and other commodity prices. Consistent with higher inflation expectations and/or inflation risk premia, short-term inflation rates implied by the difference between yields on conventional and index-linked government debt have risen since the start of the year (Chart 12).

It is possible that higher energy prices and the associated inflationary pressures have led market participants to revise their global growth expectations downwards, reflecting a perceived reduction in potential aggregate supply capacity and/or the expected policy response from central banks. In broad terms, some market contacts commented that concerns about the macroeconomic outlook had increased over the past six months. Heightened geopolitical tensions, the possibility of a slowdown in US consumer demand and the potential for Chart 12 International two-year inflation forward rates^(a)



(a) Instantaneous forward rates. Dollar rates derived from the Bank's government liability curve. Sterling and euro rates derived from inflation swaps rates. Dollar rates are based on a 2¹/₂-year forward rate. Sterling rates referenced to RPI, dollar rates referenced to CPI and euro-area rates referenced to HICP.





Source: Consensus Economics

an unwinding of global imbalances were other factors mentioned by contacts. And while recent indicators of economic activity have so far remained robust, Consensus forecasts for GDP growth in 2007 have edged lower for some economies (Chart 13).

Short-term implied *real* interest rates provide a read on market expectations of future central bank policy. These rose steadily earlier in the year, but drifted slightly lower from around the beginning of July (**Chart 14**). This may have reflected downward revisions to expectations about future official rates in the face of a possible perceived weakening in future economic growth.

At longer horizons, real forward rates also fell over recent months, partly reversing some of the increases earlier in the year (Chart 15). As highlighted in the previous *Bulletin*, movements in nominal short-term and long-term real interest rates have been highly correlated over the past few years. So market participants could have edged down their expectations





(a) Instantaneous forward rates. Real component of euro and sterling rates implied by nominal government bond yields less inflation swap rates. Dollar real rates derived from the Bank's government liability curves. Dollar rates are based on a 2¹/z-year forward rate. Rates may not be directly comparable — sterling rates referenced to RPI, dollar rates referenced to CPI and euro-area rates to HICP.

Chart 15 International ten-year real forward rates^(a)



⁽a) Real component of euro rates implied by nominal government bond yields less inflation swap rates. Sterling and dollar instantaneous forward rates derived from the Bank's government liability curves. Dollar rates are nine-year forward rates. Rates may not be directly comparable — sterling rates referenced to RPI, dollar rates referenced to CPI and euro-area rates to HICP.

of long-run equilibrium real rates based on recent developments in short-term rates.

The falls in long-horizon real forward rates could have reflected a shift in the balance of expected future savings and investment. Perhaps related to this, market contacts have continued to cite demand from institutional investors (such as pension funds) seeking to increase the duration of their assets as an influence on long bond yields. In addition, market contacts have highlighted renewed interest from Asian investors, particularly central banks, in buying longer-dated government bonds, after a period when their new investments were reportedly concentrated at short maturities.

Another possible explanation for lower long-horizon real interest rates is that real term premia — ie compensation for uncertainty about future short-term real rates — have changed.⁽¹⁾ Information from long-dated swaptions suggests





that investors' perceptions of uncertainty surrounding long-term interest rates has not changed markedly (Chart 16). However, discussions with market contacts suggest, if anything, they have become more uncertain about the global macroeconomic outlook over the past few months.

Repricing of risk

Related to this, one widely held view is that the rise in financial market volatility during May and June was prompted by an increase in the risk premia required on more speculative assets. For example, recent changes in market interest rates and survey data on earnings expectations would, other things being equal, have been expected to boost equity prices. So the observed fall in equity prices since the beginning of May implies a large unexplained residual component, which in turn might have reflected an increase in the equity risk premium (Chart 17).

However, any reduction in investors' desire for risk exposure seems to have been relatively modest and most concentrated among more highly leveraged investors. Proxy measures of aggregate risk appetite have fallen over recent months but they remained relatively high (Chart 18). The period of elevated market volatility was brief. And throughout, credit spreads remained relatively narrow and quite close to historical lows, even for low-rated debt, while flows into hedge funds increased further in 2006 Q2 (Chart 19). Taken together, these indicators tend to suggest that there has not been a widespread repricing of risk.

That also seems to accord with the views of market contacts, who have suggested that the increase in volatility in capital markets in May and June led some short-term leveraged investors to cut their risk positions. This was especially true of

For more discussion of real term premia on government bonds see box on 'Real interest rates and macroeconomic volatility', Autumn 2005 Bulletin, pages 308–09.



Chart 17 Decomposition of changes in equity prices^(a)



Chart 18 Proxy measures of risk appetite



Sources: Chicago Board Options Exchange, Credit Suisse, Merrill Lynch and Bank calculations.

- (a) Principal component analysis was applied to twelve-month rolling moving averages of the three individual measures of risk appetite. The blue line shows the first principal component. Qualitatively similar results were found when a wider set of risk appetite proxy measures was used, but these series were only available for shorter time periods.
- (b) The VIX is an index of volatility in the S&P 500 implied from options prices. On the chart it is inverted.

their investments in EME markets, where the unwinding of carry trades may have accentuated the asset price falls. And flows into EME mutual funds — both debt and equity — fell sharply in Q2.

The apparent lack of a repricing of risk in credit markets may be consistent with corporate credit market indicators suggesting few obvious signs of distress. In particular, the global default rate on sub-investment grade corporate bonds has increased only marginally since May, and remained close to its lowest level since April 1997. Furthermore, forecasts by Moody's indicated that global default rates were expected to remain low for the next twelve months (Chart 20).



Chart 20 Corporate bond default rates(a)



Source: Moody's Investors Service.

(a) Trailing twelve-month issuer default rates.

(b) August 2006 forecast for default rates.

The low level of expected default rates may provide one explanation for the muted impact of greater volatility in financial markets on companies' credit spreads. This is explored in more detail in the box on pages 276–77.

Spreads on household sector debt also changed little. In the United Kingdom, there was a small increase in spreads on the lower-rated tranches of some UK credit card asset-backed securities (ABS). That coincided with reports about high overall debt levels of UK consumers, increased personal insolvencies and slightly higher reported loan-loss provisions by some major UK banks. However, spreads on credit card ABS remained close to their historical lows. And spreads on residential mortgage-backed securities (RMBS) have generally remained narrow.

In the United States, any widening in spreads on home equity loan (HEL) ABS was also small, despite some recent signs of a possible slowdown in the US housing market and some increases in arrears on mortgage repayments.

Analysing recent moves in credit spreads using a Merton model

Equity market volatility rose sharply in May and June after a sustained period of low volatility. But there was a relatively muted reaction in credit spread indices (**Charts A** and **B**).





Chart B Spreads on investment-grade corporate bond indices^(a)



⁽a) Option-adjusted spreads.

At face value, the relatively small movement in credit spreads given the size of the increase in equity volatility might seem surprising. In principle, if the rise in equity volatility reflected increased uncertainty surrounding firms' expected earnings, it should have led to a widening in the spread paid over the government's borrowing rate, reflecting an increased likelihood of firms being unable to repay debt.

A commonly used theoretical model of the relationship between the value of a firm's debt and equity is the Merton model.⁽¹⁾ This assumes that the underlying value of a firm is made up of debt and equity. The firm's value is assumed to follow a stochastic process, as shown in **Figure 1**. If, when the debt matures, the firm's value is greater than the face value of its debt, then the bondholder is paid in full and the equity holder receives the remaining value of the firm's assets. By contrast, if the value of the firm is less than the face value of its debt, then the firm defaults and the remaining assets are passed to the bondholder (the equity holder receives nothing).





In the Merton framework, equity can be thought of as a call option on the value of the firm, with a strike price equal to the face value of its debt. Similarly, the debt provides the same pay-off as buying a risk-free bond and selling a put option on the firm value. As a consequence, debt can be priced using observed equity values and standard option-pricing formulae.⁽²⁾ In turn, implied credit spreads can be derived.

The standard Merton model assumes that the volatility of a firm's value is constant. By varying the assumed level of volatility (for a given leverage), it is possible to consider the relationship between the volatility of a firm's value and its implied credit spread. Moreover, by deriving the model-implied relationship between the volatility of a firm's assets and the volatility of its equity, the relationship between credit spreads and equity volatility can be uncovered.

Chart C shows the result of such an exercise for three different leverage levels. In general, higher leverage is associated with a higher spread for a given equity volatility.⁽³⁾ But even for firms with high leverage, when the level of equity volatility is low (below 20%, say) significant changes in volatility have very little impact on spreads.

Given the initially low level of equity volatility and typically healthy corporate balance sheets in early May, the Merton model would have predicted only a small reaction in credit **Chart C** Credit spreads implied by the Merton model for different levels of equity volatility^(a)



Source: Bank calculations.

(a) Values in brackets represent leverage ratios, ie the ratio of the present value of debt (discounted at the risk-free rate) to the value of the firm.

spreads following a permanent rise in implied equity volatility, and a fall in equity prices, of the magnitudes observed. Indeed, from trough to peak, the small observed widening in international credit spreads was actually *greater* than that suggested by the model (**Table 1**).

Table 1

	Change in implied volatility (percentage points)	Changes in spreads (basis points)	Change in implied Merton spreads (basis points)
United Kingdom United States	+8 +7	+5 +9	+3 +1
Euro area	+9	+6	+1

Changes are maximum changes between 11 May and 14 June 2006.

The initial leverage ratios used are 0.35, 0.40 and 0.45 for the United Kingdom, euro area and the United States respectively. Although such ratios are difficult to measure precisely, these values are estimates based on available capital gearing data (to 2006 Q1 for the United Kingdom and the United States, 2005 Q4 for the euro area).

The maturity values of debt used are in line with those of the Merrill Lynch investment-grade indices: 12.7, 9.5 and 5.8 years for the United Kingdom, United States and euro area respectively.

The simple model outlined above may be insufficient to capture the complex relationship between debt and equity. But fully calibrated richer Merton-type models yield similar conclusions. For example, the model of Tudela and Young (2003),⁽⁴⁾ which allows for early default, produces qualitatively similar results. It suggests that credit spreads on a typical UK corporate would have been predicted to increase by between 3 and 5 basis points following the recent pickup in equity volatility.

One caveat to these findings is that the composition and construction of credit and equity indices differ.⁽⁵⁾ For example, if the observed rise in equity index volatility predominantly reflected a rise in volatility of a few companies with very low

leverage but high market capitalisation, there would not be any direct link to major credit indices.

Moreover, the Merton approach may not adequately capture the dynamics of the credit market. A frequent criticism of the Merton model is that it typically predicts credit spreads that are lower than those observed. One alternative explanation for the resilience of credit markets, proposed by some market contacts, is that high demand for debt instruments from buy-and-hold investors (the so-called structured-credit bid) has helped to insulate credit markets from wider disturbances in financial markets.

Subject to these caveats, the analysis in this box suggests that, in the context of the Merton model, an increase in equity volatility from a low level is likely to have little impact on investors' perception of the firm's ability to repay its debt. This finding is broadly consistent with market moves in May and June. The result may be particularly plausible when the increase in volatility is broad-based, rather than company or sector specific, and aggregate company balance sheets are not highly leveraged. However, as the convex relationship in **Chart C** suggests, at higher levels of equity volatility the changes in credit spreads would become increasingly pronounced for similar percentage point changes in equity volatility.

(5) Equity indices are weighted by market capitalisation whereas bond spread indices are weighted by outstanding debt and credit derivative indices are equally weighted.

⁽¹⁾ See Merton, R C (1974), 'The pricing of corporate debt: the risk structure of interest rates', *Journal of Finance*, Vol. 29, No. 2, May, pages 449–70.

⁽²⁾ In particular, the Black-Scholes option-pricing formula can be used. For more detail, see Black, F and Scholes, M (1973), 'The pricing of options and corporate liabilities', *Journal of Political Economy*, Vol. 81, pages 637–59.

⁽³⁾ For very highly leveraged firms (eg where debt is 90% of overall firm value or more) this relationship may not hold. As debt levels become very high, the increased likelihood of default is offset by low firm-value volatility. Credit spreads are, however, always increasing in firm-value volatility.

^{(4) &#}x27;A Merton-model approach to assessing the default risk of UK public companies', Bank of England Working Paper no. 194.

Recent trends in investors' asset allocations

Notwithstanding the partial recovery in major asset markets, many asset managers have suggested that the relatively high level of returns on traditional risky assets over the past few years is unlikely to continue. This has encouraged continued interest in so-called 'alternative' asset classes in the pursuit of higher returns and/or increased diversification. Survey data suggest that investment in such asset classes has increased over recent years (Chart 21). In particular, hedge funds have become a more important element in the asset portfolios of pension funds and life insurance companies. Arguably, hedge funds are not an independent asset class since the funds invest in other assets. Instead, benefits to investors depend on the ability of hedge fund managers to employ dynamic investment strategies and/or to use derivatives to short-sell assets and increase leverage. Academic studies on hedge fund performance suggest that the inclusion of such funds in a balanced investment portfolio can potentially reduce portfolio risk and enhance overall returns, although different studies have not always produced consistent results.⁽¹⁾





Source: Russell Investment Group

However, unlike traditional asset classes, the development of reliable models of hedge fund returns, which are an important element in assessing optimal portfolios, has proved difficult for investors. Hedge fund strategies, which sometimes employ a multitude of complex products, are difficult to capture using standard finance models. Moreover, the absence of a sufficiently long historical record of actual returns, and how these were achieved, further complicates modelling long-term risk and return parameters.

Recent events have also shown that investing in hedge funds may not always provide the assumed diversification benefits. Many funds reported significant losses in May and continued to lose money in June. And the correlation of hedge fund index returns with returns on equities and commodities would appear to have increased in 2006 compared with 2005 (Chart 22).





Sources: Bloomberg and Credit Suisse Tremont

(a) Morgan Stanley Capital International global equity index

(b) Merrill Lynch Global Broad Market Corporate Index, total return index in

common currency. (c) JPMorgan Chase Government Bond Index (Global), total return hedged in

on currer (d) Goldman Sachs Commodity Index (total return).

Contacts have also reported institutional investors increasing asset allocations toward investments such as private equity, emerging markets and commodities. And a number of large UK pension schemes have announced their intentions to invest a larger proportion of their funds in commodities. In part, this move may be motivated by a desire to increase diversification and/or to provide a hedge against inflation. Historically, on average over long periods, returns from commodities investments have tended to be positively correlated with inflation and negatively correlated with equity and bond returns (Table A).

Table A Correlation of commodity futures returns^(a) with equity returns, government bond returns and inflation (1973–2006)

	Equities ^(b)	Bonds ^(c)	Inflation ^(d)
Monthly	0.00	-0.13	0.12
Quarterly	-0.17	-0.30	0.25
One-year	-0.17	-0.59	0.22

Sources: Bloomberg, Thomson Financial Datastream and Bank calculations

(a) Reuters Jefferies-Commodity Research Bureau index

(b) Returns on S&P 500 index

(d) US CPI inflation.
 (d) US CPI inflation.

But events in May and June showed that returns from commodities do not always covary negatively with other assets, so the desired diversification gains may not always be realised. Furthermore, investors with equity market exposure

⁽¹⁾ For example, Martellini, L and Ziemann, V (2005), 'The benefits of hedge funds in asset liability management', EDHEC Risk and Asset Management Research Centre publication, September, found that hedge funds' ability to diversify traditional asset portfolios both in terms of a reduction in the variance of the distribution of portfolio returns as well as its kurtosis is robust. But the benefits in terms of increased expected returns and skewness are less stable through time. In contrast, Amin, G and Kat, H (2002), 'Diversification and yield enhancement', Alternative Investment Research Centre Working Paper no. 0008 showed that the inclusion of hedge funds may significantly improve a portfolio's mean-variance characteristics, but it can also be expected to lead to significantly lower skewness as well as higher kurtosis.

may already have significant indirect exposure to commodities through holdings of shares in oil and mining companies (either directly or via equity indices). In turn, this could dilute any potential diversification benefits. And, as explained in the box on pages 280–81, some market contacts have noted that the recent increase in institutional investment in commodities may itself have bid up prices, lowering expected future returns.

Market participants have increasingly reported interest in pension fund strategies that invest passively a large proportion of assets in some benchmark portfolio while actively investing the remainder in a wide range of less conventional assets to provide additional returns (the so-called 'alpha'). Contacts differ in their views about the size of these flows, although it is reported that funds with the largest deficits have the most aggressive targets for generating additional excess returns (up to 250 basis points above their benchmark).

This type of investment strategy may have stimulated growth in benchmark products, in particular the development of vehicles such as exchange-traded funds (ETFs). A recent innovation is the development of exchange-traded notes (ETNs), which offer exposure to an asset usually by tracking a particular price index. For example, ETNs that track two popular commodity indices (the Goldman Sachs Commodity Index and Dow Jones-AIG commodity index) were introduced in June.

In addition to investments in commodities and hedge funds, institutional demand for exposure to credit has also remained robust, including through investments in collateralised debt obligations (CDOs). Spreads on tranches of CDOs and tradable CDS indices generally narrowed further. This in turn may have prompted some speculative investors to move into longer maturity investments, which typically have higher yields. In particular, trading activity in seven to ten-year CDS index tranches reportedly picked up. And trading in first-loss (or equity) tranches of CDOs also reportedly increased, as investors were attracted to relatively new products that package the risk as a zero-coupon bond.⁽¹⁾

Issuance of CDOs has also increased further over recent months. The majority continued to be backed by leveraged loans and structured-finance or asset-backed securities (ABS), although there are signs that a greater array of underlying assets are being employed (Chart 23).

Credit market demand, product innovation and search for yield

Continued high demand for structured credit products backed by loans has been a key factor supporting growth in leveraged lending to finance leveraged buyouts (LBOs) of companies. Issuance of LBO leveraged loans has continued to increase strongly. Global issuance in 2006 H1 was over \$200 billion, compared with less than \$150 billion in each half of 2005

Chart 23 Global CDO issuance by collateral type^(a)



(a) Cash flow/hybrid arbitrage CDOs(b) Year to August.

(Chart 24). Leverage multiples on deals rose further in a number of markets, with some contacts noting that arranging banks were competing on the basis of these multiples. Recent market conditions also reportedly supported raising funds through a variety of debt instruments, including mezzanine debt, second lien (ie subordinated) loans and payment in kind (PIK) notes.⁽²⁾

Chart 24 LBO loan issuance



Source: Dealogic

Likewise, demand for ABS assets to structure CDOs backed by them may have contributed to rapid growth in the underlying ABS markets: in the United States, the ABS market (excluding CDOs) totalled over \$1.6 trillion at the end of June. Strong growth also continued in Europe, particularly in the issuance of securities backed by residential and commercial mortgages

⁽¹⁾ In these so-called 'zero-coupon' equity products, the initial investment is deeply discounted, and at maturity the investor receives par minus any default losses affecting the underlying assets of the bespoke CDO or index. The attraction for investors appears to be the simplicity of the format and potentially high returns.

⁽²⁾ A PIK security gives the issuer the option of paying investors in similar securities instead of paying interest coupons. They are generally issued by companies who value the option of conserving cash.

Investing in commodity futures

One way for investors to gain exposure to commodities without taking physical delivery is to invest in commodity futures. These are standardised contracts, traded on a futures exchange, to buy or sell some fixed amount of a commodity at a certain date in the future, at a pre-set price. Investors can purchase individual futures contracts directly or they can invest in products linked to commodity indices, the providers of which themselves tend to invest in commodity futures.⁽¹⁾

Some market contacts have suggested that the recent increase in investment in commodity markets by long-term institutions such as pension funds may have contributed to changes in the shapes of futures curves. In order to understand how this might occur, it is helpful to review the theory behind commodity futures.

Understanding futures curves

The simplest theories of the futures curve suggest that commodity prices should be expected to rise over investment horizons to reflect the 'carry costs' (which include interest foregone, insurance and storage costs) involved with selling a commodity at a pre-agreed price at a future date. The existence of such carry costs means that the shape of a commodity futures curve might be expected to be upward sloping, a situation known as contango.

However, futures curves can also be downward sloping or 'backwardated'. Several theories exist to explain this. One possible explanation is that backwardation occurs due to the demand for immediate supply of the commodity. Consumers are willing to pay a premium for the physical good rather than the contract. This is typically referred to as a 'convenience yield'.

Commodities can, generally, be separated into three distinctive groups according to their convenience yield. The first group — energy and industrial metals — tend to have long supply lags and are therefore subject to supply constraints. For this reason they typically tend to be in backwardation. The second group has large above-ground stocks such as gold and some other precious metals, while the third group is agricultural commodities, where supply-side responses are relatively quick to correct market imbalances. As a result, demand constraints are likely to be less for the latter two types of commodity and thus backwardations tend to be much rarer.

Keynes⁽²⁾ rationalised the existence of a convenience yield as the premium required by 'speculators' to compensate them for the risk of future price fluctuations. Specifically, speculators in commodity markets provide insurance to commodity producers who want to hedge their exposure and the convenience yield serves as compensation for this service. When overall hedging demand is net short (ie there is greater demand from producers to hedge than available supply from investors), this premium takes the form of a futures price that is below the expected future spot price.⁽³⁾

In summary, the futures price (F_t) should be a function of the current spot price (S_0) and the carry (interest foregone (r) plus insurance costs (μ) plus storage costs (ψ)) net of any convenience yield (cy). That is:

$$F_t = S_0 \cdot e^{(r_f + \mu + \psi - cy)T}$$
⁽¹⁾

Assuming markets are efficient, the spot price should reflect all available information. Therefore futures prices at different horizons should only move differently from the spot price to the extent that demand and supply conditions in commodity markets impact on the cost of carry or the convenience yield.

Interpreting recent developments in futures curve

Cast in this theoretical framework, the recent reported increase in demand for commodity exposure could potentially have altered the dynamics of futures pricing. In particular, the increased institutional investment may have reduced the compensation required for bearing commodity price risk. In so doing, it may have contributed to the moves towards contango/less backwardation in a number of commodity markets (Chart A). Put another way, if the number of investors ready to bear commodity price risk has increased significantly, the futures risk premium may have fallen (ie convenience yields may have been reduced).



(a) Solid lines refer to prices from futures curves on 1 September 2006 with prices indexed

to the front contract (ie the futures contract that is nearest to expiry). Dotted lines indicate similarly constructed futures curves on 3 January 2006.

Investors tracking commodity indices typically roll underlying futures contracts as they approach their delivery date (ie they sell the contract that is included in the index as it nears expiry and buy a contract with the same characteristic but with a longer expiration data). Some commentators have argued that the scale of demand relative to supply (according to some estimates around \$100 billion may have been invested in funds tracking the main commodity indices, up from less than \$20 billion three years ago) has amplified the effect of rolling, which puts downward pressure on the price of 'front-month' contracts (ie those nearest to expiry) and upward pressure on the later contracts. This might explain why the futures curves have tended to be most affected at short horizons where rolling is most active.

However, there may be other explanations behind the recent developments in commodity futures prices that are unrelated to increased institutional investment and reflect market-specific factors. For example, some market contacts have suggested the moves toward contango in oil can be attributed to change in inventory levels. And **Chart B** shows that there may indeed be a negative relationship between the slope of the oil futures curve and US crude oil inventories.

The increase in oil inventories could have reduced the uncertainty about future price fluctuations as there is more physical supply to meet immediate demand. In turn, this could have led to falls in the premia that investors demand as insurance against future price changes (ie lower convenience yields). This would be consistent with falls in implied volatility of oil prices over the past year (Chart C).

Chart B Oil inventory levels versus slope of oil futures curve since 2004







⁽¹⁾ There are many commodities indices managed by different institutions including the Goldman Sachs Commodity Index (GSCI), Dow Jones-AIG commodity index and Reuters Jefferies-Commodity Research Bureau (RJ-CRB) index.

⁽²⁾ Keynes, J M (1930), 'A treatise on money', *The Applied Theory of Money*, Vol. 2.
(3) This is sometimes referred to as 'normal' backwardation. Generalising Keynes' insight,

⁽³⁾ This is sometimes referred to as 'normal' backwardation. Generalising Keynes' insight, Cootner, P H (1960), 'Returns to speculators: Telser vs. Keynes', *The Journal of Political Economy*, argued that the futures premium can be positive or negative depending on the sign of net demand for commodity price risk.



Chart 25 European ABS issuance by collateral type (excluding CDOs)

(Chart 25). ABS activity also picked up in non-core markets, such as Asia, Russia and South America. And there was a further increase in the variety of assets used to back such securities, such as social security payments, export credits and football stadium receipts.

Demand from asset managers to access a wider universe of assets has also fuelled the development of investment vehicles that offer a way into asset classes that would previously have been difficult for them to access. ETFs are one example, but there have also been a spate of launches of closed-end funds. These list on a stock exchange and invest their capital in a specific, often relatively illiquid, market such as private equity or real estate.

Market contacts have also reported a further broadening of the assets bought by structured investment vehicles (SIVs). SIVs are special-purpose companies that typically buy high-quality assets of longer maturities than their liabilities — mainly commercial paper or medium-term notes (MTNs) — thereby taking a view on the term structure of credit spreads, which is typically upward sloping. However, some SIVs have reportedly invested in non-investment grade securities, albeit with lower leverage. And SIV activity appears to have increased — issuance of MTNs in the eight months to August 2006 exceeded the total raised in the whole of 2005 (Chart 26).

Arguably, such innovations are further manifestations of the much-reported 'search for yield' and indeed, more generally, there are few signs that this has been significantly dented over recent months. As discussed in previous editions of the *Bulletin* and *Financial Stability Report*, the fact that markets have coped with a succession of potentially destabilising events — for example, the credit market 'wobble' in May 2005, the gradual removal of global monetary accommodation over the past two years and most recently the temporary spike up





(a) Year to August.

in asset price volatility — could suggest that the continued low level of risk premia in recent years is based on underlying fundamentals. In addition to continued macroeconomic stability, it is possible that financial product innovation and the widening of the investor base in some markets may have facilitated greater dispersion and diversification of risk and thereby contributed to greater financial market stability.

As some contacts have pointed out, there are, however, risks to this scenario. The nature and/or size of the recent disturbances may not have provided a sufficiently rigorous test of complex financial markets that have grown rapidly over recent years. And the macroeconomic environment has so far remained relatively benign. In particular, there have been few credit defaults. This may have led market participants to underestimate the potential for macroeconomic volatility going forward, perhaps because they have placed too much faith in the ability of policymakers to offset adverse shocks to the macroeconomy.

Developments in market structure

CREST settlement moves to Euroclear's Single Settlement Engine and delivery-by-value (DBV) transactions on CREST

Major aspects of settlement for UK and Irish securities in CREST moved to Euroclear's Single Settlement Engine (SSE) from 28 August. That followed the implementation of the SSE by Euroclear France on 29 May as a step towards Euroclear's objective to consolidate the Belgian, French, Dutch, UK and Irish Central Securities Depositories, and Euroclear Bank onto a single platform.

In the days following the transfer, communication issues between CREST and the SSE caused UK settlement to be completed later than scheduled. In particular, the settlement of delivery-by-value (DBV) transactions at the end of the day was affected. There were consequent extensions to CHAPS settlement and to the availability of the Bank's standing facilities (the standing facilities are a key element of the Bank's new framework for its operations in the sterling money markets, as discussed in the next section). Over a ten-day period, CRESTCo progressively improved the settlement timetable and restored it to normal.

DBVs are overnight collateral deliveries in CREST used to settle repos and securities loans where the intention is to deliver a basket of collateral rather than specific securities. The function allows those delivering collateral to specify the value to be delivered rather than specific securities. The CREST system then picks suitable securities from their account for delivery according to a predetermined algorithm.

Very large values (around £120 billion) of transactions settle via DBV each day, including a significant proportion of the Bank's repos against gilt collateral in its open market operations. Since DBV is a mechanism for overnight deliveries of collateral, term transactions (ie trades for longer maturities) are conducted as a series of forward-starting DBVs, which unwind every morning and are reinstated at the close each day. Term transactions processed in this manner increase the demand for intraday financing from both the settlement banks and the Bank, and generate operational risk from the need to reinstate the DBVs each day.

The possibility of developing a 'term DBV' facility for the UK market has been raised in the context of Euroclear's consultation on securities financing on the Single Platform. Using such a facility, DBV transactions could be kept intact during the day for term trades. The Bank is in favour of developing such a product, given the potential benefits to CREST's users and their settlement banks and indirect benefits arising from a potential reduction in risks to financial stability.

LCH plans for netting of gilt DBV repos

Use of CREST's DBV facility for settlement of gilt repo transactions may increase following LCH.Clearnet's planned extension of its gilt repo clearing service to gilt DBVs from 23 October. (Testing is scheduled to begin in September.) LCH.Clearnet's plans have been discussed at the Bank's sterling Money Market Liaison Group (MMLG) and Securities Lending and Repo Committee (SLRC) and market contacts have said it should improve liquidity in the gilt repo market at longer maturities, particularly if it facilitates netting of transactions for balance sheet reporting purposes.

Removal of Government Sponsored Enterprise daylight overdraft facility in the United States

There was also an important change in the US dollar payments systems during the review period. On 20 July, the Federal Reserve Bank of New York (FRBNY) ended the free daylight overdraft facilities previously offered to the US Government Sponsored Enterprises (GSEs), such as Fannie Mae and Freddie Mac. The GSEs had used the facilities to cover intraday mismatches between the payment of liabilities early in the day and the receipt of income from assets later in the day. On days when the GSEs made payments of interest and principal on mortgage-backed securities, these overdrafts would be very large (up to \$80 billion).

The changes had previously been announced by the FRBNY in September 2004. Market contacts suggest that the change passed off smoothly with little market impact and there have been no reported difficulties during the high-volume payment days since the change.

In the sterling and euro high-value payments systems — CHAPS and TARGET — there are no intraday overdrafts of the type used in the US system (Fedwire). Instead, liquidity is provided to settlement banks within these payments systems against collateral.

Leveraged loan credit default swaps

An important development in the infrastructure supporting the credit markets has been the adoption in June 2006 of standard documentation, jointly developed by the International Swaps and Derivatives Association and the Loan Syndications and Trading Association, for credit default swaps on US leveraged loans. The European market is fine-tuning its documentation, which differs from the US model. For example, in Europe leveraged loan credit default swaps (LCDS) cancel if the underlying loan is repaid, whereas US LCDS cancel only if there are no remaining loans outstanding at the same lien (ie loans at a similar level of subordination).

LCDS were first traded about a year ago, and the market has grown to around €2.5 billion in Europe and \$5 billion in the United States according to studies carried out by investment banks. Market participants suggest that an obstacle to further growth is the current imbalance between buyers and sellers (more demand to sell protection, especially from hedge funds). But liquidity may increase when two European LCDS indices are introduced by iTraxx, with a US index to follow later in the year.

Bank of England official operations⁽¹⁾

The Bank's management of its balance sheet is directed to policy purposes. Changes in the Bank's assets and liabilities are related to the implementation of monetary policy through establishing the official Bank rate in the money markets; management of foreign exchange reserves; provision of banking services to other central banks; and management of

⁽¹⁾ This section reviews the three maintenance periods from 18 May to 2 August.

the Bank's free capital and cash ratio deposits from financial institutions.

Monetary policy implementation

The introduction of the reserves scheme on 18 May, before the start of the review period, significantly increased the size of the Bank's balance sheet. However, its largest liability has remained the value of banknotes in circulation. Over the review period, the value of banknotes issued rose slightly, in line with its recent trend (Table B). Despite this, the overall size of the Bank's balance sheet fell, reflecting a reduction in banks' and building societies' choice of target reserve balances. The 41 reserves scheme members chose to target around £23 billion in the first maintenance period. This had been reduced to a target of £18 billion by the third maintenance period. Some banks held a higher level of reserves immediately following the launch of the new framework for precautionary reasons. But following a smooth transition and the experience of full maintenance periods, some opted to reduce targets, motivated also by the cost of financing reserves and the yields available on other liquid sterling assets.

The Bank's reserves averaging scheme is intended to smooth short-term interest rate volatility during the monthly maintenance periods such that overnight market interest rates are in line with the official Bank rate. Since the launch of the new framework, overnight unsecured interest rates have generally been close to the official Bank rate (Chart 27). The distribution of the spread between the sterling unsecured overnight interest rate and the official Bank rate narrowed (Chart 28), and day-to-day volatility of sterling overnight rates compared favourably with that of overnight rates in other currencies (Chart 29).

A small positive spread between the official Bank rate and unsecured interbank rates is to be expected, reflecting a premium for credit risk and the cost to the Bank's counterparties of obtaining collateral eligible for use in the Bank's short-term repo OMOs. But there were two noticeable

Chart 27 Spread of sterling unsecured market interest rates to official Bank rate



(a) Sterling overnight index average

outliers on the final working days in June and July (Chart 27). Market contacts suggested that the spike at the end of June reflected a reduced willingness to lend unsecured to other banks at the half-year end, which put upward pressure on unsecured market interest rates. Some banks appear to have put limits on interbank lending in order to reduce the size of their risk-weighted assets reported to regulators and published at the half-year end. It is easier for banks to reduce short-term interbank lending temporarily than other types of lending.

Secured overnight interest rates were also close to the official Bank rate and the vast majority of trades were executed within a few basis points of it (Chart 30). But, as with unsecured rates, there were one or two outliers, notably on 31 July. As explained in the box on page 286, this reflected a sharp fall in overnight secured rates on that day.

The effectiveness of the reserves scheme in keeping market rates in line with the official Bank rate depends on the willingness of reserve scheme members to vary their reserves balances actively in response to changes in market interest rates.

£ billions					
Liabilities	2 Aug.	18 May	Assets	2 Aug.	18 May
Banknote issue	39	38	Short-term sterling reverse repo	34	36
Reserve account balances	21	25	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	9	Standing facility assets	0	0
Foreign currency denominated liabilities	12	14	Other sterling-denominated assets	5	4
			Foreign currency denominated assets	15	18
Total ^(c)	82	86	Total ^(c)	82	86

(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: 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.

Chart 28 Cumulative folded distribution^(a) of spread of sterling unsecured overnight interest rate to official Bank rate (trade weighted)



(a) The cumulative distribution function shows the percentage of trades executed at or below a given spread to the official Bank 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.

Chart 29 Spread of unsecured market interest rates to official rates^(a)



Sources: Bloomberg and Bank calculations

(a) Overnight interest rates are SONIA for sterling, the Fed funds rate for US dollar and EONIA for euro.

One indication of the degree to which a bank is managing its reserves is the difference between its actual reserves balance at the end of each day and the average balance it would have needed to hold for the remainder of the maintenance period in order to hit its target exactly. **Chart 31** shows the sum of (the absolute value of) this difference across all reserves scheme members; a higher value indicates more active reserves management. It suggests significant variation in reserve balances across the system as a whole, although willingness to move actual reserves away from target differs considerably across banks.

Chart 30 Cumulative folded distribution^(a) of spread of sterling secured overnight interest rate to official Bank rate (trade weighted)



20 February – 17 May 2006
 Review period for Spring 2006 Quarterly Bulletin

- Review period for spring 2000 Quarterly Bullet



Source: BrokerTec

(a) The cumulative distribution function shows the percentage of trades executed at or below a given spread to the official Bank 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.

To enable reserves scheme members to meet their chosen targets during each maintenance period, the Bank aims to provide through its open market operations (OMOs) the exact amount of reserves needed by the system as a whole. Reflecting lower aggregate targets in the second and third maintenance periods, the size of the weekly short-term OMOs was lower than in the first maintenance period (**Chart 32**). Cover (ratio of bids to amount to be supplied) on short-term OMOs increased steadily through the first six weeks, but edged back ahead of the half-year end and has been more stable since.





(a) The line indicates the extent to which reserve scheme members were actively managing their reserve accounts. For each day, it sums the absolute difference between each member's observed balance and the average balance it would have needed to hold in order to hit its reserve target. Higher values suggest a greater degree of active reserves management.

(b) Sterling overnight index average

Idiosyncratic volatility in the overnight gilt repo market

On 31 July, overnight gilt repo rates (for repos against a basket of gilts) fell to very low levels, apparently reflecting a generalised scarcity of gilts in the overnight repo market. This very sharp fall in secured rates caused spreads between secured and unsecured rates to widen significantly (**Chart A**). According to market contacts, some repo trades failed to settle because counterparties were unable to obtain the necessary gilts. While the value of gilt collateral will vary over time reflecting, for example, changes in the total value of gilts outstanding, such excessive day-to-day volatility is undesirable and inconsistent with the Bank's objectives for its money market operations.

Spikes in the overnight secured-unsecured spread have occurred before and rarely persist for more than one day. Contacts suggest that, in general, shortages of gilts in the market occur largely without warning, although they have been more common around quarter and half-year ends because of the decrease in the flow of gilts into the repo market via securities lending, associated with a reduction in intermediaries' holdings of bank certificates of deposits (CDs). CDs are used extensively to collateralise loans of gilts made by long-term owners (such as pension funds and life insurance companies). Some banks and dealers seek to reduce CD holdings at year ends and half-year ends in order to lower their risk-weighted assets for regulatory reporting purposes or to reduce the size of their published balance sheets.

The fall in gilt repo rates on 31 July was more puzzling because it did not occur at a quarter-end. Market participants have suggested a number of possible alternative explanations. These include the use of gilts to collateralise borrowing of equities; a higher-than-expected allotment ratio in the Bank's routine weekly one-week repo OMO on the previous Thursday, leaving some counterparties needing to borrow collateral unexpectedly in the market; and month-end restrictions on the market activities of some banks. But none of these explanations is especially compelling — each has occurred at other times without leading to a scarcity of gilts in the overnight repo market.

One option available to the Bank's counterparties in response to a shortage of gilts in the overnight gilt repo market is to substitute euro-denominated government bonds for gilt collateral in any outstanding repos with the Bank. Until now, the Bank has generally permitted such collateral substitutions provided it was informed before 9.30 am.⁽¹⁾ Partly to facilitate the release of gilts into the repo market in the event of any future shortages of collateral, the Bank is intending to make changes to its operational timetable in order to allow for later substitutions of euro-denominated collateral for gilts.

Another option available to repo market participants is to put in place arrangements with securities lenders to borrow gilts for same-day settlement against other collateral types. This is because banks, in aggregate, borrow gilts rather than own them outright so that the great majority of gilts enter the repo market through the securities lending market. Contacts say that the cut-off times for same-day settlement of gilt loans vary across lenders and depend on the collateral used. The Bank is holding meetings with gilt repo and securities lending market participants to understand better what happened on 31 July and what steps can be taken to prevent a repeat. The issues will also be discussed at the Bank's sterling Money Market Liaison Group (MMLG) and Securities Lending and Repo Committee (SLRC).





 The Bank does not accept substitutions on days when it is conducting a weekly short-term repo OMO.

Chart 32 Liquidity provided in weekly operations and cover ratio



The size of each weekly OMO also varies to offset weekly changes in sterling flows across the Bank's balance sheet (such as deposits or withdrawals from customer accounts). Changes in these so-called 'autonomous factors' also feed into the Bank's routine fine-tuning OMO on the final day of each maintenance period, which ensures that the banking system's net need for central bank money is provided as precisely as possible.

Two fine-tuning OMOs were conducted over the review period (if forecasting errors are negligible, no operation is needed). The first, on 7 June, was to reduce reserves by £560 million but no offers of funds were received from counterparties. The second, on 2 August, supplied reserves of £730 million and was more than fully covered. The size of both fine-tunes was small in relation to aggregate, cumulative reserve target ranges.⁽¹⁾ As a consequence, reserves holders, in aggregate, ended each maintenance period well within the cumulative target range even though one of the fine-tunes was not allotted. There were no instances of a reserves scheme member ending a maintenance period outside its target range and only very limited use of the standing facilities.

The Bank introduced long-term repo OMOs in January as part of the reforms to its operations in the sterling money market. Without longer-term lending, the entire stock of financing would be rolled over in the Bank's weekly short-term OMOs. Over the review period, the Bank's long-term OMOs were fully covered and yield 'tails' were small (**Table C**). As a further step towards more efficient asset and liability management, the Bank has announced that it intends to provide longer-term finance to the banking system via outright purchases of gilts and high-quality foreign currency government bonds (with the cash flows swapped into fixed-rate sterling). More detail is provided in the box on page 288.

The introduction of the reserves scheme significantly increased the amount of funds the Bank provided to the market via its

Table C Long-term repo operations

	Three month	Six month	Nine month	Twelve month	
20 June 2006					
On offer (£ millions)	1,900	750	400	200	
Cover	2.85	3	2.25	2.75	
Weighted average rate ^(a)	4.586	4.683	4.785	4.88	
Highest accepted rate ^(a)	4.6	4.69	4.785	4.88	
Lowest accepted rate ^(a)	4.58	4.675	4.785	4.88	
Tail ^(b) basis points	0.6	0.8	0	0	
18 July 2006					
On offer (£ millions)	1,900	750	400	200	
Cover	1.85	1.6	1.63	2	
Weighted average rate ^(a)	4.55	4.635	4.74	4.83	
Highest accepted rate ^(a)	4.565	4.64	4.74	4.83	
Lowest accepted rate ^(a)	4.54	4.635	4.74	4.83	
Tail ^(b) basis points	1	0	0	0	
15 August 2006					
On offer (£ millions)	1,900	750	400	200	
Cover	2.22	1.6	1.38	1.75	
Weighted average rate ^(a)	4.792	4.913	5.01	5.1	
Highest accepted rate ^(a)	4.801	4.918	5.01	5.1	
Lowest accepted rate ^(a)	4.781	4.91	5.01	5.1	
Tail ^(b) basis points	1.1	0.5	0	0	

(a) Per cent.

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

OMOs. In turn, its holdings of gilt and high-quality euro-denominated collateral has increased. The proportion of gilt collateral provided in short-term repo OMOs has changed little, whereas in long-term repos the proportion of gilt collateral has decreased (Chart 33).

Foreign currency reserves

As part of the monetary regime introduced in 1997, the Bank holds its own foreign exchange reserves. These assets, together with others used to facilitate participation in the euro area's TARGET payment system, have been financed by issuing foreign currency securities (euro bills, initially of three and six-month maturity, and three-year euro notes).

Under current arrangements, the Bank holds some €3.5 billion of euro-denominated assets to facilitate the United Kingdom's participation in TARGET. When the European System of Central Banks (ESCB) replaces TARGET, the Bank will not participate as a direct member of TARGET2. UK institutions will instead link to TARGET2 through access points within the euro area.⁽²⁾ The changes to TARGET arrangements mean that the Bank will eventually be able to hold fewer foreign currency assets thereby reducing its need for foreign currency financing.

Reserve scheme members are subject to interest penalties if, at the end of a maintenance period, their average balance falls outside a ±1% range around their chosen target.

⁽²⁾ The planned changes to the euro area's payment system, including the introduction (and membership) of TARGET2, are detailed on the ECB's website www.ecb.int/paym/target/target2/html/index.en.html.

Provision of longer-term financing through outright bond purchases

As part of the new framework for implementing monetary policy, the Bank announced jointly with the Debt Management Office on 15 May that it intends to provide longer-term finance to the banking system via outright purchases of gilts and high-quality foreign currency government bonds (with the foreign currency cash flows swapped into fixed-rate sterling) as part of its routine OMOs.⁽¹⁾ The Bank's overall net provision of financing for the banking system will not change as a result of outright purchases of bonds. Rather provision of financing via bond purchase operations will replace part of the Bank's financing via short and long-term repos.

On 27 July 2006, the Bank issued a consultative paper on the proposed outright purchases.⁽²⁾ The paper set out the background to the Bank's plans and describes the principles that will underlie the management of the resulting bond portfolio, in particular that the purchases will be simple, transparent and non-discretionary. It asked for comment on a number of specific issues related to the mechanics of those purchases. The paper also sought feedback on a proposal that the Bank should move to electronic bidding for all its OMOs, including its existing short and long-term repo operations.

The consultative paper explains that the bond portfolio will be held as assets to back banknotes. The value of banknotes in circulation fluctuates throughout the year, owing to seasonal factors. The Bank will continue to use short-term repo lending to accommodate such temporary, seasonal variation in banknote demand.

The underlying trend has, however, been stable for many years, and so the majority of the necessary financing for banknotes can be provided via the purchase of longer-maturity assets. Purchasing a five-year bond, for example, provides central bank money to the banking system for five years (injected on the day of purchase and withdrawn on the day of maturity). Providing longer-term financing for the banking system across a range of maturities represents a more structured approach to managing the Bank's balance sheet. A number of central banks, including the FRBNY and the Bank of Japan, provide longer-term financing for the banking system's purchase of banknotes via outright purchases of government bonds.

In the light of comments on this paper, the Bank will issue in due course a further paper setting out the details for the planned bond purchases and a proposed timetable for implementation. The Bank will consult on further issues of detail (including the design of an electronic bidding system) as necessary.

- (1) See www.bankofengland.co.uk/markets/money/documentation/boe_dmo.pdf
- (2) See www.bankofengland.co.uk/markets/money/documentation/ consult bond purchases.pdf.

Chart 33 Proportion of euro-denominated collateral used in OMOs and its relative cost^(a)



(a) Cost of euro-denominated collateral relative to sterling-denominated collateral is calculated as the five-day moving average of the difference between the sterling and euro secured-unsecured (one-month) interest rate spread. A higher value indicates that the relative cost of euro-denominated collateral has fallen.

The Bank announced on 24 April 2006 that its euro bill issuance programme, which provided \in 3.6 billion of regular financing, would cease with immediate effect. Euro bills totalling \in 3.3 billion have so far matured. The final euro bill, for \in 0.3 billion, will mature on 12 October 2006.

Capital portfolio

As set out in previous *Bulletins*,⁽¹⁾ the Bank holds a sterling bond portfolio of approximately the same value as its capital and reserves (net of equity holdings — in the ECB, BIS and some other companies — and the Bank's premises, property portfolio and equipment) and aggregate cash ratio deposits.

The portfolio is invested in gilts (currently around £2 billion) and other high-quality sterling-denominated debt securities (currently around £1 billion). These investments are generally held to maturity. Over the current review period, gilt purchases were made in accordance with the published screen announcements: £37.6 million of 4.75% 2020 in June, £37.6 million of 4.75% 2015 in July, and £37.6 million 4.75% 2020 in August. A screen announcement on 1 September 2006 detailed the purchases to be made over the following three months.

For example, see the box entitled 'Management of the Bank's sterling bond portfolio' on page 279 of the Autumn 2004 Bulletin.

Research and analysis

PROMISE

The UK international investment position

By Simon Whitaker of the Bank's Structural Economic Analysis Division.

This article looks at how the United Kingdom can, surprisingly, generate net investment income from net debt. The article explores the possible linkages between the improvement in net investment income and the stability of the sterling effective exchange rate index in the face of persistent trade deficits. It identifies some risks to net investment income from shifts in relative yields and a rise in global interest rates. With the rapid increase in cross-border asset trade, particularly in financial centres such as the United Kingdom, fluctuations in asset prices have become more powerful influences on our net debt position than in the past. Capital gains can stabilise a net external debt position even in the face of ongoing trade deficits, potentially reducing the extent of any adjustment to the exchange rate.

Official data suggest that the United Kingdom's financial liabilities exceed the value of its financial assets — net foreign liabilities were equal to around 14% of GDP at the end of 2005. Yet the data also suggest the United Kingdom has been earning net income on those net liabilities. In other words, the income generated by UK-owned assets abroad is greater than the payments made on the larger stock of UK liabilities owed to foreigners. Moreover, net investment income has improved at the same time that the United Kingdom has become more indebted (Chart 1). This apparent ability to generate net investment income from a net debt position is also currently shared with the United States. This article looks at the recent dynamics of the United Kingdom's net foreign asset position, officially termed the international investment position (IIP), and the source of its investment income surplus.

The first section illustrates how fluctuations in asset prices, and yields, have been important factors offsetting the impact of cumulative trade deficits on the evolution of the IIP. The article then explores how the United Kingdom is apparently able to obtain a higher yield on its assets than it pays on its liabilities, and sets out some difficult measurement issues. For example, does the excess yield tell us that in fact the United Kingdom has more assets abroad than currently measured in the official data - which has been termed 'dark matter' in the US context by Hausmann and Sturzenegger (2006)? The article then explains how the strength of investment income may help explain the stability of the sterling effective exchange rate index in the face of persistent trade deficits, and discusses some of the risks to investment income going forward. The final section then looks at how increases in the holdings of financial assets and liabilities have affected the sensitivity of the economy to exchange rate movements.

Chart 1 International investment position (IIP) and net investment income



Dynamics of the international investment position

The balance of payments describes the value of transactions between households, companies and institutions in the United Kingdom and those in the rest of the world. Those transactions are recorded on either the current or the financial account, depending on the nature of the transaction.⁽¹⁾ If UK

There is also a third account — the capital account — which records transfers of ownership of non-produced, non-financial assets (such as copyrights) and transactions by extra-territorial institutions (like embassies). The values of credits and debits on this account are dwarfed by the transactions on the current and financial accounts.

residents are spending more on imports than the amount of income they receive from overseas purchases of UK exports and any net inflow of investment income (and transfers) from abroad, then the United Kingdom will be running a current account deficit. To finance this gap between income and spending, UK residents need to borrow from, or sell assets to, overseas residents. Those transactions are represented by a surplus on the financial account that offsets the current account deficit. A current account deficit will therefore be associated with a declining balance of financial assets to liabilities, and hence a deterioration in the United Kingdom's IIP. The IIP will also be affected by changes in the prices of UK assets and liabilities, or revaluations. So the evolution of the IIP can be simply described as follows:⁽¹⁾

 $IIP_t = IIP_{t-1} + Revaluations_t + Current account balance_t$

The current account comprises the balance of trade, investment income, and transfers. Since the United Kingdom last ran a trade surplus in 1997, the balance of trade has been in deficit each year and this deficit has increased over time. **Chart 2** shows the actual level of the IIP and how it would have evolved since 1997 if we simply cumulated the borrowing associated with the trade deficits. It shows that trade deficits over this period would have increased net foreign liabilities to around 22% of annual GDP by 2005 (from around 8% in 1997), compared to the official estimate of around 14%. This implies that investment income and capital gains or losses have also had an important impact on the evolution of the IIP.

Chart 2 The IIP and the evolution implied by trade deficits



Chart 3 shows a decomposition of changes in the IIP each year since 1997. It shows that a significant offset to the trade deficits has indeed been a positive contribution from net investment income. So, despite UK indebtedness rising over this period, earnings on UK assets outweighed payments on the United Kingdom's larger liabilities, generating a net surplus of investment income. It is not unusual for the United

Kingdom to earn a net surplus of investment income — indeed in the later part of the 19th century the estimated surplus as a percentage of GDP was around three times its current level. But at that time the United Kingdom was a large net creditor to the rest of the world: its foreign assets exceeded its liabilities to overseas residents. The recent combination of investment income surpluses and increasing net debt is unprecedented. This ability to generate net investment income from an apparent net debtor position is currently shared with the United States (see Higgins *et al* (2005)).



Chart 3 also shows that revaluations — the capital gains or losses in any year due to movements in either asset prices or exchange rates — can be much larger than the impact of the trade deficit. The next section of the article looks in more detail at how the United Kingdom has generated its net investment income and, following that, the growing importance of revaluations.

How do we obtain net investment income from net debt?

Two factors are behind the United Kingdom's ability to obtain net investment income despite increasing net indebtedness. First, the yield that the United Kingdom pays on the bonds and equities issued to overseas investors — termed portfolio debt and equity — appears to have declined relative to the yield that the United Kingdom earns on the bonds and equities issued by the rest of the world that it owns. Second, there has been a shift in the composition of UK external assets towards foreign direct investment (FDI). FDI assets generate a higher yield than the United Kingdom's predominantly debt-like liabilities.

In practice there is also an 'errors and omissions' term reflecting the fact that measurement error means that the current balance does not equal measured net capital flows.

In aggregate over the past decade, the estimated yield that the United Kingdom received on its overseas assets has increased relative to the estimated yield that it pays on its liabilities (Chart 4). The estimated yield differentials on portfolio equity and debt have moved from being substantially negative to slightly positive. The improvement in the debt yield differential is broadly consistent with the decline in UK interest rates relative to world interest rates since the early 1990s. In addition to the changes in relative yields, there has been a big shift in the composition of assets and liabilities: over the past decade the United Kingdom has shifted sharply towards having a substantial net asset position in FDI (Chart 5). The difference between the yields on the United Kingdom's FDI assets and liabilities has typically been positive, so this shift has increased net investment income. At the same time, the United Kingdom has been accumulating mainly low risk, and hence low yield, net banking liabilities; Chart 5 shows all interest-paying assets and liabilities (including bonds and bank deposits) in one broad category, called net interest-sensitive assets. While the UK net liability position in this category is

Chart 4 Difference between yields on UK assets and liabilities(a)



(a) Yields are defined as income from the asset (or liability) in time t as a percentage of its value at the end of time t-1

Chart 5 Decomposition of the IIP



(a) Interest-paying assets and liabilities (bonds and bank deposits)

larger than its net positive FDI position, the net payments that the United Kingdom makes on interest-sensitive liabilities are smaller than the net income it receives from FDI assets (Chart 6). So the United Kingdom could broadly be characterised as being like a bank or venture capitalist that earns net income by borrowing to invest in projects that earn a higher return than the cost of funding.

One region with high savings, potentially looking for low-risk investments (such as UK bonds and bank deposits) is Asia. The region has also historically offered UK investors high FDI returns. How important has Asia been to the United Kingdom's net investment income generation? Chart 7 shows that, in gross terms, Asia's importance to UK assets and liabilities is dwarfed by Europe and the Americas, consistent with the United Kingdom's trading relationships. However, the United Kingdom does have a relatively large net debt position with the non-Japan Asia region (Chart 8). Despite this, the United Kingdom manages to generate a positive net investment income surplus with this region. That is because





Chart 7 Gross UK assets and liabilities by region (2004)



our liabilities to them are mainly in the form of low-cost bank deposits whereas our assets in non-Japan Asia are higher return FDI. So the yield on UK assets in non-Japan Asia exceeds the yield the United Kingdom pays on liabilities to non-Japan Asia by around 3¹/₂ percentage points, compared with an overall difference for assets and liabilities of around ³/₄ of a percentage point. The margin between yields on UK assets held in the rest of Europe and UK liabilities to the rest of Europe is relatively small but, because the gross positions are so much larger, that region generates most of our investment income. In particular, around two thirds of the United Kingdom's FDI assets are located in Europe — over 80% of which is within the euro area.

Chart 8 Distribution of the United Kingdom's IIP and investment income across regions (2004)^(a)



(a) Figures in brackets are yields on assets minus yields on liabilities.

Measurement issues — dark matter?

There are big measurement problems with both stocks and flows of assets and liabilities. Lane and Milesi-Ferretti (2006), for example, suggest that official estimates of world liabilities exceed official estimates of world assets by around 5% of world GDP. Hausmann and Sturzenegger (2006) have argued that the income generated by the United States' financial position is a good measure of the true value of its assets. They suggest that if US assets generate more income than US liabilities then they must be worth more. In other words because the United States earns net investment income it must be a net creditor, rather than a substantial net debtor as measured by official statistics. The authors term the apparently missing assets 'dark matter'.

Based on US net investment income of around \$30 billion, and the assumption of a 5% rate of return, Hausmann and Sturzenegger (2006) calculate an implied net asset position of \$600 billion. That compares with the official net debt position of \$2.5 trillion. There are obvious parallels with the United Kingdom. Applying their same simple arithmetic, UK net investment income of approximately £27 billion in 2005 implied net assets of \pounds 540 billion. That compared with the official measured net liability position of \pounds 169 billion.

This is obviously a very simple story. In particular, it rests crucially on the assumption that yields on assets are identical to those on liabilities. But there are good reasons why the overall yields on UK or US assets may exceed those on their liabilities. The composition of assets and liabilities is different, with risky investments like foreign direct investment accounting for a larger share of assets than liabilities. And yields are only one aspect of total returns: capital gains matter as well. For example, overseas investors may have been investing in UK or US companies paying no or low dividends (eg information communication and technology firms) but whose share prices are expected to rise quickly and generate large capital gains, increasing the value of the United Kingdom's stock of liabilities.

However, it is puzzling that for both the United States and the United Kingdom, the yields on overseas FDI assets appear to have been consistently higher than those on FDI liabilities in recent years. This is particularly notable for the United States (see Higgins et al (2005)). That could reflect problems with measuring the FDI stock positions. International statistical guidelines recommend that FDI assets and liabilities are measured at current market prices. But direct investment positions often involve illiquid ownership interests in companies that are not listed on stock markets and may possess unique attributes that are hard to value. So, in practice, book values are often used — this practice is followed in the United Kingdom (see Elliott and Wong Min (2004)). Previous work by Westwood and Young (2002) has suggested that the United Kingdom's net stock of FDI is much higher than currently measured. Recent updates by Nickell (2006) suggest that when FDI is approximately revalued according to relative movements in stock markets, the United Kingdom has actually remained an overall net creditor, despite persistent current account deficits in recent years: the capital gains from equity revaluations have more than offset the run of trade deficits.

The relationship between net investment income and sterling

Persistent trade deficits lead to a build-up of net debt, as agents borrow to fund spending in excess of income. That rise in debt should, everything else held constant, result in the United Kingdom making increasing net interest payments overseas. And in the absence of revaluations (discussed in the next section), trade surpluses are needed in the future to repay that debt, or at least stabilise net debt relative to GDP. Those future trade surpluses could be achieved by a depreciation in the real exchange rate, which would boost domestic production relative to imports. However, because the United Kingdom has been able to generate net investment income, it has been able to finance part of the trade deficit using that income. This has moderated the accumulation of debt and hence there has been less pressure for an adjustment in the real exchange rate. Positive net investment income may therefore have contributed to the relative stability of the sterling real effective exchange rate since its appreciation in 1996–97, in the face of rising trade deficits.

In judging the potential risks to the level of the exchange rate, an important question is therefore how persistent the improvement in net investment income will prove to be. The bulk of the improvement in net investment income has come from the increase in net income from FDI (Chart 6) which reflects the increase in FDI assets (Chart 5). Official data suggest that FDI assets are around 60% larger than FDI liabilities. However, Chart 9 indicates that the difference between the yields on FDI assets and liabilities can be volatile - there was a period in the late 1970s and early 1980s when the nominal yield on the United Kingdom's FDI assets overseas was well below that earned by overseas investors on FDI assets in the United Kingdom. Though part of the higher yield on liabilities may have been compensation for the high level of inflation in the United Kingdom at that time. As a compensation for risk the return from FDI should on average be higher than the cost of the United Kingdom's predominantly debt-like liabilities, but there may be periods of relatively low returns.

Per cent 35 Liabilities 30 25 20 15 Asset 10 5 0 1967 72 77 82 87 92 97 2002

Chart 9 Nominal yields on FDI assets and liabilities^(a)

(a) Yields are defined as income from the asset (or liability) in time t as a percentage of its value at the end of time t-1.

As the United Kingdom has net interest-sensitive liabilities, net investment income would also be adversely affected by a global rise in interest rates. **Chart 10** shows that the United Kingdom's net interest payments have remained stable since 1987, despite the accumulation of net debts, because of the sharp fall in interest rates during the period. Mechanically, holding everything else constant, a rise of 1 percentage point in interest rates both in the United Kingdom and abroad would subtract around £4 billion from total annual net investment income — a little more than 15% of the surplus in 2005.

Moreover, the potential drag from higher interest rates is likely to grow over time, as most of the ongoing build-up in UK net liabilities is in interest-paying instruments.

Chart 10 Net interest payments and liabilities

- Net interest-sensitive liabilities as a percentage of GDP (right-hand scale)
 Yield on interest-sensitive liabilities (per cent)
- (left-hand scale) — Net interest-sensitive payments as a percentage of GDP
- (left-hand scale)



Of course, changes in interest rates could also be associated with changes in exchange rates, which will affect the sterling value of investment income from overseas.⁽¹⁾ In a similar vein, financial flows should react to changes in asset prices. So these sorts of mechanical calculations are very simplistic.

The implications of greater financial leverage

With the greater financial integration of different economies over time, there has been an increase in gross global financial assets and liabilities. This leverage is particularly marked for financial centres like the United Kingdom. **Chart 11** shows how gross overseas financial assets and liabilities have

Chart 11 Financial integration(a)



⁽¹⁾ See, for example, Brigden et al (1997).

increased markedly relative to trade in goods and services, especially since the mid-1990s, and that the relative size of gross financial assets and liabilities is greater for the United Kingdom than for industrialised countries as a whole.

There are two important implications of this. First, with larger gross financial positions, differences between yields on assets and liabilities have a much greater role to play in affecting the evolution of net investment income, the current account deficit, and hence the IIP. Second, revaluations, in response to changes in asset prices, become a potentially more important driver of changes in the IIP than the borrowing associated with current account deficits. Table A shows the correlation between the current account deficit and the change in the IIP. In the absence of measurement error and revaluations, this should be positive and equal to one. In common with industrialised countries, the correlation for the United Kingdom has fallen since the late 1970s. But since the early 1990s, the UK correlation has fallen more markedly than for industrialised countries as a whole, as the United Kingdom's gross asset and liability positions have expanded particularly rapidly, and has actually been negative.

Table A Correlation between the current account and the change in the IIP

	Industrialised countries ^(a)	United Kingdom	
1971–81	0.71	0.78	
1982–92	0.63	0.42	
1993–2004	0.32	-0.54	

(a) Industrialised country data: Lane and Milesi-Ferretti (2006). Correlations calculated on annual data expressed as a percentage of GDP.

Some UK liabilities are denominated in foreign currency. Reliable information on the currency split is only available for the banking sector. Data collected by the statistics division of the Bank of England (see, for example, Elliott and Wong Min (2004)) suggest that around 85% of the banking sector's liabilities are denominated in foreign currency, with the dollar more important than the euro. If we assume, given the lack of accurate information, that all other liabilities are sterling denominated, that implies around 40% of the United Kingdom's total liabilities are sterling denominated.⁽¹⁾ Information on the banking sector suggests that around 90% of their assets are denominated in foreign currency. Assuming that all other assets are denominated in foreign currency would imply that around 95% of total UK assets are denominated in foreign currency. Overall, this suggests that the United Kingdom has net foreign currency assets and net sterling liabilities (Chart 12). In turn, this means that a depreciation of the exchange rate, which raises the sterling value of net foreign currency assets, generates a net capital gain for the United Kingdom. With net foreign currency assets equal to around 225% of UK GDP, small changes in the exchange rate can have a large impact on the IIP, relative to

trade deficits. For example, if the sterling effective exchange rate is the right one to use for revaluations, then the IIP would improve by around 2.25% of GDP for a 1% depreciation.⁽²⁾ By comparison, the current account deficit in 2005, the financing of which acted to increase net external liabilities, was around 2.5% of GDP. So currency-related revaluations to the stock of assets and liabilities are very important in determining the evolution of the IIP.

Chart 12 Estimated currency split of the IIP^(a)



(a) Assumes around 15% of banking sector liabilities and all non-banking sector liabilities are denominated in sterling, and around 90% of banking sector overseas assets and all non-banking sector overseas assets are denominated in foreign currency. Information on the currency split of banking sector assets and liabilities is provided by the statistics division of the Bank of England.

Tille (2005) and Gourinchas and Rey (2005) have recently emphasised the importance of the financial revaluation channel to the adjustment of imbalances. The valuation effect can help to smooth corrections to the trade deficit. Capital gains from a depreciation can allow a net external debt position to stabilise, even in the face of ongoing trade deficits. And because the trade deficit does not need to adjust as abruptly to stabilise the net debt position, the exchange rate can depreciate more smoothly and ultimately by less than in the absence of positive revaluation effects (see Cavallo and Tille (2006)).

Summary

The United Kingdom, like the United States, is apparently able to generate net investment income from an apparent net external debt position. This has significantly helped to cushion the impact of cumulative trade deficits on the build-up of net external liabilities. This net investment income helps us to sustain a higher real exchange rate than would otherwise be the case, as the trade deficit can be larger for a given overall

Foreign direct investment in the United Kingdom and UK equities held by foreigners would be expected to be sterling denominated.

⁽²⁾ Because the sterling effective exchange rate is trade weighted rather than weighted by the currency composition of financial assets and liabilities, this is only an approximation.

current account, or net borrowing, position. If the differential between yields on UK assets and liabilities is maintained we might expect the United Kingdom to benefit further from the trend to greater gross cross-border assets flows — the scaling up of its international balance sheet increases the gain from the transformation of low-cost liabilities into higher yielding assets. However, that net investment income is vulnerable to a significant global increase in interest rates.

In principle, the accumulation of net debt needs eventually to be corrected either by future net export growth (the trade adjustment channel) or an increase in the market value of assets relative to liabilities (the revaluation channel). Both imply a depreciation of the real exchange rate. But the positive impact that such a depreciation has on the value of external assets can smooth and mitigate the amount of adjustment required via net trade (and hence the exchange rate) to stabilise or reduce net external liabilities. However there are significant measurement problems with these data it is possible that the United Kingdom's current net external debt position is overstated, and hence the need for any adjustment is too.

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Costs of sovereign default

By Bianca De Paoli of the Bank's Monetary Instruments and Markets Division, Glenn Hoggarth of the Bank's International Finance Division and Victoria Saporta of the Bank's Systemic Risk Reduction Division.

Over the past quarter of a century, emerging market economies (EMEs) have defaulted on their sovereign debts frequently. This article assesses the size and types of costs that have been associated with these defaults. It emphasises that costs, measured by the fall in output, are particularly large when default is combined with banking and/or currency crises. Output losses also seem to increase the longer that countries stay in arrears or take to restructure their debts. The paper concludes with a number of policy suggestions to improve debt crisis prevention and management and the role played by the IMF.

Introduction

Since the financial crises of the 1990s, including the sovereign defaults by Russia, Ecuador and Argentina, a number of policy initiatives have been taken and others suggested to improve the international financial architecture, including the effectiveness of crisis resolution.⁽¹⁾

This article puts the recent policy initiatives into a broader context by attempting to draw lessons from the large number of sovereign defaults witnessed over the past 30 years. In particular, it assesses the type and size of costs that are associated with sovereign default and the implications for crisis prevention and management policies.

The larger these default costs, the greater the incentive for debtors to avoid default or, if default occurs, to resolve the crisis as effectively as possible. But to the extent that these costs are not internalised, there may be a role for international official sector intervention, by an agency such as the IMF, to help prevent or resolve debt crises. Distinguishing the size and type of different costs of sovereign default may help to determine where efforts at crisis prevention and management should be most focused.⁽²⁾

Costs of debt crises: the literature

Sovereign defaults have been a feature of the international financial landscape for centuries. For example, Reinhart *et al* (2003) report that France defaulted on its sovereign debt eight times between 1500 and 1800, while Spain defaulted thirteen times between 1500 and 1900. And, more recently, over the past quarter of a century EMEs have defaulted on their sovereign debts frequently.

The extent to which governments can take evasive action to avoid default will depend, among other things, on the initial size of debt and debt repayments and the magnitude and speed with which the economy is hit by adverse shocks (such as a deterioration in the terms of trade, an economic downturn or an increase in the cost of debt repayments).

In the absence of large negative shocks, governments may have time to adjust fiscal policies to put debts back on a sustainable path. And in the case of debt denominated in domestic currency, governments faced with financing difficulties may, in extreme circumstances, increase the money supply sharply to reduce the real value of debt repayments. But for countries with a large amount of foreign currency debt, the policy choices are likely to be more limited, especially once faced with a foreign exchange crisis.

To the extent that default is voluntary, sovereigns might have been expected to default even more frequently than they have in the past. Sovereign nations — unlike companies — cannot be liquidated and there are also no national, or international, courts that can enforce payments on contract through, for example, transferring assets from the debtor to the creditor.⁽³⁾ Defaulting, or restructuring, enables debtor countries to reduce the size and/or lengthen the maturity of their

⁽¹⁾ See for example Bedford et al (2005).

⁽²⁾ The IMF (2003) lists a number of default costs that may justify IMF liquidity support intended to substitute for loss of trade financing, contain balance sheet effects, provide liquidity support to domestic banks, minimise the collapse in investment and maintain access to priority financing from other international financial institutions (IFIs).

⁽³⁾ Following the Foreign Sovereign Immunity Act (1976) in the United States and the State Immunity Act (1978) in the United Kingdom, it became common practice for most governments to waive sovereign immunity on foreign loans and bond contracts. In practice, however, this only allows creditors to have access to the debtor's assets held for 'commercial activity' in the country where the debt contract was issued. Moreover, a country considering default could remove its assets held in the foreign jurisdiction before any default.

repayments, and thereby seek to provide a temporary boost to current consumption.

Weighing against this, though, there are a number of potential costs of default that incentivise debtors to repay. Some are penalties imposed by external creditors on the cost or ability of defaulters to access future finance. So increasing consumption today may be at the expense of reducing consumption in the future. Moreover, given that defaulting may cause a broader financial crisis in which domestic activity and output are reduced even in the short run, any attempt to boost current spending temporarily through a default may not be successful.

Penalty costs

Defaulters may lose access to borrowing from financial markets. However, the theoretical evidence is mixed on how a sovereign contemplating default might balance the potential loss of access to international capital markets against its ability to use the breathing space afforded by default to support domestic expenditure. Eaton and Gersovitz (1981) argue that, if the expected reduction in future consumption from losing market access is at least as large as any increase in current consumption from default, sovereigns should prefer to honour their debt repayments.⁽¹⁾ In contrast, Bulow and Rogoff (1989) suggest that, if the government can invest existing borrowed funds in international markets, this cushion could be used to support current consumption should the sovereign be cut off from international borrowing following a voluntary default.

A loss of trade finance may also result in defaulters facing a reduction in international trade. However, trade finance need not be provided by the same creditors that hold the defaulted debt. For example, during the 1980s a few major international banks held most of the defaulted Latin American debt. But this did not prevent other banks, with fewer exposures, stepping in to provide trade finance.

Overall, the empirical evidence suggests that sovereign default is not necessarily associated with a loss of market access, so fears about any such loss may not in themselves be a major deterrent to default. Lindert and Morton (1989) argue that in the 1930s, and again in the early 1980s, during periods when a number of countries defaulted, external credit was no more inaccessible to sovereign defaulters than to non-defaulters.⁽²⁾ Jorgensen and Sachs (1989) find that, in the two decades following the 1930s sovereign debt crisis, access to international capital markets for Latin American countries was severely restricted for previous non-defaulters as well as for defaulters. And once capital markets opened up in the 1960s, defaulters found it as easy to access capital as non-defaulters. More recently, assessing defaults since 1980, Medeiros et al (2005) find that the probability of regaining market access after default depends partly on a country's external situation

at the time of default and partly on its domestic macroeconomic performance.⁽³⁾ The current external environment has enabled recent defaulters, such as Russia, Argentina and Ecuador, to regain market access quickly.⁽⁴⁾ More generally, Gelos *et al* (2004) find that it only took past-defaulters $3^{1}/_{2}$ months, on average, to regain market access after defaulting during the 1990s compared with more than $4^{1}/_{2}$ years during the 1980s.

Although the empirical evidence does not suggest that default necessarily closes off market access, it does point to an adverse effect on the government's cost of future borrowing. Ozler (1993) finds that, during the tranquil period of the 1970s, lenders charged up to 50 basis points more for loans to previous (post-1930) defaulters. And more recently, Reinhart *et al* (2003) find that EMEs with a history of defaulting on their external debts — especially 'serial defaulters' — received a lower credit rating over the 1979–2000 period than non-defaulters that displayed similar financial strength.⁽⁵⁾

Broader financial costs

The costs discussed above represent penalties that sovereigns may face should they default. But governments may also want to maintain debt repayments in order to avoid broader losses to the domestic economy associated with default, beyond those caused by a tightening in the terms and conditions on borrowing imposed by foreign creditors. A number of studies suggest that default is often associated with a decline in output growth (eg, Cohen (1992) and Sturzenegger and Zettelmeyer (2006)). Dooley (2000) shows that output losses, assumed to be due to domestic residents being unable to borrow from domestic as well as foreign creditors in the aftermath of crises, may be the most important incentive for debt repayment. And more recently, Alfaro and Kanczuk (2005) calibrate a dynamic equilibrium model of sovereign debt and find that the threat of higher borrowing costs alone is insufficient to discourage debtors from defaulting. It is only when default also results in 'additional output costs' over and above those caused by higher interest rates that equilibria are derived that are consistent with the stylised facts on the frequency of sovereign defaults. But what are these broader output costs to the domestic economy resulting from sovereign default?

One mechanism by which a sovereign default may reduce GDP is through its impact on the domestic financial system. In

(5) Measured by the ratios of external debt to both GDP and exports.

In practice, myopic governments might attach a high weight to current rather than future consumption, and therefore a low weight to the risk of future default through increasing current borrowing.

⁽²⁾ Tomz (1998), however, finds that, during the interwar period, defaulting countries that were expected to default, given their poor fundamentals, could regain access to capital markets twice as quickly as countries that defaulted unexpectedly, given their better fundamentals.

⁽³⁾ As measured by GDP growth, inflation, the current account balance and foreign currency reserves.

⁽⁴⁾ Indeed, assisted by the sharp rise in oil prices, Russia's sovereign debt is now rated investment grade.




Figure 1 Interaction between sovereign debt, banking and currency crises

Note: Arrows show the direction of causation and +/- whether the impact is likely to accentuate or alleviate the particular crisis or output loss.

many EMEs, domestic banks are major creditors of the government and so may be severely weakened, if not made insolvent, when the government defaults on, or restructures, its debt (including that owed to the domestic sector). In this case, banks may stop playing their intermediation role of providing liquidity and credit to the economy. This happened, for example, in Russia after the government suddenly defaulted on its domestic debt in Autumn 1998. The impact of a sovereign default on the banking system is often accentuated through government debt having been taken up increasingly by domestic banks in the run-up to debt crises, when governments find it harder, or at least more expensive, to obtain external finance. Once banking problems emerge, any fiscal weakness, in turn, reduces the ability of the government to take measures to contain a crisis. For example, it is probably not credible for a highly indebted government to introduce a blanket guarantee to deposit holders in order to stem bank runs, because depositors will not believe such a guarantee will be honoured and their investments insured (see Hoelscher and Quintyn (2003)).⁽¹⁾

Foreign and domestic investors might also react to a sovereign defaulting on its external debt by questioning whether the government has sufficient foreign currency to defend the exchange rate. For net foreign currency borrowers, a sharp currency depreciation would, in turn, increase - when valued in domestic currency terms — the net foreign currency debts and debt service costs of the government, banks and the non-bank private sector.⁽²⁾ A tightening in monetary policy might limit the extent of exchange rate depreciation but at the expense, in the short run at least, of reducing domestic demand and liquidity in the financial system. Therefore, a triple — sovereign, banking and currency — crisis may ensue, involving a run on both the domestic currency and the banking system (see Figure 1). But since depreciation tends to increase trade competitiveness there would, after a time lag, be a potentially offsetting gain in net exports and output depending, inter alia, on the size of the traded goods sector (see Frankel (2005)) and whether exporters have access to trade finance.

There is little evidence from the literature on the costs associated with these different types of sovereign crises nor on the costs and benefits of different types of crisis resolution.

The large fiscal costs that are often incurred in resolving a banking crisis can also cause, or make worse, a sovereign crisis, for example Indonesia in 1997–98.

⁽²⁾ For the balance sheet channel of currency depreciation see, *inter alia*, Cespedes *et al* (2004).

For example, is it less costly to restructure debt — and if so pre or post-default — than to reduce arrears gradually over time? Restructuring might have the benefit of starting afresh through the debtor explicitly sharing the costs of default with creditors. Some new evidence on these questions is presented below.

Estimates of the costs of debt crises

Defining a crisis

Before its costs can be assessed and measured accurately, a sovereign default needs first to be properly defined. Unfortunately, there is no off-the-shelf definition. It could be narrowly confined to debt that has gone into arrears or also include debt that has been explicitly restructured.⁽¹⁾ The definition of debtor and creditor is also not unambiguous. 'Sovereign' debtor could be defined narrowly as the government or public sector alone or more broadly to include the domestic private sector. And creditors could be confined to the commercial sector or also include the official sector.

Table A summarises recent studies of sovereign defaults. As indicated, Reinhart *et al* (2003) adopt the simplest definition of a default event as occurring when a country defaults on, or restructures, its total external debt.⁽²⁾ Detragiache and Spilimbergo (2001) define it as occurring when arrears of principal or interest obligations to commercial creditors on a country's total external debt exceed 5% or when a debt rescheduling agreement is made with commercial creditors. In contrast, in this article a sovereign debt crisis is defined as occurring when the sovereign alone is in (large) arrears (on

Table AA summary of recent studies on sovereign defaults since1970

Authors	Sample period	Definition of default event	Number of crises			
			Total	1970s	1980s	1990s
Detragiache and Spilimbergo (2001)	1971–98	Arrears on principal or interest payments >5% of debt outstanding or restructuring of a country's total (sovereign plus private) external debt with private creditors	54	11	33	10
Reinhart, Rogoff and Savastano (2003)	1970–2001	Default or restructuring of a country's total (sovereign plus private) external debt with private creditors	g 36(a	a) 4	23	8
This article	1970–2000	Arrears on principal or interest payments >15% and 5% respectively or restructuring of a sovereign's external debt with private creditors	40	3	29	8

(a) Includes one crisis in the sample since 2000.

principal or interest payments) or arranges a rescheduling agreement with its foreign private creditors.

The summary suggests that sovereign debt crises were particularly frequent during the 1980s and remained more common in the 1990s than in the 1970s.

Table B shows indicators of the economic situation at the outset of recent sovereign debt crises. Perhaps not surprisingly, sovereign crises have usually materialised in recessions, when government and/or external debt has been large — generally over 60% of GDP — and the fiscal balance in deficit (of over 2% of GDP). Although annual inflation was rapid in some cases, for example over 50% in Indonesia and Ecuador, it was negative or low in others, such as Argentina and Uruguay. Nearly all recent debt crises, however, have been associated with a banking and/or currency crisis.⁽³⁾ Table B also shows that, on average, EMEs currently have lower external debt than countries had at the time of recent sovereign crises. This partly reflects the recent improvement in current account positions in most EMEs.⁽⁴⁾ However, in many EMEs, government (domestic plus external) debt and deficits remain high with a large reliance still on financing from the domestic banking system.

Measures of the costs of debt crises

The literature summarised above suggested two main types of potential losses resulting from debt crises — those arising from any impairment of the government's future ability to raise finance or increase in the cost of raising finance from creditors; and those imposed on the domestic economy through the interaction of debt crises with banking and/or currency crises.

Penalty costs

Charts 1–2 plot the average government and external debt/GDP ratios against bond spreads and credit ratings respectively over the past three years for EMEs that have a history of default (in blue) and those that do not (in pink). past-defaulters are countries that are listed by at least two of the three studies shown in **Table A**; non-defaulters are not listed by any of these studies. Consistent with the evidence from Ozler (1993) and Reinhart *et al* (2003), for a given debt/GDP ratio, past-defaulters have generally had a higher

^{(1) &#}x27;Default' could be defined more broadly still. Manasse and Roubini (2005), for example, also include episodes of incipient defaults which they believe were averted through large-scale international bail-outs, such as occurred in Mexico in 1995, Turkey in 2000 and Brazil in 2001. And Sy (2004) defines a sovereign debt crisis to occur when sovereign spreads over US Treasuries rise to 1,000 basis points (10%) or more.

⁽²⁾ Default events are taken from Standard and Poor's (S&P's) Credit Week (various issues). S&P defines default as the failure of a borrower to meet principal or interest payment on the due date (Chambers and Alexeeva (2002)).

⁽³⁾ The definition of banking crisis, based on Caprio and Klingebiel (2003), is when 'much or all' of the banking system's capital is exhausted, while that of currency crisis, based on Frankel and Rose (1996), is when the domestic nominal exchange rate against the dollar depreciates by at least 25% in any one year combined with a 10% increase in the rate of depreciation.

⁽⁴⁾ See IMF (2006a).

Country	Type of debt crisis	General government debt/GDP (%)	Central government balance/GDP (%)	External debt/ GDP (%)	Exports/ GDP ^(a) (%)	Annual inflation rate (%)	Annual output growth (%)	Other types of financial crisis ^(b)
Argentina 2001	Post-default restructuring	63.1	-3.7	61.8	11.5	-1.1	-4.4	Banking and currency
Ecuador 1999	Post-default restructuring	101.2 ^(c)	-0.6	98.0	31.5	52.2	-6.3	Banking and currency
Indonesia 1998	Arrears	66.6	-2.2	155.5	46.0	58.4	-13.1	Banking and currency
Pakistan 1998	Pre-default restructuring	78.2	-6.7	56.2	15.9	6.2	3.1	None
Russia 1998	Post-default restructuring	75.4 (c)	-6.0	68.5	31.2	27.7	-5.3	Banking and currency
Ukraine 1998	Pre-default restructuring	37.6	-2.8	27.4	42.1	10.6	-1.9	Banking and currency
Uruguay 2001	Pre-default restructuring	39.1	-4.9	86.0	18.3	4.4	-3.4	Banking and currency
Memo: all EMEs, 200 of which:	5(d)	50.2	-0.8	26.9	43.2	5.4	7.2	
, Western Hemisphere	2	55.0	-2.1	33.3	23.4	6.3	5.3	
Developing Asia		60.2	-2.0	15.4	50.3	3.6	8.6	
Central and Eastern	Europe	46.5	-3.1	49.8	45.6	4.8	4.3	
Middle East		33.5	5.9	36.1	56.9	8.4	5.9	
Africa		59.2	1.3	35.2	38.5	8.5	5.2	

Table B Economic indicators in the year of onset of recent sovereign debt crises in selected countries

Source: IMF

(a) Exports of goods and services

(a) Explore or goods and service.
 (b) Within two years before or after the sovereign crisis.
 (c) Public sector debt.
 (d) Excludes the Newly Industrialised Economies (Hong Kong, Korea, Singapore and Taiwan).

Chart 1 Debt/GDP and bond spreads, averages, 2003–05(a)

Past-defaulters Non-defaulters





(b) External debt



Sources: IMF and JPMorgan Chase & Co.

(a) Government and external debt are end-year averages. Bond spreads are averages of daily data. Past-defaulters are countries listed as having a history of defaulting in two of the three studies in Table A. Non-defaulters are countries not listed in any of the three studies.

Chart 2 Debt/GDP and credit ratings, averages, 2003–05(a)



- Non-defaulters
- (a) Government debt

Government debt/GDP, per cent 160 140 Argentina 4 120 Philippines Singapore 100 ۲ India 80 Malaysia 1orocco Indonesia ٠ 60 Hungary Brazil Venezuela Ecuador 🔶 Peru Bulga 40 Russia Tai Czech Rep. Egypt -i 20 Chile 🔶 China Latvia 0 BB CCC+ AA+ A



Sources: IMF and Standard and Poor's.

(a) Government and external debt are end-year averages. Credit ratings are averages of monthly data.

bond spread/lower credit rating than non-defaulters in recent years. Furthermore, some past-defaulters, such as Mexico and Russia, have a higher bond spread and lower credit rating than non-defaulters, such as Hungary and Malaysia, even though these past-defaulters have lower external and government debt (relative to GDP) than these non-defaulters. This suggests that default increases the cost of obtaining external finance in the future.

Chart 3 shows that a much higher proportion of sovereign debt — issued both domestically and abroad — is denominated in foreign currency in past-defaulters than in non-defaulters. Similarly, Reinhart *et al* (2003) report that, on average over the 1996–2001 period, some 16% of domestic government debt outstanding was denominated in foreign currency in previous defaulters, but almost none in non-defaulters, in their sample. This might reflect the past strong association between debt and currency crises (discussed below), which has increased the perceived foreign currency risk of investors — whether foreign or domestic — buying sovereign debt denominated in the domestic currencies of past-defaulters.

Chart 3 Share of sovereign debt denominated in foreign currency (per cent of total marketable sovereign debt),^(a) end-2004



Source: Jeanne and Guscina (2006)

(a) Issued both domestically and abroad. Note that all the past-defaulters in the chart defaulted at least 20 years ago, suggesting that most, if not all, of the current debt stock was issued after their default.

For countries that restructure their debt the terms and conditions offered to creditors subsequently can vary markedly. The size of haircuts imposed on creditors in recent restructurings are plotted against current credit ratings and bond spreads in **Charts 4 (a)** and **(b)** respectively. Countries that recently restructured their debts before defaulting imposed much smaller haircuts on their creditors than those which restructured after defaulting. This might reflect the desire of these countries to avoid the costs associated with default and therefore their greater willingness to reach a deal with creditors. However, the size of haircut does not seem to be an important determinant of current credit ratings. Since

Chart 4 Market-based measures of credit risk for recent debt restructurers, end-2005









credit ratings measure the likelihood of default rather than expected loss given default (ie they do not take into consideration the likely recovery rates) this is perhaps not surprising. But there is some evidence that current bond spreads are correlated with past haircuts. For example, current spreads are still much higher in Argentina and Ecuador where the haircuts were large — than, say, Uruguay where they were small, despite all these countries having similar credit ratings.⁽¹⁾

Measures of the broader financial costs of debt crises

Despite research pointing to the importance of output losses as a reason why sovereigns would want to avoid defaulting, there have been few studies that have sought to quantify directly the losses following sovereign defaults. This gap in the literature is even more surprising given that similar studies have now been carried out extensively for banking and currency crises and their combination — so-called 'twin crises'

But note that, following the recent marked rise in oil prices, sovereign spreads in Russia have fallen to very low levels despite the large haircuts imposed during its sovereign default in Autumn 1998.

(see for example Kaminsky and Reinhart (1999), Aziz *et al* (2000), Bordo *et al* (2001), Hoggarth *et al* (2002) and Cerra and Saxena (2005)).

This article attempts to fill this gap. As indicated in **Table A**, a sovereign default episode is defined as occurring when either (i) the sovereign's arrears on principal are 15% or more of the total outstanding debt owed to the external private sector; (ii) arrears on interest payments are 5% or more; or (iii) a rescheduling agreement is reached with foreign private sector creditors.⁽¹⁾ Output losses are then estimated as the cumulative difference during the debt crisis period between actual GDP and estimates of what it would have been in the absence of a default.

Having defined the episodes of default, there are two crucial measurement questions — defining the beginning and end year of the default period and estimating the output counterfactual. For countries that fall into default, arrears usually build up gradually (and fall gradually after reaching a peak). Having identified the default episodes, the beginning of the crisis is defined as the first year in which arrears on principal or on interest payments rise above 5% and $1^{1}/_{2}$ % respectively of outstanding debt (or when an actual restructuring begins).⁽²⁾ The end of a (high arrears) crisis period is more difficult to pinpoint precisely so alternative specifications were considered.⁽³⁾ But for all variations of the assumed end-point, crises were found, on average, to be long-lasting. For the main output counterfactual (in the absence of a crisis) it was assumed that output would have followed its pre-crisis trend (where the trend is measured using a Hodrick-Prescott (HP) filter on the available past GDP data). As a check on the robustness of the results, an alternative output counterfactual was also derived based on a conventional equation estimated to explain (per capita) output growth.⁽⁴⁾ This method produced qualitatively similar results.

Table C shows estimates of output losses under these assumptions. The estimated average cumulative output loss of the sample increases with the length of crisis given that actual output remains below its counterfactual during most if not all of the crisis period.⁽⁵⁾ Output losses are therefore shown on a per annum basis.

A number of features are suggested by **Table C**. First, output losses in the wake of sovereign default appear to be very large — around 7% a year on the median measure — as well as long-lasting.⁽⁶⁾ However, the counterfactuals could overstate the path of output in the absence of the debt crisis, because it is difficult to separate completely the loss due to default *per se* from the loss caused by the economic shock that triggered the default. Therefore, more weight should be attached to the relative costs from different types of crises than to the absolute estimates.

Table C Output losses (per year) during sovereign crisis, 1970–2000 1970–2000

Type of sovereign default	Number of crises	Average median length of crisis (years)	Median loss, per year ^(a)	Mean cost per year ^(a)
Default only	4	3	-5.2 ^(d)	-1.0 ^(d)
Default and currency crisis ^(b)	13	5	6.5	10.3
Default and banking crisis ^(b)	7	8	10.8	13.2
Triple crisis ^(b)	21	10	22.1	21.7
All crises	45	8	6.9	15.1
Restructured debt ^(c)	15	8	2.8	8.3
Unrestructured debt	30	8.5	10.9	18.5

(a) Cumulative difference per year between potential and actual output. Potential output is based on the country's pre-crisis (HP filter) trend.

(b) Defined as when a currency or banking crisis occurs at some point during the duration of the sovereign crisis. Currency and banking crises are defined as in footnote 3 on page 300 above.
 (c) Includes both pre and post-arrears restructurings.

(d) A negative 'cost' implies that actual output was higher during the crisis than suggested by its pre-crisis trend. Note, however, the small sample of default-only crises.

Second, sovereign defaults rarely occur in isolation — in less than 10% of the sample. More often, a debt crisis coincides with a banking and/or a currency crisis. In fact, almost one half of the sample consists of triple (sovereign, banking and currency) crises. In these cases output losses appear to be particularly high — here the interactions between different sectors of the economy accentuate the decline in GDP. The box on page 304 describes how these linkages played out in the recent triple crisis in Argentina.

Third, output losses from twin crises appear to be bigger when a debt crisis is accompanied by a banking rather than a currency crisis. Banking crises often result in a sharp and prolonged reduction in the intermediation of credit to the private sector, with significant costs to economic efficiency. A currency crisis involving a sharp depreciation of the domestic currency, by contrast, has the silver lining of stimulating exports. In fact, in two thirds of the sample the share of domestic demand in total final expenditure falls during the crisis period (ie the share of exports increases).

Fourth, the output losses per year tend to increase with the length of crisis.⁽⁷⁾ This suggests that the longer that it takes to

- (6) These median output losses per year are about 2 percentage points bigger than the estimates of banking crises losses reported in Hoggarth *et al* (2002).
- (7) A simple regression shows that the length of crisis has a positive and statistically significant effect at the 5% level on output losses per year using either the trend or the model-based estimate of the GDP counterfactual.

⁽¹⁾ The higher threshold for arrears on principal than on interest payments is because, according to World Bank estimates, sovereign arrears on principal have been, on average, two to three times larger than on interest payments since 1970. The authors show that the probabilities of breaching these thresholds are low.

⁽²⁾ This was checked for consistency with other studies which include definitions of the start of debt crises.

⁽³⁾ For example, as soon as arrears on principal fall below 15% or arrears on interest payments below 5%, or when arrears fall below 5% on principal or below $1^{1}/_{2}$ % on interest payments. Other things being equal, the first definition will clearly imply a shorter crisis period than the second one.

⁽⁴⁾ This is based on a panel regression of the crisis countries over the 1970–2000 period. GDP growth per capita was found to be a negative function of the initial level of GDP, price inflation, the share of government consumption in GDP and political instability and a positive function of the investment share in GDP and trade openness.

⁽⁵⁾ In fact, output did not return to its pre-crisis trend at all during the crisis period in 60% of the sample.

Argentina's triple financial crisis

The recent crisis in Argentina is a good example of how interactions between sectors of the economy can greatly increase the costs of debt crises.⁽¹⁾ Argentina eventually defaulted on its sovereign debt in January 2002 (following two debt exchanges in June and November 2001). Before this — as the economy moved into recession — the government's fiscal deficit and debt position deteriorated markedly. This dramatically increased the interest rate spread — over US Treasuries — on external sovereign debt, from less than 10 percentage points at end-2000 to almost 50 percentage points by end-2001.

The government consequently increased its reliance on financing its deficit from domestic banks. Government debt rose as a share of the banking system's total assets from $15^{1}/_{2}\%$ at end-2000 to $21^{1}/_{2}\%$ at end-2001, exposing especially some of the largest banks.⁽²⁾ This increased significantly the banking system's credit risk.⁽³⁾ In addition, the voluntary debt exchanges in June and November 2001, which lengthened the maturity of domestic financial institutions' claims on the government, increased the maturity mismatches on banks' balance sheets. The consequential weakening of the banking system resulted in episodic deposit withdrawals throughout 2001, culminating in a massive outflow in late November (bank deposits fell by 20% in the year to end-November). A series of restrictions ('corralito') on bank withdrawals were introduced in December.⁽⁴⁾

In early January 2002, the (new) government confirmed that it was defaulting on \$81.8 billion of its external debt and simultaneously announced it was abandoning the currency board exchange rate regime. The peso quickly fell from its convertibility rate of 1 peso per US dollar to a low of 3.9 pesos per dollar at end-March 2002. Given that most liabilities in the economy were denominated in US dollars, this resulted in a large increase in debts when measured in local currency terms. In February 2002, in order to protect corporate and household dollar borrowers from valuation losses, the government announced that banks' foreign currency assets held with the domestic private sector were to be converted into pesos not at the (much depreciated) market exchange rate but at the currency board rate of 1 peso per US dollar. In contrast, banks' foreign currency liabilities were converted at 1.4 pesos to the US dollar. This 'asymmetric pesoization' passed the losses, which at 28 billion pesos were greater than the entire capital of the banking system, onto banks and their depositors. However, some depositors were able through court action ('amparos') to release their deposits at the current market exchange rate rather than at 1.4 pesos to the dollar. This increased banks' losses by an estimated further 8.8 billion pesos.⁽⁵⁾

These measures severely impaired the banking system's role of providing liquidity and credit to the economy. Bank credit to the private sector as a proportion of annual nominal GDP halved between end-2001 and end-2003 from 20.8% to 10.8%.⁽⁶⁾ This reduced economic activity further and consequently increased the government's fiscal burden relative to GDP. And banks' non-performing loans rose sharply as the recession deepened.

The government's main strategy to deal with insolvent banks was regulatory forbearance — on capital requirements and bad loan classification.⁽⁷⁾ This allowed the banking system to recover gradually. Nonetheless, the government partially compensated banks for their losses by issuing government bonds to them. This — together with private sector creditors choosing to pay off their foreign currency loans at the much more favourable pre-crisis exchange rate — resulted in the share of government assets in banks' balance sheets rising to almost 50% by end-2003.

This interaction of the sovereign default with a loss of banking intermediation contributed to the marked fall in GDP — by almost one quarter between 2001 Q2 and 2002 Q1.





(a) Sovereign default announced.

- (1) For lessons learnt from the crisis see IMF (2004) and Daseking et al (2004) and for a
- blow-by-blow account of the crisis see Blustein (2005). 2) In fact, the share of banks' assets with the government had edged up throughout th
- (2) In fact, the share of banks' assets with the government had edged up throughout the second half of the 1990s, from around 10% at end-1994. These figures also understate the banks' overall exposure to the government. For example, at the end of 2000 the banks invested a further \$25.2 billion (18% of GDP) in other financial instruments that had government debt as the underlying asset.
- (3) In addition, all bank credit to the government and around 80% of credit to the private sector was in foreign currency. Given that the income streams of the government and the non-bank private sector were mainly in pesos, this foreign exchange risk for bank borrowers translated into a credit risk for the banking system.
- (4) In the Asian crisis, in contrast, bank runs had been contained through the government introducing a blanket guarantee to depositors. However, in Argentina the government's policy options were constrained because of the weakness of its own balance sheet.
 (5) IMF (2005).
- (6) In the run-up to the crisis, during 2001 credit fell from 23.9% to 20.8% of GDP.
- (7) In the immediate aftermath of the crisis the Central Bank of Argentina also played an important role in providing lender of last resort assistance to the financial system.

reduce arrears or complete a restructuring, the more output falls (relative to its trend or potential). Crisis countries that reschedule their debts, however, appear to face smaller output losses than those which do not. Moreover, using the model-based estimate of the output counterfactual, and bearing in mind the limited available sample of countries, recent Bank work suggests that pre-arrears restructuring is associated with a smaller fall in output — both cumulatively and on an annual basis — than post-arrears restructuring.⁽¹⁾ This suggests that countries that reschedule their debts - and thus start afresh with creditors — face a lower subsequent cost of finance and/or quicker renewed access to external finance. It might also indicate that an active policy of rescheduling has a less debilitating impact on the domestic financial system than a passive policy of remaining in arrears and not restructuring.

Conclusion and policy implications

This paper has assessed the size and types of costs associated with sovereign default. The literature highlights a number of potential channels through which sovereign debtors incur costs through defaulting. Some of these costs are imposed by creditors, involving in particular a reduction in access to, or an increase in the cost of, future finance. In practice, in the aftermath of recent debt crises, EMEs have often been able to reaccess international capital markets quite quickly, although there is some evidence that they have had to pay a higher risk premium and been less able to issue in domestic currency, thereby increasing their vulnerability to currency risk. There has been less focus in the literature on the broader output costs to the domestic economy associated with sovereign default and on the interaction with currency and banking crises. In practice, most sovereign crises over the past 25 years have been associated with a banking and/or a currency crisis. Sovereign defaults appear to have the biggest impact on domestic output when they are combined with widespread failure of the domestic banking system and particularly when there is a triple (sovereign, banking and currency) crisis. And in some cases, such as following the Latin American crisis in the early 1980s and the more recent Russian crisis, sovereign defaults have precipitated broader instability in the global financial system.

Given that the costs of sovereign default appear to be high, one obvious but nonetheless important policy conclusion is that countries should take measures to reduce the risk of defaulting in the first place. At a broad level, authorities need to adopt sound macroeconomic policies and structural reform which should reduce the likelihood of crises as well as raise sustainable output growth. More specifically, the high cost of default points to the need for further development of early warning systems of crisis. The IMF has a role to play here in carrying out stress tests of the fragility of the government's balance sheet and those of other sectors in its regular Article IV surveillance. This type of analysis should allow authorities time to change domestic policies and therefore reduce the likelihood of crisis. It also emphasises the need for countries themselves to self insure against the possibility of crises. Many EMEs have done this in recent years through building up foreign exchange reserves and reducing their reliance on foreign currency and short-term debt. This has reduced the likelihood of currency crises in particular. But government debts (relative to GDP) remain high in many EMEs and are often still significantly financed by the domestic banking system.⁽²⁾ This makes the latter vulnerable to sovereign weakness (and potentially *vice versa* if governments bail out weak banking systems).

Once in crisis, annual output losses seem to increase the longer that countries stay in arrears or take to restructure their debts. There is also evidence that output losses are smaller for countries that restructure their debt than for those that do not. This emphasises the importance of recent market-based policy initiatives aimed at improving the speed and efficiency of debtor-creditor restructuring.⁽³⁾ It also highlights the need for better data transparency. In a recent survey, the Institute of International Finance (2005) emphasised the still marked cross-country differences in data transparency and investor relations.

The IMF could have a role to play in improving information in the midst of a crisis, as well as in advance of one, through publishing independent country debt sustainability analysis. But whether or not the IMF should lend following a default depends on whether this would reduce the costs of default without weakening the incentives of the debtor to repay and/or restructure its outstanding debt. Given that default costs look high, especially when a banking crisis also occurs, IMF lending could be used to support the domestic authorities' provision of liquidity to the domestic banking system, although this would need to be done promptly and for a limited time.⁽⁴⁾

The IMF could also play a role in encouraging restructuring, for example by making its provision of liquidity support conditional on the debtor reaching a restructuring agreement with its creditors within a given time period.⁽⁵⁾ This highlights the importance of a rigorous application of the IMF's exceptional access framework, which guides its lending decisions to countries experiencing capital account crises.

⁽¹⁾ The reduction in output loss averages 10% a year and is significant at the 5% confidence level. But note that no difference in output losses associated with pre and post-arrears restructurings is found when the trend-based estimate of the output counterfactual is used. The IMF (2006b) also find in recent restructurings that post-defaulters had bigger recessions than pre-defaulters.

⁽²⁾ See IMF (2006a), Chapter III.
(3) See Bedford *et al* (2005).

⁽⁴⁾ Hoggarth et al (2004) provide evidence that open-ended (central bank) liquidity support to the banking system during past banking crises has been associated with bigger rather than smaller output losses.

⁽⁵⁾ See Tanaka (2005).

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UK export performance by industry

By Ana Buisán of Banco de España and David Learmonth and María Sebastiá-Barriel of the Bank of England's Monetary Analysis Division.

The United Kingdom's export market share has declined steadily for a number of years, both in aggregate and in many industries within the manufacturing sector. A major determinant of demand for an industry's exports is the price of those exports relative to the prices of international competitors. This article shows that UK export prices tend to follow the prices set by foreign competitors quite closely, when expressed in a common currency. So, for many exporters, a dominant depressing influence on market share over the past decade was the significant appreciation of the sterling exchange rate in the late 1990s. But other factors also played a role. In particular, a number of high-tech UK industries have been able to increase their market shares, perhaps reflecting a greater ability to differentiate their products from those of their competitors.

Introduction

When setting interest rates, the Monetary Policy Committee (MPC) focuses on the balance between the demand for UK goods and services, and the capacity of the UK economy to supply them. An important source of demand for UK products comes from overseas — UK exports account for over a guarter of UK GDP. So understanding the determinants of UK exports is important in order to understand the demand for UK goods and services.

A key factor that affects the demand for UK exports is world demand, and in recent years strong growth in world trade has supported UK export growth. However, over the past 25 years as a whole UK export volumes have risen less rapidly than world exports, such that ratio of UK export volumes to world import volumes has fallen by 23% since 1980 and by 15% since 1990 (Chart 1). This has been much more pronounced than the decline in the ratio of UK GDP to world GDP, which has fallen by 8.0% since 1980 and 6.5% since 1990.⁽¹⁾

What explains these movements in the United Kingdom's export share? To some extent, global factors have been at work: advanced economies have tended to lose market share directly because of greater competition from lower-cost industrialising economies such as China, India and those in Eastern Europe. And the recent acceleration in world trade, much of which has come from Asian countries, has consisted disproportionately of intra-regional trade within Asia.⁽²⁾

There have also been UK-specific factors. Some of these have affected all UK exporters to a greater or lesser extent, notably





the sharp appreciation of sterling in the mid-to-late 1990s. But there have been significant differences across sectors. And there have also been differences within sectors, most notably in manufacturing, where the fall in export share has been more pronounced than in services. Chart 2 shows movements in UK exports and world imports across manufacturing industries between 1991 and 2001,(3) and the corresponding change in UK export market shares (the red diamonds). Market share fell in many industries; but in three of the twelve UK industries -

⁽¹⁾ In Chart 1, world GDP and trade are calculated using real GDP and import volumes, and aggregated using UK export share weights. According to IMF data, the UK value share of world imports was 3.5% in 2005. See for example Bank of England (2004), pages 19–20.

⁽³⁾ These were the latest industry-level data available at the time this analysis was conducted

pharmaceuticals, computers, and communication equipment — export growth not only matched the growth in world trade, but actually exceeded it, increasing the UK market share of those industries.⁽¹⁾

Chart 2 Change in export market share for manufacturing industries (1991–2001)^(a)



(a) In volume terms. Industry abbreviations are shown in Table A.

Table A Industry abbreviations

Ph	Medical and pharmaceutical
Comp	Office machinery and computers
Comm	Radio, TV and communications
OTr	Non motor vehicle transport equipment
Sci	Scientific and photographic appliances
Ch	Other chemicals
Me	Mechanical engineering
EMa	Electrical machinery
Veh	Motor vehicles
Mat	Material manufactures
Cloth	Clothing and footwear
Other	Other manufactured articles

This article examines the differences in export performance across UK industries, and compares those industries to their US and euro-area counterparts.⁽²⁾ First, the article briefly describes the industry-level data set, drawing a particular distinction between high and low-tech industries. Second, it discusses how movements in relative export prices - the difference between the price of UK exports and the price of foreign exports — could affect industries' exports. It considers why firms in different industries, but in the same country, might have different degrees of price-setting power, and what characteristics make the demand for an industry's goods particularly sensitive to such relative price changes. Finally, the article looks at non-price factors that are likely to have affected export performance, and examines why three of the twelve UK industries saw an increase in their export market share in the 1990s, while the market share of other industries fell.

The data set

This article draws on a disaggregated exports database covering twelve manufacturing industries. It includes quarterly data on world imports, world export prices and unit labour costs for manufacturing industries from 1991 to 2001 for the United Kingdom, the euro area and the United States.⁽³⁾ The database was specially constructed for this purpose, since disaggregated data on world export volumes are not readily available.

Table B Technological intensity by industry (in 1999)							
Aggregate R&D spending as a percentage of:	Production	Value added	Memo: Share of industry in UK manufacturing				
High-tech industries							
Medical and pharmaceutical (Ph)	10.5	22.3	4.3				
Office machinery and computers (Comp)	7.2	25.8	8.7				
Radio, TV and communications (Comm)	7.4	17.9	10.3				
Non motor vehicle transport equipment (C) Tr) 4.4	12.4	4.2				
Scientific and photographic appliances (Sci) 9.7	24.6	4.9				
Medium-tech industries							
Other chemicals (Ch)	2.9	8.3	12.3				
Mechanical engineering (Me)	2.2	5.8	15.6				
Electrical machinery (EMa)	3.6	9.1	4.8				
Motor vehicles (Veh)	3.5	13.3	10.1				
Low-tech industries							
Material manufactures (Mat)	0.6	1.4	15.0				
Clothing and footwear (Cloth)	0.3	0.8	2.4				
Other manufactured articles (Other)	0.5	1.3	7.5				

Note: Based on data for twelve OECD countries: the United States, Canada, Japan, Denmark, Finland, France, Germany, Ireland, Italy, Spain, Sweden, and the United Kingdom. Aggregate R&D intensities calculated after converting countries' R&D expenditures, value added and production using purchasing power parity (PPP) measures.

Source: OECD.

A key distinction in the analysis is between high, medium and low-tech industries. **Table B** outlines the technology intensity of each industry, as proxied by the share of measured research and development (R&D) spending in total production and in value added across twelve OECD countries. It suggests that five of the twelve industries can be broadly grouped together as 'high-technology' sectors. Notably, the three UK industries that increased their market share in the 1990s (**Chart 2**) are all in this group. The final column shows the importance of each industry in UK manufacturing: together, the five high-tech industries account for around a third of UK manufacturing output.

⁽¹⁾ A UK industry is said to have gained market share when UK exports have grown by more than world imports (weighted by UK export shares). The world imports series was constructed using data from the World Trade Organisation and consists of annual imports of various regions from the world across different sectors between 1990 and 2002 in millions of US dollars. The regions are: North America, Latin America, Western Europe, Central and Eastern Europe, Africa, Middle East, and Asia. The short time period used is due to the availability of disaggregated international trade data.

⁽²⁾ Note that a UK industry will include both UK-owned and foreign-owned companies based in the United Kingdom. Similarly, UK-owned companies in the euro area will be included in euro-area industrial data, rather than UK data.

⁽³⁾ For a full description of the data set see Buisán et al (2005).

The determinants of export demand

Other things being equal, the demand for UK exports ought to increase in line with income in the rest of the world. But the two series do not increase in lockstep with each other. Other factors are also important, particularly the common-currency price of UK exports relative to the price charged by competing exporters from the rest of the world. This is called the relative export price. A fall in the relative price of exports could reflect a number of factors, including a reduction in production costs or a depreciation of the domestic exchange rate. Competing exporters from other countries producing identical goods but at a lower relative export price should receive a larger share of global spending. So, other things being equal, the demand for exports ought to be negatively related to the relative export price.

Of course, all other things are not always equal, and there are a number of non-price considerations that also influence market share.⁽¹⁾ The following sections consider relative export prices in some detail, and then turn to non-price considerations.

Relative export prices

Chart 3 shows the change in market share in each of our twelve industries since 1990, alongside movements in the relative export price. As anticipated, it suggests that in many industries there is a relationship between price competitiveness — where a fall in relative prices implies a gain in price competitiveness — and market share. In particular, the three industries in which the United Kingdom has gained market share - pharmaceuticals, computers, and communication equipment — are the same three that display falls in relative export prices, or a notable improvement in price competitiveness. Importantly, across industries price competitiveness deteriorated by less than the appreciation of sterling in 1996–97 would imply on its own. That suggests that UK companies managed to reduce costs and squeeze margins, at least to some extent, in order to remain as competitive as possible.

It is important to note that the measure of market share used here (and in the later estimations) shows UK exports in each industry as a proportion of the level of world imports in each industry. A better denominator could be something more akin to world industrial production in each industry. The difference between the two can be demonstrated by their treatment of intra-regional trade. World trade has become more regionally integrated over the past two decades, particularly within Asia. This tends to increase world imports but not UK exports (or those of other developed economies), mechanically reducing the United Kingdom's market share. But if this intra-regional trade has partly substituted for domestic production within individual Asian countries, as is likely, then world industrial production would have risen by less than world imports. That would make the fall in UK market share less pronounced when measured as a proportion of world industrial production, rather than as a share of world imports. This caveat must be borne in mind when examining our empirical results.

Chart 3 raises two further issues: why have movements in relative export prices differed so sharply between industries? And is demand in some industries more price-sensitive than in others? These questions will be examined in turn.

Explaining relative price changes: some stylised facts

There are two key factors that influence the price charged by exporting companies: the price charged by competitors; and the domestic costs of production. The UK exporter's price should be positively related to its competitors' prices, as an increase in foreign prices allows UK firms to increase their export prices without losing market share. Likewise, in the case of a sterling exchange rate appreciation that reduces the effective sterling price of competitors' products, the UK exporter may have to reduce its export prices in sterling terms if it wants to maintain price competitiveness in foreign markets. But UK exporters' prices will also need to reflect their own costs to some degree. The extent to which prices reflect domestic costs or competitors' prices is partly influenced by the degree of competition and product differentiation in each market. An exporter who is able to pass a substantial proportion of rises in domestic production costs (or any appreciation in sterling) on to their customers in higher export prices is said to have a degree of 'pricing power'.⁽²⁾

Charts 4 and **5** provide some evidence on the degree to which firms in different industries have any price-setting power. The charts show how closely export prices have moved with competitors' prices and unit labour costs (total wages and salaries divided by output) in the past. They measure simple correlations in the data, calculated by regressing export prices on unit labour costs and competitors' export prices, with the coefficients summing to unity (so by construction **Chart 4** is the inverse of **Chart 5**). As such, they do not tell us anything about the structural nature of price-setting. Estimates range from zero — in the centre of the circle — to one.

The results are quite striking. They show clearly that, in most UK industries, export prices have moved much more closely with foreign competitors' prices (the blue line in **Chart 4**) than with changes in the cost of production (the blue line in **Chart 5**). Note that this does not imply that costs are unrelated to prices: if the sterling exchange rate were to

These could include, for example, the relative quality of exports, efficiency in meeting delivery times, or credit guarantees. Unfortunately, these factors are not easy to quantify across industries and countries.

⁽²⁾ In both instances a profit-maximising firm will seek to earn a mark-up over costs. But the sensitivity of its price to those costs, versus the sensitivity of its price to foreign prices, can vary. See Ellis and Price (2003) for more details.

Chart 3 Market share and relative export prices across UK industries^(a)

(i) Medical and pharmaceutical



(iv) Non motor vehicle transport equipment



(vii) Mechanical engineering



(x) Material manufactures



(ii) Office machinery and computers



(v) Scientific and photographic appliances



(viii) Electrical machinery



(xi) Clothing and footwear



(iii) Radio, TV and communications



(vi) Other chemicals



(ix) Motor vehicles



(xii) Other manufactured articles



(a) The relative export price for an industry is defined as the sterling UK export price divided by the sterling 'world' export price in that industry. The 'world' export price for an industry is calculated by weighting individual countries' export prices in that industry. The that industry together using shares in export values. The data for industrial export prices are taken from the OECD International Trade by Commodity Statistics database in the form of industrial annual export values and volumes in dollars over the period 1991–2001: so world export prices are effectively unit value indices. The countries are those in the euro area, Canada, China, Denmark, Hong Kong, Hungary, Japan, Poland, Sweden, Switzerland, Turkey, the United States and the United Kingdom.

appreciate, for example, UK companies could maintain prices in foreign currency terms and seek to rebuild margins by adjusting costs, rather than (effectively) raising their export prices and losing competitiveness. By contrast, there is more diversity among euro-area and US industries (the orange and red lines respectively). In several cases in these regions, prices are more closely related to production costs than competitors' prices, consistent with a greater degree of price-setting power.





Note: Charts 4 and 5 are constructed by regressing export prices on unit labour costs and competitors' export prices, with the coefficients summing to unity. Industry abbreviations are shown in Table A.

Chart 5 Co-movement of export prices and unit labour costs by industry



Note: Charts 4 and 5 are constructed by regressing export prices on unit labour costs and competitors' export prices, with the coefficients summing to unity. Industry abbreviations are shown in Table A.

What might explain the differences in pricing power across industries and countries? The following sections examine two factors in particular: the size of UK industries relative to their foreign counterparts; and the openness of each industry.

Industry size

The relative size of a country's industry could affect its pricing power — for example, the larger a UK industry's international market share, the more pricing power UK companies in that industry could have. This would imply that larger industries in larger countries may be less sensitive to competitors' prices, and would have greater ability to pass on their domestic production costs. Empirical evidence tends to support this view. For instance, Goldstein and Khan (1985) find that firms in smaller, more open economies appear to set prices in line with those of their competitors, while firms in larger, less open economies are more inclined to price in line with domestic costs.

Table C shows the share in world exports that each country accounts for, by industry. UK manufacturing industries account for a much smaller share of most international markets than either euro-area or US industries. Four UK industries account for more than a tenth of world exports in their markets, but none accounts for more than a fifth. The United States and euro area, by contrast, are among the top two exporters across most industries. Given this, UK exporters might be expected to be more sensitive to the prices set by their larger competitors, while US and euro-area industries can pay more attention to their own costs when setting prices. This is consistent with **Charts 4** and **5**.

Openness

Openness — taken here to reflect the importance of trade in production and demand — could also affect the degree of pricing power that exporters have. More open industries are likely to be more competitive industries — so the more open an industry is to international competition, the more firms in that industry may be forced to set prices in line with their competitors. Markusen (1981) and Helpman and Krugman (1985) both point to openness as a trigger for competition, as price mark-ups tend to be smaller when the number of competitors is higher. UK exporters operating in open industries would, other things being equal, therefore tend to have less price-setting power than those UK exporters operating in less open industries.

Table D presents measures of international openness for each of the twelve UK industries: the share of imports in total domestic demand; the share of exports in domestic production; and an average of these two series, which are used here as a summary 'openness' indicator. For most industries, the import penetration ratio is similar to the export share of production. The main exception is the clothing and footwear sector, where import penetration is much higher than the export share of production. This is unsurprising, given the increasing importance of low-cost overseas producers in this industry.

Per cent													
	Ph	Comp	Comm	OTr	Sci	Ch	ME	EMa	Veh	Mat	Cloth	Other	
Canada	1.5	2.9	3.7	5.9	2.0	4.5	4.0	2.5	14.3	8.0	1.2	4.4	
China	2.8	6.4	9.3	1.8	4.3	3.3	2.1	5.3	1.1	8.0	30.7	12.9	
Denmark	4.2	0.6	1.3	1.1	1.2	1.1	1.8	0.7	0.3	1.3	1.5	2.5	
Euro area	33.4	18.5	14.2	20.9	17.6	34.1	26.9	18.9	29.8	30.9	21.0	23.4	
Hong Kong	1.6	7.7	13.0	0.4	9.7	3.8	2.5	8.7	0.8	7.2	24.7	15.1	
Hungary	0.6	1.0	1.1	0.1	0.2	0.5	0.7	0.8	0.4	0.6	1.3	0.5	
Japan	3.6	22.8	23.1	11.8	20.5	10.9	20.2	25.3	26.5	11.2	0.5	6.1	
Poland	0.4	0.0	0.4	1.2	0.1	0.7	0.5	0.6	0.6	1.6	1.9	1.4	
Sweden	5.2	0.7	6.0	1.3	1.6	1.3	3.0	1.6	2.6	4.2	0.5	2.0	
Switzerland	15.2	0.7	0.6	0.9	8.5	5.1	4.4	2.1	0.3	3.1	0.7	3.7	
Turkey	0.2	0.0	0.4	0.3	0.0	0.4	0.2	0.3	0.3	1.7	5.1	0.4	
United Kingdom	15.3	11.8	9.1	11.2	8.9	11.0	9.6	7.1	6.6	8.5	4.3	8.7	
United States	16.1	27.0	17.6	43.1	25.3	23.5	24.1	26.2	16.3	13.7	6.5	18.9	
World	100	100	100	100	100	100	100	100	100	100	100	100	

Table C World export shares by industry and country^(a)

Source: OECD

(a) The data are averages over the period 1991–2001. The world is proxied by the sum of the individual countries in the table, and the two largest exporters in each industry are highlighted in red. Industry abbreviations are shown in Table A.

Table D International openness of UK industries(a)

	Import penetration ^(b)	Export share of production	'Openness' indicator ^(c)
High-tech industries			
Medical and pharmaceutical (Ph)	44.1	53.9	49.0
Office machinery and computers (Com	p) 90.6	89.2	89.9
Radio, TV and communications (Comm) 77.2	73.6	75.4
Non motor vehicle transport			
equipment (OTr)	58.8	64.5	61.7
Scientific and photographic			
appliances (Sci)	56.3	57.0	56.6
Medium-tech industries			
Other chemicals (Ch)	47.8	50.4	49.1
Mechanical engineering (Me)	50.5	52.9	51.7
Electrical machinery (EMa)	45.1	42.9	44.0
Motor vehicles (Veh)	54.5	45.6	50.1
Low-tech industries			
Material manufactures (Mat)	28.4	23.9	26.2
Clothing and footwear (Cloth)	51.9	35.5	43.7
Other manufactured articles (Other)	35.2	24.7	30.0

Source: OECD.

(a) Data are calculated as averages over the sample 1991-2001

(b) Share of imports in total domestic demand.(c) Average of import penetration and export share of production

Chart 6 presents the openness indicators across UK, euro-area and US industries. The chart shows that, in all three countries, high-tech industries (indicated by the yellow background) tend to be more open than low-tech industries.

Rank correlations can be used to examine the proposition that openness has a bearing on how firms set export prices. In the euro area, these indicate that exporters have less pricing power in those industries that are more open to international competition: the correlation between an industry's openness indicator (Chart 6) and its price responsiveness to competitors' prices (Chart 4) is significant and positive (0.71).⁽¹⁾ However, while industry openness appears to be important in the euro area, similar correlations were statistically insignificant for the United States and the United Kingdom.



Chart 6 Openness of industries across countries

Source: OECD

(a) Average of export share in domestic production and import share in domestic demand. Euro-area data include intra euro area trade.

The sensitivity of demand across industries

So far, this article has shown that relative price movements have differed markedly across industries, and has discussed

⁽¹⁾ To estimate rank correlations, industries are ordered by different factors (eg for the openness indicator in Table D, the ordering of UK industries would be: office machinery and computers; radio, TV and communications; non motor vehicle transport equipment; scientific and photographic appliances; and so on). Industries are also ordered according to their co-movement of their export prices with foreign export prices (Chart 4). Rank correlations are then calculated between these orderings (or rankings). By construction, these correlations fall between zero and one.

some factors that could drive those different movements. These same factors could also affect the sensitivity of demand to a change in prices — the price elasticity of demand. Changes in demand will also depend on changes in world income, but, again, the sensitivity of demand to income could vary across different products.

The price sensitivity of demand

One factor that may influence the price sensitivity of demand is openness. In principle, UK exporters with a higher exposure to international trade should find that the demand from abroad for their products is more sensitive to changes in their prices.

What support is there for this hypothesis in the data? **Table E** shows how a change in relative prices is estimated to affect export demand: 24 out of 36 UK, euro-area and US export industries display a significantly negative demand response to an increase in relative prices, based on simple regressions of export demand on relative prices and world income.⁽¹⁾

 Table E
 Percentage response of exports to a 1% change in relative export prices

	United Kingdom	Euro area	United States
High tech			
Ph	-2.2		
Comp	-0.5	-1.0	-2.5
Comm	-1.9	-1.3	
OTr		-2.4	
Sci	-1.4	-1.0	-0.5
Medium tech			
Ch		-1.4	
ME		-0.8	-1.3
EMa		-1.1	-1.1
Veh		-0.7	-1.4
Low tech			
Mat	-0.2	-0.8	-1.9
Cloth		-0.9	
Other	-0.4	-0.9	-1.0

Note: A blank entry means that relative prices were not found to be a statistically significant determinant of export volumes at the 10% level. Industry abbreviations are shown in Table A.

In the United Kingdom, changes in relative export prices have a significant effect on export volumes in six of the twelve industries. Rank correlations for UK data between openness (**Table D**) and the sensitivity of export demand to price (**Table E**) confirm a significant relationship: the correlation coefficient is -0.66.⁽²⁾ However, while the same rank correlations were negative for the euro area and the United States, they were statistically insignificant.

Interestingly, four of the UK industries where prices significantly affect volumes — pharmaceuticals, computers, communications and scientific equipment — are high-tech

industries, which tend to be more exposed to international trade (Table D).

The sensitivity of demand to overseas income

Previous work has highlighted the importance of product differentiation and technological competitiveness in explaining the growth in world trade (see Helpman and Krugman (1985) and Grossman and Helpman (1991)). In these studies, industries that produce a greater variety of differentiated goods (which high-tech industries tend to do) benefit more than others from an increase in foreign income, as people demand a greater variety of products as their income rises. So as income increases abroad, foreigners may spend a larger proportion of any increase on differentiated goods. Differentiation can be enhanced by patent systems, which are intended to protect innovative products, and brand image. Other things being equal, this relationship between product differentiation and export demand would show up as an increase in market share as income rises.

Chart 7 shows how closely export volumes move in line with changes in world demand, based on simple regression analysis.⁽³⁾ Where the responsiveness is greater than one, this suggests that, for a given change in relative prices, the industry's exports are likely to grow at a faster rate than world income, such that market share would increase. Similarly, market share might be expected to decline as world income rises where the response is less than one.

The chart suggests that there may be some relationship between technological intensity and the sensitivity of exports to world demand, at least in the euro area and the United Kingdom. Exports of high-tech industries in these countries appear to respond more vigorously to changes in world demand than low-tech exports. In contrast, US exports appear to have been more sensitive to world demand in the low and medium-tech industries. It is possible that these results are driven by specific goods within these sectors; unfortunately the sectoral disaggregation is not detailed enough to shed light on this. But the UK and euro-area results suggest that high-tech exports do respond more to changes in world demand, consistent with greater product differentiation in these industries than in their low-tech counterparts.

Once again, correlation analysis can test the relationship between technological intensity and the responsiveness of

⁽¹⁾ One technical consideration here is that domestic export prices — and hence relative export prices — could be endogenous: in other words, export prices are related to export volumes and associated production costs, and vice versa. That would create an identification problem. For the United Kingdom at least, this is probably not a significant problem, since evidence suggests that domestic export prices are effectively exogenous — or unrelated to costs — for UK exporters across industries (Charts 4 and 5). But this caveat is probably more important for the euro-area and US results, which should only be taken as indicative.

⁽²⁾ A larger negative coefficient in Table D indicates greater price sensitivity, so the negative correlation is consistent with more open industries having a greater sensitivity of export demand to prices.

⁽³⁾ Relative prices are controlled for by including them in the regression.

export demand to world income. **Chart 8** shows a significant positive correlation (0.74) between the responsiveness of UK exports to world demand and technology, as proxied by the intensity of R&D activity in production. The correlation is also significant in the euro area (0.73). These results are consistent with more product differentiation in high-tech than in low-tech industries. In turn, this lends support to the argument that technological intensity can affect market share **(Chart 2)**. This mechanism occurs over and above the impact of relative prices, and hence is consistent with the United Kingdom being a price taker **(Chart 4)**.⁽¹⁾





(a) Industry abbreviations are shown in Table A.

Chart 8 Technological intensity and the responsiveness of exports to changes in world demand



Conclusion

UK exports are a significant component of the demand for UK goods and services. Many UK manufacturing industries lost market share between 1991 and 2001 - or in other words, exports did not keep pace with world demand. The industry-level analysis presented in this article suggests that most UK industries are price takers, with very limited scope for passing changes in costs on to their foreign customers in higher export prices. This contrasts with the United States and the euro area, where companies appear to have more pricing power, perhaps reflecting the greater size of US and euro-area industries. It also implies that UK industries will be more sensitive than their US and euro-area counterparts to movements in exchange rates. In particular, in the face of a sterling appreciation UK companies are more likely to have to maintain their foreign currency prices and work to rebuild margins by adjusting costs, rather than change their export prices. This implies that there was limited scope for UK exporters to pass on the effects of sterling's appreciation in the mid-to-late 1990s on to their customers.

The disaggregated analysis in this article also reveals significant differences across UK industries. In particular, the three UK industries that increased their market share between 1991 and 2001 are all relatively technologically intensive. Although data suggest that these industries do not have materially more pricing power than other UK industries, their relative export prices did fall somewhat over the period, in contrast with other UK industries. There is also some evidence that higher technological intensity increases the responsiveness of demand in an industry to movements in world demand, perhaps by increasing the scope for product differentiation. So those high-tech industries may have been better placed to reap the benefits of the increase in world demand over the decade, thereby increasing their market share.

⁽¹⁾ There was no significant correlation between R&D intensity and demand responsiveness in the United States, which casts some doubt on the strength of this channel. But given the range of responses of exports to world demand across industries (Chart 7), this was unsurprising.

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Elasticities, markups and technical progress: evidence from a state-space approach

Summary of Working Paper no. 300 Colin Ellis

UK monetary policy is concerned with keeping inflation — the rate of increase in prices — on target at 2% a year. So it is important for policymakers to consider how firms set prices. Typically, economists work with models that assume companies set their output prices as a markup over marginal cost — that is, the cost of producing an extra unit of output.

In most economic models, that markup is assumed to be fixed, at least on average over a long period of time. But in practice, it is possible that the markup could have changed over time, for example if competition between companies becomes more intense. At the same time, standard economic models often impose an assumption about production technology: in particular, how easy companies find it to swap between machines (capital) and workers (labour) when they produce their output. This is called the elasticity of substitution in production. In fact, any assumption about the markup will affect the estimated elasticity of substitution in a model, and *vice versa*.

This paper proposes a new approach, where the markup and elasticity are jointly estimated. In particular, the markup is allowed to (potentially) vary over the past 30 years. The model is estimated using so-called 'state-space' techniques, which allow the unobserved markup to be modelled using UK data on prices, wages and other macroeconomic variables. The estimation results are very different from what standard approaches find — in particular, the state-space approach suggests that the aggregate markup in the UK economy has fallen by around a quarter since the early 1970s, and that firms find it harder to swap between capital and labour than is often assumed. In addition, the model also lets technical progress in the economy — a gauge of the efficiency with which firms use capital and labour to make output — be estimated in a more realistic manner than in most models. This turns out to be crucial — the usual approach in other work, of simply including a time trend in the model, is shown to give misleading results.

The key results from using the state-space model are robust to a number of consistency checks, such as the degree of tightness in the labour market, looking at the private sector rather than the economy as a whole, and measuring how useful machines are in production, rather than what they are worth. Given that the model focuses on long-run effects, data from the 19th century are used to check that running the model from 1970 is not misleading. Finally, the model is applied to US data, again retrieving plausible results.

This new approach of treating the markup as unobserved and estimating it at the same time as production technology yields several insights. First, the markup in the United Kingdom has fallen over the past 30 years or so. This implies that the unit labour cost of production — essentially the pay workers receive for each unit of output they produce — has not always been a good guide to the marginal cost of production, despite it being widely used to proxy marginal cost in previous work. Second, firms find it harder to swap between capital and labour in production than most other estimates suggest. Finally, using a time trend to proxy technical progress can be very misleading.

The welfare benefits of stable and efficient payment systems

Summary of Working Paper no. 301 Stephen Millard and Matthew Willison

The Bank of England's second core purpose is to maintain the stability of the financial system, both domestic and international. A key aspect of financial stability is the ability of consumers, firms and the government to continue making payments to each other in the presence of shocks both external to and emanating from within the systems through which such payments are made. Examples of such shocks could include bankruptcy of payment system participants; liquidity shortages among participants or problems with their operations; events in the wider economy that lead to changes in the profitability or liquidity holdings of participants in the system; or operational problems within the system leading to its temporary closure.

In this paper, we introduce a payment system into a recently developed theoretical model of banks and examine the ability of agents in an economy to make payments to each other in the presence of operational problems within this payment system. In the model agents have a choice between two means of making payments — cash and an alternative — but only one, cash, can be stolen. The safe alternative to cash is referred to as 'cheques' but, in essence, this can be thought of as any reliable interbank payment system. The introduction of a payment system (and banks) enables agents to more easily make payments between each other.

But the payment system in their model is risk free. In the real world this is not the case. In particular, such systems can suffer from operational problems, the focus of this paper. There is a risk that the payment systems temporarily fail to function for some reason and payments cannot be made. In this paper, we model the possibility of shocks to the payment system as a probability that the payment system fails to function when a buyer and producer who meet and agree to trade would like it to. Agents do not know whether the system will function or not when they choose whether to use it rather than using cash. We show that agents have an incentive to use the payment system if it is sufficiently cheap to use and/or sufficiently reliable. We also derive lower bounds on the probability that the payment system functions (given the cost of using it) that are consistent with buyers choosing to use it.

Finally, we compare social welfare with and without the payment system. The presence of a safe and reliable system for transferring money can make people prepared to hold and use money in situations where the presence of thieves would have otherwise stopped this from happening. In such cases, the presence of a payment system unambiguously increases social welfare since it expands the number of trades occurring in the economy. We find that the more reliable the system, the more likely this is to happen. Using our model, we then calculate the welfare gains resulting from an increase in stability. When money is accepted as a medium of exchange in the absence of a payment system, social welfare can increase or decrease with the introduction of a payment system. In this case, the addition of a payment system will not expand the number of trades that occur in our model; so there will be no social benefit arising from this channel. Social welfare will only increase if the reduction in deadweight loss caused by theft in the economy (a cost that thieves incur when they steal successfully) is sufficiently greater than the costs of using the payment system (including both the direct costs of using the system and costs related to system failures). Again, we show that this is more likely for a more reliable system, and calculate how welfare increases as stability is increased.

International and intranational consumption risk sharing: the evidence for the United Kingdom and OECD

Summary of Working Paper no. 302 Vincent Labhard and Michael Sawicki

'Consumption risk sharing' refers to the ability of households to protect their consumption against shocks to their income. This could take the form of holding equity claims on output that is unrelated to their income, by receiving transfers from other agents or by borrowing and lending. Successful risk sharing should imply a smooth pattern of consumption, not greatly affected by fluctuations in households' incomes. However, empirical work has shown that this does not appear to be the case. For example, households hold a much smaller proportion of foreign equity than would be expected if they decided on their asset holdings on the basis of risk and return, a phenomenon known in the literature as the home bias in equities. A related puzzle is the home bias in consumption. Under full risk sharing, domestic consumption growth should be more highly correlated with foreign consumption growth than with domestic output growth, but the empirical evidence again suggests the contrary: cross-country consumption growth correlations are relatively low, and often lower than correlations with domestic output growth. This would suggest that 'idiosyncratic' — ie country or region-specific — output shocks are not effectively smoothed away and hence materially affect consumption.

Measuring the overall extent of risk sharing in consumption is interesting for monetary policy makers because of its impact on the transmission of shocks. Gauging the extent of risk sharing as well as the channels through which it occurs — can help us understand business cycle developments and imbalances in an economy by informing us about how consumption is likely to respond to country or region-specific output shocks, and can shed light on how much policymakers might need to react to such shocks. As another potential adjustment mechanism against country-specific shocks, a large enough degree of international risk sharing may mitigate the effects of such shocks if other adjustment mechanisms, for example exchange rate flexibility or labour mobility, are absent or limited. And finally, understanding the channels by which risk sharing is achieved would also provide an insight into the effects of capital and credit market integration, both domestically and internationally.

In this paper, we present the empirical evidence for consumption risk sharing by UK consumers, both between the United Kingdom and other countries (internationally) and across regions of the United Kingdom (domestically). Such evidence can tell us whether risk sharing acts as an absorber of country or region-specific shocks in the United Kingdom. The key questions we seek to answer are whether there is more or less risk sharing domestically than internationally; through which channels it occurs; whether risk sharing has increased or decreased over time; and finally, whether these estimation results are robust. We address these questions by employing two specific methodologies. First, we use an established panel regression analysis - using a data set spanning a set of countries or regions across time — to illustrate both the extent of risk sharing and the channels through which it is carried out, updating existing UK results with more recent data. The incremental information on the channels by which risk sharing occurs means that we prefer this methodology to simple correlations of consumption and output data. However, as with correlations, the panel analysis may be distorted by factors affecting output or consumption but not related to risk sharing, such as changes in household preferences and measurement error in the data. This prompts us to utilise a second, more recent, methodology, which takes these influences explicitly into account using a factor model — a technique which aims to separate out the key drivers or factors (here at the regional and national level, for example) from a potentially large set of data — on consumption and output. Applying this factor model to the United Kingdom and OECD data is the main contribution of this paper.

We find that there is more risk sharing across the UK regions than between the United Kingdom and OECD countries. This baseline result is robust to accounting for the possible impact of measurement error and changes in household preferences, and consistent with results reported in the previous work. We find that the main mechanism of regional risk sharing operates via cross-regional asset holdings. Internationally, the main source of income smoothing comes from international borrowing and lending. Consistent with previous work in the field, we find tentative evidence that risk sharing has declined over time, although the importance of capital market smoothing has gradually increased, consistent with recent increases in capital market integration. However, these trends may require caution in interpretation, because the methodologies we use may not fully detect changes in the nature of the risks to output occurring during the course of our sample.

Finally, our paper also makes a separate contribution to the literature by illustrating the role of the choice of price measures (deflators) in estimating the true extent of risk sharing for the United Kingdom and OECD. While estimates of the extent of risk sharing within the United Kingdom are relatively invariant to the choice of deflator, using our preferred choice of deflator for the OECD data set yields higher estimates of risk sharing than typically reported in previous work.

Therefore, it appears as if in the United Kingdom regional consumption fluctuations may be largely unaffected by regional output fluctuations, and that UK consumption — while affected by global output fluctuations — may also be more robust than suggested in previous work.

The danger of inflating expectations of macroeconomic stability: heuristic switching in an overlapping generations monetary model

Summary of Working Paper no. 303 Alex Brazier, Richard Harrison, Mervyn King and Tony Yates

In the past decade we have witnessed a step change in macroeconomic performance. Both output growth and inflation have been much more stable than they were in the 1970s and 1980s. Policymakers — keen that this development should be durable — have tried to understand the causes of this 'Great Stability'.

Research has tended to place explanations into two groups: good luck in the form of fewer, smaller shocks; or better stewardship of the economy by governments and central banks. But as Ben Bernanke, Chairman of the Federal Reserve, has pointed out, apparently smaller shocks might actually be the result of better stewardship of the economy through anchoring of expectations about the future. With clear objectives for monetary and fiscal policy, expectations of the future need not be guided by what happens to the economy today. They can instead be guided by those clear objectives. When decisions made today by businesses and households depend on their expectations of the future, their actions will be less sensitive to past developments.

So thinking about the way expectations are formed is likely to be an important step towards understanding the 'Great Stability'. Standard economic models tend to assume that people form expectations using detailed knowledge about the way the economy works and the shocks that hit it. What if, instead, they use simple rules of thumb — or 'heuristics' to form their expectations?

This paper explores that question using a very simple model in which output and inflation today depend on expectations of inflation tomorrow. Although the model is too abstract to explore questions about current monetary policy, it allows us to explore the more general issue of the role that expectations play in shaping economic performance.

In this model, predictions about future inflation affect decisions about what to do today. So if, other things being equal, inflation is expected to be high tomorrow, it will start to pick up today. Predicting future inflation is difficult because the economy is subject to temporary, unpredictable shocks. So people are assumed to use one of two heuristics. The first is to assume that inflation tomorrow will be the same as inflation yesterday — the 'lagged inflation' heuristic. The second is to assume that inflation tomorrow will equal a target announced by the central bank — the 'inflation target' heuristic.

It seems reasonable to assume that people will only adopt a particular heuristic if it would have predicted inflation well over the past. That opens up the possibility that people might switch between them. Sometimes, when inflation has been close to target, they are likely to use the inflation target heuristic. When they do, we know that it helps to keep inflation stable because it acts as an anchor for expectations. Sometimes, however, shocks will move inflation away from the target. If people then switch to using a lagged inflation heuristic, there will not be a firm anchor for expectations. This means that there are periods like 'Great Stabilities' in which inflation is very stable but these are interspersed with periods of greater volatility.

In our experiments, the inflation target is only used as a heuristic if it would have performed better than others in the past. There is no guarantee that it will be used. But the announcement of an inflation target at least opens up the possibility of more stable periods of economic performance. And, as such, inflation in an economy with an inflation target tends to be more stable than in an economy without a target.

That illustrates the importance of the monetary policy framework in this model. Given that framework, what does this simple model say about how a central bank should operate? It is not possible for us to draw conclusions for the conduct of monetary policy in the real world because the model is so abstract. But we illustrate how, in this model, monetary policy can better stabilise the economy by responding to inflation expectations. This contrasts with many standard economic models, in which inflation expectations contain no information about the state of the economy that is not already apparent in other indicators. But in our model, inflation expectations do contain information about the state of the economy. They indicate which heuristic people are using and, therefore, how the economy will respond to shocks.

Procyclicality, collateral values and financial stability

Summary of Working Paper no. 304 Prasanna Gai, Peter Kondor and Nicholas Vause

A financial system plays a highly beneficial role in an economy by helping to transfer resources to sectors where they can be used most productively, with transfers taking place both across time and potential states of the world that could materialise. In principle, a perfect financial system could insure the constituent sectors of an economy from the idiosyncratic risks that they face, so that fluctuations in economic activity at the macroeconomic level would reflect only systematic shocks, ie those that affect all sectors. But financial systems operate under frictions such as asymmetric information, where some market participants are better informed than others, and this makes financial contracts costly to monitor and enforce. A practical view that appears to be becoming more widespread suggests that when financial systems operate with frictions, economic shocks can be amplified and propagated, exaggerating economic upturns and prolonging the severity of economic downturns, and leave economies more vulnerable to such shocks during expansionary phases of the business cycle.

This paper outlines a model that analyses both how macroeconomic shocks can be amplified and how procyclical macroeconomic risk can be generated within a macro-financial system. The model is constructed so that shocks that boost the productivity of one sector adversely affect the productivity of the other sectors. Thus, a series of shocks that raise the output of one sector, such as a clustering of technological innovations, will cause the economy to grow as this sector accounts for a greater and greater share of the total economy. And, as the economy becomes more concentrated, it becomes more vulnerable to the dominant sector being hit by an adverse shock at some point in the future.

The financial system in the model allows risk-averse entrepreneurs in the economy to insulate their balance sheets against uncertainty. But financial contracts must be supported by collateral, such as real estate, to ensure that promises to make payments in the future are credible. If the collateral asset is also used in production, a feedback loop between aggregate output and the value of collateral emerges. A key contribution of the paper is to show how such feedback loops are maintained in the presence of insurance markets. An initial decline in aggregate output reduces entrepreneurs' net worth and, hence, the price of the collateral asset, as demand for the asset for use in future production declines. The decline in the value of the collateral asset implies that producers are unable to obtain sufficient insurance, exposing balance sheets to shocks. Since entrepreneurs are risk-averse, their response to additional balance-sheet uncertainty is to reduce the scale of production. This leads to subsequent declines in the price of the collateral asset, completing the feedback loop. Any decline in its value as a result of incomplete insurance by one sector leads to inadequate insurance by other sectors. This externality increases the level of systemic risk across the economy. Systemic risk imposes welfare costs on the economy as it leads to inefficient production and results in balance-sheet uncertainty. Both aspects are captured by the model

Bank capital, asset prices and monetary policy

Summary of Working Paper no. 305 David Aikman and Matthias Paustian

Do weak banks affect the transmission mechanism of monetary policy? Does bank lending merely reflect general macroeconomic conditions, or are there important feedback effects from banks to other macro variables? More generally, how should financial sector conditions influence the conduct of monetary policy? These questions are of long-standing interest to policymakers and they form the motivation for this paper. In order to study them, we develop a framework that explicitly models the role of banks in intermediating credit flows, and takes into account some possible frictions that are likely to exist between depositors, banks and borrowers.

In our model, the amount of capital held by banks and the creditworthiness of borrowers are both important ingredients in transmitting shocks throughout the economy. To see why, suppose that an unanticipated tightening of monetary policy (or some other adverse shock) leads to a decline in output, which then lowers the profitability of firms, triggers a fall in asset prices, and causes loan losses for banks. The accompanying reductions in borrower net worth and bank capital will have two effects. First, banks will be less willing to lend to borrowers whose creditworthiness has declined. And second, depositors will view banks as riskier institutions, and will readjust their portfolios out of bank deposits. We show by simulation that these effects are able to generate a significant second-round cutback in the flow of lending which exacerbates the initial downturn.

Intuitively, we might expect there to be a role for monetary policy in mitigating the second-round effects generated by these frictions. For instance, by aggressively cutting interest rates in a downturn, the central bank might be able to check the falls in asset prices and net worth associated with the shock, thereby partly cushioning the impact on aggregate demand. The cost of acting in this way, however, is higher inflation — at least in the short term. A key question for policymakers is therefore: how much of an increase in inflation volatility should be tolerated in order to reduce the volatility of output growth in this way?

The chief contribution of this paper is to tackle this question. We proceed in two steps. First, we assess the performance of monetary policy strategies that respond in a mechanical way to 'financial' variables such as asset prices or credit flows over-and-above consumer price inflation. It turns out that these simple monetary policy rules perform poorly if the goal of policy is maximising the wellbeing of economic agents in the model. Second, we use numerical techniques to analyse the properties of the 'optimal' monetary policy implied by the model. Our main finding is that a central bank acting in this optimal way will tolerate only a very small amount of inflation volatility. Furthermore, the 'trade-off' implied by our model is very steep in the sense that the reduction in output growth volatility achieved by allowing inflation to become more volatile is very small. Given that similar results have been reported for models that abstract from banks — and in fact credit market imperfections altogether - we conclude that assigning a non-trivial role for these frictions need not materially affect optimal monetary policy. This suggests that policies that work well in 'normal' times are likely to continue working well in a situation where weak banks are limiting the expansion of credit.

Consumption excess sensitivity, liquidity constraints and the collateral role of housing

Summary of Working Paper no. 306 Andrew Benito and Haroon Mumtaz

Consumer expenditure is the dominant component of aggregate demand, and as such, understanding consumption plays a central role in understanding the behaviour of the macroeconomy. That requires a good understanding of how households form their consumption plans. The most influential way of thinking about how households do that is through the life-cycle model. That is based on the idea that households are forward looking and wish to avoid changes in the satisfaction they get from consumption during their lives. In that way, households smooth their consumption.

It has long been recognised that some households may not smooth their consumption to the full extent implied by the life-cycle model. The first aim of this paper is to estimate what percentage of households in the United Kingdom do not smooth their consumption in such a manner. Among other things, that is important for understanding how households will adjust their spending in reaction to shocks that affect their income.

In recent years there has been increasing interest in the role of housing and its relationship with consumption. On several occasions in the past, consumption and house prices have moved together. But Monetary Policy Committee discussions have noted that the reduced-form relationship between consumption and house prices has recently appeared weaker than in earlier periods.

There are various channels through which house prices can influence consumption, notably the so-called collateral channel, and common determinants of both housing demand and consumption. One view has it that house prices are an asset price for an essential commodity, shelter, and that they merely reflect macroeconomic conditions with no special role of their own. But on another view, there is an important causal effect of housing in providing collateral. That allows credit to be obtained on more favourable terms and supports consumption. That role may be particularly strong, or only exist at all, for those that might otherwise have been constrained by the availability of credit. Among other things, this collateral channel could amplify the effects of monetary policy on the economy. However, there is little evidence on whether housing equity fulfils this role and how it affects households' consumption plans. A further aim of this paper is to use microdata to confront the implication of the collateral hypothesis that housing capital gains should affect those that are liquidity constrained differently from those that are not liquidity constrained.

If households smooth consumption as the life-cycle model implies, then current consumption plans should not react to past news about income: that should already be incorporated into households' consumption plans. In this paper, we explicitly model the likelihood that a household's behaviour falls into one of two 'regimes' according to whether the household displays 'excess sensitivity' to recent income news or not (ie, whether it fails to smooth consumption). We find that around 20%-40% of households display excess sensitivity. These households are liquidity constrained or saving for other precautionary reasons. The former are households who would like to borrow to smooth consumption but cannot, or face a relatively high interest rate which puts them off borrowing. The latter are those who are reluctant to borrow because of the risks of large amounts of debt when future income or expenses are uncertain. They can be said to have a 'self-imposed' liquidity constraint and instead want to accumulate their buffer of assets. We find that households are more likely to fall into either group if they are without liquid assets, have negative home equity, are young, unmarried, non-white or are degree-educated.

Regarding the collateral channel, in addition to the effect of negative home equity in influencing the likelihood of being liquidity constrained, we also find evidence for the effect referred to above, that housing capital gains affect the consumption of those that are more likely to be liquidity constrained. That is direct evidence in support of the existence of a collateral channel.

Fiscal rules for debt sustainability in emerging markets: the impact of volatility and default risk

Summary of Working Paper no. 307 Adrian Penalver and Gregory Thwaites

The prospects of receiving full payment of emerging market sovereign debt cannot be established with certainty. In emerging market economies (EMEs), key macroeconomic variables — the primary budget balance, economic growth, inflation, domestic and foreign interest rates and the exchange rate — are typically volatile, making it difficult to predict the future with confidence. These macroeconomic variables are also usually correlated. For example, an adverse terms-of-trade shock can slow output growth, result in an exchange rate depreciation and raise the risk premium on interest rates, all of which will worsen a sovereign's debt position. The volatility, correlation and persistence of shocks in emerging markets mean that assessing debt sustainability on a single future path of these variables is too simplistic. Forecasts based solely on historical averages of these variables may therefore erroneously neglect a chance that sovereign debt and fiscal policy are unsustainable.

Using a simple econometric model estimated on a representative EME, this paper measures how uncertainty

about the future and the effect of the risk of sovereign default on interest rates alters the probability of future debt to GDP outcomes. Simulations of this model under alternative fiscal policy regimes show that any stabilising fiscal policy must react strongly to innovations in the debt-GDP ratio. Forecast uncertainty and feedback from the debt level to real interest rates impose material constraints on the set of fiscal policy rules which stabilise debt.

These techniques and analysis have practical policy implications. A quantitative analysis of the uncertainty that surrounds debt projections could help the IMF when assessing members' debt sustainability before agreeing to financial assistance programmes. It could also support IMF surveillance of fiscal policy and thereby contribute to crisis prevention. The technique may also be useful to policymakers in EMEs when determining their medium-term fiscal policy strategy. It would be particularly useful if a country is considering the introduction of fiscal policy rules.

Optimal emerging market fiscal policy when trend output growth is unobserved

Summary of Working Paper no. 308 Gregory Thwaites

This paper is concerned with how fiscal policy in emerging markets should respond to changes in economic conditions. We model the behaviour of a fiscal authority in an emerging market economy (EME) who can borrow from other countries to smooth the effects of unexpected changes in residents' spending. We focus on the policy implications of (1) Aguiar and Gopinath's finding that GDP in emerging markets is characterised by relatively large and persistent shocks to the trend growth rate, and (2) that policymakers cannot directly observe the output gap or the trend GDP growth rate.

We have two key findings. First, we find that risk-averse policymakers who face EME-style output processes (ie changes in output are dominated by shocks to trend growth) should run tighter fiscal policies, with lower average debt-GDP ratios, than those in industrialised countries. This result is robust to agents' risk-averseness and dislike of holding debt, as well to the amount of real-time information that the policymaker has on what determines a change in output. In all cases, and particularly when the interest rate is very sensitive to the debt-GDP ratio, we find that the primary fiscal balance (ie excluding net debt interest payments) should respond strongly as the debt-GDP ratio moves above its long-run average. We find that the introduction of moderate shocks to the gross return on debt (eg those due to real-exchange rate shocks if debt is denominated in foreign currency) has little effect on the relationship between the primary fiscal balance and the debt-GDP ratio, unless the shocks happen at the same time as offsetting changes to the trend growth rate.

Second, in our baseline 'EME' model, we find that the primary fiscal balance of an optimising policymaker is countercyclical, despite changes in output being driven by shocks to trend growth. This appears to be true irrespective of the amount of information the policymaker has about trend growth and the output gap. This result contrasts with other papers, which have used optimising frameworks and the features of EME output processes to rationalise the observed procyclicality of EME fiscal policies or external balances. The result is somewhat sensitive to assumptions about debt intolerance and risk aversion; in particular, greater debt intolerance makes policy more countercyclical.

Our simulations also suggest that the welfare costs of naively running a fiscal policy that would be appropriate for an industrialised country are around 1% of average consumption. But this result is sensitive to assumptions about capital markets and risk aversion. We find that a simple rule-of-thumb policy that stabilises the debt-GDP ratio in every period results in smaller welfare losses than if the 'industrialised' policy is implemented.

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Speeches

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The Governor's speech[®] in Edinburgh, Scotland

It is 230 years since David Hume died and Adam Smith published *An inquiry into the nature and causes of the wealth of nations*. Economists will be forever indebted to two of the greatest minds of the Scottish Enlightenment. Both Smith and Hume were members of the Poker Club in Edinburgh, formed, as the name might suggest, to stir up opinion and make the sparks fly. Alexander Carlyle described the Club as so 'frugal and moderate' that 'a very constant attendant told me that he never observed even an approach of inebriation on any of the members'. Perhaps that's why it faded away in the 1780s. In any event, I'm glad we are not at the Poker Club tonight, but enjoying your splendid hospitality here.

Given Edinburgh's importance to the Scottish Enlightenment, it is appropriate that I start by discussing an intellectual puzzle. The puzzle is the following. After 1945 governments felt they had the secret to managing the economy. They thought that by boosting the level of demand through higher government spending and lower interest rates, they could secure permanently higher levels of output and employment. If we were prepared to accept a somewhat higher rate of inflation, then we could achieve a somewhat higher rate of economic growth. In other words, there was a trade-off between inflation, on the one hand, and employment and output, on the other.

There did seem to be something to this proposition in the short run. But in the 1970s, economists and governments alike came to recognise that higher inflation did not, in the long run, lead to higher output and employment; rather it led simply to even higher inflation. Inflation accelerated if economic activity was run at too high a level. In other words, if we plot a graph with inflation on the vertical axis and unemployment on the horizontal axis, we should expect to see a vertical line. In the jargon of economists this is known as a vertical Phillips curve, showing that there is no trade-off between inflation and unemployment in the long run (shown in **Chart 1**).

This conventional wisdom has governed macroeconomic policy in almost all advanced — and indeed emerging market economies — ever since, and underlies our inflation-targeting framework in the United Kingdom. That's the theory. Does it work in practice? Well, if you plot a graph of inflation against





0

Chart 2 The UK Phillips curve, 1993–2005



Note: The unemployment rate used here is the Labour Force Survey measure. Inflation is measured using the retail prices index excluding mortgage interest payments (RPIX).

unemployment in the United Kingdom since the adoption of inflation targeting at the end of 1992, you find that far from being vertical, the Phillips curve has in fact been completely horizontal (Chart 2). The conventional wisdom appears to have been overturned.

⁽¹⁾ Speech at a dinner hosted by Scottish Financial Enterprise (SFE) and Edinburgh Chamber of Commerce (ECC), delivered on 12 June 2006. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2006/speech277.pdf.

So what is going on? The explanation is, I believe, straightforward, but it contains some important lessons for the conduct of monetary policy today. In the 1950s and 1960s our experience was that the rate of structural unemployment was rather stable, so that large swings in the growth rate of money spending eventually showed up in movements of inflation. In those circumstances the Phillips curve does indeed appear vertical. But since 1992 monetary policy has kept inflation broadly constant — within 1 percentage point of its target every single month since December 1992 — while structural changes have reduced the sustainable rate of unemployment in every part of the United Kingdom — including Scotland. So the Phillips curve appears horizontal.

In the decade up to 2004, that is until the recent slowdown, unemployment fell from double-digit levels to around 5% on the internationally comparable measure and to 3% on the claimant count. Over the same period, employment grew at its fastest rate over any peacetime decade since 1920, raising, probably temporarily, the growth rate of the supply capacity of the economy. Output growth was noticeably faster than its post-war average. Behind that expansion were three significant structural changes: one at home and two overseas.

At home, there has been a sequence of reforms to the labour market which began in the 1980s and have continued since. Reforms such as the New Deal and Working Tax Credit have encouraged benefit recipients back to work. Changes to pay bargaining and a decline in the share of wage settlements covered by collective bargaining have made the labour market more flexible. Those reforms reduced the rate of structural unemployment.

The two other structural changes reflect globalisation and the openness of the British economy. The first is the rise in the prices of the goods and, especially, services that we export relative to the prices of goods and services that we buy from abroad. The so-called terms of trade have improved markedly over the past decade. Countries such as China and India are now major players in the world trading system, and the prices of manufactured goods globally have fallen as a result. That has produced changes in the pattern of international trade, and in our own industrial structure. Although those changes were, and are, uncomfortable to make, they benefit us all as consumers. The rise in the value of what we can buy with our take-home pay has allowed businesses to recruit from a larger pool of labour without having to raise wages.

The other factor is migration. Over the past few years, the impact of migration, particularly from the new member countries of the European Union, has been substantial. The official data on total net migration are derived from small and incomplete surveys, so we cannot pretend to have an accurate idea of the real extent of migration. But, based on responses to the International Passenger Survey, net inward migration

between 1995 and 2004 was estimated to have been 1.3 million, compared with a rise in the labour force as a whole of 1.7 million. We do know that the labour force has recently been expanding twice as fast as in the rest of the post-war period. Migration on this scale raised the potential growth rate of the UK economy and probably dampened the response of costs and prices to changes in demand.

That was the past. What of the future? Is there a lesson for the Monetary Policy Committee from the experience since 1992 of stable inflation with large changes in unemployment? I think there is. It is that the MPC, in trying to keep inflation close to our 2% target, must recognise that movements in demand and employment cannot be considered independently of changes in the structure of the economy. Focusing too much on short-run movements in demand may lead it to misjudge the outlook for inflation. It is not possible to form a view about the extent of spare capacity in the economy — the so-called output gap — without explicit judgements on how much the economy is capable of producing. But it is really quite difficult to disentangle movements in the output gap from changes in supply capacity. One economist's output gap is another economist's change in supply potential.

That issue has been central to the deliberations of the Monetary Policy Committee in recent months. The current outlook for inflation — and hence interest rates — depends not only on the prospects for demand but also upon whether the changes to the supply capacity of the economy that we observed in the past will persist or reverse. Over the past year or so, a degree of uncertainty has entered the economic landscape on both the supply and demand side.

So what is causing this uncertainty? On the supply side, inflows of migrant workers from the new member countries of the EU remain high. That may or may not continue, and we cannot be sure that migrants would stay in the United Kingdom if the labour market were to turn down. And it is also unclear whether businesses will be able to recruit staff as easily as in the past when, as the prices of imported goods and services fell, the real value of take-home pay rose without higher wage settlements. Last year, non-oil import prices rose, depressing the growth of real take-home pay. And oil prices increased further.

On the demand side, our central view remains a relatively benign one. The economy slowed in the first half of last year, led by consumer spending. But growth has begun to pick up. Averaging the growth rate of consumer spending over the final quarter of last year and the first quarter of this, shows that consumption growth has returned to not far off its long-run average. Export growth and business investment both seem to be recovering. So in its May *Inflation Report*, the Monetary Policy Committee had, as its central outlook, a return to steady growth with inflation close to the 2% target. But there are many risks and those have been bought into sharp focus by the recent financial market turbulence. And, just as for England in the World Cup, the threats come mainly from the rest of the world.

The recent volatility in financial markets is reflecting the real risks which face us as, after a period of robust world economic growth, we approach a somewhat bumpier stretch of the road. A rebalancing of global demand is desirable, but the way ahead may not be smooth.

One risk is that during the fastest three-year period of world economic growth for a generation, monetary policy around the world may simply have been too accommodative. In the main industrialised regions - the United States, euro area and Japan — official interest rates were very low for a long period. The liquidity created by low official interest rates around the world has helped to push down long-term real interest rates and compress credit spreads to unusually low levels. That monetary stimulus is now being withdrawn. Since January, long-term interest rates have moved up, and now other asset prices are responding. So far we have seen little more than a modest correction to the prices of a wide range of assets that had risen sharply over the previous two years. The realisation that such levels of asset prices were unlikely to be sustainable, coupled with a tightening of monetary policy in many countries, has injected uncertainty into financial markets. And it is hardly surprising that, as investors searching for yield realised that they might have underestimated the uncertainties, the price of risk moved up.

Even though the monetary stimulus around the world is now being withdrawn, its effects are still being felt. There are some signs of inflationary pressures in the main industrial countries. Even in China, with its growing manufacturing base and large pool of labour, some indicators are showing upward pressures on export prices. And in turn that is raising our import prices, over and above the increases resulting from higher energy costs.

At home, we can take some comfort from the fact that, despite sharp increases in energy prices, both consumer price inflation and inflation expectations have remained close to the target. Pay pressures in the labour market are muted, reflecting in part the need of employers to adopt a tough stance in wage bargaining when faced by such large increases in other input costs. Companies facing higher costs for energy, raw materials and other inputs, have been willing to offer only moderate wage increases in order to minimise the squeeze on their profit margins. The rapid rise in input prices and the muted degree of pay pressures are not independent of each other.

Inflation expectations — whether measured by household surveys or implicit in government bond yields — have moved up during the course of this year. Although not of serious concern as yet, the MPC will monitor inflation expectations carefully. Inflation itself remains volatile as increases in oil and natural gas prices pass through to household bills. Those increases will dampen the growth of real household disposable incomes and moderate consumer spending.

So the economic outlook is far from certain. In these circumstances the Monetary Policy Committee must examine carefully all information, learn and, if necessary, revise its judgements, and question all received wisdom. In other words, it must be enlightened.

The Scottish Enlightenment, it is generally agreed, began and ended in the 18th century. Our present framework for monetary policy is of more recent vintage. But just as the Scottish Enlightenment still influences our thinking today, so the twin features of that framework — namely inflation targeting and independence of the Bank of England — will be crucial to successful monetary policy in the future.

Just as the Monetary Policy Committee meets monthly to decide on interest rates, so David Hume and Adam Smith met regularly in the Poker Club to debate the policy issues of the day. Hume was an officer of the Club with the unusual title of the Assassin's Assessor, 'without whose assent nothing could be done', and whose role was to ensure that in meetings 'there was likely to be no bloodshed'. So I take it that Hume at least would have been content with last week's decision to leave interest rates unchanged. There is no Assassin's Assessor on the Monetary Policy Committee, nor — you will be relieved to hear — any bloodshed. But, month by month, we shall be debating the prospects for the economy in order to decide in which direction, if any, interest rates need to move.

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

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

Twenty years ago, the City was anxiously awaiting its revolution — Big Bang. If ever there was an example of structural change in response to global competition, Big Bang was it. None of the leading broking and jobbing firms of the time now survives. Yet the City, and the people who work here, are more successful today than at any time in its history. Few in 1986 could have imagined how much the City would change and how far its domain would extend — from Canary Wharf to the West End, no longer a single Square Mile but a banker's dozen.

A key ingredient of the City's success has been, as the Lord Mayor remarked, a stable set of rules within which to play up and play the game. Simple, clear rules of the game are essential for a market economy to function. But excessive regulation makes life difficult for us all. In March of this year I received a letter from a certain government department which read as follows:

'Dear Mr King; I am writing to inform you about how the changes to Crown immunity... in relation to planning legislation, will affect flying national flags.... Flags are defined as advertisements under the Town and Country Planning (Control of Advertisements) Regulations 1992. Under these regulations you are allowed to fly the national flag of any country... from a single vertical flagpole without requiring the prior express consent of the local planning authority. The European Union flag is not classified as a national flag under the current regulations... the Office of the Deputy Prime Minister is proposing to change the Regulations'. Until then, however, consent is required. The letter continued: 'I have been advised that consent usually takes six to eight weeks to obtain and costs £75. You need to send the completed advertisement consent form plus fee with a covering letter explaining when and where you wish to fly the flag providing details of the size of the flag and photos of the flagpole in relation to the building.'

Chancellor, you can be sure that the Bank of England will abide by the rules — although we may not fly many flags, both literally and metaphorically. The Bank now has a very clear focus on maintaining monetary and financial stability — the former defined by the inflation target and the latter by the revised Memorandum of Understanding between Bank, FSA and Treasury published in March.

The great strength of the 1997 reforms to the monetary policy process is that they establish clear rules of the game for making decisions on interest rates. The Monetary Policy Committee sets interest rates each month to meet the inflation target. But how do we implement those decisions in the market? Our objective is to ensure that the policy rate set at the monthly meetings of the MPC is the rate in the money markets until the following meeting. For many years, the Bank operated several times a day in the money markets, but that hyperactive approach did not succeed in stabilising the overnight interest rate which remained more volatile than in most other advanced countries. It was important to move to a simpler system in order to reduce that volatility, and the new system of money market operations, which was introduced last month, has done precisely that. The Bank now deals in the markets only once a week. Almost all banks and building societies now have access to the Bank. And they no longer have to balance their books with us at the close of business every day, but instead must achieve a target balance with us on average over the month running between MPC meetings. For the first time in its history, the Bank pays interest on reserve balances held by the commercial banks with us. The rate paid by the Bank on those reserve balances is the rate set by the MPC — Bank Rate is back.

Great credit is due to the teams led by Andrew Bailey and Paul Tucker who together managed the introduction of the new system, proving that, as Cameron Cobbold remarked in 1958, 'the Bank is a bank, not a study group'.

The 1997 reforms also changed the rules of the game for communication between the Bank and financial markets, and I would like to say a word about what they are. Markets need to form a view on the probabilities of different paths of future interest rates in order to price a wide range of financial instruments. So they are interested in what central banks say.

 Given on 21 June 2006. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2006/speech278.pdf.

In recent months both the Federal Reserve and the European Central Bank have found it far from straightforward to convey the likely trajectory of future interest rates. And the Fed announced three weeks ago that Chairman Bernanke had established a subcommittee of the FOMC to examine a number of 'communication issues'. There is now a lively debate about how, and to what extent, central banks should try to communicate their intentions with respect to future official interest rates to financial markets and the wider public. At the Bank of England, our approach is to keep it as simple as possible. We don't say where interest rates will go next for the simple reason that we don't know. And it would be quite misleading to pretend otherwise. The MPC reaches a new judgement each month, made afresh in the light of all the new information about the prospects for inflation. We don't decide in advance. So trying to give direct hints on the path of interest rates over the next few months risks deceiving financial markets into believing there are definite plans for the next few months when no such plans exist.

But in order to form judgements about the likely path of interest rates over somewhat longer time horizons, markets do require some information from the central bank. To be precise, two key pieces of information — our objective, and our analysis of the economy.

Our objective is the 2% inflation target given to us by the Chancellor and plain for all to see. And our analysis of the economy is published in the minutes of our monthly meetings, in more detail in our quarterly *Inflation Report*, and in speeches by members of the MPC.

Knowledge of our objective and our analysis is all that markets need from us to form judgements about the future path of interest rates. Changes in our analysis, and the range of views within the Committee, may well affect the conclusions that financial markets draw about the likely path of interest rates. Markets appear to have been rather successful in drawing conclusions because our decisions on interest rates have not, by and large, surprised them. But there is a big difference between setting out our analysis of the UK economy and dropping hints about decisions we have yet to make.

So all those listening to the speeches of MPC members including this one — for a hint as to the decisions we shall take in the coming months will be disappointed repeatedly. We make up our minds one month at a time. Those, however, who read our *Minutes, Inflation Reports* and speeches to understand our thinking will mine a richer seam. Knowing our thinking, they will be in a better position to evaluate the implications of developments in the economy for the future path of interest rates. There is one other arena where clearer rules of the game would be of great value — the Commercial Court. After thirteen years, we have at last drawn a line under the BCCI case, the most expensive fishing expedition in history. It ended as a comprehensive victory for the Bank, both on the substance of the case and on costs. The trial set new records — the longest opening speech in English legal history, an even longer reply, and almost certainly the most expensive commercial litigation ever.

It is for others to comment on the behaviour of those who brought a case that even they described as a blood sport. I can presume only that they were allowed to play within the rules of the game. In which case, it is the rules of the game that should be questioned.

A legal framework for enforcing contracts and resolving disputes is not just an arcane process which allows professionals to earn vast fees, but an integral part of the infrastructure of a successful market economy. It matters that there are simple, clear and timely ways of resolving disputes. What the BCCI case revealed was a legal system incapable of guaranteeing that. How can a case described by the trial judge himself as built 'not even on sand but on air' take thirteen years and over £100 million in costs to come to a conclusion?

The Bingham Report was produced in only a year and contains all that is worth saying about the supervision of BCCI. It was not comfortable reading for the Bank, but the Bank accepted and acted on its findings. The subsequent legal proceedings over thirteen years have benefited only one group at the expense, in the end, largely of the creditors.

As Mr Justice Lightman argued in his 2003 Edward Bramley Memorial Lecture, the adversarial system imposes huge costs on litigants and defendants alike. As he put it, 'To the great majority of the public the perception (if not the reality) is that the legal system is a profitable monopoly of the lawyers.' BCCI showed that perception was indeed reality.

A system that is powerless to prevent a case so hopelessly misconceived continuing for thirteen years requires examination. I very much hope that the Government will look carefully at this case, learn the lessons, and take steps to ensure that such an outcome can never occur again.

Lord Mayor, over the past year you have brought the global economy to Mansion House, you have opened its doors to many who would not otherwise have thought of entering, especially from the Asian community, and you have gone out of your way to meet young people from our financial firms. You have raised money for disabled children and you have promoted Cornwall — next Tuesday is 'Cornwall Day in the City' with, I hope, free pasties for everyone. And tonight all of us here would like to pay tribute to your work since you became Lord Mayor, and to thank both the Lady Mayoress and you for the splendid hospitality — Cornish produce in fact — 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', David and Tessa Brewer.

Stability and change

In this speech,⁽¹⁾ Sir John Gieve, Deputy Governor and member of the Monetary Policy Committee, discusses how globalisation and inflation targeting have affected the UK economy. He explains how 'the great stability' in growth and prices has made the underlying market pressures on business clearer. It has therefore provided a platform for rapid change in structure, ownership and technology and forced businesses to specialise in those products and services for which they have a comparative advantage. He explains the impact of globalisation on world and UK inflation in recent years. He concludes by suggesting that in an economy with well-anchored inflation expectations, the relative price of imports and domestically produced goods and services may adjust to maintain the overall rate near target; in effect, where the target is credible, market adjustments to relative prices may do a lot of the central bank's work for it.

I am delighted to be here today. The Bank of England has long connections with this region. We first set up offices in Manchester and Liverpool back in the 1820s. That was a time when the North West of England was a key hub in an emerging international economy, with the Port of Liverpool providing the gateway for industry in Lancashire and Cheshire to trade with the rest of the world, particularly textiles.

The structure of the economy in the North West has of course changed markedly since those days and the region is now more associated with the aerospace, defence and pharmaceuticals industries than with textiles. Here as elsewhere, recent years have been a time of rapid change in the structure of industry and the economy. We may have been talking about globalisation for years but that doesn't mean it is complete; in fact it is still gathering momentum.

Macroeconomic stability: a platform for change

In the face of that rate of change, it may seem paradoxical that among central banks the past ten years have been known as the 'Great Stability'.

The United Kingdom is an example of that. Since 1992, when an explicit target for inflation was first introduced here, inflation has been stable and very close to its target. Not only has inflation been low, but we have avoided the large swings in output and employment that have characterised previous periods in UK economic history. We have seen employment grow from around 56% of the population at the trough in 1993 to over 60% now and unemployment fall back to levels not seen since the mid-1970s. GDP growth has been between 1% and 4.5% per annum throughout. To someone like me who was in the Treasury in the 1970s and 1980s when we experienced real booms and busts, the past ten years have looked like a golden age (Chart 1).



⁽a) Rolling ten-year standard deviation of UK GDP growth

Of course we hoped that the reform of economic policy would bring greater stability, but the speed and extent of that success has been unexpected. When the MPC was created in 1997 and given responsibility for meeting the inflation target, it was told that whenever inflation was more than 1 percentage point

Given to the Engineering Employers' Federation North West on 20 July 2006. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2006/speech279.pdf.

away from the target the Governor would have to write a letter to the Chancellor explaining why this had occurred. The Bank's current Chief Economist estimated that the Governor would need to write a letter on average one month in every two.⁽¹⁾ Even the current Governor thought that 'given past experience of inflation volatility it is likely, even allowing for the change in policy regime, to restore the lost art of letter writing to British life'.⁽²⁾ It is remarkable that not a single letter has needed to be written — yet.

But stability at the macroeconomic level does not mean stability for individual firms or industries. Indeed one of the virtues of macro stability is that it allows — indeed forces firms to focus on the real long-term business challenges and opportunities they face rather than how to survive or profit from the short-term cycle. It is not a paradox therefore that the Great Stability has also been a time of great change in industry in ownership, structure and technology.

The Engineering Employers' Federation (EEF) has itself stated that 'manufacturing prospers best in a stable macroeconomic environment with low inflation, low interest rates and stable exchange rates'.⁽³⁾ That is not because they are a recipe for a quiet life but because they allow businesses to focus on what really matters — their products, their technology, their customers and their competition. In the past few years, macroeconomic stability has provided business with a platform for rapid changes in ownership, location and product mix, and for the transformation by IT of all business processes in the factory, the warehouse and the office.

Globalisation and UK manufacturing

Looking wider than the United Kingdom, one of the most striking changes of the past few years has been the integration of China, India and countries from the former Soviet Union into world markets and the sharper competition that is bringing first into goods markets and, increasingly, into services also. The EEF report, *Where now for manufacturing?*, published at the end of 2004, highlighted the 'huge increase in the importance of lower-cost countries as competitors'. Just under half of companies surveyed by the EEF saw China as the biggest competitive threat to their activities and nearly 60% identified China as a major competitive threat over the next five years. That was sharply up on the equivalent figure of 18% in 2001, illustrating that the change was occurring faster than companies then foresaw.

One of the consequences of the globalisation of production is that a reduced proportion of output in the developed economies is in manufacturing. This is true of the United Kingdom, where manufacturing accounts for less than 15% of GDP, but also of France, Spain, the Netherlands and United States (**Chart 2**).⁽⁴⁾ Some have felt the blunt end of this competition from Asia. But the emergence of China and others has also created opportunities. It has encouraged UK manufacturers to specialise in those products for which they have a comparative advantage over their competitors, prompting a change in structure and focus of the UK manufacturing sector. The fact that globalisation encourages this type of specialisation is one of the great benefits of having an open trading system, felt by both consumers and manufacturers. The EEF, for example, remains 'upbeat about the future of UK manufacturing', especially when it comes to high value-added activities.





(a) Manufacturing contribution to gross value added.
(b) 1993 and 2001.
(c) 1992 and 2003.

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Globalisation and UK inflationary pressures

The changes we have seen in UK manufacturing have occurred, in part, due to the impact globalisation has had on the relative prices of different goods and services. These changes have also had a big impact on the sources of inflationary pressure over the past decade, both here and internationally.

First, as in other developed countries, the prices of goods imported into the United Kingdom have fallen relative to goods and services produced domestically. Second, most markets for goods and many markets for services are now internationally 'contestable'. In other words, companies are under continual pressure to keep prices down because of the

⁽¹⁾ Bean, C (1998), 'The new UK monetary arrangements: a view from the literature', *Economic Journal*, November.

⁽²⁾ King, M (1997), 'The inflation target five years on', Bank of England Quarterly Bulletin, November, pages 434–42.

⁽³⁾ Engineering Employers' Federation (2005), Manufacturing in the UK, May.

⁽⁴⁾ The weight of manufacturing in UK gross value added was 14.7% in 2003 (United Kingdom Economic Accounts, 2006 Q1).
threat of competition from potential rivals from around the globe and this has limited the extent to which domestic producers can raise prices even in markets where import penetration is low. Third, factors of production have become more mobile. For example, increased labour migration into the United Kingdom has helped employment to grow with low wage inflation. And the ease with which production can be switched across countries has contributed towards lower costs in a wide range of services and goods which are still home grown.

It is difficult to quantify the impact of these factors on inflation. It depends on the importance of imported goods in the consumer prices index and on whether lower import prices are passed on to consumers.⁽¹⁾ In the United Kingdom in the ten years from 1994 to 2004, the price of imported goods fell on average by 1% per annum, so the direct effect of this on the consumer prices index was quite marked. This shows up in the striking contrast between goods and services consumer price inflation (Chart 3).

Chart 3 CPI inflation of goods and services



But the impact of greater competition does not stop with prices. Business tells us that greater competition between companies is encouraging them to protect their profits by cutting costs. This involves control of wage growth and the search for productivity improvements. This has been complemented by greater contestability in the labour market due to both greater migration and the potential for outsourcing and relocation of production should wage demands become excessive.

My view therefore is that the disinflationary pressure from globalisation may well have been more substantial than the direct estimates suggest, and this helps to explain why inflation has fallen throughout the world over the past fifteen years from 30% in the early 1990s to about 4% in 2003.⁽²⁾ This decline has been particularly marked in Africa, Latin America and the transition economies but is also significant in the United Kingdom and other developed countries.

None of this makes monetary policy any less important. Ultimately inflation in the United Kingdom is a product of our monetary policy. Inflation would certainly reappear if we relaxed. But the disinflationary pressures from the Far East and elsewhere have made our job easier. In the United Kingdom, interest rates are set to deliver the inflation target. If there is disinflationary pressure from the rest of the world then that allows us to set lower interest rates (and accommodate a higher rate of price increases in services) than would otherwise have been the case. Thus the consequence is lower interest rates as well as low inflation.

Prospects for UK inflation

That leaves the question whether that benign trend is likely to continue in the future. Over the past year, the downward trend in the prices of imported goods has stopped and import prices have started to rise, even after excluding oil and erratic items (**Chart 4**). The MPC's current view, as expressed in the latest *Inflation Report*, is that import price inflation will moderate over the coming period, but that it will not prove as much of a downward force on inflation as in the late 1990s and early 2000s. We have, for example, seen signs of costs rising in China and the Far East. Looking further ahead, there must be a risk that this begins to spill over into higher import price inflation.





And while globalisation has helped to hold down prices of most goods, the demand for energy and other raw materials coming from the newly emerging economies has contributed to higher prices of energy and some commodities. The direct effect on the CPI of higher petrol prices has been much more

⁽¹⁾ This is discussed in detail by my former MPC colleague, Stephen Nickell in 'Why has inflation been so low since 1999?', Bank of England Quarterly Bulletin, Spring 2005, pages 92–107.

⁽²⁾ Estimates from Kenneth Rogoff, 'Globalization and global disinflation', paper prepared for the Federal Reserve Bank of Kansas City conference on 'Monetary policy and uncertainty: adapting to a changing economy', Jackson Hole, 28–30 August 2003. The Bank for International Settlements has also emphasised the 'increasing global character of the inflation process', see BIS Annual Report 2006.

limited here than in the United States for example because so much of the price of our petrol is accounted for by duty. Nonetheless since the beginning of 2004, petrol prices have gone up by over 25% and gas prices by more still. The prices of petrol, utilities and transport services added about 1 percentage point to CPI inflation in May. And this does not include the effect on other goods and services where oil or gas is a component cost.

In the past we have seen wages pick up in response to hikes in the oil price and all central banks have been — and remain watchful for those 'second-round effects' now. So far we have seen few signs of them. Part of the reason for that has been that the oil price increases have been offset by lower price increases elsewhere. Most recently CPI inflation peaked at 2.5% during 2005 and has recently returned to that level (Chart 5). Given the relatively small immediate impact of higher oil and gas prices on CPI inflation, it is less surprising that this has not had major knock-on effects.

Chart 5 CPI inflation and the contribution from energy-intensive components



Indeed it is not clear how far it is possible to predict the movement of prices overall by adding up the movements of different components. You might expect overall inflation to be made up of a 'core' of domestically produced and consumed goods and services which would be relatively stable and responsive to policy at home and a more unpredictable and uncontrollable component arising from oil and other world markets. But that doesn't seem to match our recent experience.

The CPI in total seems to have been more stable than the CPI adjusted to exclude the impact of energy and import prices. The rise in these external components of our inflation rate has been offset by lower price increases of domestically produced goods and services. Services inflation, for example, has weakened from 4.6% in August to 3.4% in June. This might be because UK price-setters have chosen to take a hit to their margins or squeeze other costs rather than pass on higher oil and other import prices to their consumers. In other words,

they have taken account of the effect of higher import prices in depressing the real incomes of their customers and curtailed price increases on their own products to avoid losing sales.

This all suggests that in an economy with well-anchored inflation expectations, relative prices adjust quickly to maintain the overall rate near target; with domestic price inflation, for example, moving in the opposite direction to import price inflation. In effect, where the target is credible, the market adjustments to relative prices will do most of our work.

That is another reason for paying very close attention to inflation expectations. The MPC has been successful over the years in maintaining inflation expectations at a rate broadly consistent with the inflation target. Anchoring expectations in this way is important because it prevents the wage-price spirals that were a key part of the inflation process in the past. If wage and price-setters believed that inflation was going to rise above the target, then they would make some allowance for this in setting current wages and prices. That would add to current inflationary pressure, requiring higher interest rates to control it. While there was some evidence of a pickup in the general public's inflation expectations at the beginning of the year, probably in response to higher gas prices, they have fallen back a little since then and do not yet appear to have had any effect on actual wages or prices.

Conclusion

To sum up, by delivering the inflation target the MPC seeks to produce a platform of stability. That doesn't produce a quiet life for businesses — on the contrary it can make the pace of change quicker because it makes the underlying business imperatives clearer. In recent years, we have been helped in keeping inflation low and stable by the integration of new economies into the world market and the disinflationary pressure that has produced. As a result of that stability, the market and the public now expect inflation to remain around target and that appears to have helped to damp the impact of the recent oil price hikes on the overall inflation rate; the total impact has been modest and there are no signs yet of spillovers into wages and prices.

We do not know yet whether the benign international context will continue or what other shocks may occur. We are seeing renewed rises in energy prices this year which have helped push inflation back above target. Our role is to continue to assess the situation as it develops, monitoring economic data, financial markets, and listening to our regional Agents and their business contacts. We will not hesitate to change interest rates if it is necessary to keep inflation on track. That will allow you to concentrate on the real business issues of the future.

Financial system risks in the United Kingdom — issues and challenges

In this speech,⁽¹⁾ Sir John Gieve, Deputy Governor responsible for financial stability, explains the Bank's role in financial stability, identifies some of the key sources of vulnerability in the financial system, and highlights actions that firms and authorities are taking to guard against these risks. The speech notes that fierce competition to establish positions in new markets is shifting the key financial firms up the risk spectrum. A key theme of the speech is that although changes to the structure of the financial system over recent years may have made it more efficient at sharing risk, these same changes may also have made the system more efficient at transmitting shocks. It is therefore possible that we are moving into a world of less frequent but higher impact crises.

The Bank and financial stability

The Bank of England's central position in the economy owes a great deal to the development of its role in managing financial crises. The need for a central bank to provide liquidity to the market was identified as early as 1802, when Henry Thornton said:

'...if the Bank of England, in future seasons of alarm, should be disposed to extend its discounts in a greater degree than heretofore, then the threatened calamity may be averted through the generosity of that institution.'⁽²⁾

It took until the 1870s for that role to be institutionalised. The arrangement to request a letter from the Chancellor permitting the Bank to issue notes not backed by gold at a time of crisis was important to the remarkable financial stability that ensued. Indeed, some academics suggest that a true financial panic has not taken place in the United Kingdom since Overend Gurney and Company collapsed in 1866.⁽³⁾

Of course a lot has changed since then but maintaining financial stability remains one of the Bank's two core purposes. The current institutional arrangements are spelt out in a Memorandum of Understanding (MoU) between the Bank, the Treasury, and the Financial Services Authority (FSA). It establishes a framework for co-operation on three joint responsibilities — first identifying risks to the stability of the UK financial system, second reducing the risks where we can, and third managing crises if they occur.

The Bank contributes to all three.

• We bring to the assessment of risks both the expertise in economic analysis that we have developed as the monetary

authority and the experience that gives us as a participant as well as an observer of financial markets.

- We can help to reduce risks directly through our engagement with payment systems and by working with the FSA at home, and with other financial authorities abroad, to improve the resilience of the financial system.
- As Lender of Last Resort, we can contribute to the resolution of crises either by supplying liquidity to the market in general or, in rare circumstances, acting as the channel of support or facilitating transactions for individual institutions. The new MoU makes plain that the decision to authorise support operations rests with the Chancellor following independent advice from both the Bank and the FSA.

Our concern is with the stability and resilience of the financial system as a whole. Inevitably that causes us to focus on the major UK banks, markets and infrastructure at the centre of our economy, not because they are the most likely to run into problems but because an incident that doesn't affect them will not become a crisis for the system as a whole. While our responsibility is for the United Kingdom's system, the pivotal position of London as a major international financial centre means that we have to take a wider view of global developments and can share that perspective with colleagues abroad.

One way of reducing the probability and impact of the risks to the UK financial system is by helping the private sector to

⁽¹⁾ Given at the Centre for the Study of Financial Innovation (CSFI) roundtable on 25 July 2006. This speech can be found on the Bank's website at www.bankofengland.co.uk/publications/speeches/2006/speech280.pdf.

 ⁽²⁾ Thornton, H (1802), An enquiry into the nature and effects of paper credit of Great Britain, Chapter 7, page 121.

⁽³⁾ Allen, F and Gale, D (2000), Comparing financial systems, MIT Press.

improve their identification and management of risks. We contribute to that by talking to market participants about their businesses and drawing those threads together with our economic analysis of financial markets and trends. This enables us to feed back to market participants the broader picture to inform their understanding and management of their own risks.⁽¹⁾

In the latest edition of the Bank's *Financial Stability Report*, we have sought to improve the way that we present our assessment of risks. It is shorter, more selective and clearer on what we think is important and what isn't.

Of course it is not difficult to draw up a long list of possible 'triggers' for changes in sentiment in markets. Avian flu or worsening strife in the Middle East are two obvious ones at the moment. What we have tried to do in the new *FSR* is to identify the features of the economy and the structure of financial markets which could lead an initial shock to turn into a crisis. We set out six main sources of vulnerability.

Two of these vulnerabilities are features of the global economy: unusually low premia for bearing risk and the large financial imbalances among major economies. Two relate to the balance sheets of the non-financial sector: rapid leveraging of some parts of the corporate sector and high UK household debt. And two arise from structural dependencies within the financial system: the rising systemic importance of large complex financial institutions (or LCFIs for short) and the heavy dependence of financial institutions on some elements of market infrastructure. In each case the probability of the risk materialising is small but non negligible.

Rather than go over all that ground today, I'd like to pick out two themes that span many of these six vulnerabilities: first the increased competitive pressure on financial firms, and second the way in which changes to the structure of our financial system that have made it more efficient at sharing risk may also have made it more efficient at transmitting shocks.

A changing financial landscape

Over the past decade technological change, financial innovation, cross-border financial consolidation and the increasing demands of investors for better performance have had a profound effect on financial markets and institutions (Charts 1 and 2), and have increased the flow of savings across markets and national boundaries.

These changes have brought with them a shift away from bank-dominated finance, with its emphasis on a 'special relationship' between lender and borrower, towards 'anonymous' markets and arms-length asset management. Traditional worries about bank runs — where vulnerabilities lay on the liability side of the balance sheet — have not disappeared but these days there is equal concern about the reliability of apparent liquidity on the asset side of the balance sheet.

Chart 1 Concentration in the UK and US banking sector



and Board of Governors of the Federal Reserve System calculations.

(a) UK market shares determined by top ten banks' proportion of domestic loans to private non-financial institutions and individuals.

(b) US market shares determined by top ten banks' proportion of domestic commercial banking assets.

Chart 2 Current concentrations in global financial markets



Sources: Bloomberg (equities), Dealogic (syndicated loans and bonds) and Bank calculations

The changing nature of financial activity is illustrated by developments in credit derivatives markets. The availability of these instruments is enabling a change in the nature of banking itself towards business models based on origination and distribution rather than the retention of credit risk. The notional amount outstanding on CDS contracts globally reached \$14 trillion in 2005, up from \$40 billion in 1996. And

⁽¹⁾ Ben Bernanke also highlights risk management lapses by the private sector as a key source of crisis and stresses the vital role of market discipline in preventing such lapses from recurring. See Bernanke, B (2006), 'Hedge funds and systemic risk', remarks at the Federal Reserve Bank of Atlanta Financial Markets Conference, Sea Island, Georgia, 16 May.

the issuance of asset-backed securities in the United Kingdom, which involve parcelling up and selling different claims on pools of assets such as consumer loans and mortgages, has risen to some \$165 billion from \$5.5 billion in 1995. The United Kingdom now accounts for around a third of the issuance volume in European ABS markets.

On the whole, such developments are positive for financial stability. Coupled with greater macroeconomic stability (Chart 3), they have made the financial system more robust by allowing market participants greater scope to distribute and diversify risk and to manage it effectively.





(a) Rolling ten-year standard deviation of UK GDP growth

Experience of previous rounds of financial innovation also suggests grounds for optimism. Swaps and other over-the-counter interest rate derivatives, for example, are now well understood and widely recognised as increasing economic flexibility and the productivity of capital. More recently global financial systems and the newer asset markets appear also to have withstood several recent shocks, such as September 11, the Dotcom bubble, the GM-related wobbles in May 2005, Refco, and the Iraq war. The fact that some investors, such as hedge funds, are willing to take on greater risk does not necessarily give rise to system-wide concerns.

Systemic risk in modern financial systems

But there are limits to the amount of risk that can be hedged away. The financial system cannot reduce the amount of risk in the economy, but only repackage and transfer it. As more instruments that transfer risk are added to the balance sheets of financial institutions, so leverage and connectivity grow. While some of these connections might constitute a perfect hedge, they can leave the system more vulnerable to both counterparty risk and the liquidity of these markets.

The precise extent to which market participants are now connected through interlocking obligations is difficult to

gauge, but the UK interbank market provides some clues. Over 70% of the total lending in the market is accounted for by 15 institutions. And the major UK banks' large exposures to the main foreign-owned LCFIs are almost two thirds of Tier 1 capital. The rising correlation between the share prices of major UK banks and foreign-owned LCFIs also provides a hint of the growing interconnections (**Chart 4**).





Sources: Bloomberg and Bank calculations.

(a) Median determined by rolling 52-week bilateral equity correlations of the following financial institutions: Bank of America, Barclays, Citigroup, Credit Suisse, Deutsche Bank, HSBC, Lloyds TSB, Merrill Lynch, Morgan Stanley, RBS, Société Générale and UBS. Zero figures have been added to weekly percentage change figures for combining series in the event of mergers.

At the same time, rapid innovation in new financial instruments poses challenges within the financial system. As I have already discussed, these developments are likely to be positive in the long run, allowing market participants greater scope to diversify and manage risk. But in the short run, newer products, such as structured credit derivatives, do pose challenges. We simply do not have experience of how they behave in the full range of market conditions. The models that have been built by banks and other players in the market to value and hedge positions in these instruments are more sophisticated than ever before, but they are not proven in adversity. The infrastructure to support credit default swaps, the building blocks of many of these new products, is developing rapidly thanks to the initiative of the FSA and the New York Fed but there is still some way to go.

Competition between financial firms to establish positions in these new and fast-growing markets is also rising. The business risk not just of losing profits this year but of being left behind in the longer term by competitors looms large at the moment. And compensation structures that strongly reward financial performance are also influencing risk-taking.⁽¹⁾ There

⁽¹⁾ For a discussion of the role of compensation structures in systemic risk, see Rajan, R (2005), 'Has financial development made the world riskier?', paper presented at the Federal Reserve Bank of Kansas City Symposium on 'The Greenspan era — lessons for the future', Jackson Hole, 25–27 August.

is a tendency for rewards from generating 'excess returns' to far outstrip the penalties for poor performance. This intensifies the need to stay ahead of, or keep up with, the pack and stretches risk management systems in the process.

The more aggressively management pursues short-term shareholder value in the form of rates of return on equity, the greater the motivation to build leverage to meet its targets. Balance sheets have been growing strongly (Chart 5). In markets where a 20% return on capital is seen as disappointing, we are seeing efforts to emulate the business models of others and take on more risk through both proprietary trading (in fairly liquid markets) and principal position taking (in illiquid investments).





Sources: Bloomberg and Bank calculations.

(a) Due to changes introduced under International Financial Reporting Standards, figures for 2004 and 2005 use the most comparable data possible.

The history of financial crises is replete with injudicious attempts to 'keep up with the Joneses'. The very first CSFI survey in 1994 highlighted the important tension between financial risk and business risk when it observed:

'...that banks are being forced by the quest for new sources of business to become a different sort of financial institution — sometimes without noticing it, and probably without the necessary skills.'(1)

As 1987 and 1998 remind us, the best laid hedges and collateral can lose much of their reliability during times of stress. When financial institutions seek to liquidate portfolios to meet margin calls or solvency requirements, their attempts to lower risk exposures can cause a high degree of correlation amongst assets that appeared uncorrelated in normal times. We saw the same phenomenon on a much smaller scale in May and June this year.

In less liquid markets the price impact of any shock tends to be larger, the knock-on to balance sheets greater, and the

spillover effects across market participants wider. Our contacts in financial markets continue to suggest that market liquidity remains plentiful, but that there is a trend towards tying up funds in potentially illiquid assets in markets with relatively few players. And while hedge funds have played a positive role in recent episodes of turbulence — by absorbing some of the losses — their capacity and willingness to provide liquidity in the event of a large shock to the market remains uncertain.

To summarise, although financial innovation and macroeconomic stability have strengthened the financial system, the pace of innovation and the battle for market share may have also deepened some vulnerabilities.

More generally, and pulling together a number of issues that I have already discussed, the changing landscape may also be altering the character of the financial system. In a system with more connections between firms, losses are likely to be more widely dispersed and so absorbed more easily by individual firms and the system itself. So the probability of a contagious crisis may have fallen. But should we ever find ourselves in a crisis, with more connections between firms the impact could be spread around the financial system more rapidly and widely.⁽²⁾ Thus we may be moving to a world of less frequent but higher impact crises.

Dealing with systemic risk

Of course regulation and market infrastructure have not stood still as markets have developed — whether on capital requirements, large exposure limits or the introduction of real-time gross settlement. But the growth of financial firms active across different business lines and national boundaries does make designing policies to address systemic risks more challenging. Let me conclude by highlighting some actions we can take to guard against such risk.

First, there is scope for more private and public sector co-operation on stress testing. There is room to develop further our analysis of the combined effects of market and credit risk on the balance sheets of financial firms and at a system-wide level. And it is important that macroeconomic stress scenarios do not blindly extrapolate from the robust economic performance of recent years. The FSA is reviewing stress-testing practices of UK firms as part of a campaign to identify and encourage best practices. Of course each firm needs to tailor its tests to its own business, but I believe that there may also be merit in looking at a common set of plausible scenarios. This would help compare risk profiles and

⁽¹⁾ Banking banana skins, CSFI, June 1994, page 2.

⁽²⁾ Recent work at the Bank has been exploring this issue. See, for example, the analysis in Wells, S (2002), 'UK interbank exposures: systemic risk implications', *Financial Stability Review*, December, pages 175–82, and Cifuentes, R, Ferrucci, G and Shin, H S (2005), 'Liquidity risk and contagion', *Bank of England Working Paper no. 264*.

publishing these results could potentially strengthen market discipline.

Second, efforts are underway to improve further liquidity risk management. The fundamental reforms to the sterling money market introduced in May should make for greater flexibility in the day-to-day management of sterling liquidity, and help ease potential liquidity bottlenecks in times of stress.⁽¹⁾ These changes build on the lessons of the Federal Reserve's discount window in US dollars and the ECB's marginal lending facility in euros. Handling potential liquidity pressures faced by LCFIs operating in multiple countries and currencies continues to be a focus of policy attention.

Third, the UK authorities are improving the procedures and information needed to manage system-wide risks should they crystallise. The Bank, the FSA and HMT now conduct regular crisis management exercises to develop the co-ordination needed to handle operational disruptions and financial crises. Market-wide testing of business continuity arrangements takes place annually. It involved some 70 firms and utilities in 2005 and another test is about to start.

Finally, the changing financial landscape has increased the importance of international crisis co-operation. An MoU to develop such co-ordination in the EU among central banks, finance ministries, and regulators has been established and tested. We need to build on that to reach beyond Europe and to test crisis management arrangements especially with US authorities.

Taken together, these measures should help reduce the likelihood of systemic instability in the United Kingdom. I hope that my remarks today help make clear that the private sector — through sound individual and collective risk management — has its part to play in lengthening those odds still further.

See Tucker, P (2004), 'Managing the central bank's balance sheet: where monetary policy meets financial stability', lecture to mark the 15th anniversary of Lombard Street Research, 28 July.

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Appendices

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Bank of England speeches

Speeches made by Bank personnel since publication of the previous *Bulletin* are listed below.

Jackson Hole Symposium

Comments by Charles Bean in response to a paper by Ken Rogoff — 'Impact of globalization on monetary policy' in Wyoming, United States on 26 August 2006.

www.bankofengland.co.uk/publications/speeches/2006/ speech281.pdf

Financial system risks in the United Kingdom — issues and challenges

(Reproduced on pages 337–41 of this *Bulletin*.) Speech by Sir John Gieve at the Centre for the Study of Financial Innovation roundtable on 25 July 2006.

www.bankofengland.co.uk/publications/speeches/2006/ speech280.pdf

Stability and change

(Reproduced on pages 333–36 of this *Bulletin.*) Speech by Sir John Gieve to the Engineering Employers' Federation North West on 20 July 2006.

www.bankofengland.co.uk/publications/speeches/2006/ speech279.pdf

Mansion House Dinner

(Reproduced on pages 330–32 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 21 June 2006.

www.bankofengland.co.uk/publications/speeches/2006/ speech278.pdf

Speech at a dinner hosted by Scottish Financial Enterprise (SFE) and Edinburgh Chamber of Commerce (ECC)

(Reproduced on pages 327–29 of this *Bulletin.*) Speech by Mervyn King, Governor, in Scotland on 12 June 2006.

www.bankofengland.co.uk/publications/speeches/2006/ speech277.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 2004

- Durable spending, relative prices and consumption
- Asset pricing and the housing market
- The relationship between the overnight interbank unsecured loan market and the CHAPS Sterling system
- How much does bank capital matter?
- Measuring total factor productivity for the United Kingdom
- The Governor's speech at the annual Birmingham Forward/CBI business luncheon (S)
- Inflation targeting achievement and challenges (S)
- Risk, uncertainty and monetary policy regimes (S)
- E-commerce and the foreign exchange market have the promises been met? (S)

Summer 2004

- Assessing the stability of narrow money demand in the United Kingdom
- Deriving a market-based measure of interest rate expectations
- The economics of retail banking an empirical analysis of the UK market for personal current accounts
- The financing of smaller quoted companies: a survey
- Recent developments in surveys of exchange rate forecasts
- Sterling money market funds
- The new Bank of England Quarterly Model
- Public attitudes to inflation
- Perfect partners or uncomfortable bedfellows? On the nature of the relationship between monetary policy and financial stability
- A review of the work of the London Foreign Exchange Joint Standing Committee in 2003
- Reform of the Bank of England's operations in the sterling money markets
- Puzzles in today's economy the build-up of household debt (S)
- Speech at the National Association of Pension Funds Annual Investment Conference (S)
- Boring bankers should we listen? (S)
- Speech at CBI Yorkshire and the Humber annual dinner (S)

Autumn 2004

- How should we think about consumer confidence?
- Household secured debt
- Housing equity and consumption: insights from the Survey of English Housing
- Why has world trade grown faster than world output?
- The institutions of monetary policy (S)
- The Governor's speech to the CBI Scotland dinner (S)
- The Governor's speech at the Mansion House (S)
- Keeping the party under control anniversary comments on monetary policy (S)
- Some current issues in UK monetary policy (S)
- Managing the central bank's balance sheet: where monetary policy meets financial stability (S)
- Household debt, house prices and consumption growth (S)

Winter 2004

- British household indebtedness and financial stress: a household-level picture
- The new sterling ERI
- Using option prices to measure financial market views about balances of risk to future asset prices
- The foreign exchange and over-the-counter derivatives markets in the United Kingdom
- The external balance sheet of the United Kingdom: recent developments
- Stability and statistics (S)
- Why is inflation so low? (S)
- Monetary policy, data uncertainty and the supply side: living with the statistical fog (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)

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. 286 Modelling the cross-border use of collateral in payment systems (January 2006) Mark J Manning and Matthew Willison

No. 287 Assessing central counterparty margin coverage on futures contracts using GARCH models (January 2006) *Raymond Knott and Marco Polenghi*

No. 288 The price puzzle: fact or artefact? (January 2006) *Efrem Castelnuovo and Paolo Surico*

No. 289 Defined benefit company pensions and corporate valuations: simulation and empirical evidence from the United Kingdom (March 2006) *Kamakshya Trivedi and Garry Young*

No. 290 UK monetary regimes and macroeconomic stylised facts (March 2006) *Luca Benati*

No. 291 Affine term structure models for the foreign exchange risk premium (March 2006) Luca Benati

No. 292 Switching costs in the market for personal current accounts: some evidence for the United Kingdom (March 2006) Céline Gondat-Larralde and Erlend Nier

No. 293 Resolving banking crises — an analysis of policy options (March 2006) *Misa Tanaka and Glenn Hoggarth* No. 294 How does the down-payment constraint affect the UK housing market? (March 2006) *Andrew Benito*

No. 295 Productivity growth, adjustment costs and variable factor utilisation: the UK case (April 2006) *Charlotta Groth, Soledad Nuñez and Sylaja Srinivasan*

No. 296 Sterling implications of a US current account reversal (June 2006) Morten Spange and Pawel Zabczyk

No. 297 Optimal monetary policy in a regime-switching economy: the response to abrupt shifts in exchange rate dynamics (June 2006) *Fabrizio Zampolli*

No. 298 Optimal monetary policy in Markov-switching models with rational expectations agents (June 2006) Andrew P Blake and Fabrizio Zampolli

No. 299 Optimal discretionary policy in rational expectations models with regime switching (June 2006) *Richhild Moessner*

No. 300 Elasticities, markups and technical progress: evidence from a state-space approach (July 2006) *Colin Ellis*

No. 301 The welfare benefits of stable and efficient payment systems (July 2006) Stephen Millard and Matthew Willison

No. 302 International and intranational consumption risk sharing: the evidence for the United Kingdom and OECD (July 2006) *Vincent Labhard and Michael Sawicki*

No. 303 The danger of inflating expectations of macroeconomic stability: heuristic switching in an overlapping generations monetary model (August 2006) *Alex Brazier, Richard Harrison, Mervyn King and Tony Yates*

No. 304 Procyclicality, collateral values and financial stability (August 2006) *Prasanna Gai, Peter Kondor and Nicholas Vause*

No. 305 Bank capital, asset prices and monetary policy (August 2006) David Aikman and Matthias Paustian No. 306 Consumption excess sensitivity, liquidity constraints and the collateral role of housing (August 2006) *Andrew Benito and Haroon Mumtaz*

No. 307 Fiscal rules for debt sustainability in emerging markets: the impact of volatility and default risk (September 2006) Adrian Penalver and Gregory Thwaites

No. 308 Optimal emerging market fiscal policy when trend output growth is unobserved (September 2006) *Gregory Thwaites*

External MPC Unit discussion papers

The MPC Unit discussion paper series reports on research carried out by, or under supervision of, the external members of the Monetary Policy Committee. Papers are available from the Bank's website at:

www.bankofengland.co.uk/publications/other/ externalmpcpapers/index.htm.

The following papers have been published recently.

No. 14 National Accounts revisions and output gap estimates in a model of monetary policy with data uncertainty (May 2005) *Lavan Mahadeva and Alex Muscatelli*

No. 15 Do financial markets react to Bank of England communication? (December 2005) Rachel Reeves and Michael Sawicki

Monetary and Financial Statistics

Monetary and Financial Statistics (Bankstats) contains detailed information on money and lending, monetary and financial institutions' balance sheets, banks' income and expenditure, analyses of bank deposits and lending, external business of banks, public sector debt, money markets, issues of securities, financial derivatives, interest and exchange rates, explanatory notes to tables and occasional related articles.

Bankstats is published 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.

Further details are available from: Lucy Hallybone, Monetary and Financial Statistics Division, Bank of England: telephone 020 7601 5353; fax 020 7601 3208; email lucy.hallybone@bankofengland.co.uk.

The following articles have been published in recent issues of *Monetary and Financial Statistics*. They can also be found on the Bank of England's website at:

www.bankofengland.co.uk/statistics/ms/articles.htm.

The treatment of securitisations and loan transfers when seasonally adjusting using X-12-ARIMA (March 2006, pages 6–7) *Martin Daines*

Update of new effective interest rates data (March 2006, pages 8–10) *Rob Spillet, Michelle Rowe*

A work programme in financial statistics (April 2006, pages 11–15) *Nick Davey*

Proposed changes to industrial analysis of bank deposits from and lending to UK residents: consultation with users (May 2006, pages 16–17) *Duncan Weldon*

The implications of money market reform for data published in *Monetary and Financial Statistics* (June 2006, pages 18–19)

Financial Stability Report

The *Financial Stability Report* is published twice a year. Its purpose is to encourage informed debate on financial stability; survey potential risks to financial stability; and analyse ways to promote and maintain a stable financial system. The Bank of England intends this publication to be read by those who are responsible for, or have interest in, maintaining and promoting financial stability at a national or international level. It is of especial interest to policymakers in the United Kingdom and abroad; international financial institutions; academics; journalists; market infrastructure providers; and financial market participants. It is available from Financial Stability Report, Bank of England HO-3, Threadneedle Street, London, EC2R 8AH and on the Bank's website at:

www.bankofengland.co.uk/publications/fsr/index.htm.

Payment Systems Oversight Report

The Payment Systems Oversight Report provides an account of how the Bank is discharging its responsibility for oversight of UK payment systems. Published annually, the Oversight Report sets out the Bank's assessment of key systems against the benchmark standards for payment system risk management provided by the internationally adopted Core Principles for Systemically Important Payment Systems, as well as current issues and priorities in reducing systemic risk in payment systems. Copies are available on the Bank's website at:

www.bankofengland.co.uk/publications/psor/index.htm.

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/ redbook0506.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.

Quarterly Bulletin

The *Quarterly Bulletin* provides regular commentary on market developments and UK monetary policy operations. It also contains research and analysis and reports on a wide range of topical economic and financial issues, both domestic and international.

Summary pages of the *Bulletin* from February 1994, giving a brief description of each of the articles, are available on the Bank's website at:

www.bankofengland.co.uk/publications/quarterlybulletin/ index.htm.

Individual articles from May 1994 are also available at the same address.

The *Bulletin* is also available from National Archive Publishing Company: enquiries from customers in Japan and North and South America should be addressed to ProQuest Information and Learning, 300 North Zeeb Road, Ann Arbor, Michigan 48106, United States of America; customers from all other countries should apply to The Quorum, Barnwell Road, Cambridge, CB5 8SW, telephone 01223 215512.

An index of the *Quarterly Bulletin* is also available to customers free of charge. It is produced annually, and lists alphabetically terms used in the *Bulletin* and articles written by named authors. It is also available at:

www.bankofengland.co.uk/publications/quarterlybulletin/ contentsandindex.htm.

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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:

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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

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Quarterly Bulletin

Spring	13 March
Summer	19 June
Q3	25 September
Q4	11 December

Inflation Report

February	15 February
May	10 May
August	9 August
November	15 November

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