# Markets and operations

This article reviews recent developments in global financial markets. It summarises asset price movements in conjunction with market intelligence gathered from market contacts, and evaluates them in the context of the Bank's core purposes. The article also outlines changes in market structures and reviews the Bank's official operations.

#### Global financial markets(1)

#### Overview

Following sharp falls in the prices of risky financial assets in late February, there was a short period of increased financial market volatility that continued into early March. Most asset prices subsequently recovered quickly against the backdrop of a continued robust expansion in the global economy, suggesting that the so-called 'search for yield' remained largely intact.

Monetary accommodation was withdrawn further in some major economies. Towards the end of the period reviewed in this article, market intelligence from the Bank's contacts suggested some uncertainty about the robustness of asset markets looking forward.

#### Recent developments in global capital markets

During the past few months, there were further increases in policy rates by some major central banks. For example, the United Kingdom's Monetary Policy Committee increased Bank Rate by 25 basis points, to 5.5%, on 10 May. The ECB also raised its main refinancing rate by 25 basis points, to 3.75%, on 8 March. The People's Bank of China increased its one-year benchmark lending rate by 18 basis points on 18 May to 6.57%, as well as increasing commercial bank reserve requirements. But the US FOMC maintained its target for the federal funds rate at 5.25%, as it had for the previous eleven consecutive months, and the Bank of Japan left its policy rate unchanged, as it had since February.

Looking ahead, market perceptions of the future path of official rates were revised upwards in the United Kingdom, United States and euro area, but were little changed in Japan (Chart 1). On 25 May, short-term forward interest rates were consistent with further interest rate increases in the United Kingdom and the euro area by the end of 2007. And in Japan, policy rates were expected to rise, albeit very gradually. By contrast, the implied path for dollar rates continued to suggest some expectation that policy rates would be reduced over the next twelve months.



<sup>(</sup>a) Nominal forward rates derived from instruments that settle on the London interbank offered rate. One-day nominal forward rates for sterling, dollar and euro. Three-month nominal forward rates for yen.

(b) Solid lines show nominal forward rates for 25 May 2007. Dashed lines show nominal forward rates for 23 February 2007.

Implied uncertainty about the future path of interest rates, inferred from options prices, picked up in February and March, especially for short-term dollar rates. This coincided with the period of heightened volatility across asset markets. But by the end of May, implied volatilities on short-term interest rates had generally returned to lower levels than those observed at the turn of the year (Chart 2).

The skew of the implied distribution of future short-term interest rates remained relatively unchanged for sterling and the euro (although the latter moved quite sharply toward the end of the period). However, the balance of risks moved further to the downside for US dollar rates (Chart 3).

In foreign exchange markets, the US dollar depreciated further. Indeed, the dollar reached a new low against the euro and a

<sup>(1)</sup> This section focuses on global capital markets. The data cut-off for this section is 25 May 2007.

## Chart 2 International six-month implied volatility from interest rate options



## Chart 3 International six-month skews from interest rate options



Sources: Bank of England and Euronext.liffe

26-year low against sterling during April, although it appreciated slightly against both currencies in May. Since late February, the US dollar effective exchange rate index (ERI) depreciated by around 3% to reach a level about 6% lower than a year ago and around 25% lower than the beginning of 2002. The yen ERI also declined, more than reversing its rise earlier in the year (**Chart 4**).

Long-term interest rates generally increased internationally (Chart 5). But long-term forward breakeven inflation rates, as implied by inflation swaps or the difference between nominal and real yields, changed little (Chart 6). That was consistent with a general pickup in global long-term real forward rates, which have gradually drifted higher since the end of last year (Chart 7).

Other things equal, the increase in international long-term real forward rates might have been associated with lower equity prices via higher discount rates. In fact, most of the major











<sup>(</sup>a) Instantaneous forward rates. Sterling and dollar rates derived from the Bank's government liability curve. Euro rates derived from inflation swap rates. Sterling rates referenced to RPI, dollar rates referenced to CPI and euro-area rates referenced to HICP.

equity indices increased further over recent months, despite the widespread market turbulence in late February and early



### Chart 7 International ten-year real forward interest rates<sup>(a)</sup>



March during which equity markets fell sharply (**Chart 8**). Following that period of global financial market volatility, emerging market equity indices also rose sharply and by more than equity markets in the major economies. The largest increases were in Asia and Latin America. Most notably, the Shanghai Composite index gained over 25%.



Chart 8 International equity indices

After widening during the period of market turbulence in late February, global non-investment grade corporate and emerging market bond spreads narrowed towards their levels observed at the start of the year. In contrast, investment-grade corporate bond spreads remained a little wider than their levels in late February (Chart 9).

There was also a sharp and persistent widening of spreads in some US mortgage markets.<sup>(1)</sup> In particular, spreads on US sub-prime residential mortgage-backed securities (RMBS)



Chart 9 Global corporate bond spreads<sup>(a)</sup>

(a) Option-adjusted spreads

widened sharply during the February turbulence, particularly for lower-rated borrowers (Chart 10). The spike in spreads followed a period of gradual widening since the end of last year. During May, spreads narrowed a little but remained well above levels observed at the end of 2006. Spreads on US commercial mortgage-backed securities (CMBS) also widened sharply in late February, and continued to widen further over subsequent months (Chart 11).





Source: JPMorgan Chase & Co.

(a) Spreads refer to the ABX.HE indices which are comprised of a basket of credit default swaps on 20 RMBS.

#### Key influences on global capital markets

The general pattern of developments across asset markets was, according to market contacts, consistent with a continued robust macroeconomic outlook and a resumption of the so-called 'search for yield'.

(1) For more details, see Section 1 of the Bank's Financial Stability Report, April 2007.

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

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

## Chart 11 Spreads on a basket of US commercial mortgage-backed securities (CMBS)<sup>(a)</sup>



Source: JPMorgan Chase & Co.

(a) Spreads refer to the CMBX.NA indices which are comprised of a basket of credit default swaps on 25 CMBS.

#### Global economic growth remained strong

Despite the repricing of assets backed by US mortgages, many other asset prices continued to increase robustly. One factor that may have underpinned this has been the continued brisk expansion of the global economy. Although growth slowed recently in the United States, the world's largest economy, economic activity in other regions continued to increase strongly (Chart 12). GDP grew by more than market participants expected in 2007 Q1 in both the United Kingdom and the euro area, maintaining annual rates at close to 3%. Similarly, economic activity in Asia continued to expand rapidly in the first few months of 2007.





(a) Purchasing power parity weighted

Consistent with the relative cyclical positions of the major economies, short-term dollar real interest rates were lower than their levels at the start of the year for most of the period before increasing in late May. In contrast, sterling and euro rates increased steadily over recent months (Chart 13). And as relative interest rates changed, the US dollar depreciated further against other major currencies in real terms before appreciating slightly in May (Chart 14). This depreciation may also be part of a gradual adjustment to global imbalances.<sup>(1)</sup>







Sources: Bloomberg, Consensus Economics and Bank calculations

(a) The real exchange rate is calculated as the ratio of price indices of two economies, expressed

(b) Observation for May 2007 is derived using Consensus forecast of CPI.

Looking ahead, market participants anticipated that the US economy will rebound quite quickly. Indeed, Consensus forecasts indicated that US GDP growth in 2008 will exceed that of a number of other major economies (Chart 15).

However market commentators highlighted significant downside risks to this outlook. For example, the recent problems in the US housing market could lead to a larger and more protracted slowdown in the US economy. This may be consistent with the negative skew to short-term dollar interest rates inferred from options prices, which was around its lowest level since the mid-1980s (Chart 3). Moreover, if the

<sup>(1)</sup> See also the Bank's Financial Stability Report, April 2007, page 13.

downside risks to the US economy were to crystallise, there could be an adverse impact on global growth prospects and, in turn, global asset prices. This might explain why the skews of the implied distribution for both the S&P 500 and the FTSE 100 remained below their long-run averages (Chart 16).



(a) Solid line represents 2007 forecast. Dot represents latest 2008 forecast.





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

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

#### Commodity prices picked up again

Reflecting the underlying strength in world demand, commodity prices picked up again, especially industrial metal prices which reached new highs in May (Chart 17). According to market commentators, weaker demand from US residential construction has been more than offset by strong Chinese demand. Similarly, while OECD demand for oil was projected to stay broadly unchanged this year, non-OECD demand was forecast to grow by 3.3%, which has underpinned some strengthening in oil prices.<sup>(1)</sup>



Chart 17 Selected commodity price indices<sup>(a)</sup>

(a) Indices refer to Goldman Sachs Commodity Index (GSCI).

Despite the renewed price pressures in commodity markets, there were few signs that medium-term inflation expectations increased in the major economies. In the United Kingdom, medium-term forward inflation rates were little changed over recent months, but remained higher than at the beginning of 2006 (Chart 18). However, market contacts have not reported any widespread rise in their medium-term inflation expectations. Rather, they have highlighted the recent greater volatility of realised inflation as a possible reason why investors may have revised upwards their required compensation for bearing inflation risk (ie inflation risk premia) which in turn might have contributed to higher sterling forward inflation rates.





Sources: Consensus Economics, ONS and Bank calculations.

(a) RPI inflation forward rates derived from the Bank's government liability curve.
 (b) Consensus Economics surveys average forecasts of RPIX five-to-ten years ahead.

According to the International Energy Agency, Chinese demand for oil grew by 10.1% in January and 12% in February.

#### Market contacts reported continued healthy corporate conditions

The generally robust macro environment appears to have supported corporate earnings and, in turn, international equity prices. In the United States and the United Kingdom, aggregate corporate earnings of quoted companies increased as a proportion of GDP over the past few years, and remained well above their averages since the 1990s (Chart 19). And over recent months, despite the slowdown in US GDP growth, corporate earnings have generally been stronger than market expectations.





Sources: Bloomberg, Bureau of Economic Analysis and ONS

Corporate credit spreads also generally remained narrow and close to historical lows, which, in part at least, reflected continued low levels of defaults (Chart 20). Many market commentators have predicted that default rates will increase in 2007, albeit only modestly. But predictions of an imminent rise in defaults have been proved wrong for some years.

Chart 20 Global high-yield corporate bond spreads and default rates



The continued narrow level of corporate credit spreads has kept the cost of debt finance low for many firms, to some

extent offsetting the upward influence exerted by higher risk-free interest rates. Combined with higher equity prices, this has meant that (by crude measures at least) UK firms' overall cost of finance may have been broadly flat (Chart 21).

Chart 21 Illustrative UK corporate sector cost of finance



<sup>(</sup>a) Conventional government bond yield plus an equity risk premium, estimated using a Gordon growth model for a sample of FTSE All-Share companies.

- (b) Average of pre-tax cost of equity and corporate debt yield, weighted according to average
- Levels of debt and equity liabilities. Including corporate taxes would tend to lower the cost of debt finance. (c) Ten-year conventional government bond yield plus an investment-grade bond spread

Moreover, relative to equity financing, the cost of debt financing has remained low. This may have encouraged firms to increase their level of gearing and supported a pickup in leveraged buyout (LBO) activity internationally (Chart 22).<sup>(1)</sup> Moreover, some very large deals were reportedly in the pipeline.





(1) See also Section 1 of the Bank's Financial Stability Report, April 2007.

#### Investor demand for corporate debt remained high

Demand for corporate debt remained high, perhaps in part related to the high realised returns experienced in recent years. Contacts reported that issuance of senior debt — ie instruments that provide investors with priority claims in the event of default — was particularly strong. As a result, some firms' capital structures might consist of a proportionally smaller subordinated debt cushion protecting senior debt holders in the event of default. The box on pages 196–97 discusses the possibility that these changes may have reduced the prospective recovery rates for senior debt holders.

Despite the possible fall in future recovery rates, risk compensation on loans continued to fall. While a higher proportion of debt financing has raised some firms' leverage over the past few years, in general investors have not demanded extra compensation. In fact, the spread per unit of leverage fell further in Europe in 2007 Q1, although it may have stabilised somewhat in the United States (Chart 23).

Chart 23 Senior secured credit spreads per unit of leverage<sup>(a)(b)</sup>



(a) Based upon average institutional spreads versus average total debt leverage ratios

(b) Quarterly data to 2007 Q1.

 (c) US leverage reflects ratios for Large Corporate Transactions (minimum earnings before interest, taxes, depreciation and amortisation (EBITDA) of US\$50 million).

Alongside narrower spreads, lenders reportedly continued to compete aggressively for business on non-price terms, driving lending standards down further. These include weaker covenants and in particular greater issuance of so-called 'covenant-lite' deals. As explained in the box on page 195, such developments mean that the underlying value of a firm could be allowed to deteriorate for longer before its creditors can intervene. And according to survey evidence — the recent Federal Reserve Senior Loan Officer and ECB Bank Lending surveys — overall corporate credit standards loosened a little further in 2007.

## A sharp repricing occurred in US sub-prime mortgage markets

Recent problems in the US sub-prime mortgage market<sup>(1)</sup> may provide a useful case study of how lax lending behaviour and

deteriorating fundamentals can test the structure of a market that has grown rapidly in benign credit conditions.

Heightened competition between sub-prime originators during 2005 and 2006 in the face of strong demand for assets from end-investors resulted in a weakening of lending standards. However, from mid-late 2006, arrears and delinquencies on US sub-prime loans increased, prompting a gradual widening in spreads on securities backed by US residential mortgages (Chart 10). In early 2007, there was an increase in early payment defaults (EPDs).<sup>(2)</sup> Many of these loans were in the process of being repackaged into RMBS by securities dealers. These EPDs caused the dealers to pass the loans back to the loan originators, the losses on which triggered a wave of failures of these institutions. In turn, investors adjusted their perceptions of the riskiness of the underlying loans, causing a very sharp widening in spreads on securities backed by US sub-prime mortgages in late February.

In addition, some dealers had reportedly sold protection using credit default swaps (CDS) of asset-backed securities (ABS), or indices of such CDS. Although dealers attempted to offset these exposures, some of their hedges may have been imperfect forcing them to close out of their positions, which in turn might have accentuated market moves.

The most obvious impact of the problems in the US sub-prime mortgage markets has been a tightening in credit standards and a re-evaluation of the appropriate level of compensation for the underlying risk of default in associated markets. The latest Federal Reserve Senior Loan Officer Survey suggests, a net balance of 25% of respondents reported tighter lending standards on residential mortgages in 2007 Q1 (Chart 24). In the wake of developments in the US sub-prime RMBS market, rating agencies also identified signs of deterioration in underwriting standards in CMBS markets. This prompted tighter controls on the value of the underlying collateral, and there was a sustained widening of spreads on CMBS (Chart 11).

#### Overall, financial markets shook off the latest shock and the so-called search for yield seemingly continued

Recent events in the US sub-prime market may also have prompted a more widespread reassessment of the underlying risk across credit markets. For example, implied uncertainty about future credit spreads derived from option prices increased and remained higher than earlier in the year, although it has fallen relative to the levels observed during the late February/early March turbulence. Similarly, the implied uncertainty on major equity indices has remained slightly more elevated than earlier in the year (Chart 25).

<sup>(1)</sup> For more details, see *Financial Stability Report*, April 2007, pages 20–24.

<sup>(2)</sup> An EPD occurs when the borrower is in arrears after, or defaults in, the first few months of the loan.

#### Recent developments in loan covenants

This box discusses recent weakening in corporate lending standards in the leveraged loan market via reduced protection from loan covenants. A covenant is a condition that a borrower must comply with as part of the terms of a loan or bond. Hence they give lenders additional credit protection. If the borrower does not act in accordance with covenants, this may be considered a 'technical' default and allows lenders to demand payment (usually in full), although lenders may agree to a waiver or restructuring of the loan.

Covenants can either refer to a firm's financial position, for example, setting a level of allowable leverage (usually debt to earnings ratios), or cover non-financial events, for example, the delivery of financial information or confer veto rights.

Covenants can operate in two ways. Maintenance covenants place restrictions on the borrower to be met on an ongoing (eg quarterly) basis. And incurrence covenants impose conditions should an event such as issuance of a new debt occur.

In the United States, the average number of maintenance covenants attached to US leveraged loans has fallen gradually since 2000 (Chart A). This partly reflects a shift towards so-called 'covenant-lite' deals; a term typically used to describe loans with incurrence-only covenants. In Europe, thus far there have been fewer covenant-lite deals. However, contacts reported a recent small increase in the number of European leveraged loans that included incurrence, rather than maintenance, covenants.

There are also some signs that covenants (either maintenance or incurrence) have become less stringent over recent years, although the data are mixed. For example, according to Standard and Poor's, those lenders financing leveraged buyouts have accepted progressively higher debt to income ratios of companies to whom they lent since 2002 (Chart B). And while this measure fell slightly in the first few months of 2007, projected leverage ratios edged higher, implying there may be less headroom before covenants are triggered. Other US data from the Loan Pricing Corporation, however, do not show financial covenants becoming less stringent.

Market contacts suggest that covenant weakening partly reflects intense competition among lenders, which has led to a general loosening in credit standards. To some extent, this could reflect the ease with which investors can transfer risk to a third party. For example, lenders can package loans and sell them via collateralised loan obligations (CLOs). Alternatively, they could purchase default protection using loan credit default swaps.

#### Chart A Developments in US leveraged loan covenants<sup>(a)</sup>

Average number of maintenance covenants per loan (left-hand scale)<sup>(b)</sup> US covenant-lite issuance (incurrence only) (right-hand scale)



(a) Maintenance covenants data to end-2007 Q1. Covenant-lite issuance data to 15 March 2007.
 (b) Excludes covenant-lite lending.





Source: Standard and Poor's Leveraged Commentary and Data

(a) Earnings before interest, tax, depreciation and amortisation.
(b) Actual level specified in buyout documentation.
(c) S&P estimate of leverage ratio in second year after buyout.

Contacts are divided about the wider implications of covenant weakening and whether it is a cyclical development or more structural. Some suggest that it has not had a material negative impact on firms' credit ratings because covenants play a small part in determining ratings. However, other contacts think covenant weakening, particularly if applied throughout firms' capital structures, could mean lenders have insufficient opportunity to monitor the underlying value of the firm and influence management behaviour. Hence the value of the firm might be allowed to deteriorate for longer before lenders force a restructuring, possibly resulting in lower recovery rates for lenders if the firm defaults on its debt.

# Credit spreads, recovery rates and changes in corporate capital structure

Corporate bond spreads have generally narrowed over recent years and remain low compared with historical levels. At the same time, according to market contacts, firms have shifted their liabilities towards more senior creditors (which have priority claims in the event of default) and away from more junior creditors and equity holders. This box considers whether this change in firms' capital structure may widen credit spreads on senior debt using a simple structural credit model.<sup>(1)</sup>

#### Firms' capital structure and recovery rates

A typical firm's capital structure will be made up of equity and debt. Within this, a firm may issue both senior and subordinated debt, with the latter including mezzanine loans and high-yield bonds. When a firm defaults on its debt, its assets are divided between its creditors. The more senior the creditor, the higher priority claim they have on a firm's assets and hence the higher their expected recovery rate.

Changes in firms' capital structures may affect recovery rates for investors in corporate debt. Recovery rates for senior creditors should, other things being equal, be higher the larger the 'cushion' of subordinated debt holders below them. This is because, in the event of default, there would be a proportionately smaller number of senior debt holders to share the firm's remaining assets. Conversely, an increase in the issuance of senior debt relative to subordinated debt might lead to lower senior debt recovery rates.

In 2006, over 150% of incremental funding required for European leveraged buyouts was provided by senior lenders. This suggests that the proportion of senior debt relative to subordinated (junior) debt and equity increased.

Rating agencies have estimated recovery rates for firms with different capital structures. For example, Moody's found an 89% recovery rate for senior debt with a large subordinated debt cushion (≥40% subordinated debt) but a 52% recovery rate for structures with senior debt only. Likewise, Fitch Ratings suggest that about 60% of unsecured bond (ie subordinated debt) downgrades have been caused by an increase in the size of the secured (ie senior) debt tranche.

#### Recovery rates and corporate bond spreads

A Merton structural credit risk model provides a framework for considering the effect of lower recovery rates on credit spreads. It models the relationship between the value of a firm's equity and debt, where the latter comprises both senior and subordinated debt. The firm's value (ie debt plus equity) is assumed to grow on average at a rate equal to the cost of capital net of dividends and interest payments, but with a normally distributed degree of uncertainty around this central path as shown in **Figure 1**. If at any time the firm's value falls below the face value of the firm's debt, the equity holders default and transfer the firm's value (ie the firm's assets) net of bankruptcy costs, to the debt holders. Essentially, it is assumed that the debt instruments contain protective covenants (that is, terms and conditions attached to the loan, see the box on page 195), which allow lenders to force a default if the value of the firm falls below the face value of its debt.





Cast in this framework, the debt holders' position is akin to holding a risk-free bond, but having sold a put option on the firm to the equity holders with a strike price equal to the face value of the debt. In a similar vein, the firm's equity is like a call option on the firm's assets, also with a strike price equal to the face value of the debt. Using a standard Black-Scholes barrier option pricing formula, it is possible to derive an explicit formula for the price of the risky bond which in turn can be used to estimate the yield differential between a risky bond and a default-free bond (ie the credit spread).

The model was calibrated such that debt to equity ratios, bankruptcy costs, volatility and the risk-free rate were broadly in line with observed average levels. However, as with any simple model it embodies some simplifying assumptions, and the results should therefore only be taken as illustrative. Here, the model is used to characterise a stylised firm that finances itself through senior and subordinated debt and equity. By altering the size of the subordinated debt tranche it is possible to examine the impact of a change in capital structure on recovery rates and spreads.

**Charts A** and **B** show the results. When the subordinated tranche is sufficiently large to absorb all losses and eliminate senior credit risk, the senior tranche's recovery rate reaches 100% and its spread falls to zero. As the size of the

subordinated debt tranche falls, however, the loss given default for senior debt, and the corresponding spread, increases.

Chart A Proportion of subordinated debt and senior debt loss given default



Chart B Proportion of subordinated debt and senior debt implied spreads



**Charts A** and **B** assume that the junior debt issue is fully subordinated to the senior issue (that is, junior debt holders receive nothing in the event of default unless senior debt holders have been fully paid). However, in some circumstances a large number of subordinated debt holders may be able to hold up a restructuring to extract concessions from the senior debt holders. Likewise, contacts have remarked that the documentation of second lien loans — senior debt which ranks below first lien debt and has a junior claim on the firm's assets in the event of bankruptcy — has rarely been tested in a bankruptcy situation, and varies widely from deal to deal. It is not certain that the priority of first lien over second lien loans would be upheld in all cases.

One simple way to examine this issue is to change the assumed proportion of firm assets which accrue to the senior debt holder in the stylised model. **Chart C** shows how the

spreads of the senior and subordinated issues converge as a greater proportion of the firm's assets accrues to the subordinated debt holder. This might suggest that differences in documentation may have a sizable impact on the valuation of both senior and subordinated debt.





As noted above, these model results are purely illustrative. In particular, they assume that corporate bond spreads reflect only the risk of default losses and investors' appetite to bear this risk. In reality, the difference between yields on corporate and government debt also reflects other factors such as liquidity premia.

In addition, the model incorporates a mechanical default mechanism when the firm's value falls below the face value of its debt as specified in the loan covenant. In practice, debt holders may act differently, possibly forcing a default prior to this point, so the presence of more senior debt holders may improve recovery rates.

In summary, the insights from this simple model suggest that an increase in senior, relative to subordinated, debt is likely to lead to lower recovery rates and higher senior credit spreads. This echoes rating agency analysis and is reflected in the cost of protecting senior debt-only issuance. However senior loan spreads have remained narrow, which suggests that some market participants may not have fully accounted for recovery rate risk.

(1) For more details of this model, see Churm and Panigirtzoglou (2005), 'Decomposing credit spreads', *Bank of England Working Paper no. 253*.





(a) The April 2007 survey splits standards for the overall residential market into prime, non-traditional and sub-prime mortgages. The final data point is therefore a weighted average based on some approximate weights (70% prime; 15% non-traditional; and 15% sub-prime).

Chart 25 Implied volatility on US credit default swaps and the S&P 500 inferred from options



(a) The CDX crossover index comprises credit default swaps of 35 equally weighted US entities with an average rating of 8B.
(b) The VIX is an index of volatility in the S&P 500 implied from option prices.

However, any impact on investors' overall appetite for risky assets appears to have been limited. After the brief period of heightened volatility and general risk reduction, asset price movements and information from market contacts suggested that the so-called 'search for yield' resumed despite a pickup in long-term risk-free interest rates. Put another way, while investors may have reassessed the underlying riskiness of particular assets, the market price of risk remained low.

Moreover, in credit markets, there were continued signs of investors moving into lower-rated credits in search of returns. For example, there was a further increase in US syndicated lending, and a higher proportion of deals had low ratings (Chart 26).

Product innovations continued apace as investors sought ways to boost overall returns. For example, there have been several launches of constant proportion debt obligations (see box on page 199) and credit derivative product companies (see page 201).



Chart 26 US B-rated syndicated loan issuance

(a) Total syndicated loans rated AAA to B grade.

corporates(a)

Likewise in equity markets, the volume of initial public offerings (IPOs) continued to rise, especially in emerging market economies (EMEs). And debt issuance by EME corporates also rose strongly in recent months (Chart 27).



Chart 27 Foreign-currency bond issuance by EME

Sources: Dealogic and Bank calculations

(a) Refers to bonds issued in US dollars, euros, yen and sterling. The aggregate series for each region were crudely calculated at constant prices using a weighted average of euro-area, Japanese, UK and US price indices.

(b) Year to May 2000, current prices.

In foreign exchange markets, market contacts have suggested that so-called 'carry trades' were largely reinstated following the period of market turbulence earlier in the year. (In a foreign exchange carry trade, an investor typically borrows in the currency of a country with low interest rates and invests in assets denominated in the currency of another country paying higher rates of interest.)

#### Constant proportion debt obligations

Constant proportion debt obligations (CPDOs) are fixed-income instruments that provide a highly rated, leveraged corporate credit investment. CPDOs have attracted considerable interest by achieving high (AAA) ratings while offering returns significantly higher than other similarly rated assets (up to 200 basis points above Libor).

The first CPDO was launched in August 2006. Market contacts reported that actual and expected issuance contributed to the observed narrowing of credit spreads during 2006 Q4. However, issuance to date has been somewhat below the market's initial expectations. More recently, a new generation of CPDOs, which employ an asset manager to actively manage the portfolio, has been launched. This box describes the mechanics and potential implications of the first generation of index CPDOs.

#### **CPDO** mechanics

A typical CPDO structure uses a special purpose vehicle (SPV) to issue credit-linked notes. The note proceeds are used as collateral to write credit protection on investment-grade credit default swap (CDS) indices. To increase prospective returns, this credit exposure is leveraged.

The amount of leverage used is determined by a dynamic trading rule, which is a function of changes in credit spreads. Leverage is reduced when spreads narrow in order to lock in mark-to-market gains. By contrast, when spreads widen and the CPDO makes losses on its portfolio, leverage is raised to increase risk with the aim of making higher returns in future. The maximum leverage is, however, capped by the terms of the CPDO.

This business model of leveraging up to compensate for poor performance relies on credit spreads fluctuating around a long-run average level and some portion of the credit spread reflecting factors other than default risk (for example a liquidity or other risk premia).<sup>(1)</sup> If credit spreads only compensated investors for expected default losses, a greater exposure to the credit indices would imply higher expected default losses. The CPDO relies on there being additional compensation embodied in the credit spread, in conjunction with a long investment horizon, to generate sufficient returns to meet its liabilities.

The CPDO aims to close the gap between the present value of its liabilities (known as the target bond price) and the value of its credit portfolio (known as the net asset value (NAV)). This objective can leave the CPDO in one of three states (Chart A). First, it can 'cash-in' (Scenario 1). Here, the CPDO has sufficient funds to pay the remaining coupons and the note principal at maturity. On cashing-in, the CPDO sells its credit portfolio, placing the proceeds in a risk-free investment until maturity of its liabilities. Second, the CPDO can 'cash-out' (Scenario 2) if the NAV falls below some threshold (10% of the principal in this example). In this case, the CPDO is wound up before maturity, with investors realising potentially large losses. Third, a CPDO can pay all coupons in full, but not have enough funds to repay the principal in full (Scenario 3).

#### Chart A CPDO net asset value





#### Implications for financial markets

CPDOs combine an offer of high returns with a high credit rating, apparently a 'free lunch' for investors. The high credit rating largely stems from low expected losses from defaults, reflecting the CPDO investing in liquid CDS indices, which 'roll' every six months. At the roll, any credits that have deteriorated are removed from the index and replaced with less risky names. This regular rebalancing means that a CPDO's exposure to default risk is low. But this may not mitigate other risks such as mark-to-market volatility (ie market risk).

The high prospective return reflects CPDOs exposure to jump-to-default events. Indeed, a large and unexpected cluster of defaults could cause the CPDO to 'cash-out', forcing it to sell its portfolio into an already distressed market. In this event, investor losses could be severe. So while the high rating reflects a low expected loss in relatively benign conditions, investors are being compensated for a very small probability of a severe loss.

Otherwise, the leverage rule for CPDOs means that, by selling credit protection when spreads widen (and *vice versa*) they could potentially serve to dampen fluctuations in credit spreads; the opposite to constant proportion portfolio insurance (CPPI). The rule would, though, tend to mean that leverage increased during a period in which credit spreads generally rose.

For more information on the content of credit spreads, see Churm and Panigirtzoglou (2005), 'Decomposing credit spreads', *Bank of England Working Paper no. 253*.

One factor supporting the search for yield has been the large amount of risk capital available in the financial system. More generally, strong growth in the amount of broad money in circulation around the globe has continued to underpin asset markets. Indeed, domestic money growth remained strong in a number of countries, particularly in the United Kingdom, despite the further withdrawal of monetary accommodation (Chart 28). And these domestic monetary measures exclude cross-border money holdings, which reportedly remained strong in some countries. For example, non-residents' holdings of sterling deposits with the UK banking system increased by around 36% in the year to April 2007.





<sup>(</sup>a) Definitions of broad money vary between countries. This chart uses M4 for the United Kingdom, M2 for the United States, M3 for the euro area and M2+CDs for Japan

Financial markets have passed through a series of temporary bouts of volatility (in particular, in May 2005, May/June 2006 and more recently February/March 2007). This possibly provides support for the view that the risk-bearing capacity of the financial system has increased, perhaps due to financial innovation, including the growing use of credit risk transfer markets. These structural developments may have distributed risk more widely. In addition, the proliferation of more speculative investors, such as hedge funds, may in some cases support stable markets. For example, during the latest period of market turbulence in February, contacts reported that some hedge funds were important sources of market liquidity, which helped to stabilise markets.

Taken together, these factors might have justified a fall in the risk premia offered by some risky assets over recent years. For example, falls in credit premia may have been consistent with new instruments and more liquid credit transfer markets meaning that asset prices better match investors' assessment of underlying credit risk.

However, an alternative explanation is that lower levels of risk compensation may reflect an overly optimistic assessment of the likely level of asset market volatility going forward, a view perhaps accentuated by the continuing high levels of liquidity in financial markets. In this scenario, a large and pervasive enough shock might cause asset markets to adjust quite sharply as required risk premia increased. For example, a sharp increase in uncertainty about the macroeconomic outlook, and/or a shift in investors' aversion to risk, might cause an increase in the required compensation for bearing risk across all assets.

Of course, it is not clear what might be the likely trigger for such an adjustment. The continued withdrawal of global monetary accommodation has thus far proceeded smoothly. But recent market intelligence suggested some increased nervousness about the outlook for risky asset prices as global market interest rates have shifted higher. Arguably, the apparent rebalancing of economic growth away from the United States might have helped to lessen the prospect of a disorderly fall in the value of the dollar, although market contacts continued to cite this as a risk. They also pointed to the possibility that the failure of a large leveraged loan deal which left the lead intermediaries with unexpectedly large commitments could prompt a widespread disruption as investors adjusted their positions.

#### Developments in market structure

In the event of a significant disturbance to financial asset markets, there is great uncertainty surrounding how the shock would be transmitted through the financial system. In part, this uncertainty stems from changes in the nature and structure of both markets and financial institutions over the past few years.<sup>(1)</sup> More specifically, innovations to financial instruments have allowed many risks to be distributed to a wider investor base, and hedge funds and special purpose financing vehicles have taken on increasingly important roles as financial intermediaries.

#### Further innovations in tradable loan markets

Tradable credit markets have continued to develop at a rapid pace. The growth of credit default swaps on leveraged loans (LCDS), described in previous *Bulletins*, has led to the development of indices of LCDS, akin to the CDX and iTraxx indices of CDS contracts that reference corporate bonds. These LCDS indices, known as LevX in the European market and LCDX in the US market,<sup>(2)</sup> provide investors with a liquid instrument to take or hedge the credit risk on a diversified portfolio of loans.

One previous impediment to the development of these indices had been the issue of 'cancellability'. In broad terms, there was disagreement among market participants as to whether, when a loan is called, the CDS contract should be cancelled or

<sup>(1)</sup> This point is made in the speech by Paul Tucker on page 310–16 of this Bulletin.

<sup>(2)</sup> The launch of LevX was completed in November 2006; LCDX reprinted was launched in May 2007.

switched to reference another loan (to the same borrower) with similar characteristics. According to market contacts, participants wishing to hedge risks were said to favour the cancelling structure whereas traders were said to prefer non-cancellability. Moreover, conventions differ across jurisdictions with the United States having adopted the non-cancellable format and Europe the alternative cancellable structure.

These differences across jurisdictions, which had been a barrier to liquidity, have been resolved with the launch of the latest versions of the US (LCDX) and European (LevX) indices. Each will have cancellability as an option.

The creation of these indices may lead to tradable tranches of the LCDS indices and, in turn, a market in loan default correlation. Tranches of CDS indices referencing bonds have existed for several years and market contacts have reported that the investor base has widened recently.

#### Credit derivative product companies (CDPCs)

An example of a relatively new class of specialist investor in structured credit instruments are credit derivative product companies (CDPCs). CDPCs typically sell credit protection on low-risk (senior and super senior) tranches of CDOs.<sup>(1)</sup>

Although there are currently only a small number of CDPCs, ratings agencies have been reportedly processing a number of applications for new CDPCs. A top notch rating (AAA) is crucial to the business model of a CDPC as it means it can write protection on large notional values with relatively little capital. In particular, a high rating provides operational benefits as CDPCs do not have to post collateral based on mark-to-market changes in the value of their derivative positions. To obtain high ratings the firms must prove to the rating agency, among other things, the robustness of their proprietary model for determining their capital holdings.

Another characteristic of a CDPC is that it raises 'permanent capital' (ie equity capital, rather than term debt or other liabilities). This is important owing to the typical long horizon of the trading strategy.

#### Permanent capital

Attempting to access 'permanent capital' has led to a rise in the number of specialist investment vehicles and funds listed on stock exchanges. Several hedge funds and private equity firms have recently floated funds.

Accessing permanent capital is appealing to hedge funds because it can facilitate investment in relatively illiquid assets and long-horizon trading strategies without increasing any maturity mismatch between the fund's assets and liabilities. Many hedge funds already limit the risk of being forced to sell illiquid assets following unexpected investor redemptions by specifying 'lock-up periods' during which investors in the fund cannot withdraw money. But, unlike permanent capital, lock-up periods are typically fixed. At the end of the specified period, investors are free to withdraw funds.

As well as allowing fund managers to pursue different investment strategies, listed vehicles may widen the investor base for specific types of risk. More specifically, listed investment vehicles may provide investors with access to asset classes that may otherwise have been unavailable to them. For example, some listed vehicles invest in equity tranches of ABS and CDOs. Exposure to these more esoteric asset classes might otherwise be unobtainable to traditional equity investors.

#### UK real estate investment trusts

Commercial property is another asset class that has been opened up to equity investors in the United Kingdom following the introduction of real estate investment trusts (REITs) in the United Kingdom in January 2007. Similar legislation had been introduced in Japan, France and more recently in Germany. All follow the established US market.

The key advantage for a commercial property company in adopting a REIT structure is the advantageous tax status it affords. REITs are exempt from paying tax on income and capital gains from properties, provided they distribute a minimum 90% of their income as dividends (and meet certain other conditions). This allows the firms to pay out higher dividends, the key motivation for investors in REIT shares.

The establishment of REITs in the United Kingdom is consistent with increased demand for property exposure by institutional investors, such as pension funds, which to date may have been unwilling to invest in property directly owing to the illiquid nature of the asset and considerations related to property management. Indeed, the development has already spurred several investment funds dedicated to UK REIT shares, allowing investors to gain exposure to a diversified portfolio of commercial property assets.

So far, fourteen British commercial property firms with a combined capitalisation of around £35 billion have reportedly made the switch to REIT status. And seven other companies announced that they are actively considering conversion or the launch of a REIT vehicle in 2007.

#### Bank of England official operations

The Bank's balance sheet is managed in accordance with its policy purposes. These relate to the implementation of monetary policy; management of the Bank's foreign currency

The first generation of CDPCs wrote protection on individual corporates, rather than tranches of credit risk.

reserves; provision of banking services to other central banks; provision of payment services for the UK financial system and the wider economy; and management of the Bank's free capital and cash ratio deposits from financial institutions. The key event in the current review period related to the Bank's foreign currency reserves. On 13 March, the Bank successfully launched a \$2 billion three-year bond under its new debt issuance programme. Going forward, the Bank intends to issue annually in a transparent way under this new programme in order to finance its foreign currency reserves.

#### Sterling monetary framework<sup>(1)</sup>

The size of the Bank's balance sheet in aggregate rose modestly over the review period, reflecting a slight rise in notes in circulation and reserves account balances (Table A). On the asset side, the balance sheet temporarily expanded partly owing to £747 million of borrowing in the standing facilities on the final day of the maintenance period that ended on 9 May.

Members of the Bank's reserves scheme chose, on average, to hold slightly lower aggregate target reserves balances than during the previous review period (Chart 28). That was partly attributable to the previous review period spanning the calendar year end, when reserves targets were somewhat higher than the average level chosen since September 2006.

As well as influencing reserves targets, calendar effects can also impact on the level of money market interest rates. As reported in previous Bulletins, the calendar year end and particularly the month end last July seemed to contribute to a widening of the spread between market interest rates and Bank Rate. During the current review period, however, the spread of unsecured market interest rates to Bank Rate was fairly narrow and seemingly unaffected by the quarter end in March (Chart 29). This may reflect an ongoing process of market participants becoming more familiar with the new regime.



Chart 29 Spread to Bank Rate of unsecured sterling overnight interest rates(a)



<sup>(</sup>a) Sterling overnight index average (SONIA) fixing less Bank Rate

The average spread of SONIA to Bank Rate was 5.3 basis points, 2 basis points lower than over the previous review period. The volatility of this spread has also remained around

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

£ billions	5
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ilities 9 May 7 Feb. Assets		Assets	9 May	7 Feb.	
Bank note issue	40	38	Short-term sterling reverse repo	31	31
Reserves account balances	18	17	Long-term sterling reverse repo	15	15
Standing facility deposits	0	0	Ways and Means advance to HMG	13	13
Other sterling deposits, cash ratio deposits and the Bank of England's capital and reserves	11	12	Standing facility assets	1	0
Foreign currency denominated liabilities	11	11	Other sterling-denominated assets		4
			Foreign currency denominated assets	16	15
Total <sup>(c)</sup>	80	78	Total <sup>(c)</sup>	80	78

(a) The Bank Charter Act 1844 requires the Bank of England to separate the note issue function from its other activities. Accordingly, the Bank has two balance sheets: for Issue Department and Banking Department. See

 (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

(1) This section reviews the period from 8 February to 9 May covering three maintenance periods

#### Chart 28 Aggregate reserves targets

the low levels observed since the launch of the Bank's new sterling monetary framework in May 2006 (Chart 30).

Chart 30 Folded cumulative distribution<sup>(a)</sup> of spread of sterling unsecured overnight interest rate (trade weighted) to Bank Rate

8 February–9 May 2007 9 November 2006–7 February 2007 3 August–8 November 2006 Cumulative frequency, per cent Cumulative frequency, per cent 50 50 40 60 30 70 20 80 10 90 100 0.0 + 0.1 0.5 0.4 0.3 0.2 0.1 0.2 0.3 0.4 0.5 Percentage points Sources: Wholesale Market Brokers' Association and Bank calculations

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

The volatility of the spread of secured overnight interest rates to Bank Rate also remained narrow and the distribution of executed trades was narrower than those for either of the previous two review periods (**Chart 31**). The March quarter end did not cause significant volatility in secured overnight market interest rates, despite being a high transaction volume day for payments systems and coming just before Easter.

Chart 31 Folded cumulative distribution<sup>(a)</sup> of spread of sterling secured overnight interest rate (trade weighted) to Bank Rate



Sources: BrokerTec and Bank calculations

(a) Distribution of the spread between overnight interest rate at end-of-day and the official interest rate. The distributions are folded at the median so that cumulative probabilities for values above (below) the median are indicated by the right-hand (left-hand) scale. The current arrangements for monetary policy implementation have now been in place for around one year. As reserves-scheme participants have familiarised themselves with the system, the secured market interest rate has settled close to Bank Rate, having been slightly higher during the second half of 2006 (Chart 32).





(a) ICAP GC overnight repo fixing less Bank Rate.

As in previous review periods, there were one or two days when secured market rates fell relative to Bank Rate. This was most pronounced towards the end of April, when a reported shortage of gilt collateral caused the spread between secured market rates and Bank Rate to widen. Market contacts have suggested that one factor underlying this could be that foreign central banks have diversified into sterling assets recently.<sup>(1)</sup> These institutions may be less active in gilt repo markets than other gilt investors, which in turn may have reduced the availability (or 'float') of some bonds.

Contacts also suggested that shortages of collateral may be more likely at certain times during the equity dividend season. This is because demand for collateral may increase, due to settlement banks making dividend payments from corporates to investors' accounts. This would mean that they needed more intraday liquidity from the Bank, which they borrow against eligible collateral such as gilts. Also, there may be an increase in institutions seeking to borrow equities over dividend payment dates, against which they pledge gilt collateral.

Shortages of gilt collateral can be partially alleviated by the Bank's open market operation (OMO) counterparties substituting eligible euro-denominated collateral for gilts in the Bank's repo operations. A crude measure of the relative

(1) See the box on page 360 of the Winter 2006 Bulletin.

Sources: Wholesale Market Brokers Association and Bank calculations.

cost suggests that euro-denominated collateral was slightly cheaper to deliver relative to gilt collateral compared to the previous review period (Chart 33). To some degree, this was reflected in an increase in the proportion of euro-denominated collateral delivered to the Bank in its OMOs.

Chart 33 Relative cost and use of euro-denominated EEA government securities<sup>(a)</sup>



<sup>(</sup>a) Intraday liquidity represents collateral posted by CHAPS Sterling members in the Bank's Real-Time Gross Settlement payments system. Data not available before 8 September 2006. (b) Cost of euro-denominated collateral relative to sterling-denominated collateral is calculated at the five-day moving average of the difference between the sterling and euro secured-unsecured (one-month) interest rate spread.

Reserves accounts, remunerated at Bank Rate, are designed to create the incentives to produce stable market rates throughout each maintenance period. The ability of individual reserves-scheme members to hold reserves-account balances above (below) target when market rates are below (above) Bank Rate should mean that market rates are drawn towards Bank Rate through a natural process of arbitrage. In aggregate, the Bank aims to provide sufficient liquidity through its OMOs for all reserve account holders, collectively, to meet their chosen reserves targets over the maintenance period.

The Bank publishes lists of reserves-scheme and standing facilities participants on its website. Since the 2007 Q1 *Bulletin*, there have been two changes to the lists of participants in these facilities. First, Egg Banking plc has ceased to be a participant in both schemes, following the completion of its purchase by Citi. Second, N M Rothschild & Sons Ltd has signed up to have access to standing facilities. The number of OMO counterparties has not changed.

Short-term OMOs are conducted on a weekly basis and, if necessary, routinely on the final day of the maintenance period, in order to correct for any excess or deficient reserves relative to the aggregate target. The size of the weekly short-term OMO increased until Easter, falling thereafter as demand for banknotes fell (**Chart 34**). The ratio of bids to the size of each operation (the 'cover ratio') generally fell during the quarter to levels observed in Summer 2006. The weekly OMO held on 17 May, which fell in the maintenance period immediately following the end of the review period for this *Bulletin*, received a slightly lower aggregate value of bids than was on offer in the operation. These funds were offered to, and taken by, the market in the subsequent scheduled OMO.





Several factors may explain lower cover in the Bank's OMOs. The slightly lower level of market rates relative to Bank Rate during the past three months may have made it more attractive for some counterparties to obtain cash from the market, rather than via the Bank's OMOs. Also, when participants perceive a substantial risk that cover will be low, they may tend to bid for lower amounts. Such a strategy would reduce the risk of their receiving more funds than they need and having to source the collateral for their allocation. To some extent, therefore, the expectation of low cover can be self-fulfilling. A similar dynamic would exist were cover expected to be especially high, which might encourage higher bidding. Indeed such behaviour was observed in 2006 Q4. Some contacts have suggested that weeks of low cover have been associated with lower spreads of secured rates to Bank Rate, although it is difficult to test this hypothesis formally owing to the short period for which data are available (Chart 35). Ultimately, the Bank's view on whether lower cover ratios matter depends on any impact on the stability of relevant market interest rates.

Three fine-tuning OMOs were conducted. On 7 March there was a fine-tune operation to drain £1.9 billion of liquidity, which was fully allocated; on 4 April the Bank offered to supply £1.96 billion, of which £784 million was allocated; on 9 May an offer to supply £1.27 billion did not receive offers.

The Bank also conducted monthly long-term repo operations at four different maturities. Each of these were fully covered.

Chart 35 Cover ratio in weekly OMOs versus spread to Bank Rate of secured market interest rates<sup>(a)</sup>



Cover fell slightly at the three-month maturity during this quarter (**Table B**). Yield tails were small or zero in all operations.

#### Table B Long-term repo operations

	Three-month	Six-month	Nine-month	Twelve-month
20 February 2007				
On offer (£ millions)	1,500	750	400	150
Cover	2.08	2.39	1.13	3.13
Weighted average rate <sup>(a)</sup>	5.390	5.508	5.590	5.640
Highest accepted rate <sup>(a)</sup>	5.405	5.515	5.590	5.640
Lowest accepted rate <sup>(a)</sup>	5.380	5.505	5.590	5.640
Tail <sup>(b)</sup> basis points	0.1	0	0	0
20 March 2007				
On offer (£ millions)	1,500	750	400	150
Cover	1.63	2.64	2.25	1.25
Weighted average rate <sup>(a)</sup>	5.4	5.516	5.591	5.630
Highest accepted rate <sup>(a)</sup>	5.405	5.520	5.591	5.630
Lowest accepted rate <sup>(a)</sup>	5.395	5.515	5.591	5.630
Tail <sup>(b)</sup> basis points	0.5	0.1	0	0
17 April 2007				
On offer (£ millions)	1,600	750	400	200
Cover	1.55	2.47	1.69	2.38
Weighted average rate <sup>(a)</sup>	5.512	5.671	5.730	5.800
Highest accepted rate <sup>(a)</sup>	5.527	5.671	5.730	5.800
Lowest accepted rate <sup>(a)</sup>	5.500	5.671	5.730	5.800
Tail <sup>(b)</sup> basis points	1.2	0	0	0

(a) Per cent.

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

In addition to short and long-term repo operations, the Bank intends to provide longer-term financing to the banking system through purchases, on an outright basis, of gilts and foreign currency bonds (with the cash flows swapped into sterling). The Bank will build up a portfolio of bonds over time broadly to match the maturity profile of gilts in issue. Operations to purchase bonds will buy up to six bonds in three maturity segments using an electronic system. This system will also be used to conduct the Bank's existing open market operations. These plans are outlined in further detail on the Bank's website<sup>(1)</sup> and are expected to be introduced in a phased manner from Autumn 2007.

#### Foreign currency reserves

Reflecting the remit given by the Chancellor of the Exchequer in 1997, the Bank holds its own foreign currency reserves in support of its monetary policy objective. The Monetary Policy Committee can use the Bank's reserves, subject to financial limits agreed by the Bank's Court of Directors, to intervene in the foreign exchange markets, as set out in the Bank of England Act.

The Bank's foreign currency reserves are separate from the UK Government's own foreign exchange reserves, which the Bank manages as the Treasury's agent. In steady state, the Bank currently intends to hold approximately  $\pounds$ 3 billion worth of foreign exchange reserves in highly liquid and creditworthy fixed-income securities.

As announced on 15 December 2006, the Bank will finance its own foreign currency reserves by a regular and highly transparent programme of issuance of foreign-currency denominated bonds. Each issue will be marketed and distributed via a group of banks. The new debt issuance programme has replaced the previous Euro Note programme.

The market risk in the Bank's foreign currency assets and liabilities will be closely matched. This means that any foreign currency intervention would initially open up a foreign currency exposure. Any intervention would be disclosed in the monthly reserves press release, in line with the procedure for Government's own foreign currency reserves.<sup>(2)</sup>

As with the previous Euro Note programme, securities issued under the new debt issuance programme will be under a Trust Deed governed by English Law. The Trust Deed incorporates collective action clauses (CACs) based upon the recommendations put forward by the G10 Working Group on Contractual Clauses in 2003.

The first issue under the new debt issuance programme was announced on 22 February and executed on 12–13 March. The \$2 billion three-year transaction, which was marketed and distributed by Barclays Capital, Citi, Goldman Sachs and JPMorgan, priced at approximately 17 basis points over the US Treasury yield curve and 25 basis points below Libor. The issue attracted orders totalling \$3.2 billion and was sold to investors in Africa, the Americas, Asia, Europe and the Middle East. Public sector institutions, including central banks, were the

<sup>(1)</sup> www.bankofengland.co.uk/markets/money/omo/outright\_purchases.htm.

<sup>(2)</sup> www.bankofengland.co.uk/markets/forex/reserves/published\_reserves.htm.

predominant buyers. The issue represented a successful launch of the new financing programme for the Bank's foreign currency reserves.

#### Facilitating the provision of payments services

Under current arrangements, the Bank holds just over €3 billion of euro-denominated assets to facilitate the United Kingdom's participation in the euro area's TARGET payment system. The €3 billion nominal note maturing on 27 January 2009 and a small proportion of the €2 billion nominal note maturing on 28 January 2008 currently provide the financing for the TARGET assets.

As described in the 2006 Q3 *Bulletin*, the Bank will no longer participate as a direct member when the European System of Central Banks (ESCB) replaces TARGET with TARGET2 in 2008. Any outstanding assets funded by the Notes will temporarily add to the Bank's foreign currency reserves, until the final note matures in January 2009.

#### Capital portfolio

The Bank holds an investment portfolio that is approximately the same size as the Bank's capital and reserves (net of equity holdings, eg in the BIS and ECB, and the Bank's physical assets) together with aggregate cash ratio deposits. Cash ratio deposits (CRDs) are non-interest bearing deposits lodged with the Bank by commercial banks and building societies with eligible sterling liabilities of over £500 million. Institutions that are required to place CRDs are (subject to certain other conditions) eligible to have access to the Bank's reserves scheme and standing facilities.

The Bank's 'free' capital and CRDs are partly invested in a portfolio of sterling-denominated securities. Securities purchased by the Bank for this portfolio are normally held to maturity; nevertheless sales may be made from time to time, reflecting for example, risk management, liquidity management or changes in investment policy.<sup>(1)</sup>

The bond portfolio currently includes around  $\pounds 2$  billion of gilts and  $\pounds 1$  billion of other debt securities. Purchases are generally made each month with purchase details announced in advance on the Bank's wire service pages. Over the current review period, gilt purchases were made in accordance with the announcement on 15 March:  $\pounds 20$  million each in March, April and May.

The remainder of the Bank's capital and reserves are invested in short-term repos, which are conducted as part of the Bank's OMOs.