

## Overview: a cautious return of risk tolerance

Following deepening turmoil and rising concerns about systemic risks in the first two weeks of March, financial markets witnessed a cautious return of investor risk tolerance over the remainder of the period to end-May 2008. The process of disorderly deleveraging which had started in 2007 intensified from end-February, with asset markets becoming increasingly illiquid and valuations plunging to levels implying severe stress. However, markets subsequently rebounded in the wake of repeated central bank action and the Federal Reserve-facilitated takeover of a large US investment bank. In sharp contrast to these favourable developments, interbank money markets failed to recover, as liquidity demand remained elevated.

Mid-March was a turning point for many asset classes. Amid signs of short covering, credit spreads rallied back to their mid-January values before fluctuating around these levels throughout May. Market liquidity improved, allowing for better price differentiation across instruments. The stabilisation of financial markets and the emergence of a somewhat less pessimistic economic outlook also contributed to a turnaround in equity markets. In this environment, government bond yields bottomed out and subsequently rose considerably. A reduction in the demand for safe government securities contributed to this, as did growing perceptions among investors that the impact from the financial turmoil on real economic activity might turn out to be less severe than had been anticipated. Emerging market assets, in turn, performed broadly in line with assets in the industrialised economies, as the balance of risk shifted from concerns about economic growth to those about inflation.

### Credit market turmoil gives way to fragile recovery

Following two weeks of increasingly unstable conditions in early March, credit markets were buoyed by a cautious return of risk tolerance, with spreads recovering from the very wide levels reached during the first quarter of 2008. Sentiment turned in mid-March, following repeated interventions by the Federal Reserve to improve market functioning and to help avert the collapse of a major US investment bank. As these actions alleviated earlier concerns about risks to the financial system, previously dysfunctional markets resumed trading and prices rallied across a variety of risky assets.

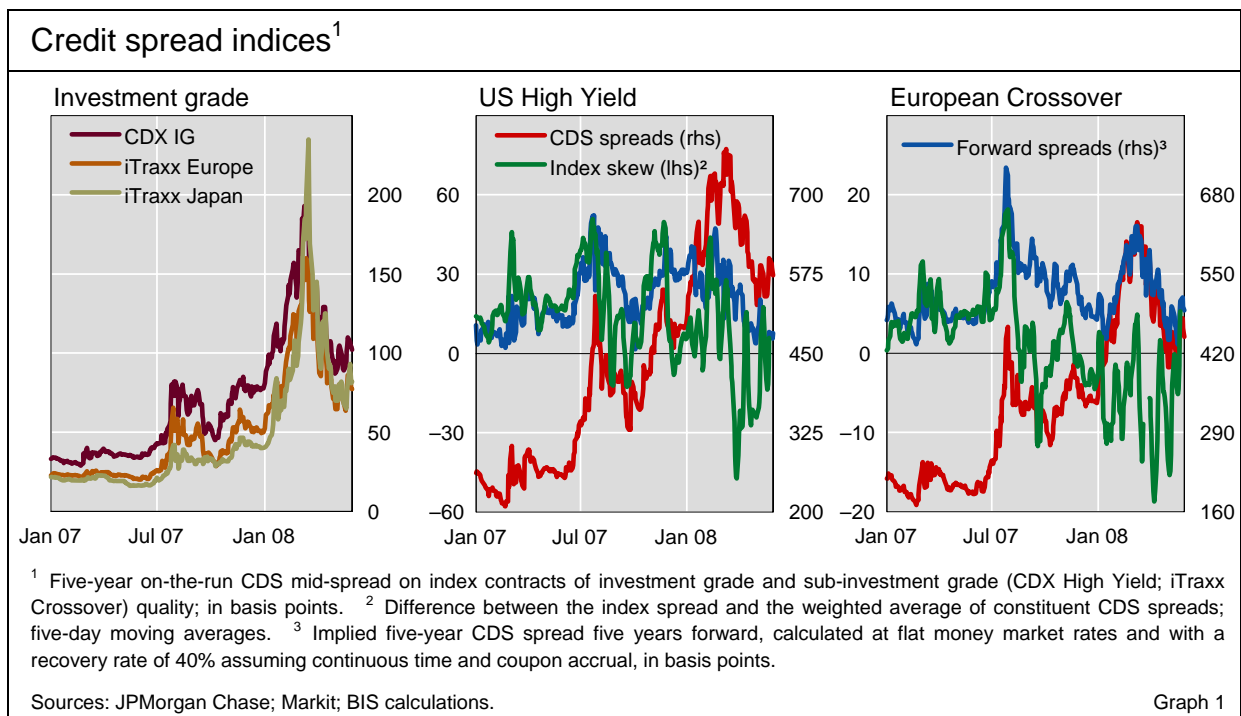
Between end-February and end-May, the US five-year CDX high-yield index spread tightened by about 144 basis points to 573, while corresponding investment grade spreads fell by 63 basis points to 102. European and Japanese spreads broadly mirrored the performance of the major US indices, declining by between 25 and 153 basis points overall. Between 10 and 17 March, all five major indices had been pushed out to or near the widest levels seen since their inception. They then rallied back and seemed to stabilise around their mid-January values, remaining significantly above the levels prevailing before the start of the market turmoil in mid-2007 (Graph 1).

Turmoil in credit markets deepened in early March, setting the stage for the pronounced shift in market sentiment later during the period. Pressures on bank balance sheets had been accumulating throughout the crisis, but further intensified early in the month. As banks continued to cut their exposures across business lines, tightening repo haircuts caused a number of hedge funds and other leveraged investors to unwind existing positions. As a result, concerns about a cascade of margin calls and forced asset sales accelerated the ongoing investor withdrawal from various financial markets. In the process, spreads on even the most highly rated assets reached unusually wide levels, with market liquidity disappearing across most fixed income markets. This included assets, such as certain US student loan securitisations, whose underlying exposures are almost entirely protected by federal guarantees, as well as mortgage-backed securities underwritten by US government-sponsored enterprises (Graph 2, right-hand panel). Heightened uncertainty was also evident from implied volatilities, which, expressed in absolute spread terms, returned to levels comparable to those during the onset of the crisis in the summer of 2007 (Graph 3, right-hand panel).

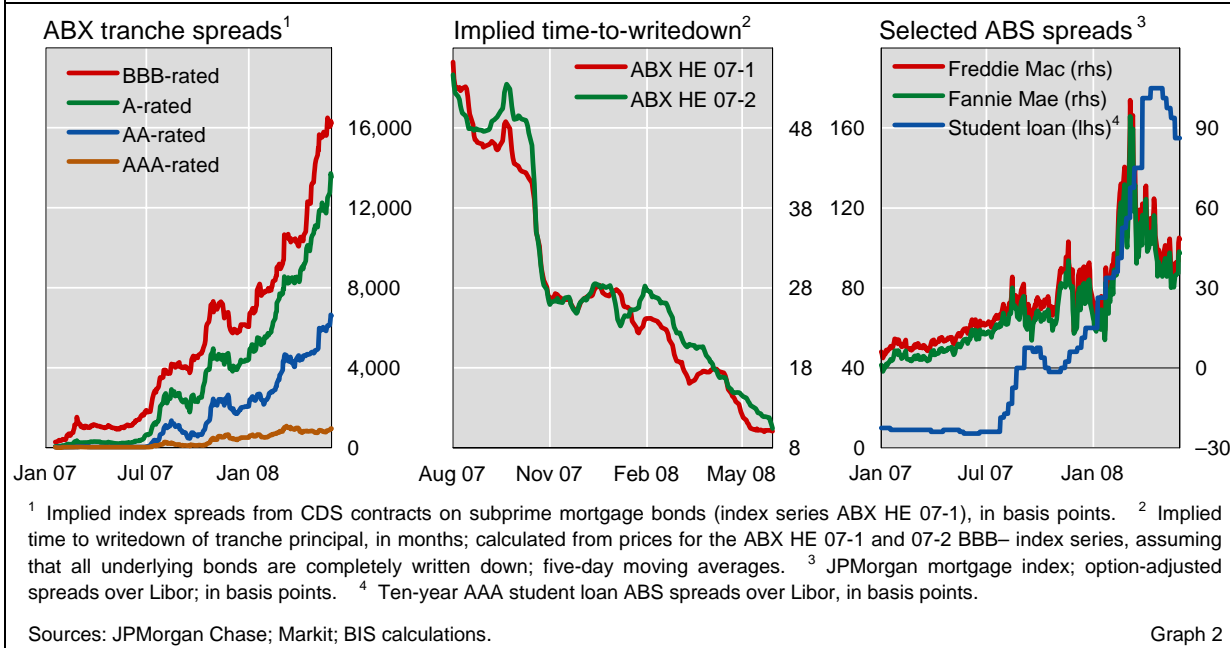
Market turmoil deepens in early March ...

... amid disappearing liquidity ...

... and heightened uncertainty



## US securitisation markets



Yet repeated  
central bank  
action ...

Fears about collapsing financial markets reached a peak in the week beginning 10 March, triggering repeated policy actions by the US authorities. Actual and anticipated deleveraging pressures had continued to weigh on markets early in the week, with financial sector spreads widening and investment grade credit default swap (CDS) indices underperforming lower-quality benchmarks (Graph 4, left-hand and centre panels). Spreads were temporarily arrested when, on 11 March, the Federal Reserve announced an expansion of its securities lending activities targeting the large US dealer banks (see section on money markets and Table 1 below). European CDS indices tightened by more than 10 basis points on the news, while the two key US indices closed 17 and 41 basis points down, respectively (Graph 1). However, market sentiment resumed its deterioration later in the week, triggering a severe liquidity squeeze on Bear Stearns. This, in turn, prompted the Federal Reserve, on the morning of Friday 14 March, to take the extraordinary step of invoking section 13(13) of the Federal Reserve Act, allowing it to make secured advance payments to the troubled investment bank, followed by its takeover by JPMorgan the following Monday.

... and the takeover  
of Bear Stearns ...

... herald a turning  
point

These developments appeared to herald a turning point in the market, ushering in a phase of broad-based spread narrowing. The sense of relief associated with the rescue of Bear Stearns was compounded by a 75 basis point policy rate cut by the Federal Reserve on 18 March, bringing the federal funds target down to 2.25%. Earnings announcements by major investment banks on 18 and 19 March that were better than anticipated provided further support, with investors increasingly adopting the view that various central bank initiatives aimed at reliquifying previously dysfunctional markets were gradually gaining traction. Consistent with perceptions of a considerable reduction in systemic risk, spreads, and particularly those for financial sector and other investment grade firms, tightened from the peaks reached in early March

(Graph 4). Movements were partially driven by the unwinding of speculative short positions, as suggested by changes in pricing differentials across products with similar exposures, according to the ease with which such positions can be opened or closed. For example, spreads on CDS contracts referencing the major credit indices moved more strongly than those on the same indices' constituent names (Graph 1, centre and right-hand panels). Similarly, CDS markets outperformed those for comparable cash bonds, as market participants adjusted their synthetic trades.

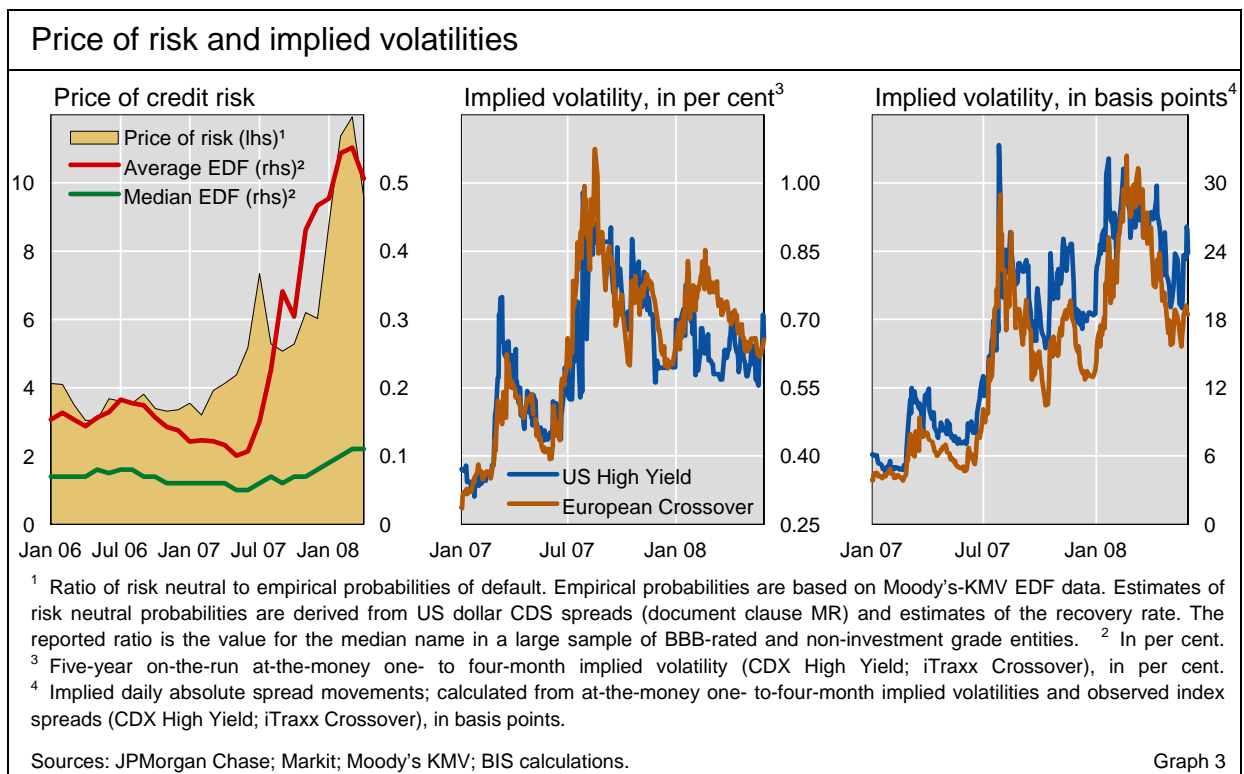
Tightening spreads coincided with a notable recovery in indicators of investor risk tolerance over the period. While remaining elevated, the price of credit risk, as extracted from credit spread-implied and empirical default probabilities of lower-quality borrowers, declined markedly from the very high levels observed earlier in 2008 (Graph 3, left-hand panel). Lower risk premia were also consistent with observed movements in the term structure of credit spreads, as indicated by current relative to implied forward spreads, which suggested that investors had adjusted the compensation required for near-term risks (Graph 1, centre and right-hand panels). Similarly, implied volatilities from CDS index options eased into the second quarter, indicating a somewhat reduced uncertainty about shorter-run credit spread movements (Graph 3, centre and right-hand panels).

Despite further deterioration in housing fundamentals, the change in sentiment was also evident in US subprime mortgage markets. Spreads on ABX indices referencing AAA bonds backed by home equity loans came off their earlier peaks (Graph 2, left-hand panel), bringing down estimates of losses based on ABX prices (see box). This was despite the lack of a recovery for the index series with lower original ratings, whose prices continued to

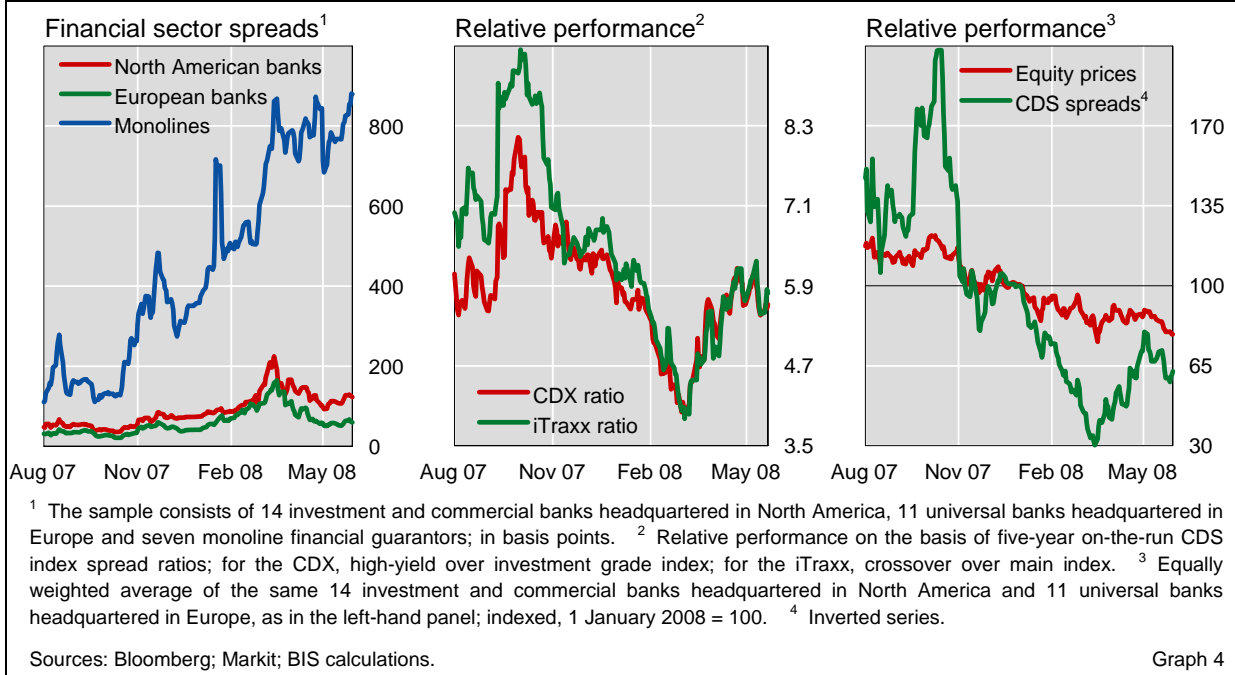
Spreads recover from their peaks ...

... and risk tolerance returns ...

... despite further deteriorating housing fundamentals



## Financial sector spreads: relative performance



suggest expectations of complete writedowns of all underlying bonds by mid-2009 (Graph 2, centre panel). At these low levels, and with none of the ABX indices having experienced any principal writedowns so far, investors appeared to be pricing in the possibility of legislation writing down mortgage principal. Against this background, issuance of private-label mortgage-backed securities remained depressed, with volume growth coming mainly from US agency-sponsored mortgage securitisations and credit card deals.

Recapitalisation efforts ...

Supported by optimism about banks' recapitalisation efforts, spreads continued to rally throughout April before retracing some of these gains in May. While announcements of large writedowns by major financial institutions continued throughout the period, recovering markets supported an increasing pace of capital replenishment. Following news of a rights issue on 31 March, CDS spreads referencing debt issued by Lehman Brothers tightened. UBS announced large first quarter losses and a fully underwritten capital increase on 1 April, and other institutions followed over the rest of the month. Globally, banks managed to raise more than \$100 billion of new capital in April alone, stemming the deterioration in capital ratios. Financial CDS spreads, the monoline segment excluded, outperformed corresponding equity prices in the process (Graph 4, right-hand panel), reflecting diminishing concerns about imminent financial sector risk as well as the dilutory effects of equity financing. Markets retraced some of these gains in early May, partially driven by strong supply flows from corporate issuers that included, at \$9 billion, the largest US dollar deal by a non-US borrower in seven years. Volumes were dominated by financial and other investment grade issuers, with high-yield markets still essentially closed. Yet market sentiment remained broadly positive, with spreads fluctuating around their mid-January levels throughout the rest of the month.

... also help sentiment ...

## Estimating valuation losses on subprime MBS with the ABX HE index — some potential pitfalls

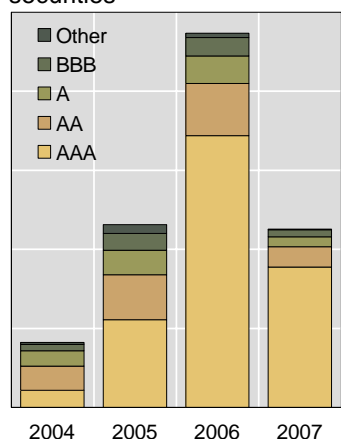
Repeated large-scale writedowns of exposures to the US mortgage market and continuing deterioration of the US housing sector have given rise to strong public and private sector interest in estimates of overall subprime-related losses. In this context, particular attention has been devoted to estimated market value changes for subprime mortgage-backed securities (MBS) and how these compare to disclosed writedowns by banks and other investors.<sup>①</sup> A key source of data for such estimates has been the ABX HE series of indices based on credit default swaps (CDS) with subprime exposure. This box conducts a simple analysis of valuation losses on subprime MBS on the basis of ABX prices and highlights a number of possible limitations of such estimates. In particular, it is argued that past estimates of total valuation losses at the AAA level may have been inflated by more than 60%.

**The ABX HE index.** Trading in the first ABX index series started in January 2006. Each index consists of a group of equally weighted, static portfolios of CDS referencing 20 subprime MBS transactions. Following the example of other major CDS indices, new “on-the-run” index series are being introduced every six months. Each of these ABX series references 20 completely new subprime MBS deals issued during a six-month period prior to index initiation. Each index series, in turn, consists of five subindices, each referencing tranche exposures to the same 20 underlying MBS deals, though at different levels (AAA, AA, A, BBB and BBB-) of the capital structure.<sup>②</sup> Index prices reflect the willingness of investors to buy or sell protection on the basis of their views about the risk of the underlying subprime loans, and are quoted as a percentage of par.

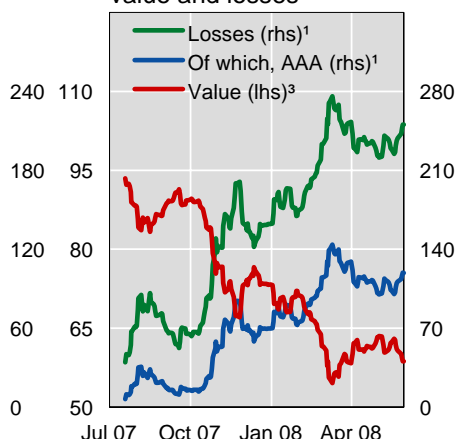
**Mark to market losses on subprime MBS.** There are various ways to measure losses on subprime MBS of which none is inherently superior. Approaches will differ according to loss concepts and data needs, with valuation (ie mark to market) losses arguably the most straightforward ones to calculate.<sup>③</sup> This is because of the reliance of the mark to market concept on observed prices, which obviates the need to make assumptions about parametric inputs or historical relationships. To obtain estimates of mark to market losses for subprime MBS, ABX prices, by rating and vintage, can simply be applied to outstanding volumes of these securities. Graph A illustrates the results (centre panel) of such an exercise, based on outstanding volumes (left-hand panel) by rating category for each vintage of subprime MBS issued between 2004 and 2007.<sup>④</sup> According to this measure, ABX prices put the value of the outstanding subprime MBS inventory at around 59 cents on the dollar as of end-May 2008. This, in turn, would imply total valuation losses of some \$250 billion, of which \$119 billion (about 47%) is incurred at the AAA level.

### Subprime MBS volumes, implied losses and MBS capital structure

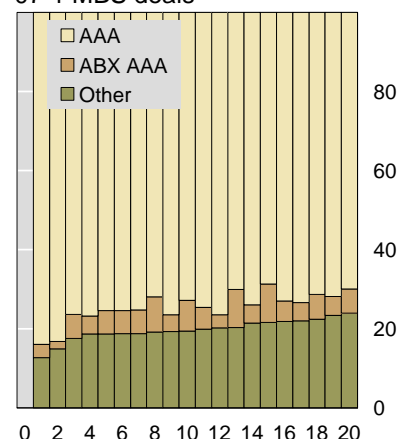
Outstanding subprime MBS securities<sup>1</sup>



Subprime MBS: ABX-implied value and losses<sup>2</sup>



Simplified capital structure of ABX 07-1 MBS deals<sup>4</sup>



<sup>1</sup> In billions of US dollars. <sup>2</sup> Assumes that unrated MBS bonds are written down completely and ABX prices (by series and rating) are applied to the respective outstanding MBS volumes (using the BBB- indices to mark BB collateral, and the average of the 06-2 and 07-1 series to mark the 2006 vintage; rated tranches from the 2004 vintage are assumed unimpaired). <sup>3</sup> As a percentage of par. <sup>4</sup> Outstanding balances (as a percentage of total balance) at issuance for the 20 deals (shown on the horizontal axis) referenced by the ABX HE 07-1 index; excludes overcollateralisation.

Sources: ABSNET.net; JPMorgan Chase; UBS; BIS calculations.

Graph A

**Pitfalls in using the ABX.** Estimated mark to market losses and actual writedowns made by banks and other investors can differ for a variety of reasons. Analysts, depending on their objective, thus have to be mindful of potential sources of bias. At least three such sources can be identified, of which two are specific to the ABX index:

- **Accounting treatment.** Subprime MBS are held by a variety of investors and for different purposes. While large amounts of outstanding subprime MBS are known to reside in banks' trading books, banks and other investors may also hold these securities to maturity. This can result in different accounting treatments, which would tend to deflate actual writedowns and impairment charges relative to estimates of mark to market losses on the basis of market indices, such as the ABX. The size of this effect, however, is difficult to determine. Further complexities are added once securities cease to be traded in active markets, implying the use of valuation techniques, which may differ across investors, in establishing fair value.<sup>Ⓢ</sup>
- **Market coverage.** ABX prices may not be representative of the total subprime universe, due to limited index coverage of the overall market. Original balance across all four series has averaged about \$31 billion. This compares to average monthly MBS issuance of some \$36 billion over the 10 quarters up to mid-2007, ie almost a month's worth of subprime MBS supply per index series. Similarly, with 2004–07 vintage subprime MBS volumes estimated at around \$600 billion in outstanding amounts, each series represents some 5% of the overall universe on average. At the same time, ABX deal composition is known to be quite similar in terms of collateral attributes (such as FICO scores and loan-to-value ratios) to the overall market (by vintage).<sup>Ⓢ</sup> Therefore, despite somewhat limited coverage, this particular source of bias may not be large.
- **Deal-level coverage.** Similarly, ABX prices may not be representative because each index series covers only part of the capital structure of the 20 deals included in the index (see Graph A, right-hand panel, for an illustration).<sup>Ⓢ</sup> In particular, tranches referenced by the AAA indices are not the most senior pieces in the capital structure, but those with the longest duration (expected average life) – the so-called “last cash flow bonds”. These claims will receive any cash flow allocations sequentially after all other AAA tranches have been paid; and tend to switch to pro rata pay only when the highest mezzanine bond has been written down. It follows that AAA ABX index prices are going to reflect durations that are longer, and effective subordinations that are lower, than those of the remaining AAA subprime MBS universe. As a result, using newly available data for MBS tranches with shorter durations, the \$119 billion of losses implied by the ABX AAA indices as of end-May would be some 62% larger than those implied under more realistic assumptions.<sup>Ⓢ</sup>

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<sup>Ⓢ</sup> See, for example, International Monetary Fund, *Global Financial Stability Report*, April 2008, pp 46–52, and Box 1 in Bank of England, *Financial Stability Report*, April 2008. <sup>Ⓢ</sup> Supplementary indices, called ABX HE PENAAA, were introduced in May 2008 to provide additional pricing information for all four existing vintages. <sup>Ⓢ</sup> An alternative approach, likely to lead to very different results, would estimate future default-related cash flow shortfalls on the basis of deal-level or aggregate data for subprime securities. To obtain these estimates, such methodologies rely on information about collateral performance and require the analyst to make assumptions about structural relationships and model parameters. Typical subprime loss projections, for example, use delinquency data and assumptions about factors such as delinquency-to-default transitions, default timing, and losses-given-default. See Box 1 in the Overview section of the December 2007 *BIS Quarterly Review* for an example on the basis of an approach devised by UBS. <sup>Ⓢ</sup> Mark to market losses (relative to par) are calculated assuming that unrated tranches are written down completely; ABX prices for the BBB– indices are used to mark BB collateral; rated tranches from the 2004 vintage are assumed unimpaired; outstanding amounts remain static. <sup>Ⓢ</sup> For details, see Global Public Policy Committee, *Determining fair value of financial instruments under IFRS in current market conditions*, December 2007. <sup>Ⓢ</sup> See, for example, UBS, *Mortgage Strategist*, 17 October 2006. <sup>Ⓢ</sup> Incomplete coverage at the deal level further reduces effective market coverage: typical subprime MBS structures have some 15 tranches per deal, of which only five were originally included in the ABX indices. As a result, each series references less than 15% of the underlying deal volume at issuance. <sup>Ⓢ</sup> Duration effects at the AAA level are bound to be significant for overall loss estimates as the AAA classes account for the lion's share of MBS capital structures. Using prices for the newly instituted PENAAA indices, which reference “second to last” AAA bonds, to calculate AAA mark to market losses generates an estimate of \$73 billion. This, in turn, translates into an overall valuation loss of \$205 billion (ie some 18% below the unadjusted estimate of \$250 billion).



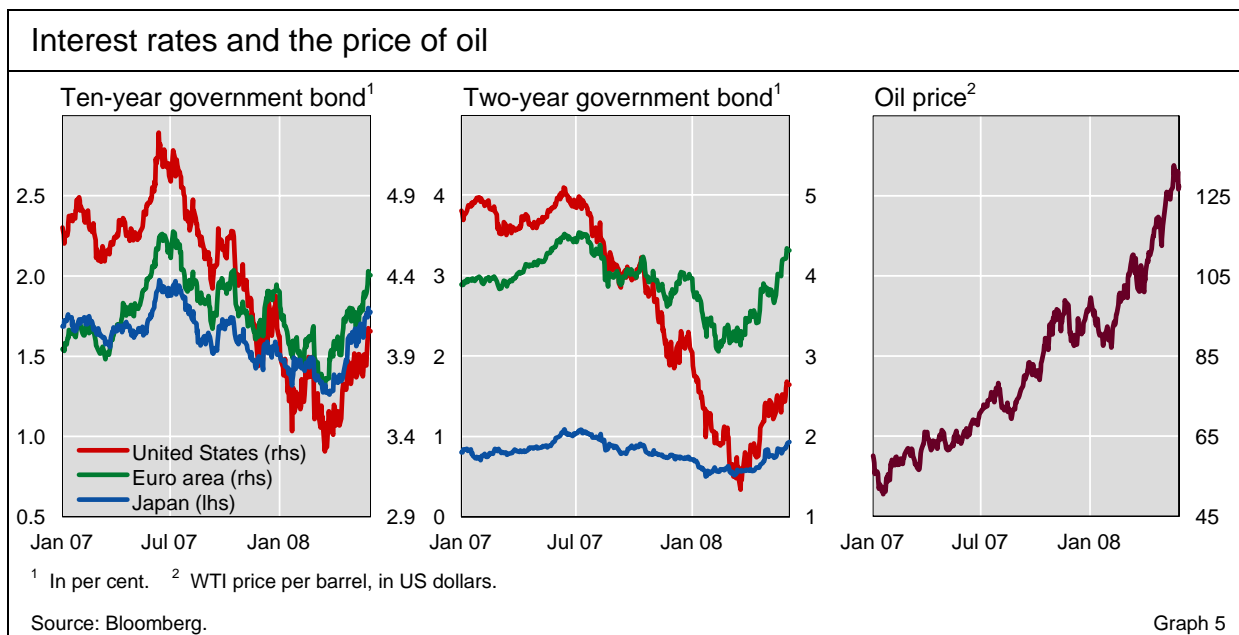
By the end of the period in late May, the process of disorderly deleveraging had come to a halt, giving way to more orderly credit market conditions. Market liquidity had improved and risk appetite increased, luring investors back into the market and allowing greater price differentiation. Bank capitalisation had recovered, while remaining weaker than before the crisis. At the same time, still-elevated implied volatilities suggested ongoing investor uncertainty over the future trajectory of credit markets. With the credit cycle continuing to deteriorate and related losses on exposures outside the residential mortgage sector looming, it was thus unclear whether liquidity supply and risk tolerance had recovered to an extent that would help maintain this improved environment on a sustained basis.

... but questions about cyclical losses remain

### Bond yields recover as markets stabilise

Mirroring developments in credit and equity markets (see section on equity markets below), yields on long-term government bonds in major industrialised economies continued to fall until mid-March, at which time yields bottomed out to establish an upward trend for the remainder of the period under review. From its low point on 17 March, the 10-year US Treasury bond yield rose by 75 basis points to reach 4.05% at the end of May. During this period, 10-year yields in the euro area and Japan climbed by around 70 and 50 basis points, respectively, to 4.40% and 1.75% (Graph 5, left-hand panel). In US and euro area bond markets, the increase in yields was particularly pronounced for short maturities, with two-year yields rising by 130 basis points in the United States and by almost 120 basis points in the euro area (Graph 5, centre panel). Two-year yields went up in Japan too, but by a more modest 35 basis points. In addition to reduced safe haven demand for government securities, the rise in short-term yields reflected a reassessment among investors of the need for monetary easing, following the stabilisation of financial markets.

Bond yields bottom out and start to rise

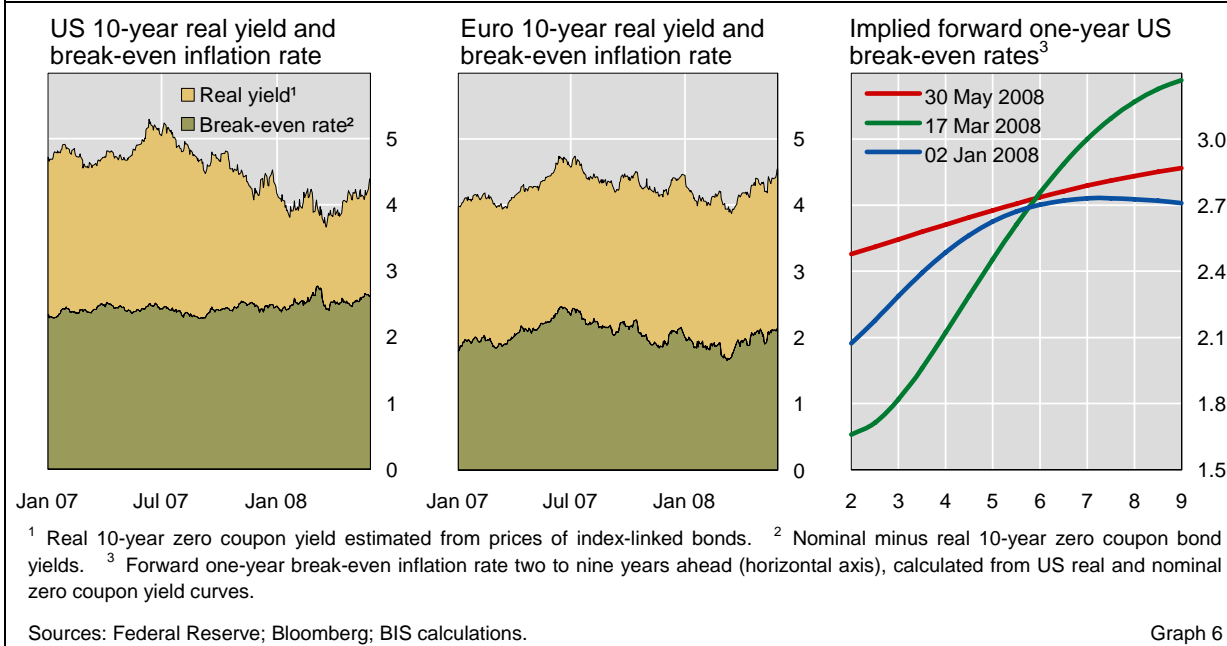


Graph 5



## Real yields and break-even inflation rates

In per cent

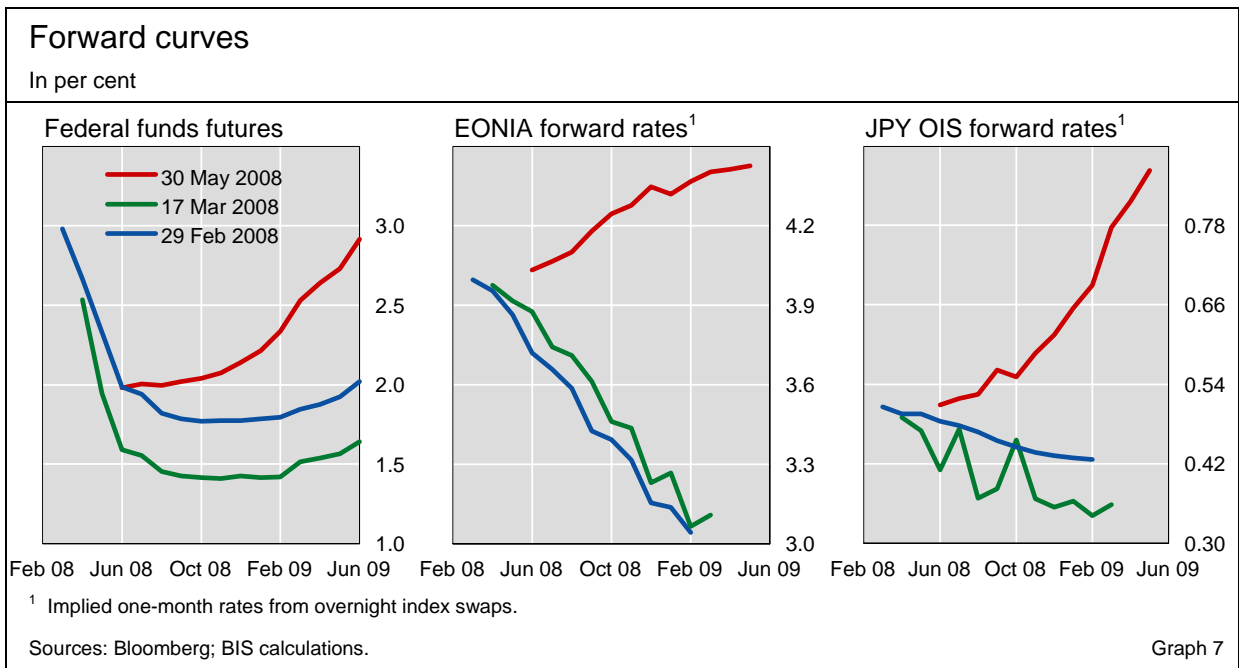


Long- and short-term forward break-even rates move in opposite direction ...

... in line with perceptions about the economy

In the first two weeks of March, as the financial turmoil deepened and yield declines accelerated, long-term break-even inflation rates were relatively stable in the United States as well as the euro area (Graph 6, left-hand and centre panels). In the case of the United States, however, this stability was the result of opposing movements in short- and long-term forward break-even inflation rates, with distant forward rates shifting upwards and near-term forward rates dropping (Graph 6, right-hand panel). While flight to safety and other effects relating to the volatility in financial markets may have influenced break-even rates during this period, the observed movements appeared consistent with macroeconomic factors. Specifically, with the situation in financial markets deteriorating rapidly, concerns that economic activity was likely to suffer badly led to expectations of easing near-term price pressures, consistent with the observed fall at the short end of the forward break-even curve. At the same time, these same concerns led investors to increasingly expect the Federal Reserve to maintain a more accommodative policy stance than normal in an effort to contain the fallout on economic growth. Insofar as this was seen as likely to lead to higher prices down the road, it could explain the rise in distant forward break-even rates at the time.

As the situation in financial markets stabilised after the rescue of Bear Stearns in mid-March, and perceptions of the economic outlook improved somewhat, the US forward break-even curve shifted in the opposite direction and flattened considerably. To a large extent, this shift in the forward curve is likely to have reflected a reversal of the same influences that had been at play in the first two weeks of March: the dampening effect on prices coming from the turmoil was perceived to be weaker after mid-March, while the Federal Reserve was seen to be less likely to deliver further sharp rate cuts. Moreover, upward price pressures appeared to intensify in the short to medium term, with food



prices rising continuously and oil prices reaching new all-time highs during this period (Graph 5, right-hand panel), pushing near-term forward break-even rates further upwards.

Although movements in long-term break-even rates explained some of the rise in long-term nominal bond yields observed between mid-March and end-May, the bulk of the increase was due to higher real rates in the United States as well as in the euro area (Graph 6, left-hand and centre panels). This rise in real yields reflected a combination of expectations of higher average real interest rates in coming years and a reversal of flight to safety pressures. The former component, in turn, was due to perceptions among investors that the real economic fallout from the financial turmoil was likely to be less severe than had previously been anticipated. This was despite indications of deteriorating consumer confidence amid tighter bank lending standards and continued weakness in US housing markets. The revival in investor confidence seemed instead to follow from the stabilisation in markets and from a number of relatively upbeat macroeconomic announcements. These included better than expected first quarter GDP figures for the United States and the euro area, and a lower than expected drop in US non-farm payrolls for April. The improving mood among investors also meant a tentative return of risk tolerance, which added to the upward pressure on yields through lower demand for safe government securities.

In line with perceptions that the stabilisation of markets had reduced the risks to economic growth somewhat, prices of short-term interest rate derivatives shifted to reflect expectations of higher policy rates than previously anticipated. In an environment where short- to medium-term price pressures were seen as rising, increased signalling by central banks that inflation remained a concern added to the shift in investors' policy expectations. In the case of the United States, by end-May federal funds futures prices were indicating expectations of a period of stable rates, followed by rising rates in

Rising real yields behind the increase in nominal yields ...

... reflecting improved investor confidence ...

... and changing monetary policy expectations

the first half of 2009 (Graph 7, left-hand panel). In the euro area, EONIA swap prices at the beginning of March had signalled expectations of sizeable ECB rate cuts, but by end-May prices had shifted to reflect expectations of gradually increasing policy rates (Graph 7, centre panel). Meanwhile in Japan, expectations of mildly falling policy rates in March had by May been revised to indicate rising rates (Graph 7, right-hand panel).

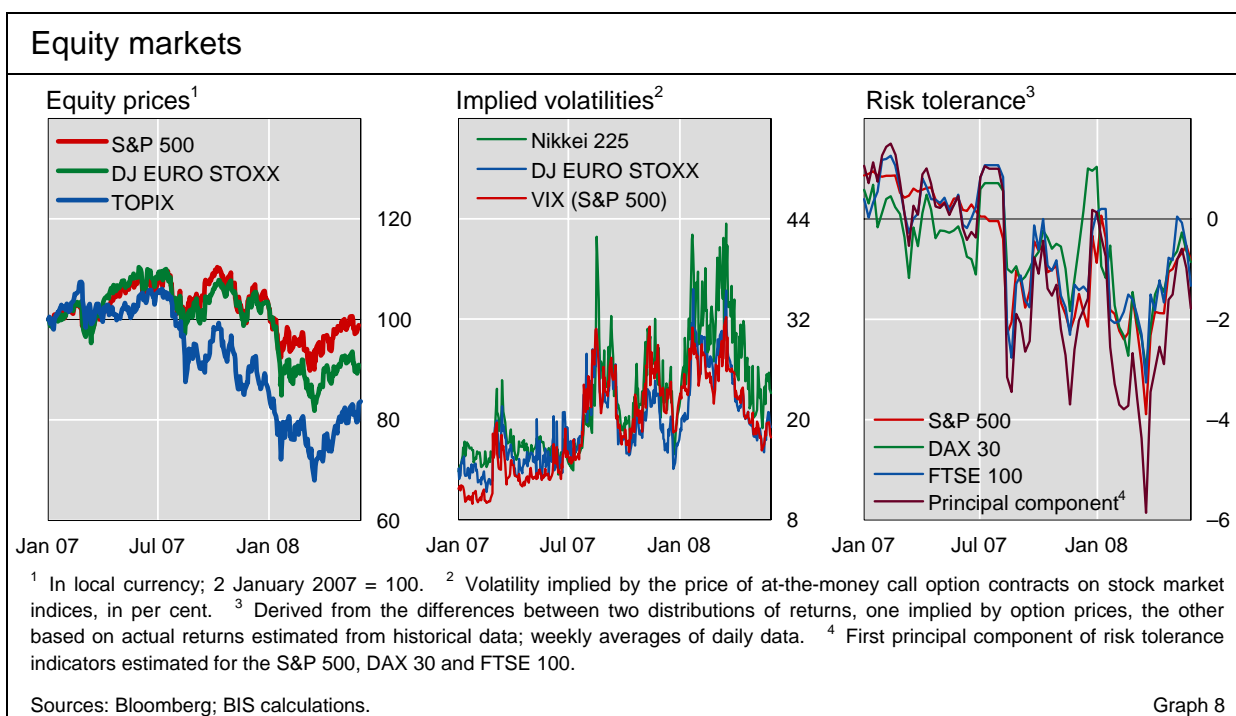
### A turning point for equity prices?

Global equity markets recover ...

Global equity markets broadly tracked events in credit and bond markets during the period under review. After falling from the start of the year, stock prices bottomed out around mid-March and began a gradual recovery (Graph 8, left-hand panel). The S&P 500 Index, which by 17 March had lost 13% compared to end-2007 levels, gained almost 10% between 17 March and end-May. Equity markets in Europe and Japan, which had seen losses in excess of 20% between the turn of the year and 17 March, subsequently also displayed a strong recovery, with the EURO STOXX gaining 11% and the Nikkei 225 rising more than 21% until end-May.

... led by financials ...

Reflecting the improved situation in financial markets during this period, financial stocks outperformed other sectors. By end-May, the investment banking and brokerage subindex of the S&P 500 had risen by 16% compared to mid-March levels, while similar subindices in Germany and Japan were up by almost 20% and 34%, respectively. These gains occurred despite announcements by several banks of record losses during the first quarter amid continued credit-related write-offs. Investors obviously took solace from the fact that losses – although big – were no worse than expected, and that a number of banks had been successful in their recapitalisation efforts (see credit market section above).



For the third quarter in a row, US corporate earnings growth was negative in the first quarter of 2008, although at  $-16.4\%$  (share-weighted) the rate of contraction in earnings per share was slightly lower than for the previous quarter ( $-22.6\%$ ). This, and the fact that the share of positive earnings surprises remained well above that of negative surprises, provided some support for equity prices. In addition, as fears failed to materialise that economic growth might slow dramatically in the first few months of the year, investors increasingly began to see equity valuations as attractive following the sharp price declines in late 2007 and early 2008.

... despite negative profit growth ...

As in other market segments, the strong performance of global equity markets after mid-March was further fuelled by perceptions among investors that uncertainty about future developments had declined somewhat, coupled with an increase in risk tolerance. This contributed to rising equity prices by lowering risk premia through a reduction in the amount of perceived risk as well as a decline in the price of risk. Consistent with such perceptions of lower risk, implied volatilities fell across the board, after having peaked in mid-March (Graph 8, centre panel). Meanwhile, indicators of risk tolerance in equity markets recovered after a sharp dip in March (Graph 8, right-hand panel).

... as risk tolerance rebounds ...

... and implied volatilities fall

## Emerging market investors discount growth risks

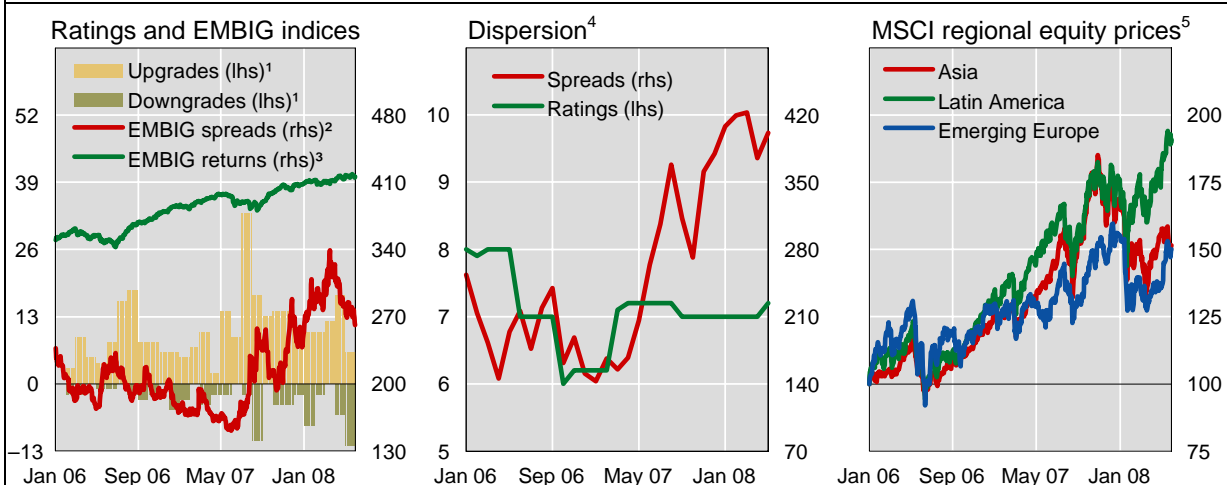
Emerging market assets performed broadly in line with assets in the major industrialised economies, although returns in emerging bond markets tended to trail the recovery observed in other asset classes. In a continuation of the general market weakness that had started in 2007, spreads widened and equities fell up to mid-March, before rebounding in the wake of the change in market sentiment following the Bear Stearns rescue in the United States.

Emerging market assets ...

Between end-February and end-May, the MSCI emerging market index gained about 4% in local currency terms, and was up more than 14% from the lows established in mid-March. Latin American markets, which had seen a more muted decline than other regions early in the period, posted the strongest gains, advancing by about 12% (Graph 9, right-hand panel). Economic growth in the region continued to be buoyed by strong prices for key commodities, such as base metals and oil, which remained on an elevated trajectory even in the face of expectations of slower global growth. While some observers cited high trading volumes in commodity derivatives (see the Highlights section in this issue) and speculative demand as a source of part of that strength, others pointed to low supply elasticities and expectations of sustained rates of industrialisation throughout the emerging markets. With the region being a major net commodities importer and natural disaster contributing to weaker equity prices in China, Asian markets were broadly flat over the period. Emerging Europe, in turn, remained exposed to the risk of a reversal in private capital flows, owing to large current account deficits and associated financing needs in a number of countries. Nevertheless, strong gains in Russia and the better than expected growth performance of major European economies in the first quarter seemed to aid equity markets in May.

... continue to be supported by strong growth

## Emerging market assets



<sup>1</sup> Monthly long-term foreign and local currency sovereign rating changes from Fitch, Moody's and Standard & Poor's. <sup>2</sup> EMBI Global index; sovereign spread over government bond yields, in basis points. <sup>3</sup> EMBI Global index; cumulative total returns. <sup>4</sup> Difference between 90th and 10th percentiles; for spreads, in basis points; for ratings, in number of notches. Calculated using identical weights. <sup>5</sup> In local currency; 31 December 2005 = 100.

Sources: Bloomberg; Datastream; JPMorgan Chase; Standard & Poor's; BIS calculations.

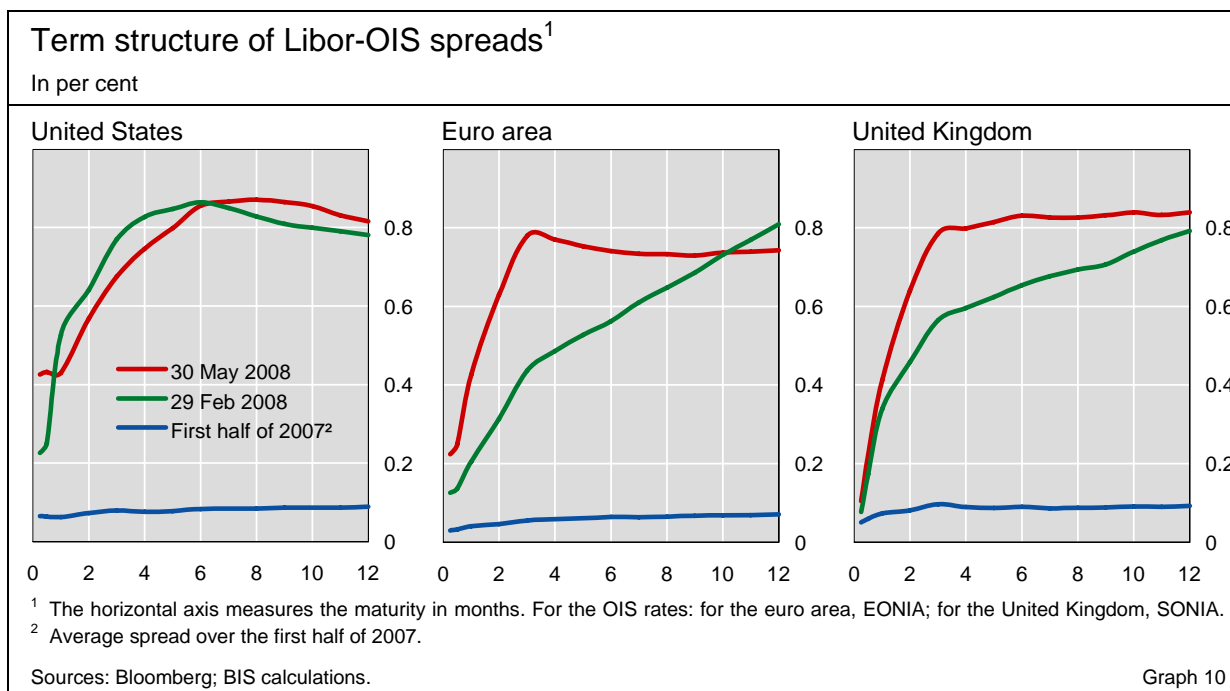
Graph 9

Emerging market credit spreads, as measured by the EMBIG index, tightened from a peak near 340 basis points in mid-March to around 261 at the end of the period, some 44 basis points lower than their level at end-February. With the sell-off in US Treasuries (see the bond market section above) accounting for most of the spread tightening, the EMBIG remained almost flat in return terms, gaining about 1.1% between end-February and end-May (Graph 9, left-hand panel). Large stocks of foreign reserves and favourable macroeconomic performance in key emerging market economies continued to provide support, aiding the market recovery. Spread dispersion remained high, pointing to ongoing price differentiation according to credit quality (Graph 10, centre panel). At the same time, with inflation running well above target in a number of major emerging market economies, policy credibility appeared to become more of a concern, putting pressure on local bond markets. Rising inflation expectations, combined with increasing US Treasury yields and relatively resilient markets during the earlier stages of the recent market turmoil, may thus have contributed to a somewhat more muted performance from emerging market bonds relative to other asset markets over the period since mid-March.

### Tensions in interbank markets remain high

Little sign of any easing of interbank tensions ...

In contrast to developments in other markets, interbank money markets continued to show clear signs of extreme stress from March to May. Spreads between Libor rates and corresponding overnight index swap (OIS) rates, due to counterparty credit risk as well as liquidity concerns, were generally at least as high at the end of May as three months earlier, across most horizons and in all three major markets (Graph 10). This appeared to imply expectations that interbank strains were likely to remain severe well into the future.



After a relatively smooth turn of the year, interbank market tensions had appeared to ease somewhat until early March 2008, and Libor-OIS spreads had shown some signs of stabilising. However, as the financial turmoil suddenly deepened in the second week of March, following an acceleration in margin calls and rapid unwinding of trades (see the credit section above), interbank market pressures quickly increased. With market rumours proliferating about imminent liquidity problems in one or more large investment banks, banks became increasingly wary of lending to others. At the same time, their own demand for funds jumped as they sought to avoid being perceived as having a shortage of liquidity.

Selected central bank liquidity measures during the period under review	
7 March	The Federal Reserve increases the size of its Term Auction Facility (TAF) to \$100 billion and extends the maturity of its repos to up to one month.
11 March	The Federal Reserve introduces the Term Securities Lending Facility (TSLF), which allows primary dealers to borrow up to \$200 billion of Treasury securities against collateral. The existing dollar swap arrangements between the Federal Reserve and the ECB and the SNB are increased from a total of \$24 billion to \$36 billion.
16 March	The Federal Reserve introduces the Primary Dealer Credit Facility (PDCF), which provides overnight funding for primary dealers in exchange for collateral. The Federal Reserve also lowers the spread between the discount rate and the federal funds rate from 50 to 25 basis points, and lengthens the maximum maturity from 30 to 90 days.
28 March	The ECB announces that the maturity of its longer-term refinancing operations (LTROs) would be extended from up to three months to a maximum of six months.
21 April	The Bank of England introduces the Special Liquidity Scheme, under which banks can swap illiquid assets for Treasury bills.
2 May	The Federal Reserve boosts the size of its TAF programme to \$150 billion, and announces a broadening of the collateral eligible for the TSLF auctions. The dollar swap arrangements with the ECB and the SNB are increased further, from \$36 billion to \$62 billion.

Source: Central bank press releases.

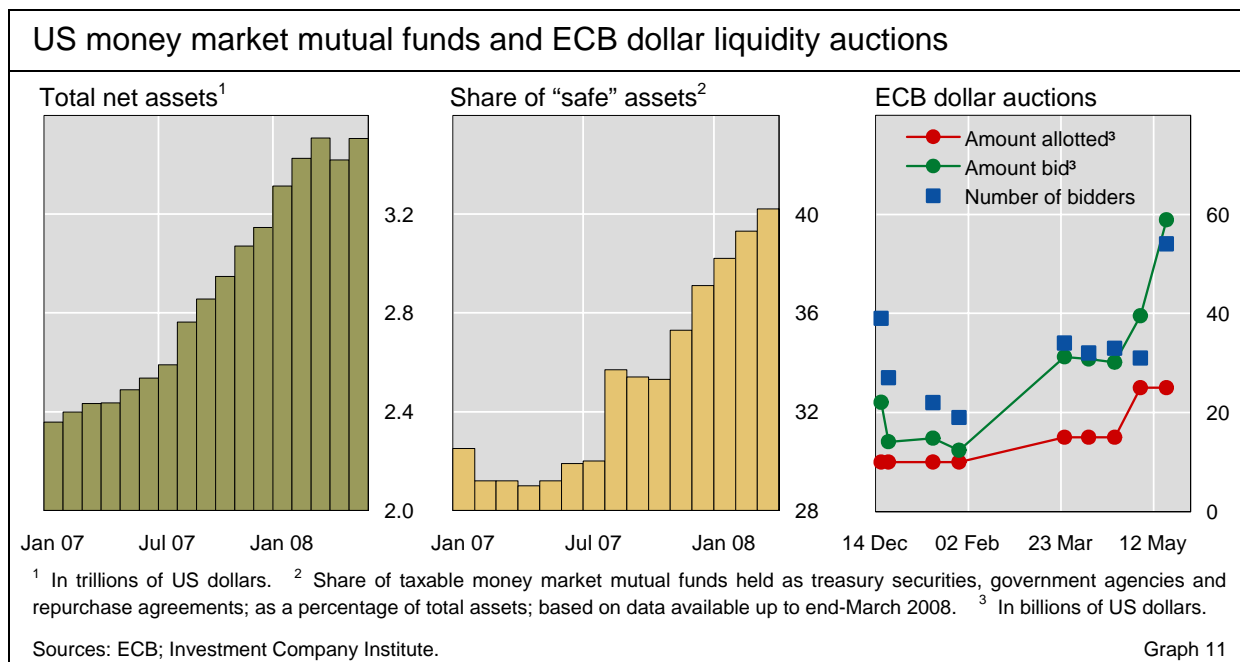
Table 1

... despite the Bear Stearns takeover ...

The near collapse and subsequent takeover of Bear Stearns on 14–18 March highlighted the risks that banks face in such situations. On the one hand, the Federal Reserve-facilitated takeover of Bear Stearns by JPMorgan was generally perceived by investors as signalling that large banks would not be allowed to fail, and this helped restore order in other markets. On the other hand, the speed with which Bear Stearns' access to market liquidity had collapsed underscored the vulnerability of other banks in this regard, which kept Libor-OIS spreads high even as CDS spreads on banks and brokerages dropped significantly.

... and continued central bank action ...

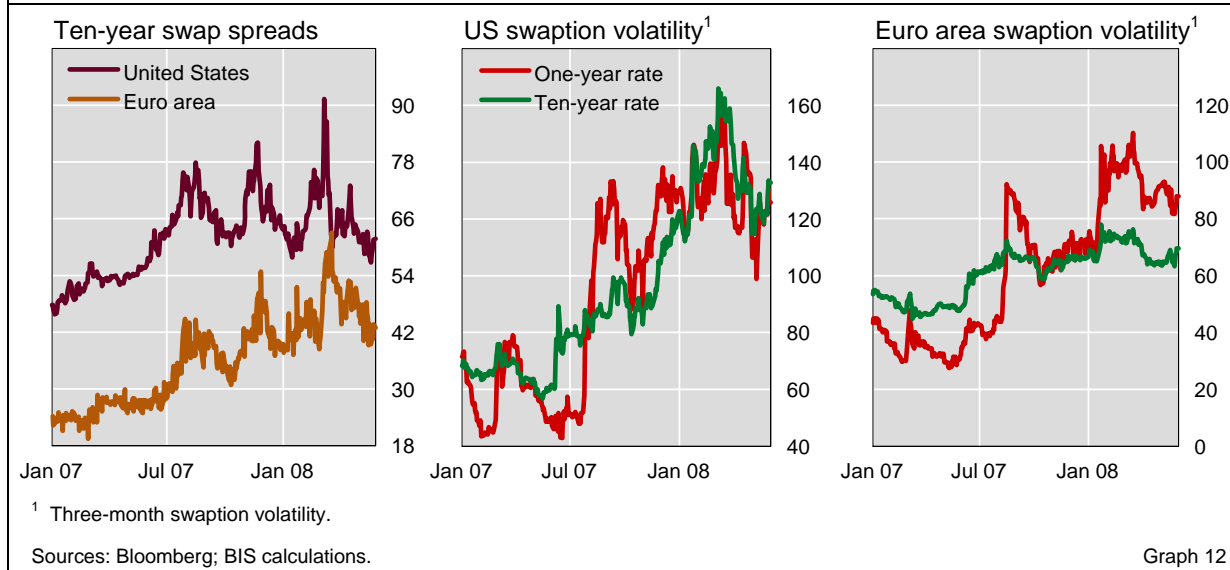
Throughout the period, central banks maintained and even stepped up their efforts to ease tensions in interbank markets. Measures included increasing the size of liquidity facilities, extending lending maturities, and broadening the pool of eligible collateral (Table 1). Even so, this flurry of activity from central banks seemed to have limited immediate impact on interbank rates. To some extent, this may have reflected the fact that while the sums involved in central bank liquidity schemes were large in absolute terms, they were still rather limited compared to banks' assessment of their overall liquidity needs against the background of a sharp decline in traditional sources of funding. One significant source of short-term funding for banks in the past has been money market mutual funds. Such funds have seen substantial inflows since the outbreak of the financial turmoil (Graph 11, left-hand panel), reflecting a noticeable reduction in investors' appetite for risk. However, this loss of risk appetite also resulted in money market funds shifting their investments increasingly into treasury bills and other safe short-term securities, hence depriving banks of a key funding source (Graph 11, centre panel). This suggests that determining how persistent the interbank tensions will be may depend significantly, among other things, on how long the risk appetite of money market fund managers, and investors more broadly, will continue to be depressed.





## Swap rates and swaption volatilities

In basis points



Difficulties faced by European banks in obtaining US dollar funding remained a characteristic of the ongoing interbank market tensions. Indeed, results from ECB 28-day dollar auctions suggest that, if anything, demand for dollar funding has been rising further recently. In the auction on 20 May, both the amount bid (\$58.9 billion) and the number of bidders (54) reached the highest levels since the auctions were introduced in December 2007 (Graph 11, right-hand panel). To some extent, the persistently elevated dollar demand seems to have been due to a need for frequent rollovers by European banks of short-term dollar borrowing in the interbank market, which they have used to finance longer-term dollar investments in non-banks (see the special feature by McGuire and von Peter in this issue).

... as money market funds increasingly turn to safer investments

Adding to the tense situation in interbank markets, the reliability of the Libor fixing mechanism, in particular for US dollar loans, was increasingly questioned by market participants. Suspicions were voiced to the effect that some banks in the Libor panel had been reporting rates lower than their actual borrowing costs. It was alleged that they did so in order to hide their true demand for dollar funds, and hence to appear less vulnerable than they actually were. As the media focused on the issue and the British Bankers' Association began investigating in mid-April, US dollar Libor rates suddenly adjusted upwards by 15–40 basis points.

Apart from interbank money markets, some other market segments also seemed to paint a picture of continuing fragility. Swap spreads, for example, while off their peaks, remained higher than before the outbreak of financial turmoil (Graph 12, left-hand panel), possibly reflecting ongoing tensions in interbank markets. Similarly, swaption volatilities had by end-May dropped only modestly from their highs, suggesting continued uncertainty about future movements in short-term as well as long-term interest rates (Graph 12, centre and right-hand panels).