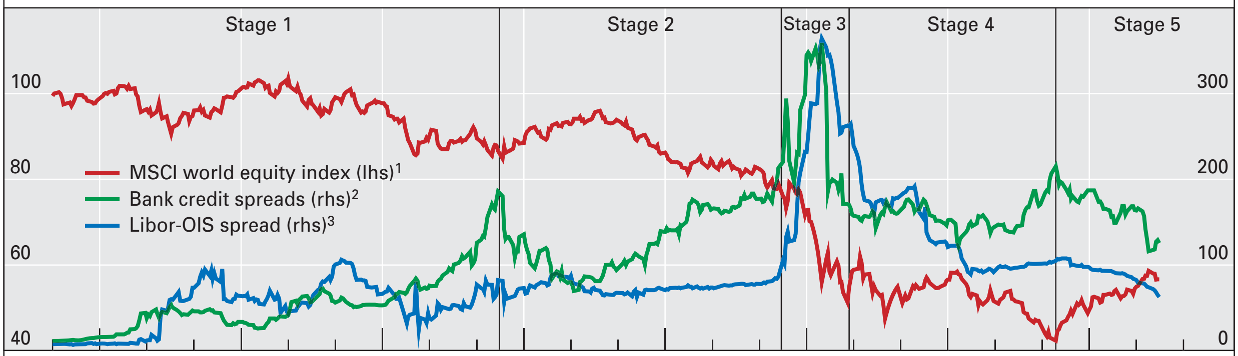
II. The global financial crisis

The period since last year's Annual Report saw the financial crisis enter its second year and transform into a generalised loss of confidence in the global financial system. The onset of the crisis in 2007 followed an extended period of unusually low real interest rates, easy credit conditions, low volatility in financial markets and widespread increases in asset prices that had generated large-scale but hidden vulnerabilities. When these vulnerabilities crystallised in the wake of repeated series of asset writedowns, key financial markets became dysfunctional and the solvency of large parts of the global banking system was challenged. In response, governments conducted successive rounds of intervention on an unprecedented scale. Yet, despite the success of these policy measures in halting the financial crisis, the market environment remained fragile, suggesting that the process of normalisation was uncertain and likely to be protracted.

So far, the crisis has developed in five more or less distinct stages of varying intensity, starting with the subprime mortgage-related turmoil between June 2007 and mid-March 2008 (Graph II.1). Following this first stage, during which the primary focus was on funding liquidity, bank losses and writedowns continued to accumulate as the cyclical deterioration slowly translated into renewed asset price weakness. As a result, in the second stage of the crisis, from March to mid-September 2008, funding problems morphed into concerns about solvency, giving rise to the risk of outright bank failures. One such failure, the demise of Lehman Brothers on 15 September, triggered the third and most intense stage of the crisis: a global loss of confidence, arrested only after unprecedented and broad-based policy intervention. Stage four, from

The five stages of the crisis to date



[1] Morgan Stanley Capital International index, in US dollar terms; 1 June 2007 = 100. [2] Equally weighted average of CDS spreads (in basis points) for 18 major international banks; includes Lehman Brothers until 15 September 2008 and Merrill Lynch until 31 December 2008. [3] Three-month US dollar Libor minus overnight index swap (OIS) rates, in basis points.

Sources: Bloomberg; Markit; BIS calculations.

Graph II.1

late October 2008 to mid-March 2009, saw markets adjust to an increasingly gloomy global growth outlook amid uncertainties over the effects of ongoing government intervention in markets and the economy. Stage five, beginning in mid-March 2009, has been marked by signs that markets are starting to show some optimism in the face of still largely negative macroeconomic and financial news, even as true normalisation – the end of the crisis – still appears some way off.

The early stages

Stage one: prelude (up to mid-March 2008)

Subprime losses escalated into widespread financial stress …

During the first stage of the crisis, concerns over losses on US subprime mortgage loans escalated into widespread financial stress. In brief, what initially appeared to be a problem affecting only a small part of the US financial system (Graph II.2) quickly spread more widely, as complex linkages among credit (Graph II.3) and funding markets (Graph II.4) increasingly translated into broad-based financial sector pressures (Table II.1).[1]

Starting in June 2007, losses from subprime mortgages exposed large-scale vulnerabilities. These included the widespread use of leverage and off-balance sheet financing, so that supposedly low-risk assets – many of which related to US mortgage market exposures – were effectively financed on a rolling basis by short-term funds. Accumulating losses on the underlying assets eventually disrupted the short-term funding model on which these positions were based, triggering a process of forced reintermediation. On 9 August 2007, the turmoil spread to interbank markets, signalling the advent of a broader financial market crisis. Valuation losses mounted during the following months, putting pressure on bank balance sheets and eventually triggering a severe liquidity shortage at Bear Stearns in mid-March 2008. These events culminated in the government-facilitated takeover of the troubled investment bank by JPMorgan Chase.

… culminating in the takeover of Bear Stearns …

… and leaving the financial system badly weakened

While an outright bank failure was avoided, this first stage of the crisis left the financial system severely weakened. Large overhangs of credit exposures weighed on markets, while banks struggled to replenish their capital positions. Elevated volatilities were consistent with investor uncertainty about the economic outlook and its implications for asset valuations (Graph II.5). Credit default swap (CDS) spreads, in turn, were well above historical levels (Graph II.6, centre panel) and equity prices had fallen substantially from the peaks reached in October 2007 (Graph II.7, left-hand panel). At the same time, bond yields (Graph II.8) and policy rates (Graph II.9) in the major economies continued to reflect different cyclical positions as well as expectations that the economic fallout from the crisis would primarily affect the United States. Robust domestic growth in many emerging market economies in the first half of 2008 initially lent some support to this view.

[1] See Chapter VI of the BIS's *78th Annual Report*, June 2008, for a detailed account of financial market developments during this early part of the financial crisis.

Timeline of key events①

2007	
9 August	Problems in mortgage and credit markets spill over into interbank money markets when issuers of asset-backed commercial paper encounter problems rolling over outstanding volumes, and large investment funds freeze redemptions, citing an inability to value their holdings.
12 December	Central banks from five major currency areas announce coordinated measures designed to address pressures in short-term funding markets, including the establishment of US dollar swap lines.
2008	
16 March	JPMorgan Chase agrees to purchase Bear Stearns in a transaction facilitated by the US authorities.
4 June	Moody's and Standard & Poor's take negative rating actions on monoline insurers MBIA and Ambac, reigniting fears about valuation losses on securities insured by these companies.
13 July	The US authorities announce plans for backstop measures supporting two US mortgage finance agencies (Fannie Mae and Freddie Mac), including purchases of agency stock.
15 July	The US Securities and Exchange Commission (SEC) issues an order restricting "naked short selling".
7 September	Fannie Mae and Freddie Mac are taken into government conservatorship.
15 September	Lehman Brothers Holdings Inc files for Chapter 11 bankruptcy protection.
16 September	Reserve Primary, a large US money market fund, "breaks the buck", triggering large volumes of fund redemptions; the US government steps in to support insurance company AIG (and is forced to repeatedly increase and restructure that rescue package over the following months).
18 September	Coordinated central bank measures address the squeeze in US dollar funding with $160 billion in new or expanded swap lines; the UK authorities prohibit short selling of financial shares.
19 September	The US Treasury announces a temporary guarantee of money market funds; the SEC announces a ban on short sales in financial shares; early details emerge of a $700 billion US Treasury proposal to remove troubled assets from bank balance sheets (the Troubled Asset Relief Program, TARP).
25 September	The authorities take control of Washington Mutual, the largest US thrift institution, with some $300 billion in assets.
29 September	UK mortgage lender Bradford & Bingley is nationalised; banking and insurance company Fortis receives a capital injection from three European governments; German commercial property lender Hypo Real Estate secures a government-facilitated credit line; troubled US bank Wachovia is taken over; the proposed TARP is rejected by the US House of Representatives.
30 September	Financial group Dexia receives a government capital injection; the Irish government announces a guarantee safeguarding all deposits, covered bonds and senior and subordinated debt of six Irish banks; other governments take similar initiatives over the following weeks.
3 October	The US Congress approves the revised TARP plan.
8 October	Major central banks undertake a coordinated round of policy rate cuts; the UK authorities announce a comprehensive support package, including capital injections for UK-incorporated banks.
13 October	Major central banks jointly announce the provision of unlimited amounts of US dollar funds to ease tensions in money markets; euro area governments pledge system-wide bank recapitalisations; reports say that the US Treasury plans to invest $125 billion to buy stakes in nine major banks.
28 October	Hungary secures a $25 billion support package from the IMF and other multilateral institutions aimed at stemming growing capital outflows and easing related currency pressures.
29 October	To counter the protracted global squeeze in US dollar funding, the US Federal Reserve agrees swap lines with the monetary authorities in Brazil, Korea, Mexico and Singapore.
15 November	The G20 countries pledge joint efforts to enhance cooperation, restore global growth and reform the world's financial systems.
25 November	The US Federal Reserve creates a $200 billion facility to extend loans against securitisations backed by consumer and small business loans; in addition, it allots up to $500 billion for purchases of bonds and mortgage-backed securities issued by US housing agencies.

2009	
16 January	The Irish authorities seize control of Anglo Irish Bank; replicating an approach taken in the case of Citigroup in November, the US authorities agree to support Bank of America through a preferred equity stake and guarantees for a pool of troubled assets.
19 January	As part of a broad-based financial rescue package, the UK authorities increase their existing stake in Royal Bank of Scotland. Similar measures by other national authorities follow over the next few days.
10 February	The US authorities present plans for new comprehensive measures in support of the financial sector, including a Public-Private Investment Program (PPIP) of up to $1 trillion to purchase troubled assets.
10 February	G7 Finance Ministers and central bank Governors reaffirm their commitment to use the full range of policy tools to support growth and employment and strengthen the financial sector.
5 March	The Bank of England launches a programme, worth about $100 billion, aimed at outright purchases of private sector assets and government bonds over a three-month period.
18 March	The US Federal Reserve announces plans for purchases of up to $300 billion of longer-term Treasury securities over a period of six months and increases the maximum amounts for planned purchases of US agency-related securities.
23 March	The US Treasury provides details on the PPIP proposed in February.
2 April	The communiqué issued at the G20 summit pledges joint efforts by governments to restore confidence and growth, including measures to strengthen the financial system.
6 April	The US Federal Open Market Committee authorises new temporary reciprocal foreign currency liquidity swap lines with the Bank of England, ECB, Bank of Japan and Swiss National Bank.
24 April	The US Federal Reserve releases details on the stress tests conducted to assess the financial soundness of the 19 largest US financial institutions, declaring that most banks currently have capital levels well in excess of the amount required for them to remain well capitalised.
7 May	The ECB's Governing Council decides in principle that the Eurosystem will purchase euro-denominated covered bonds; the US authorities publish the results of their stress tests and identify 10 banks with an overall capital shortfall of $75 billion, to be covered chiefly through additions to common equity.

[1] See Chapter VI of the BIS's *78th Annual Report*, June 2008, for a more comprehensive list of events up to March 2008.

Sources: Bank of England; Federal Reserve Board; Bloomberg; *Financial Times*; *The Wall Street Journal*. Table II.1

Stage two: events leading up to the Lehman Brothers bankruptcy (mid-March to mid-September 2008)

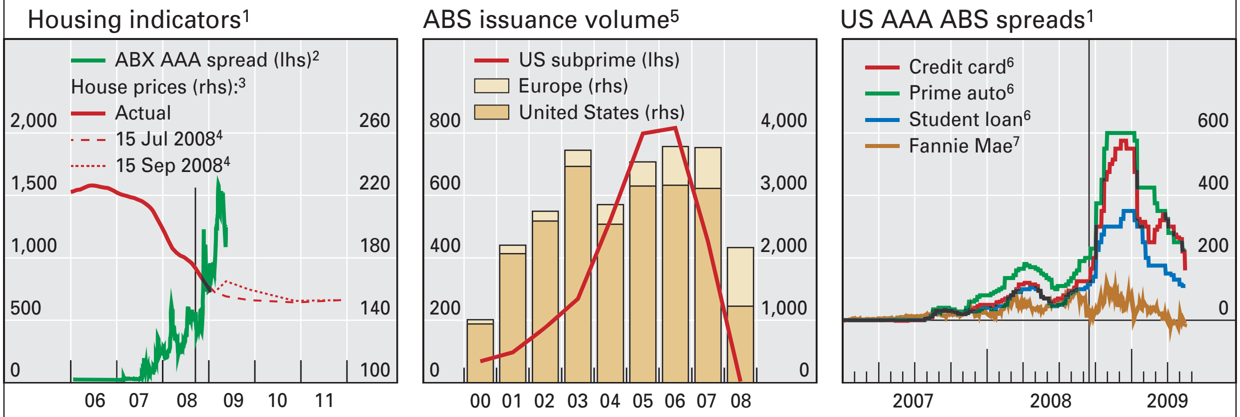
With the economic outlook deteriorating …

During the second stage of the crisis, after a short respite following the takeover of Bear Stearns on 16 March, financial asset prices came under renewed pressure. A distinctive feature of the period up to mid-September was an increased investor focus on emerging signs that the deepening US recession had spilled over to other major economies, triggering a synchronised economic downturn. The resulting outlook for earnings, defaults and associated financial sector losses renewed stress on bank balance sheets, raising concerns about banks' ability to proceed with their recapitalisation plans. Investor attention thus turned increasingly from questions about funding liquidity to those about bank solvency, putting particular strains on those institutions known to be highly leveraged and exposed to impaired assets.

… and interbank markets strained …

Although the Bear Stearns rescue ushered in a period of relative stability and rising prices for financial assets, interbank markets failed to recover. Spreads between interbank rates for term lending and overnight index swaps (OIS) continued to hover at levels significantly above those observed before August 2007 (Graph II.1; Graph II.4, left-hand panel). Banks, therefore, appeared

Mortgage and securitisation markets



[1] The vertical line marks 15 September 2008, the date on which Lehman Brothers filed for Chapter 11 bankruptcy protection. [2] Implied index spreads from CDS contracts on subprime mortgage bonds (index series ABX HE 06-01), in basis points. [3] S&P/Case-Shiller 10 home price index; January 2000 = 100. [4] Implied by prices of futures contracts. [5] In billions of US dollars; includes agency and private label securitisations. [6] Three-year floating spreads over Libor, in basis points. [7] JPMorgan index; option-adjusted spreads over Libor, in basis points.

Sources: Bloomberg; JPMorgan Chase; SIFMA; BIS calculations. Graph II.2

reluctant to commit their balance sheets to lending activities involving other banks, with the premium charged for such interbank loans pointing to some combination of greater preference for liquidity and concerns about counterparty risk. Concerns persisted despite unprecedented measures taken by central banks to support money market functioning and to substitute for the funds previously supplied by the broader financial markets, including through US dollar swap facilities with the Federal Reserve (see Chapter VI for details on these and subsequent policy responses to the crisis).

… concerns over capital positions resurfaced …

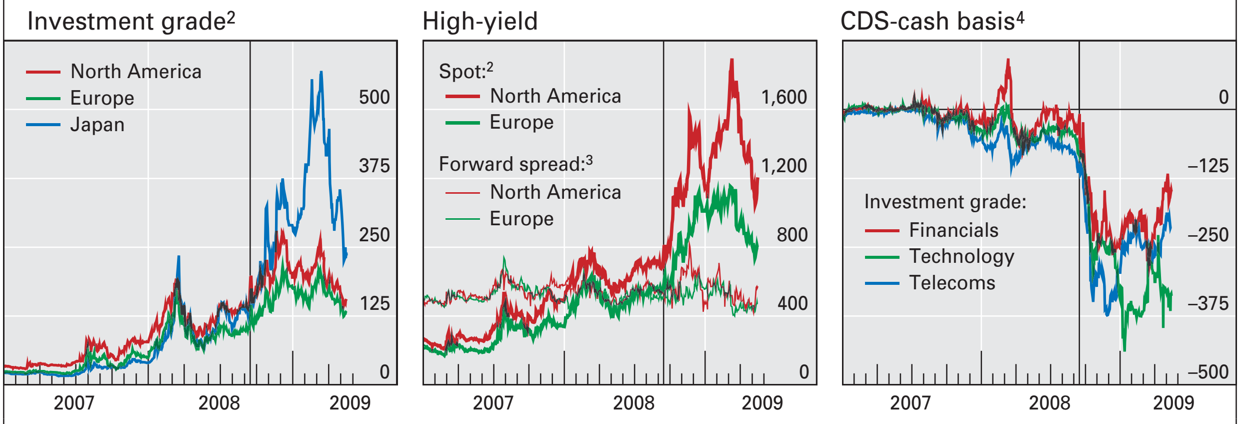
Pressing concerns about banks' capital positions resurfaced in June, following negative news about the troubled monoline insurance sector.[2] Moody's and Standard & Poor's had taken negative rating actions on MBIA and Ambac, two major monolines, early in the month, the first in a sequence of downgrades of similar insurers over the following weeks. Related fears about valuation losses on the securities insured by these companies added to news about weak investment bank earnings. As a result, valuations in both credit and equity markets deteriorated on a broad basis from mid-June (Graphs II.3 and II.7, left-hand panels), with financial sector assets leading the decline in the broader market indices.

… putting particular pressure on the US housing GSEs

Financial sector pressures were most acute, however, for the two major US housing finance government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac. Against the backdrop of further weakness in housing markets, house price depreciation in the United States was projected to extend well into the future (Graph II.2, left-hand panel). As a result, and despite announcements by their regulator that the GSEs remained adequately capitalised, credit spreads

[2] Monoline insurers provide credit enhancement to bonds and structured finance instruments, including guarantees on senior tranches of securities backed by mortgages or other assets as well as on municipal bonds. In this context, the monolines' own credit ratings will tend to determine the ratings of the instruments they insure.

Major investment grade and high-yield credit indices[1]



[1] The vertical line marks 15 September 2008, the date on which Lehman Brothers filed for Chapter 11 bankruptcy protection. [2] Five-year on-the-run CDS mid-spread on index contracts of investment grade (CDX North America; iTraxx Europe; iTraxx Japan) and sub-investment grade (CDX High Yield; iTraxx Crossover) quality, in basis points. [3] Implied five-year CDS spread five years forward, calculated with a recovery rate of 40% assuming continuous time and coupon accrual, in basis points. [4] Difference between CDS and corresponding cash (asset swap) spreads for large samples of US borrowers.

Sources: JPMorgan Chase; BIS calculations. Graph II.3

on their debt and on mortgage-backed securities (MBS) underwritten by these institutions had risen back to levels last seen in March around the time of the Bear Stearns takeover (Graph II.2, right-hand panel). Equity prices plummeted, generating valuation losses of more than 70% from the levels at end-May 2008. With much of the remaining mortgage origination activity dependent on agency guarantees, the US government stepped in on Sunday 13 July, enabling the US Treasury to increase an existing line of credit and to purchase GSE stock.

Backstop measures for the GSEs …

These backstop measures for the US GSEs provided some temporary relief across financial markets. Credit spreads tightened and equity prices began to recover part of their previous losses. The introduction of new US Securities and Exchange Commission (SEC) emergency measures curbing short selling of stocks in the largest banks and brokerage firms also helped ease pressures. As a result, and reflecting generally declining risk premia, implied volatilities across asset classes retreated from their previous highs but stayed above the levels prevailing at the start of the first stage of the crisis, in mid-2007 (Graph II.5).

At the same time, uncertainties about bank funding needs and counterparty risk persisted in money markets. Thus, Libor-OIS spreads remained elevated for key currencies, including the US dollar. Similar patterns in foreign exchange swap markets reflected asymmetric funding pressures in US dollars and other currencies that were pushing up the cost of dollar funds (Graph II.4).[3] This was despite steps taken by the US authorities in late July to enhance the effectiveness of liquidity facilities introduced around the time of the Bear Stearns takeover. These enhancements included longer-maturity

[3] See N Baba and F Packer, "Interpreting deviations from covered interest parity during the financial market turmoil of 2007–08", *BIS Working Papers*, no 267, December 2008, for a discussion of the spillover effects between money markets and foreign exchange swap markets.

(84-day) loans under the Term Auction Facility (TAF), with correspondingly longer terms on US dollar funds auctioned by both the ECB and the Swiss National Bank.

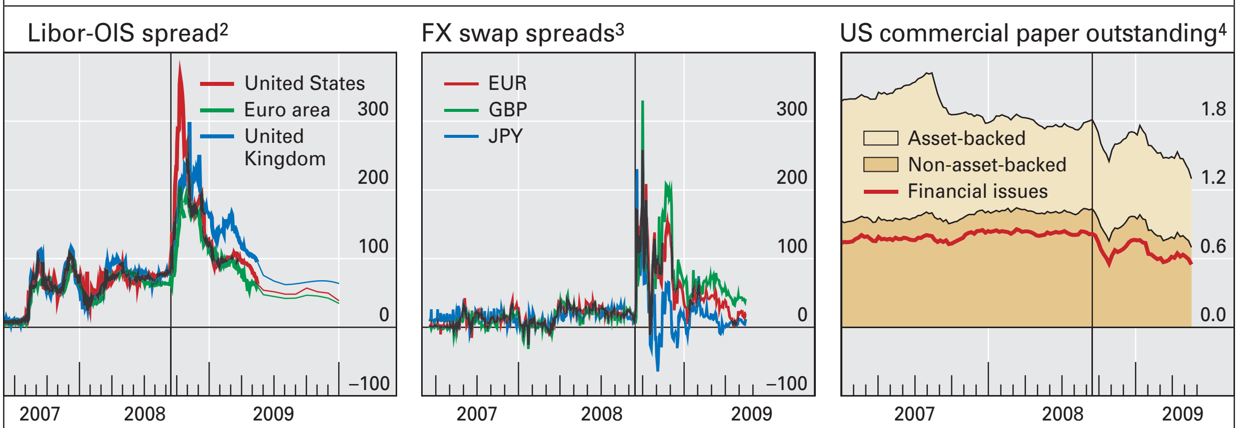
... were followed by an outright bailout

Pressures in housing markets also persisted, reigniting investor concerns about the health of the US housing GSEs. Prices for GSE shares resumed their previous slide and, following news of larger than expected quarterly losses at both Fannie Mae and Freddie Mac in August, fell to levels not seen since the late 1980s. Confidence in the continued solvency of the two GSEs vanished, and the US government formally took control on Sunday 7 September. The takeover largely eliminated credit risk for both senior and subordinated holders of GSE debt while diluting equity holdings through the government's new senior preferred equity stake. This development foreshadowed the effects of future bank rescue packages, and was thus a source of uncertainty regarding the implications of such future measures for claims at different levels of seniority.

But broader strains failed to ease ...

While news of the takeover led to tightened spreads on GSE-sponsored MBS and debt instruments, it failed to ease concerns about the financial sector more broadly. Instead, it served as a reminder of additional losses to come on top of the $500 billion or so in global writedowns that had accumulated by the end of August 2008. It also suggested that central bank efforts aimed at substituting for market-provided funding had probably run their course, with investors increasingly focusing on issues of solvency. Thus, when investor attention turned away from the US housing GSEs to refocus on bank balance sheets, financial equity prices and credit spreads came under renewed pressure. This, in turn, added to banks' problems in replenishing their capital bases and satisfying their funding needs in markets unwilling to accept

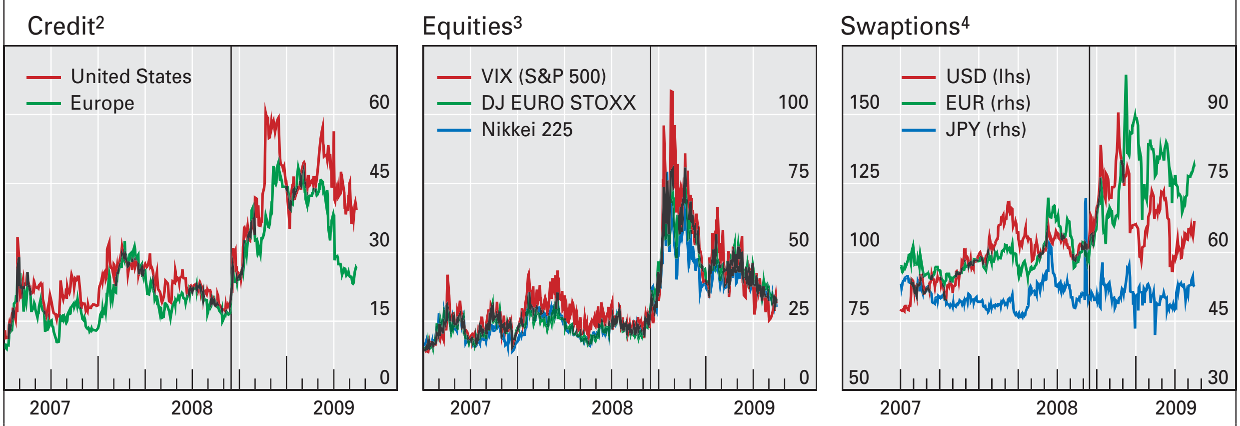
Funding markets[1]



[1] The vertical line marks 15 September 2008, the date on which Lehman Brothers filed for Chapter 11 bankruptcy protection. [2] Three-month Libor rates minus corresponding OIS rates (for the euro area, EONIA swap), in basis points. The thin lines show forward spreads, calculated as the difference between three-month forward rate agreement (FRA) rates and corresponding implied OIS rates, as at 28 April 2009. [3] Spread between the three-month FX swap-implied dollar rate and three-month Libor; the FX swap-implied dollar rate is the implied cost of raising US dollars via FX swaps using the funding currency; in basis points. For details on calculation, see N Baba, F Packer and T Nagano, "The spillover of money market turbulence to FX swap and cross-currency swap markets", *BIS Quarterly Review*, March 2008. [4] In trillions of US dollars.

Sources: Federal Reserve Board; Bloomberg; BIS calculations. Graph II.4

Implied volatility measures[1]



[1] The vertical line marks 15 September 2008, the date on which Lehman Brothers filed for Chapter 11 bankruptcy protection. [2] Implied daily absolute spread movements; calculated from at-the-money one- to four-month implied volatilities and observed index spreads (United States: CDX High Yield; Europe: iTraxx Crossover), in basis points. [3] Volatility implied by the price of at-the-money call option contracts on stock market indices, in per cent. [4] Deutsche Bank index representing implied swaption volatility measured in annualised basis points based on one-year (euro: two-year) swaptions.

Sources: Bloomberg; JPMorgan Chase; BIS calculations. Graph II.5

anything but top-quality collateral. The resulting strains were broad-based. Even so, there were signs of differentiation based on banks' business models and the implications of those models for exposures to impaired assets, funding and leverage. In that environment, the major investment banks experienced the heaviest pressure (Graph II.10).

… with the major investment banks …

When a long-awaited capital injection for Lehman Brothers did not materialise in early September, pressures on that investment bank became particularly intense. Spreads on CDS insuring Lehman's debt surged almost 200 basis points, to around 500, causing the firm's clearing agent to demand additional powers to seize collateral and short-term creditors to cut lending lines. The company's already battered stock fell 45% on Tuesday 9 September, and it dropped further the following day when weak results for the third quarter of 2008 were released. Despite the simultaneous announcement of plans to spin off business units, confidence in the firm's ability to secure urgently needed funding faded quickly. This, in turn, triggered speculation that the authorities would try to broker a Bear Stearns-style takeover the following weekend, 13–14 September.

… and Lehman Brothers, in particular, facing the most severe problems

The crisis of confidence

Stage three: global loss of confidence (15 September to late October 2008)

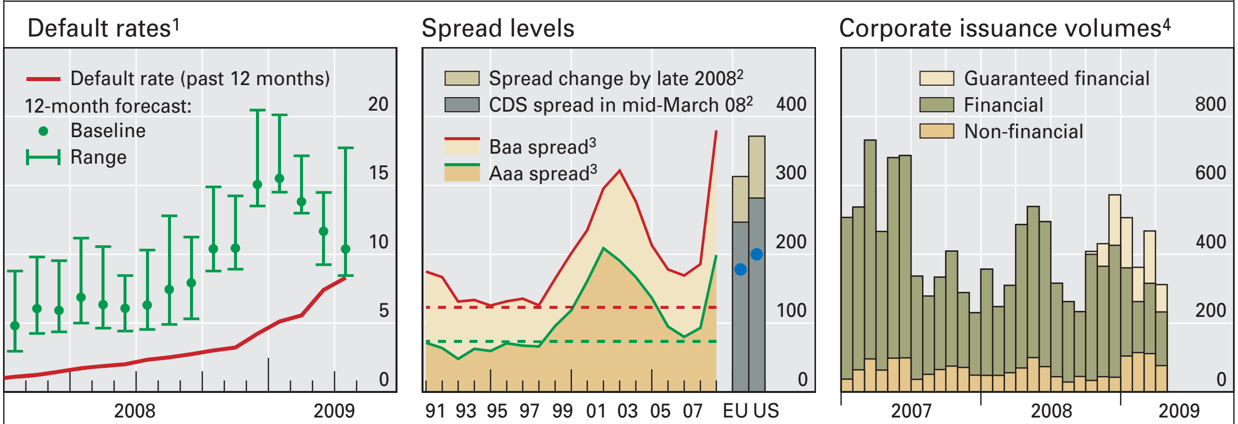
The Lehman failure …

The tipping point came on Monday 15 September, when Lehman Brothers Holdings Inc filed for Chapter 11 bankruptcy protection: what many had hoped would be merely a year of manageable market turmoil then escalated into a full-fledged global crisis. Suddenly, with markets increasingly in disarray, a growing number of financial institutions were facing the risk of default. The resulting crisis of confidence quickly spread across markets and countries, making it obvious that policy action would have to shift from liquidity support to broader-based measures, including system-wide bank recapitalisations. At the same time, as emerging markets were hit by collapsing exports and tightening financing conditions, the universal nature of the crisis became increasingly evident, as did the need for a global policy response.

Going into Lehman's bankruptcy filing, concerns had centred on the company's role as a broker and reference entity (ie the source of default risk that buyers of protection seek to insure against) in the CDS market. In fact, exposures to Lehman's outstanding debt securities turned out to be more fateful. Three events helped to shield CDS market participants from the Lehman failure. First, a special trading session was organised on Sunday 14 September, just before the bankruptcy filing. The objective was to help the main CDS dealers net out counterparty positions involving Lehman and rebalance their books through the replacement of trades. Second, AIG, a large insurer known to be holding more than $440 billion of notional positions in CDS contracts – often monoline insurance-type transactions involving client banks – received a government support package on 16 September. That package, which would be repeatedly restructured and extended during the following months, prevented the disorderly failure of AIG. It also kept CDS-related risks from being brought back onto clients' balance sheets in an already fragile environment. Third, Lehman-referencing CDS exposures turned out to be smaller than feared. They eventually translated into relatively modest net settlement payments of about $5.2 billion, which would be closed out without incident in late October. Consequently, the CDS market infrastructure held up rather well. Even so, market opacity added to policy uncertainty during the days immediately preceding the bankruptcy filing and exacerbated existing strains

… caused counterparty risk to soar …

Default rates, credit spread levels and issuance volumes



¹ Moody's global 12-month issuer-weighted speculative grade default rates for 2008–09, in per cent; forecasts refer to the 12-month period starting at the reporting date. The range is defined by pessimistic/optimistic scenarios around the baseline. ² Investment grade CDS spread levels over Treasuries (Europe: iTraxx; United States: CDX), adjusted with five-year US dollar swap spreads, in basis points. The blue dots indicate the CDS spread level prevailing in mid-May 2009; late 2008 refers to 5 December for the European Union and 20 November for the United States. ³ Moody's average monthly global investment grade bond spreads over Treasuries, in basis points; the dashed lines represent historical averages of monthly spreads from 1919 to 2008. ⁴ Syndicated international and domestic debt securities placed by private issuers, in billions of US dollars. The sectoral allocation reflects the characteristics of the immediate issuer.

Sources: Federal Reserve Bank of New York; Bloomberg; Dealogic; JPMorgan Chase; Moody's. Graph II.6

Money market funds amplify instability in the wake of the Lehman failure

A loss of confidence in US dollar money market funds amplified the financial strains arising from the September 2008 Lehman Brothers failure. The following discussion illustrates why the run on these funds coincided with the deterioration in global interbank markets.

The build-up to the run on money market mutual funds

As documented more fully in Chapter III, non-US banks' overall need for US dollar funding was an unchecked vulnerability in the global financial system ahead of the financial crisis. European banks in particular had increased their US dollar assets sharply over the past decade, to more than $8 trillion by mid-2007. Moreover, these exceeded their estimated US dollar liabilities by more than $800 billion, implying cross-currency financing and hence a heavy reliance on instruments such as foreign exchange swaps. Banks also financed their positions by borrowing directly in other wholesale interbank funding markets and from non-bank providers of short-term funding, such as money market funds.[①]

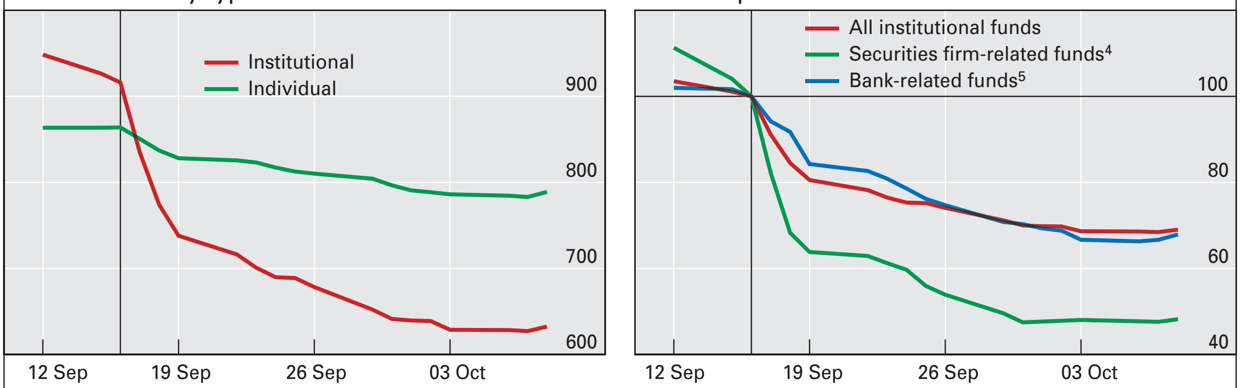
When dollar funding in interbank markets dried up starting in August 2007, European banks increasingly turned to foreign exchange swap markets to obtain dollars against European currencies, driving the corresponding funding cost well above an already elevated US Libor rate (Graph II.4, centre panel). Such interbank market strains made it critical for non-US banks to retain access to other sources of dollar funding, especially the largest: US dollar money market funds. Most funds that purchase private paper, so-called "prime" funds, invest heavily in non-US issuers. Records of the mid-2008 holdings of the 15 largest prime funds, accounting for over 40% of prime funds' assets, show that these placed half of their portfolios with non-US banks (and roughly 85% of that sum with European banks). Thus, US money market fund investments in non-US banks reached an estimated $1 trillion in mid-2008 (out of total assets of over $2 trillion), more than 15% of European banks' total estimated US dollar liabilities to non-banks.

Until September 2008 US dollar financing continued to be forthcoming, and US money market funds appear to have increased their outright investment in non-US banks in the period immediately preceding the Lehman failure. Assets at US money funds grew strongly as investors withdrew from less safe short-term investments. Non-US banks benefited as prime fund managers adopted a less risky investment mix and shifted their portfolios away from commercial paper (CP) towards certificates of deposit (CDs). This shift suggests that prime funds increased their role as providers of unsecured dollar funding to non-US banks, given the much larger share of non-US banks as issuers of CDs than of CP held by those funds. At the same time, the shift also meant that any run on dollar money market funds was bound to result in funding difficulties for European banks.

Assets of US prime money market funds

Prime funds by type[1, 2]

Selected prime institutional funds[2, 3]



[1] In billions of US dollars. [2] The vertical line marks 16 September 2008, the day after Lehman Brothers filed for Chapter 11 bankruptcy protection and the date on which Reserve Management Co announced that shares in both its flagship fund and its Caribbean fund were worth less than one dollar. [3] 16 September 2008 = 100. [4] Goldman Sachs, Merrill Lynch and Morgan Stanley. [5] Bank of America (Columbia), Bank of New York (Dreyfus), Barclays, JPMorgan Chase, State Street, Wachovia (Evergreen) and Wells Fargo.

Sources: Crane Data; BIS calculations. Graph II.A

The run on US money market funds

On 16 September, the day after Lehman's failure, Reserve Management Co, manager of the fastest-growing fund family over the previous several years, announced that, due to losses on Lehman notes, shares in its flagship fund, Reserve Primary, were worth 97 cents and those in its Caribbean fund 91 cents. Reserve Primary's "breaking the buck" was without precedent for a major fund, and only the second instance in the history of all money market funds. It set off broad-based, though differentiated, shareholder redemptions that resembled a bank run. Reserve Primary had $25 billion of redemption orders on 15 September and by 19 September another $35 billion, for a total of $60 billion out of $62 billion. Although it reported an unbroken buck, Reserve's $10 billion US Government Fund faced some $6 billion in redemption payments. Other prime funds also suffered redemption calls; meanwhile, government funds received inflows.[②]

Institutional investors fled much more quickly than individual investors. On the Wednesday and Thursday following Tuesday's breaking of the buck, institutional investors liquidated $142 billion in 102 prime institutional funds, 16% of their holdings (Graph II.A, left-hand panel). On those same days, they purchased $54 billion in government funds, a similar percentage increase. Individuals sold a more modest $27 billion from prime funds (3%) and bought a net $34 billion in government funds.

The largest redemptions occurred at prime institutional funds managed by those remaining securities firms and small independent managers that investors doubted could support their funds. Two-day redemptions at the largest prime institutional funds managed by the three largest securities firms ranged from 20 to 38% of assets, well above the 16% average. By contrast, the largest such funds managed by affiliates of seven large banks met two-day calls of between 2 and 17% of assets (Graph II.A, right-hand panel).

The flight to safety, represented by both the shift to government funds and changing portfolio compositions, resulted in new demand for Treasuries, agency securities and repos at the expense of demand for CP and bank CDs. Prime funds' holdings of repos, at 11% of portfolio, could not meet even the first two days' redemptions at many funds. Liquidating repos forced up average maturities and led funds to reinvest only at the very short term.

The run on money market funds thus threatened a run first on the CP market and then on the CD market and thereby on non-US banks, destabilising already strained global bank funding markets. The policy responses designed to stop this run, and the degree to which they replaced private with public funding, are discussed in Chapter VI.

① See P McGuire and G von Peter, "The US dollar shortage in global banking", *BIS Quarterly Review*, March 2009. ② See N Baba, R McCauley and S Ramaswamy, "US dollar money market funds and non-US banks", *BIS Quarterly Review*, March 2009.

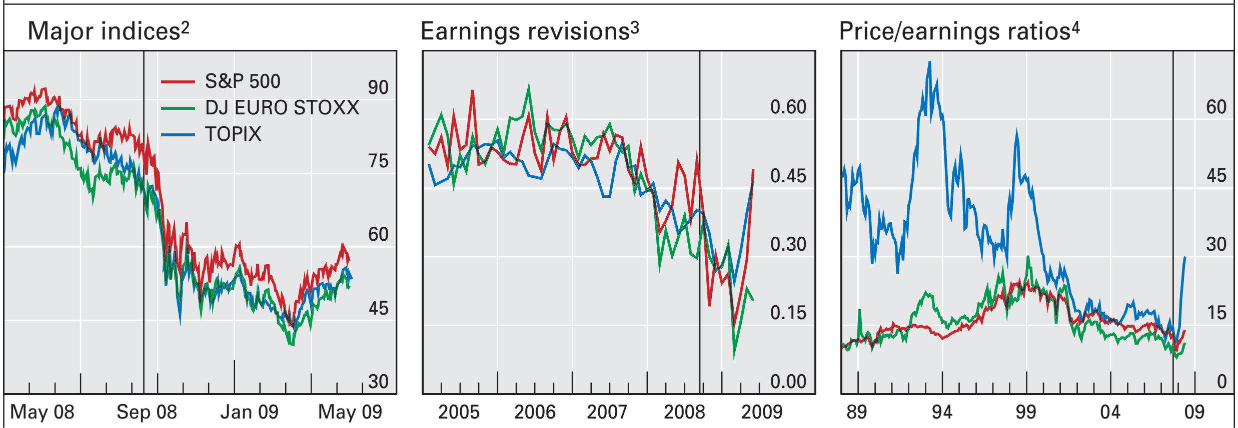
in funding markets.[4] Those markets now came under pressure from losses on exposures of money market mutual funds to short- and medium-term notes issued by Lehman.

The systemic nature of money market fund exposures became apparent when a large US fund, Reserve Primary, wrote off more than $780 million worth of Lehman debt (see box). As a result, Reserve Primary became the first major money market mutual fund ever to "break the buck", ie report less than one dollar's worth of net assets for each dollar invested. This event, in turn, triggered unprecedented volumes of US money market fund redemptions – a "bank run" in all but name – forcing fund managers to liquidate assets into essentially illiquid markets. While pressure across funds was not uniform, strains quickly spilled over into the markets for commercial paper (CP) and bank certificates of deposit, where money market funds are a key investor group.

… as an investor run on money market funds …

[4] See *BIS Quarterly Review*, December 2008, pp 6–7, for a more detailed discussion.

Equity market indicators[1]



[1] The vertical line marks 15 September 2008, the date on which Lehman Brothers filed for Chapter 11 bankruptcy protection. [2] In local currency; 1 October 2007 = 100. [3] Diffusion index of monthly revisions in forecast earnings per share, calculated as the percentage of companies for which analysts revised their earnings forecast upwards plus half of the percentage of companies for which analysts left their forecast unchanged. [4] Based on consensus forecasts for one-year operating earnings.

Sources: Bloomberg; I/B/E/S; BIS calculations. Graph II.7

Unsecured financial paper suffered the largest outflows: total outstanding CP volumes in the United States plummeted by more than $325 billion between 10 September and 22 October, from a total of about $1.76 trillion (Graph II.4, right-hand panel). Foreign banks and those US institutions without their own retail deposit base thus lost access to an important source of funds at a time when they needed to support – or take onto their balance sheets – the money market funds that they sponsored. In response, demand for US dollar interbank funds surged, causing short-term credit and money markets to seize up.

… quickly spread through the financial system

The resulting turmoil quickly spread through the global financial system. With banks hoarding liquidity, US dollar Libor-OIS spreads surged from already elevated levels of around 80 basis points in early September to near 250 points at the end of the month. Movements in other markets, such as those for euro and sterling funds, showed similar signs of disruption. Strains were particularly evident for foreign exchange swaps, where rising financial sector credit spreads and the mounting global demand for US dollar funds raised the implied cost of dollars to historically high levels above Libor (Graph II.4). With the viability of key players suddenly challenged and perceptions of counterparty risk spiking, the benchmark US investment grade CDS index spread jumped by 42 basis points on 15 September alone, and US high-yield spreads rose 118 basis points on the same day (Graph II.3). Credit spreads in other major markets moved by similar amounts, in tandem with their US counterparts. Equity prices fell by some 4% in the United States and Europe on the day of the Lehman bankruptcy and declined further until 17 September (Graph II.7).

Despite a first round of policy initiatives …

In an environment of acute systemic pressure, policymakers increased the pace and scope of their initiatives. On 18 September, UK bank HBOS was forced into a government-brokered merger with one of its competitors. Concomitantly, the UK authorities sought to ease pressure on financial stocks through a suspension of short selling – the US authorities followed suit the very next day. Simultaneously, major central banks reacted with a new round of coordinated measures to address the squeeze in US dollar short-term funding. These actions were followed on 19 September by the US Treasury's announcement of a temporary guarantee for money market fund investors, a measure aimed at arresting the escalating run on the US money market mutual fund sector. Redemptions slowed in response, with total assets eventually returning to their pre-15 September levels.

Markets recovered from the initial reaction to the Lehman bankruptcy, but pressure on banks and other financial sector firms did not abate. Helped by early details of a proposed $700 billion US plan to take troubled assets off the books of financial institutions, credit spreads retreated temporarily from the highs reached earlier in the week. Equity markets also recovered, aided in part by the new ban on short sales. The S&P 500 rebounded 4% on 19 September, with several high-profile banking stocks rising even more sharply, and European stock markets gained more than 8% on the same day. Even so, on Sunday 21 September, in a move aimed at halting ongoing transfers of counterparty positions and client funds to third parties, investment banks Goldman Sachs and Morgan Stanley obtained permission from the US authorities to convert themselves into bank holding companies, and US thrift institution Washington Mutual was taken over by the authorities during the following week.

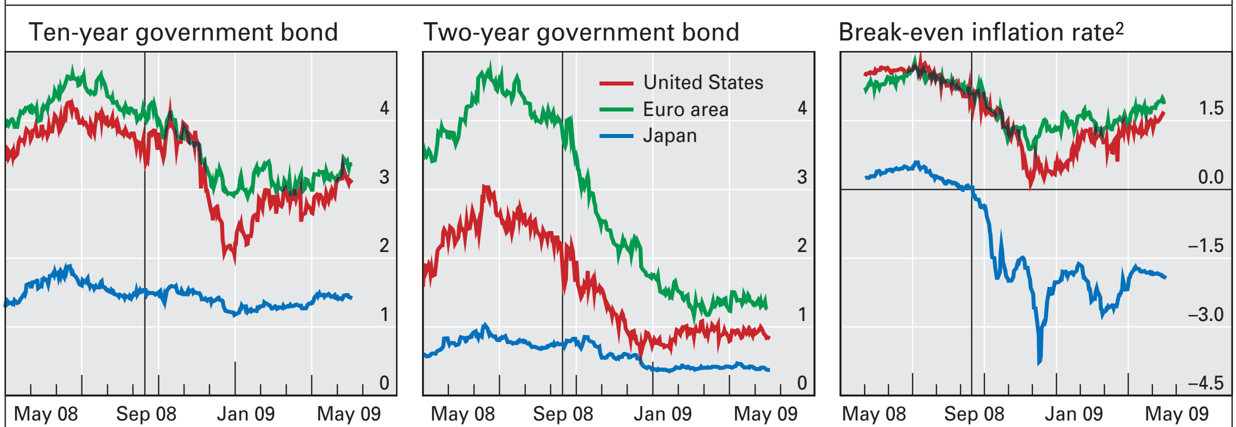
… financial sector pressures did not abate …

The ultimate proof of the depth and breadth of the crisis came on Monday 29 September. That day, authorities in a number of European countries were forced to counter threats to the stability of individual institutions within their national banking systems. Following negotiations over the weekend, the United Kingdom moved to nationalise mortgage lender Bradford & Bingley, while banking and insurance company Fortis received a capital injection from a group of three European governments. On the same day, Hypo Real Estate,

… forcing support measures by an increasing number of governments

Nominal government bond yields and break-even rates[1]

In per cent



[1] The vertical line marks 15 September 2008, the date on which Lehman Brothers filed for Chapter 11 bankruptcy protection. [2] Nominal minus real 10-year zero coupon bond yields. For the United States and the euro area, zero coupon break-even rates are calculated as in R Gürkaynak, B Sack and J Wright, "The TIPS yield curve and inflation compensation", *Finance and Economics Discussion Series*, 2008-05, Board of Governors of the Federal Reserve System; for Japan, Bloomberg.

Sources: Bloomberg; BIS calculations.

Graph II.8

a German commercial property lender, secured a government-facilitated credit line, which was later backed up by additional support measures.

Confidence in the stability of banks was lost …

These measures notwithstanding, confidence in the stability of the banking system had been lost: financial markets were now clearly focusing on the need for comprehensive policy action. Later on 29 September, when the US House of Representatives voted to reject the first version of the Treasury's proposed rescue plan for the US financial industry (it would be passed into law in revised form at the end of that week), the market response was swift: the S&P 500 fell 8.8%, with the decline again led by financial shares, and other indices saw comparable percentage declines that would accumulate to losses of about 30% by late October. Credit markets came under extreme pressure as well, with the major CDS index spreads surging back to, and surpassing, the highs reached in the days immediately after the Lehman failure. Longer-term government bond yields fell (Graph II.8) and volatilities spiked across asset classes (Graph II.5) as the deepening crisis resulted in a broad-based flight to quality.

… on a global scale …

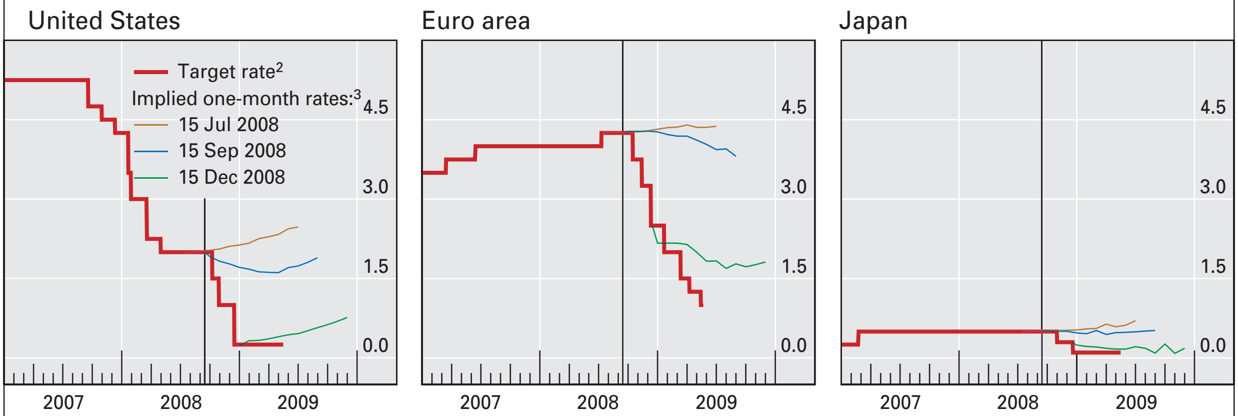
Emerging market countries were being increasingly drawn into the unfolding turmoil, even though their direct exposures to impaired assets were known to be limited. Having outperformed their industrial country counterparts between the beginning of the crisis (August 2007) and May 2008, emerging market stocks, as measured by the MSCI index, dropped by about 28% in local currency terms between mid-May and the day before the Lehman failure (compared with a loss of about 12% for the S&P 500). Up to that point, losses had been driven largely by the implications of the crisis for export demand, both directly and through the impact of weakening demand on commodity prices (see Chapter V). Following the Lehman event, emerging market assets weakened further on a broad basis as fears about the stability of banking systems in the major economies triggered a combination of concerns about collapsing global growth, lower commodity prices and the availability of external sources of funding. In response, sovereign spreads widened dramatically and equities, which plummeted in tandem with those in the industrial economies, weakened significantly more than during past periods of market turbulence (Graph II.11).

… and emerging market assets were drawn into …

While pressures were particularly intense for countries that investors regarded as among the most vulnerable, signs of more indiscriminate asset disposals emerged in the course of October. Concerns about access to foreign funding became apparent early in the month, when the near simultaneous demise of three Icelandic banks caused international investors to reassess their exposures to countries with large current account deficits and associated financing needs, including those in central and eastern Europe (see Chapter V). In recent years, a sizeable fraction of the capital inflows into markets with foreign-dominated banking systems – and the resulting access to large pools of foreign currency deposits – had been in the form of foreign currency loans to businesses and households. Now lenders became more hesitant to roll over existing loans or to extend new ones. In addition, as key parts of the global financial system turned dysfunctional, plummeting valuations in industrial country markets increasingly translated into heavy banking and portfolio flows out of emerging market assets. Pressure on asset prices mounted and market

Policy rates and implied expectations[1]

In per cent



[1] The vertical line marks 15 September 2008, the date on which Lehman Brothers filed for Chapter 11 bankruptcy protection. [2] Central bank policy rate; for the United States, target federal funds rate; for the euro area, interest rate on the main refinancing operations; for Japan, target for the uncollateralised overnight call rate. [3] Observations are positioned on the last business day of the month indicated in the legend; for the United States, federal funds futures; for the euro area, EONIA swap; for Japan, yen OIS.

Sources: Bloomberg; BIS calculations. Graph II.9

volatility surged. This broadened the sell-off, despite efforts by emerging market central banks to enhance their domestic and foreign currency lending operations and, in several countries, the announcement of full or partial guarantees of bank deposits. As a result, the MSCI emerging market index would lose about 40% from its level just before the Lehman failure, reaching values last seen in October 2004.

… a broadening sell-off

By mid-October 2008, with the flurry of unprecedented policy initiatives taken across countries increasingly adding up to a joint approach, markets were finally showing signs that the crisis of confidence had been arrested. On 8 October, the authorities in the United Kingdom announced comprehensive measures to recapitalise UK banks. The move was followed by the first ever round of coordinated cuts in policy rates by six major central banks, including the ECB, the Bank of England and the Federal Reserve. Efforts to implement additional, broad-based policy measures continued in the following weeks: on 13 October, for example, the Federal Reserve and other major central banks increased existing swap lines to accommodate unlimited quantities of US dollar funds. On the same day, the euro area member countries jointly announced guarantees and equity injections aimed at stabilising the banking sector. These were followed, on 14 October, by news that the US Treasury would use $250 billion of the previously authorised $700 billion rescue package to recapitalise major banks. Given that large amounts of financial institutions' senior liabilities had thus effectively become quasi-government debt, investors reacted by pushing financial sector spreads down from the peaks reached earlier in the period under review (Graph II.10, left-hand panel).

The crisis of confidence was arrested …

… in the wake of coordinated policy action …

Signs of easing pressures were also evident in other markets. After peaking at 364 basis points on 10 October, the three-month US dollar Libor-OIS spread steadily fell, ultimately dipping below 100 basis points in January 2009 (Graph II.4, left-hand panel). Euro and sterling Libor-OIS spreads

… and signs of easing pressures were evident across markets behaved in a similar fashion, suggesting that interbank markets had begun to stabilise. In the meantime, key equity indices showed temporary signs of relief, rebounding from lows reached in late October. Conditions in emerging markets also stabilised, following successful efforts by a number of countries to obtain assistance from the IMF and other international bodies as well as news, on 29 October, that the Federal Reserve had established US dollar swap lines with key emerging market monetary authorities. However, asset prices remained under pressure from country-specific vulnerabilities, contributing to the underperformance of credit and equity indices for emerging Europe (Graph II.11, left-hand and centre panels).

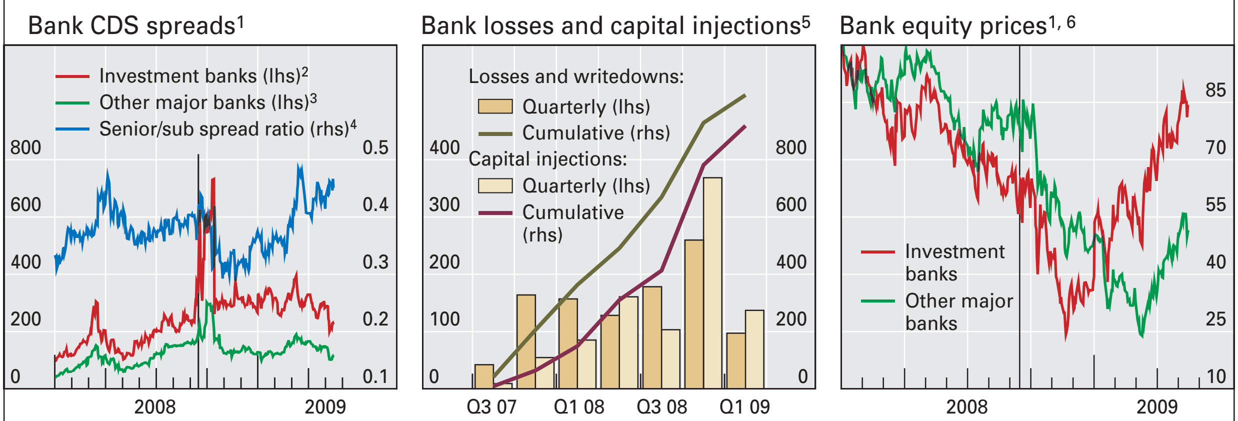
Global macroeconomic and financial spillovers

Stage four: investors focus on the global economic downturn (late October 2008 to mid-March 2009)

Recession fears took centre stage …

The next crisis stage, starting in late October, was one of uncertainty with regard to both financial sector stability and the likelihood of a deepening global recession. Although the global crisis of confidence had come to an end, policy action continued on an international scale as governments sought to support market functioning and to cushion the blow of rapid economic contraction. Even so, with many details unspecified, questions about the design, impact and consistency of these measures remained. As a result, financial markets were roiled by increasingly dire macroeconomic data releases and earnings reports, punctuated by short-lived periods of optimism – often in response to the announcement of further government interventions.

Financial sector indicators



[1] The vertical line marks 15 September 2008, the date on which Lehman Brothers filed for Chapter 11 bankruptcy protection. [2] Equally weighted average of CDS spreads (in basis points) for four major investment banks; includes Lehman Brothers until 15 September 2008 and Merrill Lynch until 31 December 2008. [3] Equally weighted average of CDS spreads (in basis points) for 14 major international banks. [4] Ratio of senior over subordinated CDS spreads for the 18 international banks in the other spread series, rescaled to imply the average recovery rate on senior bank CDS; assumes a subordinated recovery rate of 10%. [5] In billions of US dollars; data from Q3 2008 onwards include government injections of capital. [6] Equally weighted average of equity prices in US dollars for the 18 international banks in the left-hand panel; 1 January 2008 = 100.

Sources: Bloomberg; Markit; BIS calculations.

Graph II.10

Recession fears were clearly evident from government bond yields, which continued on a downward trajectory in November and December. Reductions in policy rates and a flight to safety pushed US and euro area two-year yields dramatically lower, below 1% and 2%, respectively, by mid-December (Graph II.8, centre panel). US 10-year yields, in turn, fell to a record low near 2.05% on 30 December (the previous record was around 2.10%, established in 1941). In line with these yield movements, expectations about the path of near-term policy rates were revised downwards. Meanwhile, federal funds futures prices signalled expectations of low and broadly steady policy rates in the United States for much of 2009, consistent with depressed to negative growth over the coming quarters. In the euro area, interest rate swap prices pointed to expectations of a further lowering of policy rates by the ECB over the next 12 months, reflecting in part the relatively slow pace of ECB rate adjustments seen since the start of the crisis. In Japan, where the policy rate had been cut in late October, forward rates suggested expectations of unchanged policy rates for most of 2009. In turn, break-even inflation rates (ie the difference between nominal and inflation-indexed yields) were in line with expectations of rapid disinflation, especially at shorter horizons. At the same time, movements in long-term break-even rates seemed to be due largely to technical factors, such as safe haven demand for the liquidity of nominal Treasuries and rising liquidity premia in index-linked bonds. By introducing a pessimistic bias, these technical factors thus limited the usefulness of long-term break-even rates as an indicator of inflation expectations (Graph II.8, right-hand panel).[5]

... as yields were pushed down ...

... inflation expectations were adjusted ...

Both credit and equity markets recovered somewhat into the new year, as previous policy actions showed signs of traction. One such example of tentative, policy-induced normalisation in a disrupted market was the US securitisation sector, where spreads for agency MBS and bonds as well as securities backed by consumer loans eased in response to a number of support measures announced after the Federal Reserve's first such initiative, on 25 November (Graph II.2, right-hand panel).

... and asset prices were driven lower

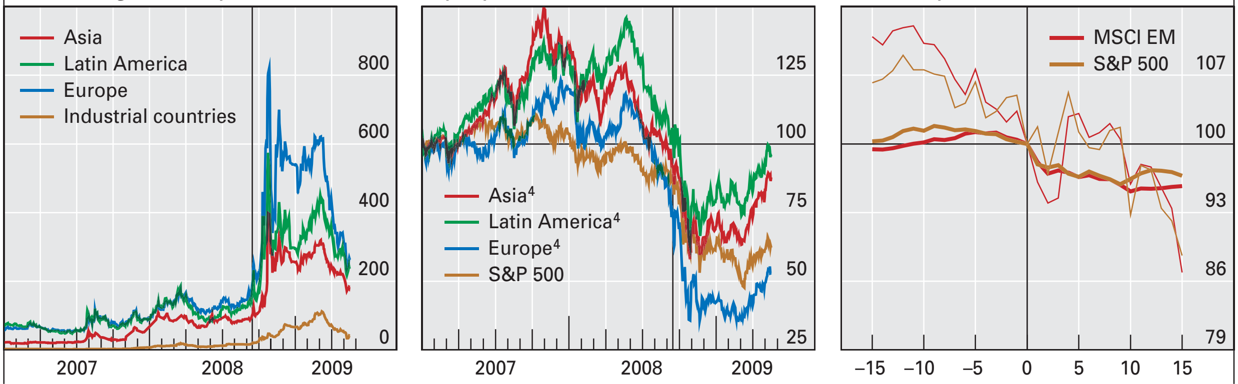
However, when the scale of the global economic downturn became fully apparent in January 2009, prices for financial assets were dragged lower once again. Against the background of weak fourth quarter data that suggested that economic activity was in the midst of the worst slump in decades (see Chapter IV for details), markets resumed their earlier slide. Major equity indices declined in the wake of deteriorating earnings; they would continue to do so into March, eventually falling back below the troughs reached in November (Graph II.7, left-hand and centre panels): on 9 March, the S&P 500 dropped to around 676 points, a level last seen in October 1996. Credit markets also weakened once again, as the ongoing slowdown in economic activity suggested further credit quality deterioration. An especially large widening in Japanese spreads (Graph II.3, left-hand panel) was accelerated by sectoral and credit quality-related index composition effects as well as by low market liquidity.

Emerging markets experienced similar pressures. GDP data for the fourth quarter confirmed the deepening impact of the financial crisis on economies

[5] See *BIS Quarterly Review*, March 2009, pp 10–11, for details.

Emerging market indicators

Sovereign CDS spreads[1, 2] | Equity indices[1, 3] | Relative performance[5]



[1] The vertical line marks 15 September 2008, the date on which Lehman Brothers filed for Chapter 11 bankruptcy protection. [2] Weighted average of sovereign CDS spreads (in basis points), based on 2005 GDP and PPP exchange rates. Asia = China, India, Korea, Malaysia and the Philippines; Latin America = Brazil, Chile, Colombia, Mexico and Peru; Europe = the Czech Republic, Hungary, Poland, Russia and Turkey; industrial countries = France, Germany, Italy, Japan, the United Kingdom and the United States. [3] 3 January 2007 = 100. [4] Morgan Stanley Capital International emerging market price indices, in local currency terms. [5] Thick lines: average for the trading days before and after the start of 11 periods of turbulence, defined as sudden and sustained increases in the VIX index, between 2000 and July 2007; thin lines: over the trading days before and after the Lehman Brothers bankruptcy; day 0 = 100.

Sources: Datastream; Markit; BIS calculations. Graph II.11

Plunging exports weighed on emerging market assets …

that had hitherto depended on exports to support growth, particularly in Asia. Korean fourth quarter GDP fell more than 3% year on year, and China reported a slowdown in growth of more than 4 percentage points over the same period, driven in part by falling export demand (see Chapter V for details). In a reflection of financial sector problems, the collapse in trade flows was probably exacerbated by counterparty risk concerns among banks involved in trade finance and by a related disruption of net flows of trade credit between exporting and importing countries. Plunging exports, in turn, were reflected in declining asset prices. However, compared with the immediate crisis of confidence in September and early October 2008, patterns across countries and regions were more differentiated (Graph II.11, left-hand and centre panels). The differentiation helped to cushion the impact on overall emerging market equity indices, which generally fared better during the fourth stage of the crisis than their industrial country counterparts. For example, although weakening from early January onwards, the MSCI emerging market index did not return to the lows established in late October, as countries from other regions compensated for the underperformance of economies across emerging Europe (Graph II.11, centre panel).

… and financial sector weakness re-emerged …

Continued problems in the financial sector also drove part of the renewed weakness in the equity and credit markets of industrial countries. Signs that the sector's stability had not been restored on a sustained basis had emerged early in 2009, despite the injection of a combined $925 billion of private and government capital since the third quarter of 2007 (Graph II.10, centre panel). Losses at a large German bank had to be backstopped by a government bailout on 8 January, and similar measures followed across a number of European countries and in the United States. Financial sector credit spreads and equities thus led the deterioration in overall indices seen into March (Graph II.7).

At the same time, existing guarantees and expectations of further support measures generally limited movements in financial sector credit spreads. However, while state guarantees contributed to a surge in financial sector debt issuance (Graph II.6, right-hand panel), spreads no longer tightened in expectation of government support. In contrast with developments in late 2008, investors thus appeared to be increasingly uncertain about the necessary scope of such measures and about any impact on their debt holdings. Related uncertainties also contributed at times to significant pricing differences across the capital structure, reflecting changing expectations about relative recovery rates in the face of government intervention (Graph II.10, left-hand panel). Heavy discounts on subordinated debt, in turn, induced numerous banks to retire these securities and to bolster core capital through retained earnings. Meanwhile, equity prices for the former standalone investment banks outperformed those for the broader banking sector; that difference was in line with improved capital positions and signs that the cyclical deterioration had contributed to a shift in the focus of concerns about bank exposures from the trading book to the banking book (Graph II.10, right-hand panel; see also Chapter III).

... against the background of uncertainties about the scope ...

... and implications of government support

Uncertainty was also driven by indications that large-scale financial sector rescue and economic support packages were starting to strain government finances. Industrial country sovereign CDS spreads had drifted upwards from low levels ever since the initiation of the first backstop measures in the summer of 2008, and they rose further into March (Graph II.11, left-hand panel). Increases came in the wake of rising fiscal commitments, with correlation patterns among different sovereigns suggesting the presence of a strong common driver. Correlation between spreads for sovereign CDS and those for senior financial sector credit, in particular, increased relative to the period before the Lehman failure. This pattern was in line with investor beliefs that major governments had underwritten the risks of substantial parts of the banking system, but it did not necessarily reflect the specifics of these commitments at the individual country level. Similar developments were evident in government bond markets, where expectations regarding large future issuance volumes had started to offset the downward pressures exerted on yields by safe haven flows and the economic outlook (Graph II.8).

Sovereign CDS spreads widened ...

... on beliefs that the authorities had underwritten banking sector risks

Stage five: first signs of stabilisation (from mid-March 2009)

Events took another turn in mid-March. Volatilities declined and asset prices recovered from their previous lows, as further and more determined policy action induced markets to show some optimism in the face of what remained a largely negative macroeconomic and financial outlook. At the same time, and despite further improving conditions in a variety of markets, signs of dysfunction and related distortions remained, suggesting that the combined efforts of governments and central banks had not yet fully restored confidence in the global financial system. Thus, the process of normalisation seemed likely to be protracted and subject to considerable risks.

Events took another turn ...

A key factor behind improving asset valuations was the confidence effect from announcements by major central banks of expansions of both the range

... when further policy action ...

and the amount of assets that they would be prepared to purchase outright. Early in March, the Bank of England announced plans to purchase private sector assets and government bonds. On 18 March, the Federal Reserve followed with news that it would acquire up to $300 billion worth of longer-term Treasury securities. In anticipation of the extra demand, investors drove 10-year Treasury yields to their biggest one-day decline in more than 20 years – 47 basis points. Shorter-term Treasury yields also fell, as did yields on Japanese government bonds, the latter driven by the authorities' announcement on the same day that they would increase by 29% the annual amount devoted to outright purchases of such securities. Despite the leeway provided by policy rates that remained higher than those in other major economies (Graph II.9), speculation about the possibility of similar measures being taken by the ECB also affected euro area bond yields. Although these yield declines were quickly reversed, announced purchases at least temporarily countered pressures from growing supplies of government bonds (Graph II.8). Similar "signalling effects" (see Chapter VI) were evident in the markets for US consumer debt-backed securitisations, where support from government programmes had contributed to a tightening of spreads (Graph II.2, right-hand panel), and would later be observed also in Europe, following an announcement in early May that the ECB was to start purchasing euro-denominated covered bonds (Table II.1).

… and improving financial sector news …

Broader asset markets also recovered, albeit from depressed levels. The announced bond purchases added to the optimism that had taken root earlier in the month following the release, on 10 and 11 March, of favourable performance data from large US banks. In response, both equity and credit markets bounced back from their lows, again driven by the financial sector. Both markets expanded these gains in the following weeks, supported by announcements of additional policy action, investor beliefs that the initiatives launched at the G20 summit in London would help boost the global economy, and robust first quarter earnings at major banks and corporates. With tentative improvements in key macroeconomic indicators providing further impetus, the S&P 500 rose by 29% between 9 March and end-April, with other major indices climbing by similar amounts. Emerging market assets also rose during this period; the gains reflected positive developments in key markets, such as China, and recovering equity prices in emerging Europe, where broad regional indices outperformed those in industrial countries (Graph II.11, centre panel).

… supported financial markets

However, persistent signs of dysfunction remained …

Yet despite these positive developments, continuing financial sector risks were underlined by persistent signs of market dysfunction. Although repeated central bank injections of liquidity and the provision of government guarantees had helped to calm interbank lending and to lower Libor-OIS spreads, observed levels remained substantially higher than before the start of the crisis in 2007, partly because of considerable lingering uncertainties about the scope and effectiveness of government support (Graph II.4, left-hand panel). Forward rates, in turn, pointed to investor expectations of only limited further improvement in Libor-OIS spreads up to end-2009. Similar concerns prevailed in credit markets. The pricing differential between CDS contracts and corresponding cash market bonds, the so-called CDS-cash basis, had moved to unusually negative levels in the aftermath of the Lehman bankruptcy. The arbitrage activities that would usually tend to compress the basis require investors to commit both funding and capital; wide price differentials therefore pointed to persistent balance sheet constraints along with large relative liquidity premia across markets (Graph II.3, right-hand panel).[6]

… suggesting that normalisation was bound to be a protracted process

In mid-May, despite further valuation gains across various asset classes in the wake of bank stress tests conducted by the US authorities, market conditions continued to be fragile. Unprecedented policy action had managed to halt the financial crisis, but normalisation was bound to be a protracted process. With a sustained recovery unlikely to take hold without a lasting stabilisation of the financial sector, questions remained about how effective past and future policy measures would be in maintaining the improved tone in markets (see also Chapter VI). Substantial reductions in policy rates and yields reflected aggressive policy action as well as a deteriorating macroeconomic environment (Graphs II.8 and II.9). Major equity markets had fallen to levels some 45% below their October 2007 highs, and valuations, as measured by forecast-based price/earnings ratios, were back to values last seen in the early 1990s (Graph II.7, left- and right-hand panels). Credit spreads, while having come down substantially from their peaks, were still wide by historical standards, reflecting expectations of sharp increases in default rates and associated losses on bond and loan portfolios (Graph II.6, left-hand and centre panels; see also Chapter III). While the cyclical deterioration in credit quality was thus bound to continue, forward CDS spreads suggested that risk premia were expected to revert to more normal levels over the medium term (Graph II.3, centre panel).

[6] Factors commonly driving the CDS-cash basis include funding constraints, counterparty credit risk and relative liquidity conditions. See J De Wit, "Exploring the CDS-bond basis", *National Bank of Belgium Working Papers*, no 104, November 2006.