BANK FOR INTERNATIONAL SETTLEMENTS

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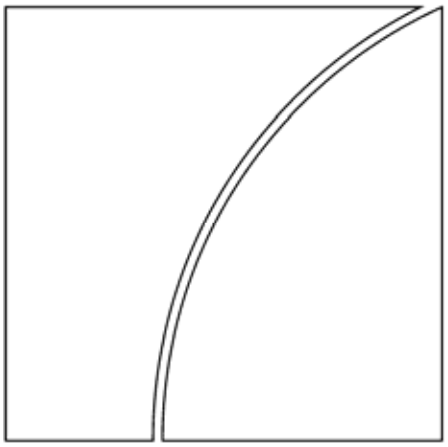
June 2008



International banking and financial market developments

BIS Quarterly Review
Monetary and Economic Department

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Special features

Notations used in this Review

e	estimated
lhs, rhs	left-hand scale, right-hand scale
billion	thousand million
…	not available
.	not applicable
–	nil
0	negligible
$	US dollar unless specified otherwise

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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).

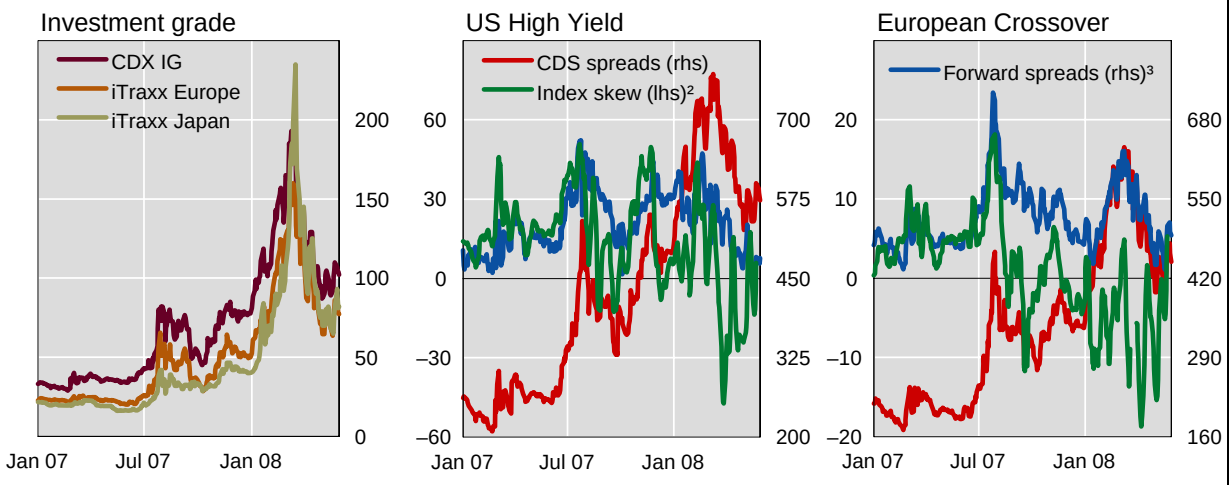
Market turmoil deepens in early March ...

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).

... amid disappearing liquidity ...

... and heightened uncertainty

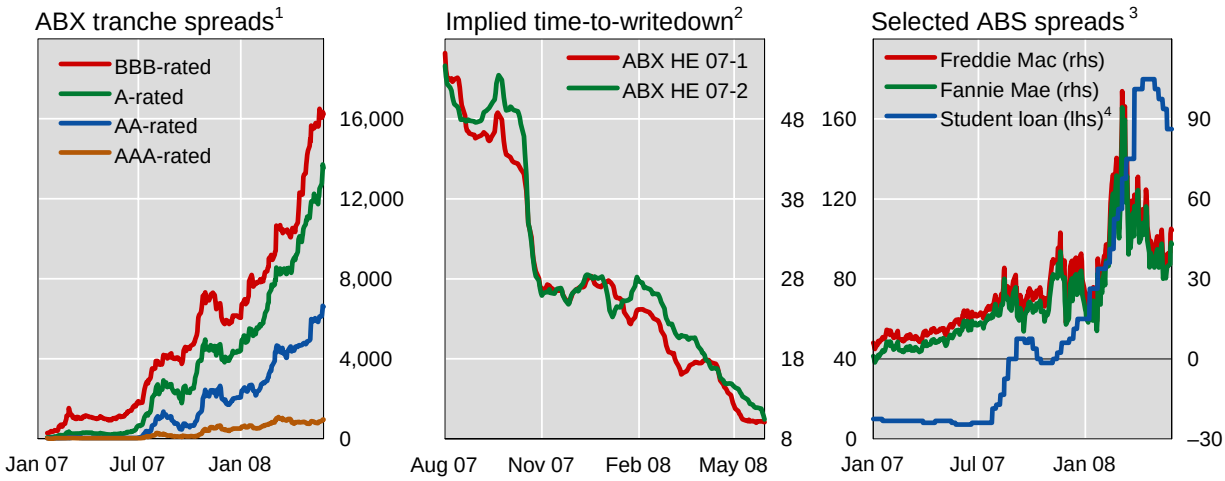
Credit spread indices[1]



[1] Five-year on-the-run CDS mid-spread on index contracts of investment grade and sub-investment grade (CDX High Yield; iTraxx Crossover) quality; in basis points. [2] Difference between the index spread and the weighted average of constituent CDS spreads; five-day moving averages. [3] Implied five-year CDS spread five years forward, calculated at flat money market rates and with a recovery rate of 40% assuming continuous time and coupon accrual, in basis points.

Sources: JPMorgan Chase; Markit; BIS calculations. Graph 1

US securitisation markets



[1] Implied index spreads from CDS contracts on subprime mortgage bonds (index series ABX HE 07-1), in basis points. [2] Implied time to writedown of tranche principal, in months; calculated from prices for the ABX HE 07-1 and 07-2 BBB– index series, assuming that all underlying bonds are completely written down; five-day moving averages. [3] JPMorgan mortgage index; option-adjusted spreads over Libor; in basis points. [4] Ten-year AAA student loan ABS spreads over Libor, in basis points.

Sources: JPMorgan Chase; Markit; BIS calculations. Graph 2

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).

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

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.

... 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.

Spreads recover from their peaks ...

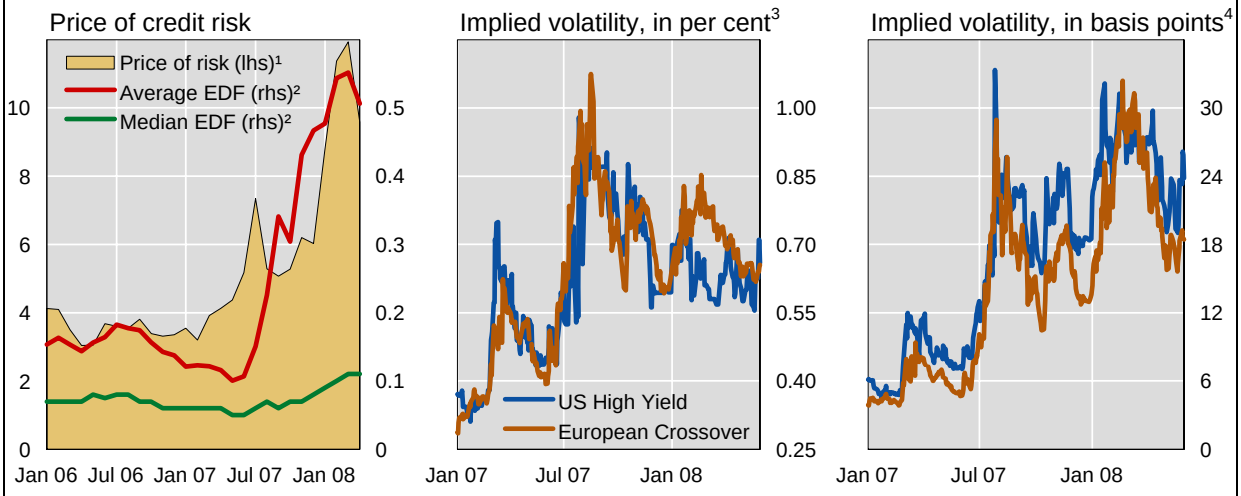
Tightening spreads coincided with a notable recovery in indicators of investor risk tolerance over the period. While remaining elevated, the price of credit risk, as extracted from credit spread-implied and empirical default probabilities of lower-quality borrowers, declined markedly from the very high 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).

... and risk tolerance returns ...

... despite further deteriorating housing fundamentals

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

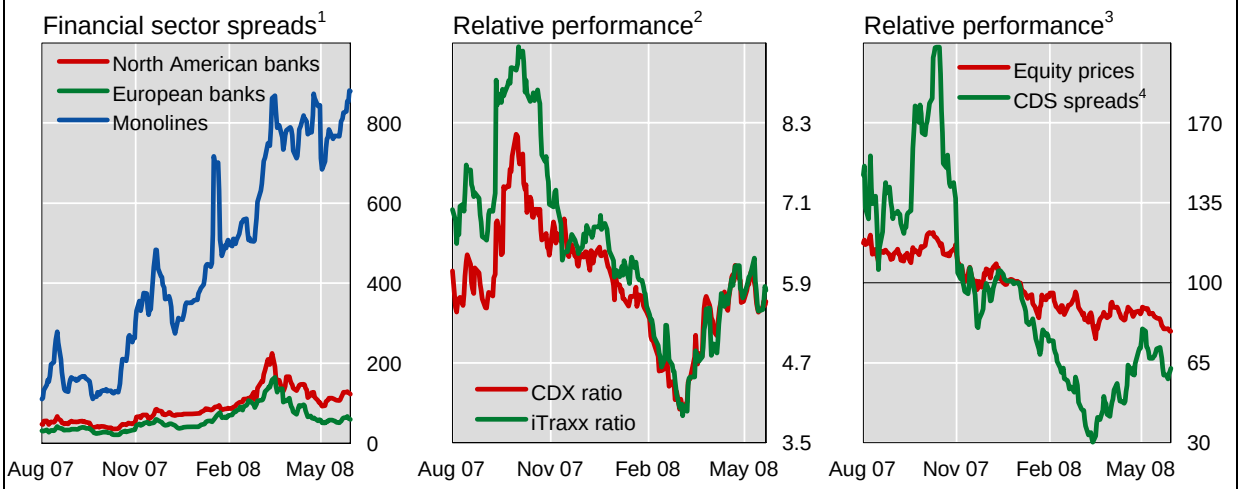
Price of risk and implied volatilities



[1] Ratio of risk neutral to empirical probabilities of default. Empirical probabilities are based on Moody's-KMV EDF data. Estimates of risk neutral probabilities are derived from US dollar CDS spreads (document clause MR) and estimates of the recovery rate. The reported ratio is the value for the median name in a large sample of BBB-rated and non-investment grade entities. [2] In per cent. [3] Five-year on-the-run at-the-money one- to four-month implied volatility (CDX High Yield; iTraxx Crossover), in per cent. [4] Implied daily absolute spread movements; calculated from at-the-money one- to-four-month implied volatilities and observed index spreads (CDX High Yield; iTraxx Crossover), in basis points.

Sources: JPMorgan Chase; Markit; Moody's KMV; BIS calculations. Graph 3

Financial sector spreads: relative performance



[1] The sample consists of 14 investment and commercial banks headquartered in North America, 11 universal banks headquartered in Europe and seven monoline financial guarantors; in basis points. [2] Relative performance on the basis of five-year on-the-run CDS index spread ratios; for the CDX, high-yield over investment grade index; for the iTraxx, crossover over main index. [3] Equally weighted average of the same 14 investment and commercial banks headquartered in North America and 11 universal banks headquartered in Europe, as in the left-hand panel; indexed, 1 January 2008 = 100. [4] Inverted series.

Sources: Bloomberg; Markit; BIS calculations. Graph 4

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 …

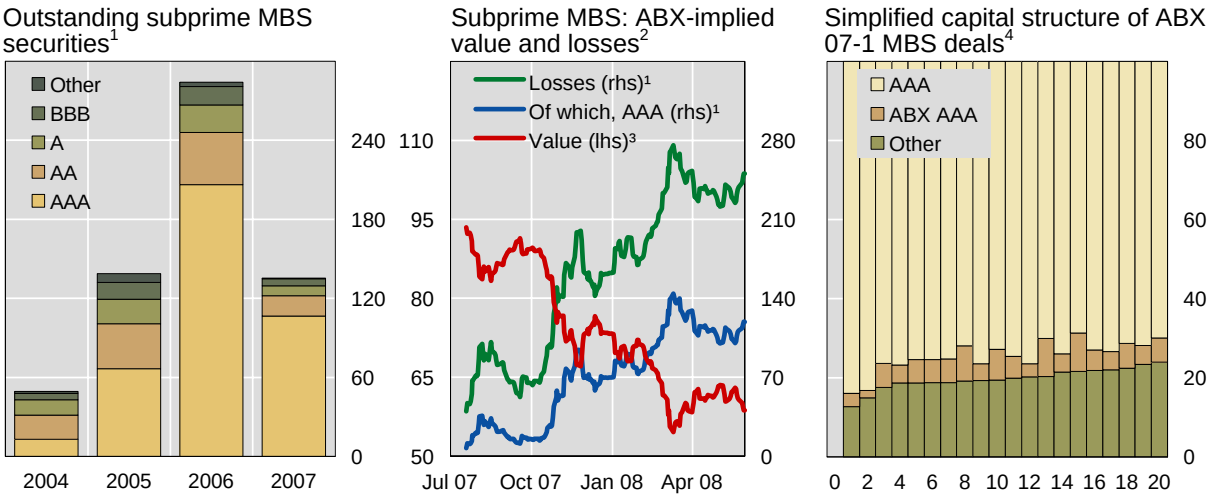
Estimating valuation losses on subprime MBS with the ABX HE index — some potential pitfalls

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.[7] 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.[2] 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.[3] 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.[4] 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



[1] In billions of US dollars. [2] 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). [3] As a percentage of par. [4] 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.[5]
- **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).[6] 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).[7] 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.[8]

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[1] 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. [2] Supplementary indices, called ABX HE PENAAA, were introduced in May 2008 to provide additional pricing information for all four existing vintages. [3] 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. [4] 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. [5] For details, see Global Public Policy Committee, *Determining fair value of financial instruments under IFRS in current market conditions*, December 2007. [6] See, for example, UBS, *Mortgage Strategist*, 17 October 2006. [7] 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. [8] 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).

... but questions about cyclical losses remain

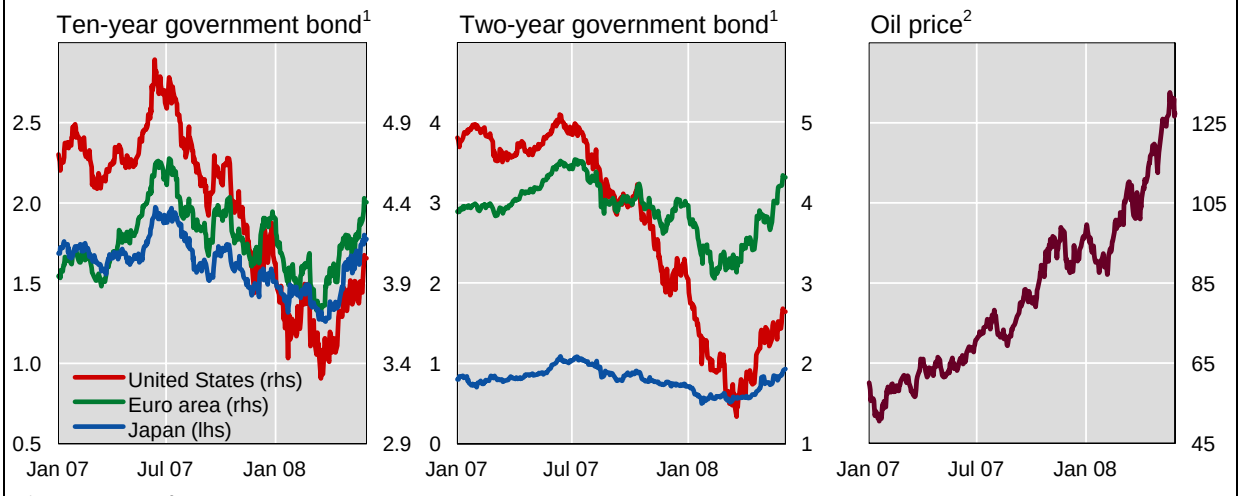
By the end of the period in late May, the process of disorderly deleveraging had come to a halt, giving way to more orderly credit market conditions. Market liquidity had improved and risk appetite increased, luring investors back into the market and allowing greater price differentiation. Bank capitalisation 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.

Bond yields recover as markets stabilise

Bond yields bottom out and start to rise

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.

Interest rates and the price of oil



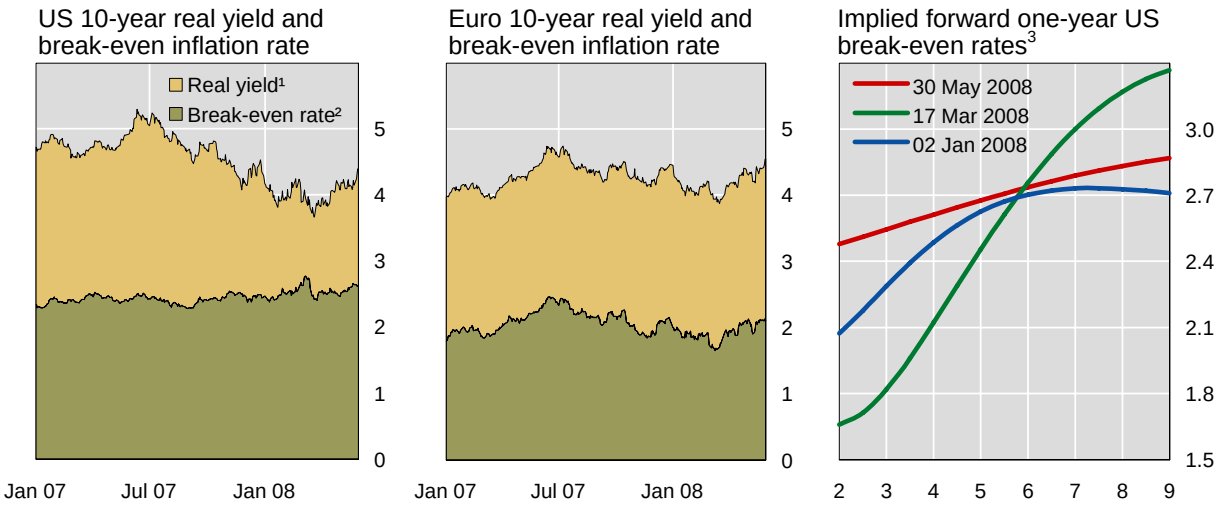
[1] In per cent. [2] WTI price per barrel, in US dollars.

Source: Bloomberg.

Graph 5

Real yields and break-even inflation rates

In per cent



[1] Real 10-year zero coupon yield estimated from prices of index-linked bonds. [2] Nominal minus real 10-year zero coupon bond yields. [3] Forward one-year break-even inflation rate two to nine years ahead (horizontal axis), calculated from US real and nominal zero coupon yield curves.

Sources: Federal Reserve; Bloomberg; BIS calculations. Graph 6

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

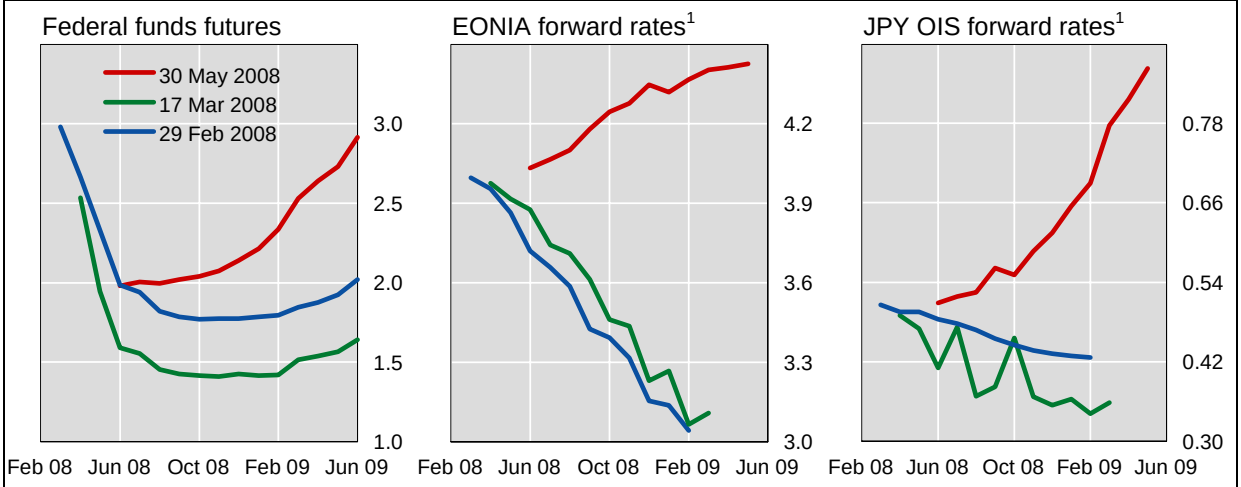
In the first two weeks of March, as the financial turmoil deepened and yield declines accelerated, long-term break-even inflation rates were relatively stable in the United States as well as the euro area (Graph 6, left-hand and centre panels). In the case of the United States, however, this stability 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.

... in line with perceptions about the economy

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

Forward curves

In per cent



[1] Implied one-month rates from overnight index swaps.

Sources: Bloomberg; BIS calculations. Graph 7

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.

Rising real yields behind the increase in nominal yields …

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.

… reflecting improved investor confidence …

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

… 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?

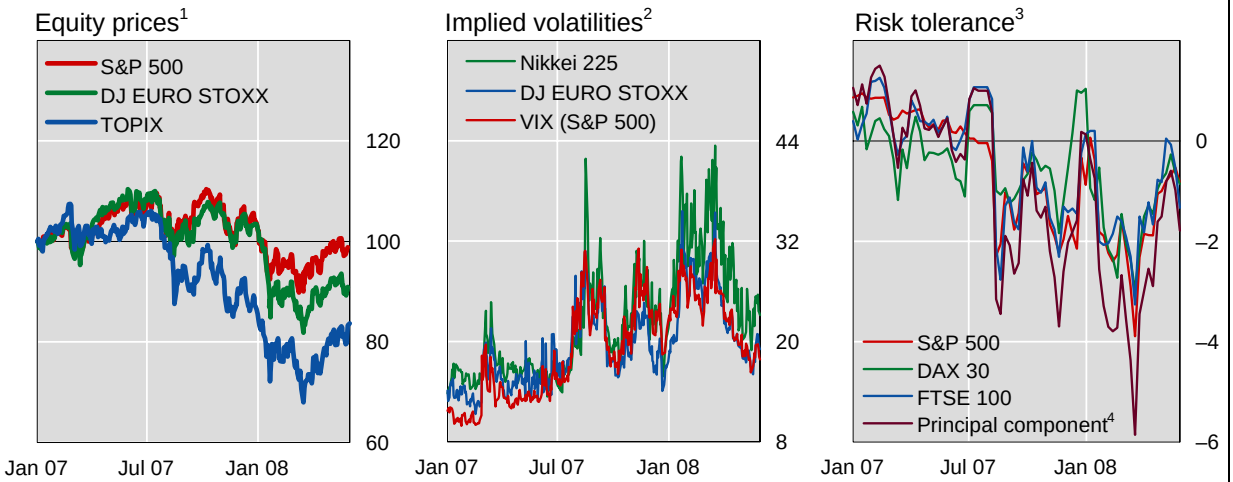
Global equity markets recover ...

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).

Equity markets



[1] In local currency; 2 January 2007 = 100. [2] Volatility implied by the price of at-the-money call option contracts on stock market indices, in per cent. [3] Derived from the differences between two distributions of returns, one implied by option prices, the other based on actual returns estimated from historical data; weekly averages of daily data. [4] First principal component of risk tolerance indicators estimated for the S&P 500, DAX 30 and FTSE 100.

Sources: Bloomberg; BIS calculations. Graph 8

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

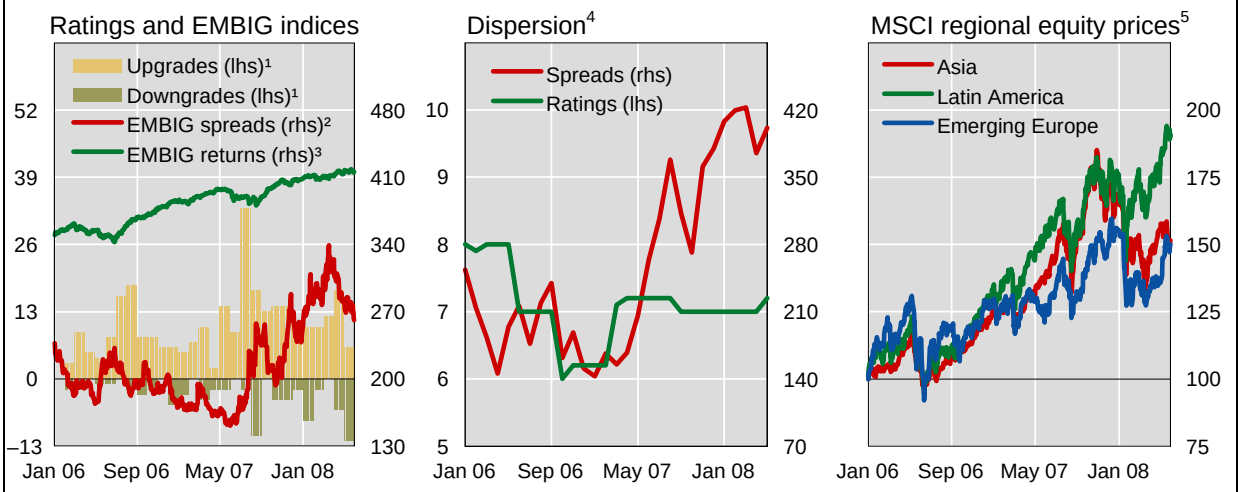
Emerging market assets performed broadly in line with assets in the major industrialised economies, although returns in emerging bond markets tended to trail the recovery observed in other asset classes. In a continuation of the general market weakness that had started in 2007, spreads widened and equities 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



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

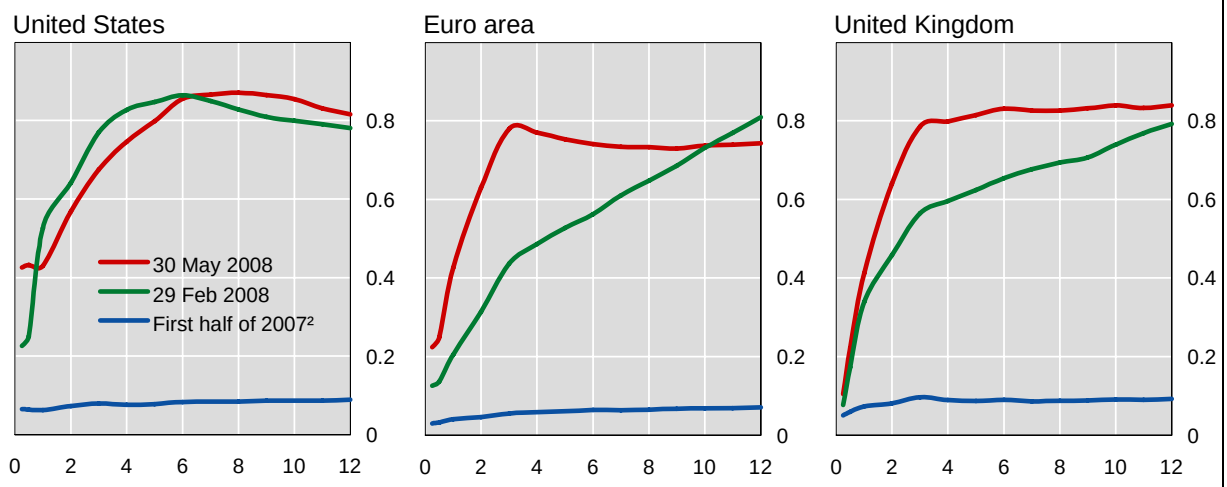
Tensions in interbank markets remain high

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.

Term structure of Libor-OIS spreads[1]

In per cent



[1] The horizontal axis measures the maturity in months. For the OIS rates: for the euro area, EONIA; for the United Kingdom, SONIA.
[2] Average spread over the first half of 2007.

Sources: Bloomberg; BIS calculations. Graph 10

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

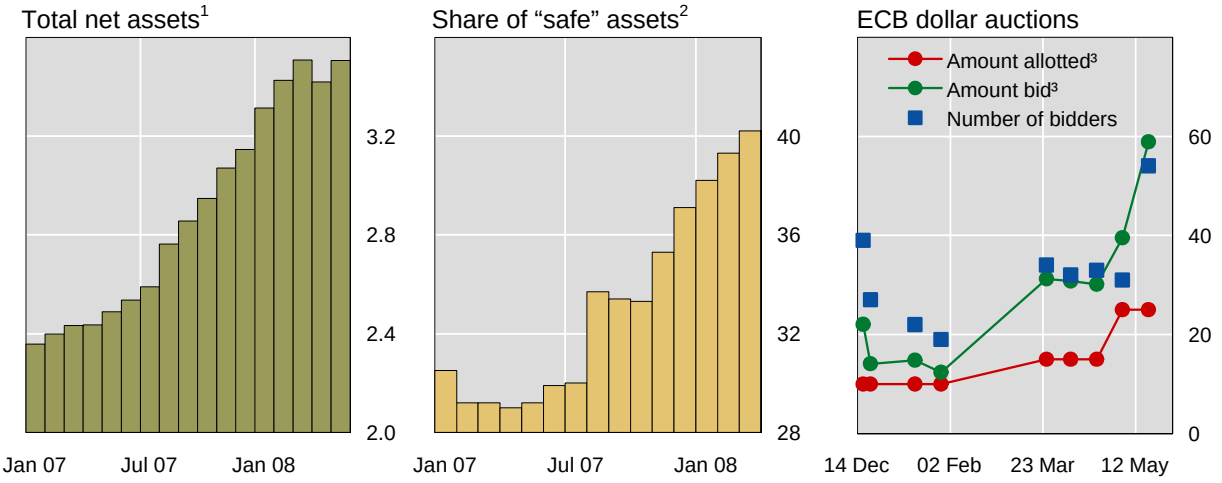
… despite the Bear Stearns takeover …

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.

US money market mutual funds and ECB dollar liquidity auctions

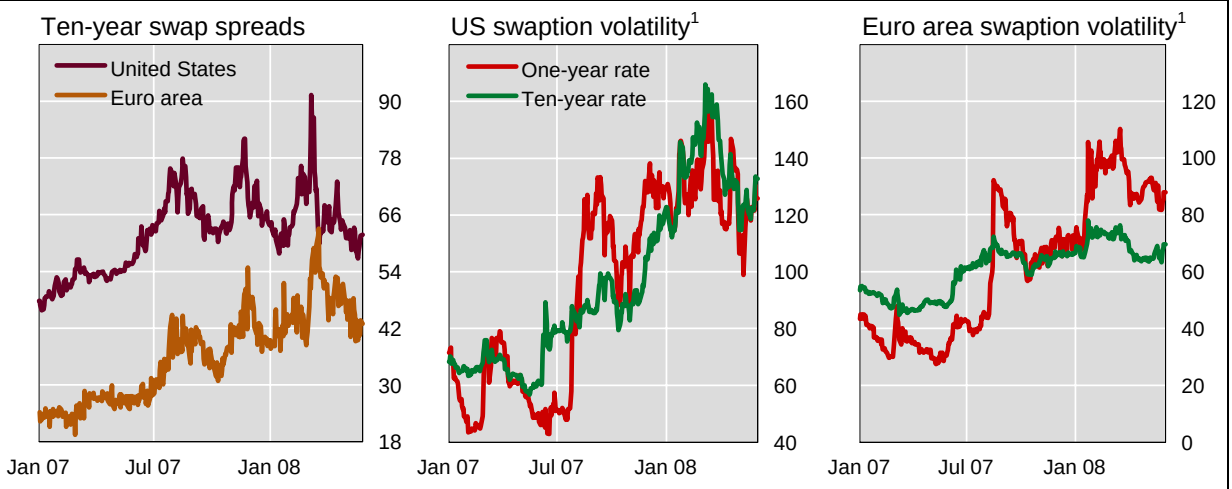


[1] In trillions of US dollars. [2] Share of taxable money market mutual funds held as treasury securities, government agencies and repurchase agreements; as a percentage of total assets; based on data available up to end-March 2008. [3] In billions of US dollars.

Sources: ECB; Investment Company Institute. Graph 11

Swap rates and swaption volatilities

In basis points



[1] Three-month swaption volatility.

Sources: Bloomberg; BIS calculations.

Graph 12

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).

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Highlights of international banking and financial market activity[1]

The BIS, in cooperation with central banks and monetary authorities worldwide, compiles and disseminates several datasets on activity in international banking and financial markets. The latest available data on the international banking market refer to the fourth quarter of 2007. The discussion on international debt securities and exchange-traded derivatives draws on data for the first quarter of 2008, and that on over-the-counter derivatives refers to the second half of 2007.

The international banking market

Activity in the international banking market continued to expand in the fourth quarter of 2007, despite the ongoing tensions in the interbank market. A significant portion of this increase was accounted for by new credit to emerging markets. In addition, there were large movements in reporting banks' liabilities to key emerging markets; while some central banks reduced their holdings of reserves in commercial banks, Middle East oil exporters deposited record amounts in banks abroad, as did the banking sector in China. Developments concerning international banking activity in the mature economies, and movements in the data related to the ongoing turmoil in financial markets, are discussed in detail in the special feature on page 31. The following discussion provides an overview of the changes in BIS reporting banks' positions vis-à-vis emerging economies during the second half of 2007.

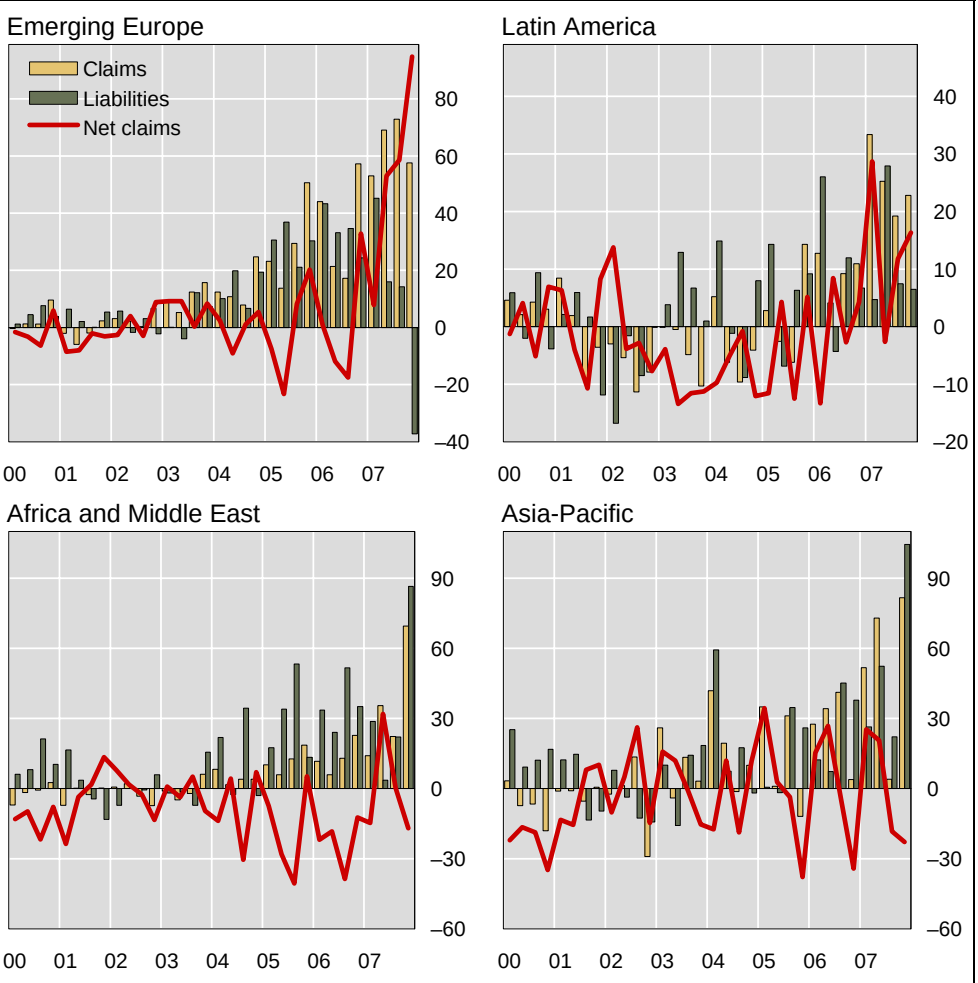
Banks channel credit into emerging economies

Credit to borrowers in emerging economies surged in the fourth quarter of 2007, with record expansions in BIS reporting banks' claims on borrowers in Asia-Pacific and Africa and the Middle East (Graph 1). Total claims booked by BIS reporting banks grew by $1.2 trillion (21% growth year over year), the fifth consecutive quarterly expansion of $1 trillion or more. Claims on emerging economies accounted for a relatively large $232 billion (or 20% of the total

[1] Queries concerning the banking statistics should be addressed to Patrick McGuire and Goetz von Peter and queries concerning international debt securities and derivatives statistics to Naohiko Baba.

Banking flows to emerging markets[1]

In billions of US dollars



[1] Exchange rate adjusted quarterly changes in BIS reporting banks' positions vis-à-vis emerging markets aggregated by region (panel headings). Net claims are claims minus liabilities.

Source: BIS locational banking statistics. Graph 1

expansion), driving total claims on these borrowers to $2.6 trillion, or 7% of total claims (from 6% in the previous quarter and 5% in early 2005).

Oil-exporting countries

Surge in credit to oil-exporting countries …

Credit to borrowers in Africa and the Middle East surged in the fourth quarter of 2007 (Graph 1, bottom left-hand panel). Total cross-border claims grew by $70 billion, the largest quarterly expansion vis-à-vis this region on record. Banks in the reporting area, primarily those in the euro area and the United Kingdom, channelled a combined $23 billion to borrowers in the United Arab Emirates, $10 billion to those in Saudi Arabia and $6 billion to those in Kuwait. Meanwhile, banks in the United States, which do not provide a country breakdown for their positions vis-à-vis Middle East oil exporters, also reported a rise of $15 billion in their aggregate claims.

… offset by greater recycling of petrodollars

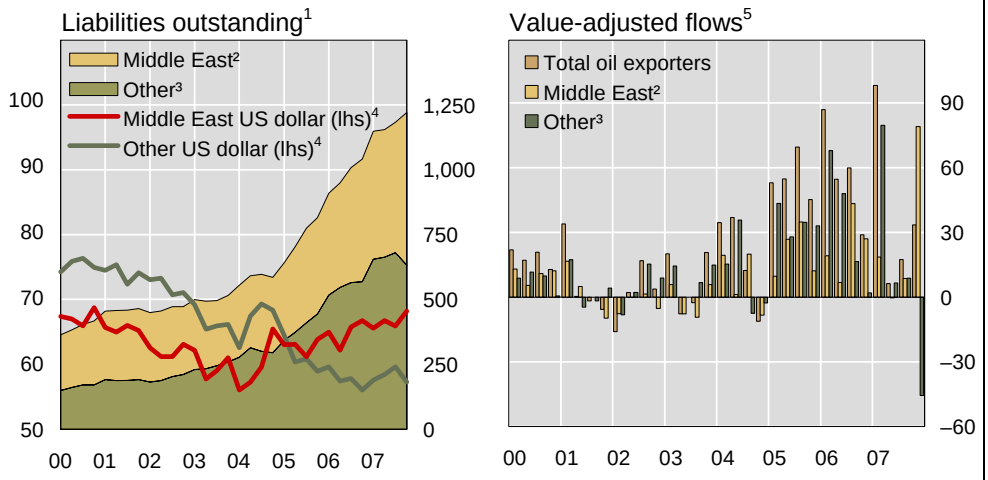
At the same time, residents of Middle East oil-exporting countries deposited significant amounts in offshore banks in the fourth quarter of 2007 (Graph 2), driving an overall net outflow from the region. BIS reporting banks'

total liabilities grew by $80 billion, the largest quarterly increase in deposits vis-à-vis these countries on record. Much of this was US dollar-denominated, pushing up the estimated US dollar share of reporting banks' total liabilities to residents of these countries to 68% (from 66% in the previous quarter), the highest level since end-2000.[2] Banks in the United Kingdom and the euro area (primarily in the Netherlands) reported a $66 billion increase in liabilities, mainly to banks in Saudi Arabia and the United Arab Emirates.

In contrast to Middle East oil exporters, residents of Russia significantly reduced their deposits with banks in Europe (Graph 2, right-hand panel). BIS reporting banks' total liabilities to Russia fell by $55 billion, the largest withdrawal on record for that country, and only the third in five years. Banks in the euro area (primarily in Germany, France and Belgium) and in the United Kingdom all reported significant decreases. Overall, total euro-denominated liabilities fell by $21 billion and US dollar-denominated liabilities by $39 billion, leaving the estimated overall US dollar share of reporting banks' total liabilities to Russian residents at 45%, the lowest level since at least end-1993, when data on these positions became available. At least part of this overall reduction in the fourth quarter seemed to be the result of actions by the Russian central bank. Data on holdings of foreign exchange reserves reported by Russia to the IMF indicate that reserves held in banks abroad dropped by more than $17 billion in the fourth quarter (and by an additional $39 billion in the first quarter of 2008), while Russia's holdings of securities grew by $92 billion.

Deposit placements by oil-exporting countries

In billions of US dollars



[1] Stock of BIS reporting banks' liabilities to oil-exporting countries, expressed at constant Q4 2007 exchange rates. Lines represent the share of liabilities denominated in US dollars. [2] Bahrain, Egypt, Iran, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia, Syria, the United Arab Emirates and Yemen. [3] Algeria, Angola, Ecuador, Indonesia, Kazakhstan, Mexico, Nigeria, Norway, Russia and Venezuela. [4] Based on data from the subset of countries which provide a currency breakdown. [5] Exchange rate adjusted quarterly change in liabilities.

Source: BIS locational banking statistics. Graph 2

[2] Roughly 17% of the total liabilities to Middle East oil exporters are reported by countries which do not provide a currency breakdown.

Asia-Pacific

Credit to residents of Asia-Pacific was also exceptionally strong in the fourth quarter of 2007 (Graph 1, bottom right-hand panel). Claims on the region grew by $82 billion, again the largest quarterly increase for this region on record, with $36 billion in new claims on residents of Korea. Banks in the United States reported a $15 billion increase in claims on banks in Korea in the fourth quarter (and a similar increase in liabilities), following a decrease of roughly the same size in the previous quarter. Greater international debt securities claims ($11 billion) on Korean entities, booked primarily by banks in the United Kingdom and in offshore centres, also contributed to overall claim growth. Elsewhere in the region, growth of credit to borrowers in India and China was also strong in the fourth quarter, rising by $18 billion and $9 billion respectively.

Banks in China deposit funds in banks abroad

Greater overall lending was outstripped by a large increase in deposits placed by residents in BIS reporting banks, yielding a net outflow of funds from the region. BIS reporting banks' liabilities to residents of China (primarily banks) grew by $61 billion in the third quarter of 2007, and by $72 billion in the fourth, the two largest quarterly increases for China on record. Banks in the United Kingdom and the euro area reported a combined increase of $38 billion in liabilities, while banks in the Asian offshore centres (Hong Kong SAR and Singapore) reported an even larger increase of $77 billion. These placements were mostly denominated in US dollars, pushing the US dollar share of BIS reporting banks' total liabilities to China to 77% at end-2007, from 64% at end-June 2007.[3]

In contrast to China, BIS reporting banks' liabilities to residents of India fell noticeably in the second half of 2007. Overall, liabilities declined by $42 billion, or 46%, from their end-June level of $90 billion. Only about half of this was denominated in US dollars, thus boosting the US dollar share of BIS reporting banks' liabilities vis-à-vis India to 67% (from 64% in the previous quarter and 55% at end-2006), the highest level since 1993.[4] This overall reduction in reporting banks' liabilities to India seemed to be at least in part related to activity conducted by the central bank. Data on holdings of foreign exchange reserves reported by India to the IMF show that reserves held in banks outside the country decreased by $36 billion in the second half of 2007, and by a further $10 billion in the first quarter of 2008.

Emerging Europe and Latin America

Credit to borrowers in emerging European countries continued to expand at a rapid pace in the second half of 2007. Cross-border claims on the region grew by no less than $130 billion (42% year on year), to stand at $899 billion.

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[3] These figures are based on positions reported by banks in those countries which provide a full currency breakdown, and in Hong Kong SAR, which provides a breakdown of US dollar positions only. In the fourth quarter of 2007, roughly 13% of reporting banks' total liabilities to China were reported by banks in countries which provide no information on the currency breakdown.

[4] In the fourth quarter of 2007, roughly 16% of reporting banks' total liabilities to India were reported by countries that provide no information on the currency breakdown.

Record net inflow of funds to emerging Europe

Greater credit, augmented by reduced liabilities to Russia (discussed above), contributed to a net inflow of $95 billion to the region in the fourth quarter, the largest on record (Graph 1, top left-hand panel). While two thirds of the overall net flow of funds was accounted for by Russia, several countries, including Poland, Ukraine, Turkey, Romania and Slovakia, attracted over $4 billion in net flows each, with the only substantial reduction in gross cross-border claims reported vis-à-vis residents of Cyprus ($3 billion).

Similarly, cross-border claims on Latin America also expanded in the fourth quarter, driving a net inflow of funds into the region. The rate of growth in total claims reached 34% year on year, in contrast to the negative growth seen as recently as 2005. As a result, the region has become a net borrower (with respect to international banks) for the first time since 2003. Claims on banks in Latin America, expanding at a rate of 75% per annum, accounted for nearly half of the inflow of $23 billion in the fourth quarter (Graph 1, top right-hand panel). Overall, banks channelled funds to borrowers in Brazil, Mexico and Chile, the largest borrowers in the region, with more than half (52%) of the new claims on Brazil being in the form of international debt securities.

Foreign claims on emerging economies from the creditor perspective

The expansion in claims on emerging economies evident in the BIS locational statistics is also reflected in the consolidated statistics.[5] Indeed, emerging markets attracted 92% of the overall increase in foreign claims (UR basis) in the fourth quarter of 2007. Credit to emerging markets (UR) expanded by $402 billion to stand at $4 trillion (or 14%) of BIS reporting banks' total foreign claims (up from 12% in early 2007).[6] Across regions, foreign claims on emerging Europe and Asia-Pacific expanded the most, accounting for 44% and 24%, respectively, of new credit to emerging markets.

Those banking systems with the most extensive local presence in emerging markets have also contributed most to the recent growth of foreign claims.[7] Graph 3 shows the national banking systems with the greatest foreign claims on various emerging market regions. Foreign claims (IB basis) on emerging Europe, at $1.5 trillion, are booked primarily by Austrian, German and Italian banks, reflecting both greater cross-border credit and foreign bank acquisitions (Graph 3, top left-hand panel). The three banking systems

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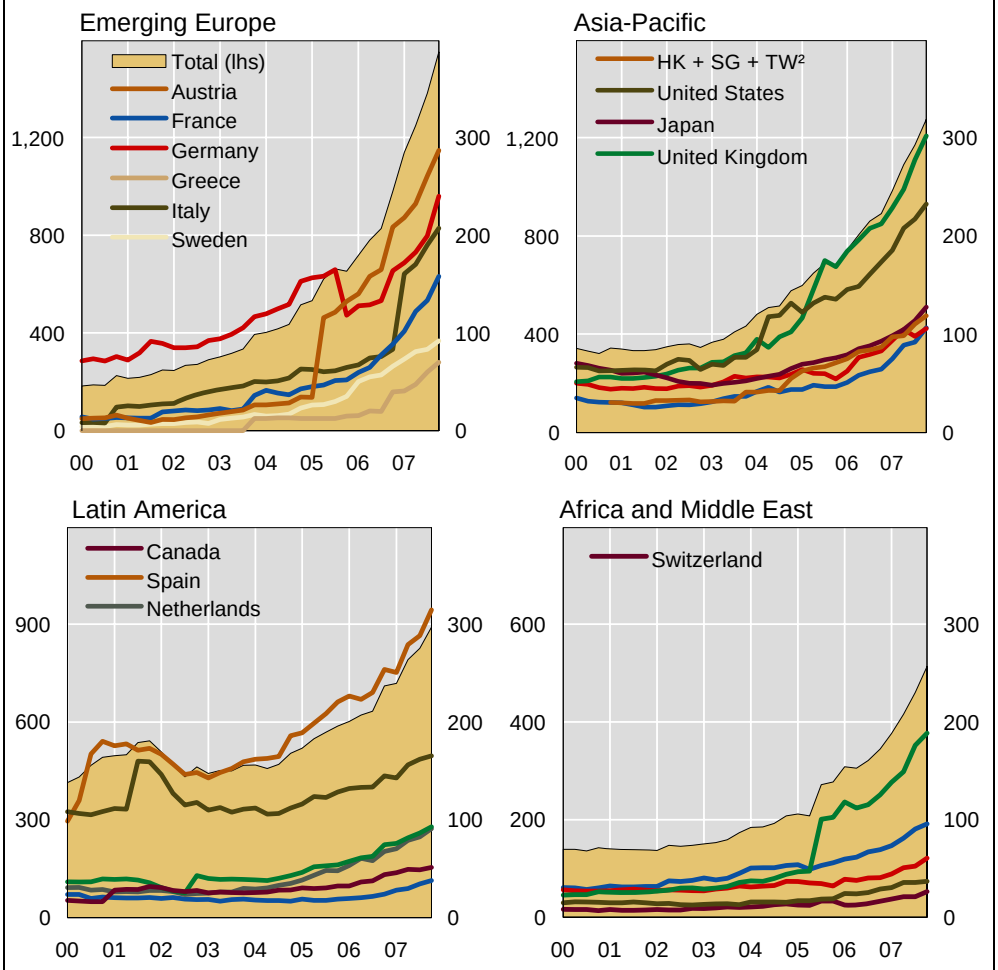
[5] The consolidated banking statistics are compiled according to the nationality of reporting banks, net out inter-office positions, and are available on an immediate borrower (IB) and an ultimate risk (UR) basis. Those available on a UR basis take into account third-party guarantees by allocating claims back to the residence of the ultimate obligor.

[6] Consolidated data are not adjusted for exchange rate changes, as currency breakdowns are not reported. The depreciation of the US dollar in recent quarters tends to overstate end-of-period stocks of other currencies when expressed in dollars.

[7] Since foreign claims include local claims booked by local offices of foreign banks, they are considerably larger ($4 trillion, UR basis) than BIS reporting banks' cross-border claims on emerging markets ($2.6 trillion). Local claims account for a stable 55% of worldwide foreign claims on emerging markets, a higher share than for claims on advanced economies (44%). Local lending is particularly prevalent in Latin America (71% of total foreign claims, booked mostly by Spanish banks), followed by emerging Europe (55%), Asia-Pacific (50%) and Africa and the Middle East (41%).

Foreign claims on emerging markets[1]

In billions of US dollars



[1] Consolidated foreign claims (IB basis) on emerging markets grouped into four regions (panel headings), as reported by banks of the nationalities shown in the legends. Foreign claims consist of cross-border claims and local claims (ie claims booked by local offices of foreign banks). Foreign claims include loans and securities, but exclude contingent exposures such as credit commitments and guarantees. [2] Hong Kong SAR, Singapore and Taiwan (China) combined.

Source: BIS consolidated banking statistics on an IB basis. Graph 3

combined also accounted for half of the $302 billion of new credit extended to this region since mid-2007. Exposures of Greek and Swedish banks to emerging Europe have tripled since 2005, although from a lower level.

In the other three regions, the geographical proximity of bank headquarters appears to play a lesser role. UK and US banks combined have booked 45% of foreign claims on Asian emerging markets and nearly 40% of new credit since mid-2007. UK banks alone accounted for as large a share of foreign claims on Africa and the Middle East, both in claims outstanding and in recent flows. Similarly, in Latin America, Spanish banks make up 36% of foreign claims and 34% of recent flows, predominantly in the form of local claims.

The international debt securities market

Net issuance of bonds and notes decreases further …

Borrowing in the international debt markets remained broadly stagnant in the first quarter of 2008 amid the continued turmoil in financial markets. Net issuance of bonds and notes decreased to $360 billion, below even the level recorded in the third quarter of 2007, when the recent turmoil first hit global financial markets. That said, signs of recovery were evident in such segments as investment grade bonds and money market instruments. In particular, net issuance of money market instruments surged from –$24 billion to $153 billion in the first quarter of 2008, the largest net issuance on record.

… but recovery is evident in investment grade bonds and money market instruments

The fall in net issuance in bonds and notes came chiefly from the euro-denominated segment, which had rebounded in the fourth quarter of 2007. Net issuance of euro-denominated bonds and notes declined to $105 billion in the first quarter of 2008, almost half the level of the previous quarter. The most substantial decline was observed in Spain, followed by Ireland and France. For these countries, the fall was accounted for mostly by private financial institutions, possibly due in part to weakness in housing-related markets.

Stagnation was also evident across an array of other currency denominations. Net issuance of dollar-denominated bonds and notes decreased from $204 billion to $180 billion in the first quarter of 2008, while that of yen-denominated bonds and notes dropped from $14 billion to $6 billion. In the meantime, gross issuance of yen-denominated bonds by non-Japanese issuers in the Japanese local market (samurai bonds) continued to be active at $7 billion in the first quarter of 2008, up from $5 billion in the previous quarter.

The breakdown by nationality showed that the decrease in overall net issuance of bonds and notes was particularly marked in the countries hit by falling euro-denominated issuance mentioned above, ie Spain, Ireland and France (Graph 4, left-hand panel). The United Kingdom and the United States also showed pronounced declines. In contrast, countries such as Switzerland, Australia and Germany showed an increase.

By sector, both financial institutions and corporate issuers in the developed countries slowed net issuance, from $346 billion to $239 billion and from $85 billion to $54 billion respectively. In particular, net issuance of bonds and notes by private financial institutions in developed countries fell markedly, from $332 billion to $208 billion. In contrast, international institutions increased net issuance from $5 billion to $22 billion.

Gross issuance of investment grade bonds increases substantially

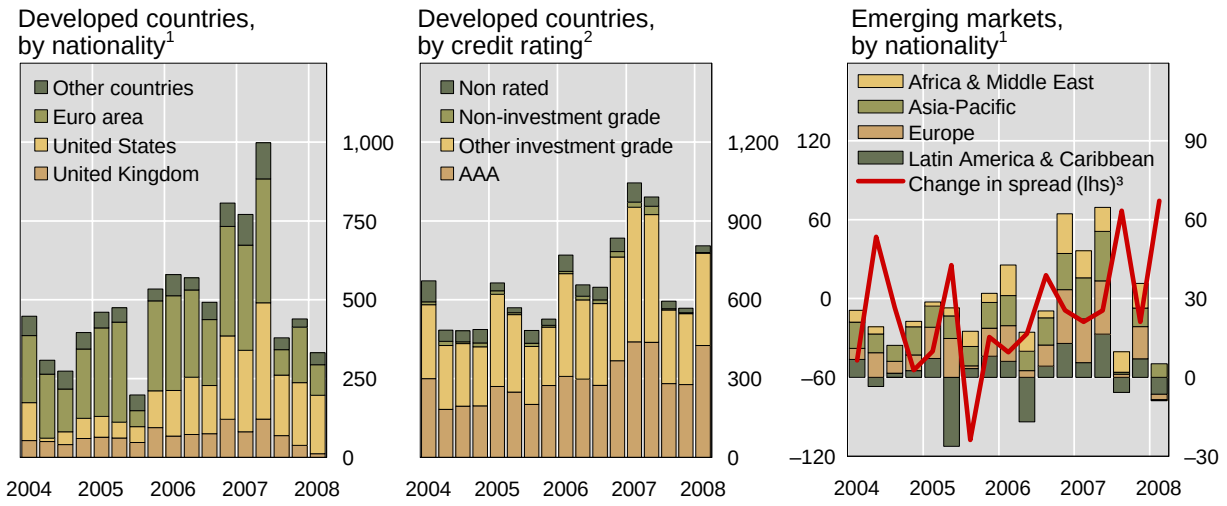
By credit quality class (for which only gross figures are available), there was a clear distinction in issuance patterns between investment grade and non-investment grade bonds (Graph 4, centre panel). Gross issuance of AAA-rated and other investment grade bonds increased to $426 billion and $352 billion from $278 billion and $270 billion respectively. The $426 billion of AAA-rated bond issuance is 59% higher than the five-year average up to 2007. Conversely, gross issuance of non-investment grade bonds declined further to $2 billion, a level not seen since the fourth quarter of 2002.

Mortgage-backed bonds continue to decline

Mortgage-backed bonds continued on a significant downtrend in the first quarter of 2008. Gross issuance of mortgage-backed bonds fell from the previous quarter's $71 billion to $33 billion, the lowest level since the third

International bond and note issuance

In billions of US dollars and basis points



[1] Net issuance. [2] Announced bond issuance. [3] Quarterly change in spread of JPMorgan EMBI Global Composite index, in basis points.

Sources: Dealogic; Euroclear; Thomson Financial; Xtrakter Ltd; BIS. Graph 4

quarter of 2003. By nationality, the Netherlands recorded the largest decline, followed by the United States, Canada and Spain. Under these circumstances, the US government-sponsored agencies began to play a larger role in the international debt market. For example, Federal Home Loan Banks and Fannie Mae issued $97 billion and $60 billion in the first quarter of 2008, respectively, the highest gross issuance ever.

In the emerging economies, net issuance of bonds and notes fell into negative territory in the first quarter of 2008, coinciding with a significant widening of emerging market bond spreads, which had narrowed in the fourth quarter of 2007 (Graph 4, right-hand panel). The decline was particularly marked in emerging Europe, followed by Latin America and Africa and the Middle East.

Money market instruments record the largest net issuance ever

In sharp contrast to the continued stagnation in bonds and notes referred to above, money market instruments recorded an unprecedented surge in the first quarter of 2008. In particular, net issuance of commercial paper (CP) increased significantly, from –$88 billion to $76 billion. The largest increase was attributed to euro-denominated CP, which rose from –$65 billion to $68 billion. The main issuers were European financial institutions. This development is broadly in line with the market observation that CP investors began to recover risk tolerance, particularly towards euro-denominated CP issued by financial institutions with relatively high credit ratings.

Derivatives markets

Exchange-traded derivatives

Rebound in turnover of futures and options …

The first quarter of 2008 saw a large rebound in activity on the international derivatives exchanges. The total turnover based on notional amounts increased

from the previous quarter's $539 trillion to $692 trillion in the latest quarter, the highest turnover on record. This resulted in year-on-year growth of 30%. Most of the increase was observed in derivatives on short-term interest rates. Gains in turnover were also seen in derivatives on long-term interest rates and foreign exchange. In contrast, turnover in derivatives on stock indices showed a slight decline, possibly reflecting overall weakness in stock markets in the first quarter of 2008. Furthermore, turnover in derivatives on commodities – which are not included in the above total since only the numbers of contracts are available – increased substantially, recording a year-on-year growth rate of 52%.

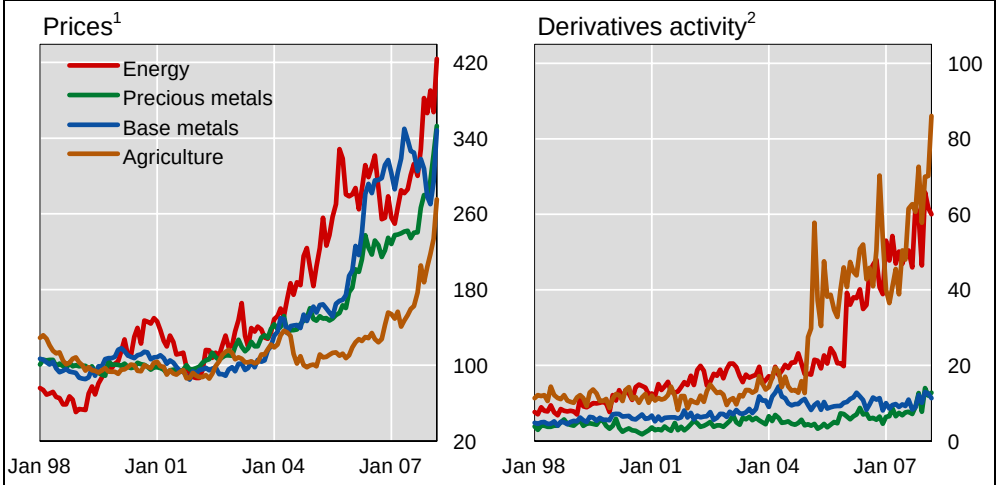
… particularly in derivatives on short-term interest rates

Turnover in derivatives on short-term interest rates rose from the previous quarter's $406 trillion to $548 trillion in the first quarter of 2008, representing a year-on-year growth rate of 32%. The increase was mostly accounted for by currency segments that had recorded a significant retreat in the fourth quarter of 2007. The US dollar and euro segments showed a substantially large rebound, while the sterling segment grew slightly. In particular, turnover in futures and options on three-month eurodollar rates picked up sharply again in the first quarter of 2008. This suggests that liquidity conditions in the term money markets might have recovered to some extent after the stressful 2007 year-end. In contrast, turnover in futures and options on federal funds rates fell, despite the policy rate cuts in the United States.

Trading recovered in the foreign exchange segment of the derivatives exchanges as well. Turnover went up from $6.0 trillion to $6.7 trillion in the first quarter of 2008, representing a year-on-year growth rate of 32%. The increase was attributed largely to the euro, yen and Swiss franc, and offset a decline in currencies such as the Canadian dollar and sterling.

On the other hand, activity in equity derivatives fell slightly in the first quarter of 2008 to $73 trillion from $75 trillion in the previous quarter, although the year-on-year growth rate was still high at 22%. By currency denomination,

Commodity prices and derivatives activity



[1] S&P GSCI Commodity Index subindices, monthly averages; 1998–2002 average = 100. [2] Exchange-traded derivatives; number of contracts traded, in millions.

Sources: Datastream; BIS. Graph 5

Korean won-denominated equity derivative contracts declined the most, followed by Indian rupee and sterling contracts. Conversely, the largest increase came from euro-denominated contracts, followed by US dollar and Canadian dollar contracts.

Commodity derivatives continue to be robust

Trading in commodity futures and options continued to be robust in the first quarter of 2008. Global turnover in commodity derivatives measured in numbers of contracts (notional amounts are not available) grew from 420 million to 489 million, representing a year-on-year growth rate of 52%. Major contributors were agricultural and energy products. In the past several years, the volume of trading activity in derivatives on agricultural and energy products has tended to move with the level of their prices substantially more than has been the case with other commodity derivatives (Graph 5).

OTC derivatives

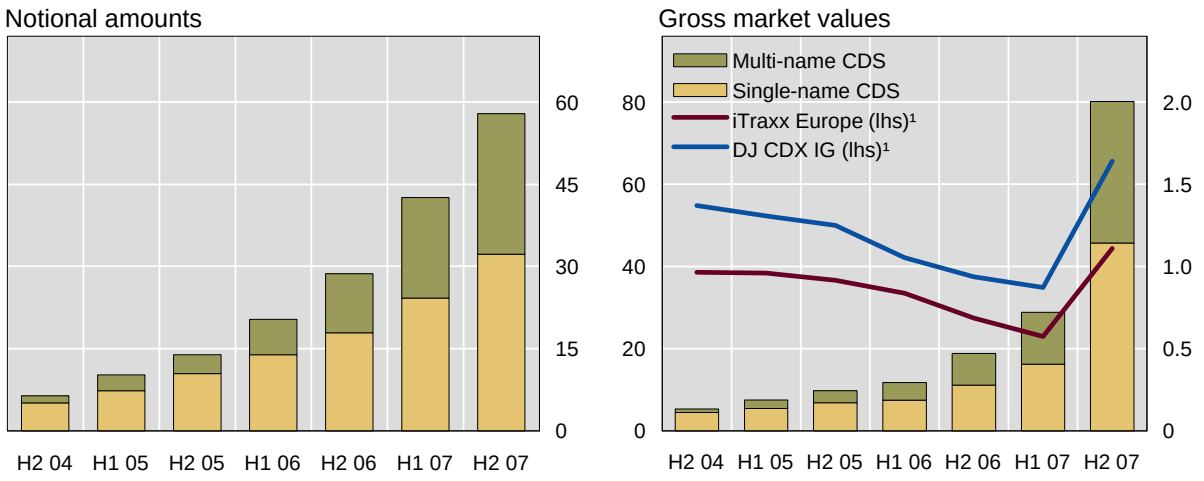
Steady growth in OTC derivatives

Despite the continued turmoil in global financial markets, the over-the-counter (OTC) derivatives market showed relatively steady growth in the second half of 2007. Growth was particularly strong in the credit segment, due possibly to heightened demand for hedging credit exposure. Notional amounts of all categories of OTC contracts increased by 15% to $596 trillion at the end of December, following a 24% increase in the first half of the year.[8] Other segments, including markets for foreign exchange, interest rates and commodity derivatives, were also robust, each recording double digit growth, while the equity segment posted a negative growth rate.

Gross market values, which measure the cost of replacing all existing contracts, increased by 30% to a total of $15 trillion at the end of December 2007. In particular, gross market values of credit default swaps (CDS) almost

Credit default swaps

In trillions of US dollars



[1] Investment grade CDS indices; five-year on-the-run mid-spread; average of daily spreads, in basis points.

Sources: JPMorgan Chase; BIS. Graph 6

[8] Growth rates for OTC derivatives refer to changes over six months.

tripled to $2 trillion. Gross credit exposures, after netting agreements, also rose, by 22% to a total of $3 trillion.

Strong growth in CDS positions amid the turmoil

Notional amounts of CDS continued to expand, by 36% in the second half of 2007 to $58 trillion, slowing from the 49% growth rate recorded in the first half of the year (Graph 6, left-hand panel). Gross market values of CDS registered a growth rate of 178% in the second half of the year, rising to $2 trillion, which was much higher than the growth rate of 53% in the first half of the year (Graph 6, right-hand panel). This unprecedented rapid growth in gross market values presumably reflected both higher valuations for existing CDS contracts and new CDS contracts in the second half of the year, amid the turmoil in global financial markets.

Notional amounts of OTC foreign exchange derivatives grew solidly at a rate of 16% in the second half of 2007, slightly below the 21% recorded in the first half. By currency, contracts with one leg denominated in US dollars, euros, yen or Swiss francs showed particularly robust growth rates of between 16 and 21%. By maturity, contracts of over five years increased substantially, by 104%. Gross market values of OTC foreign exchange derivatives in total recorded a growth rate of 34%, significantly above the 6% in the first half. By currency, euro, sterling and US dollar derivatives grew rapidly, by 73%, 50% and 32% respectively, while yen contracts fell by 5%.

For other categories, the notional amounts of OTC interest rate derivatives grew modestly, by 13%. By contrast, the notional amounts of OTC equity derivatives decelerated rapidly, from a growth rate of 15% in the first half of 2007 to –1% in the second half of the year, the lowest pace of growth since the second half of 2004.

An update on local currency debt securities markets in emerging market economies

Michael Pomerleano and Karsten von Kleist

The Committee on the Global Financial System (CGFS) released a report on local currency debt markets in June 2007 (hereafter CGFS (2007)),① and mandated the BIS to once a year update key statistics with a view to regularly publishing data on remaining and original maturity and on the structure of domestic debt instruments for a broader set of emerging market economies (EMEs). This box summarises the data reported for 2006 and 2007 against the backdrop of overall growth trends in local currency debt securities markets in EMEs; longer time series and detailed country data are available on the BIS website (www.bis.org/statistics/secstats.htm).

Overall, emerging local currency debt securities markets grew rapidly in the period 2005–07. Stocks of domestic debt securities, which proxy local currency debt outstanding, expanded,② at an annual rate of 23% in current US dollar terms (Table A, last column). Growth rates excluding exchange rate effects on outstanding stocks have been somewhat lower, reflecting the appreciation of local currencies against the US dollar. The average growth based on these adjusted changes was 18%.

Changes in stocks of domestic debt securities:[1] all issuers

In billions of US dollars and per cent

	2005	2006	2007	2007 stocks	Annual growth, FX-adjusted[2]	Annual growth at current exchange rates[2, 3]
Asia	406.8	432.5	653.1	3,908.9	19%	23%
Latin America	229.7	279.7	91.2	1,647.0	17%	29%
Central Europe	21.1	21.1	20.9	337.1	9%	16%
Other EMEs	28.9	21.5	15.0	381.4	7%	8%
Total	686.5	754.8	780.2	6,274.4	18%	23%

This table updates Table C3 in CGFS (2007), and includes money market instruments. The detailed country data are provided on the BIS website (www.bis.org/statistics/secstats.htm).

[1] Bonds, notes and money market instruments issued by residents and targeted at resident investors. The changes in stocks have been calculated in original local currencies by country and converted into US dollar amounts at quarterly average exchange rates, to arrive at net changes which exclude the effect of movements in the US dollar on the outstanding stock of debt. [2] Geometric average of 2005–07 growth rates. [3] In US dollar terms, at current exchange rates.

Sources: National authorities; BIS. Table A

Asia remains the region with the largest and, at an annual growth rate of 19% (FX-adjusted), fastest-growing bond markets. There were strong increases in China (34%) and India (27%) in 2007. Local debt in Asia was boosted in particular by greater debt securities issuance by central banks accumulating foreign exchange reserves. Outstanding short-term central bank sterilisation debt securities rose by a further $172 billion in China during 2006–07, compared with a $273 billion increase for 2000–05.③ The central banks of Thailand and Indonesia issued around $13 billion and $7 billion net respectively in 2007, while Korea repaid a net $9 billion of central bank bonds.

In Latin America, domestic debt outstanding rose 29% in current US dollar terms over the period 2005–07, but only 17% in constant dollar terms. In central Europe, exchange rate appreciation also accounted for a large part of the nominal increase in outstanding debt securities. Growth in local currency terms amounted to only about 9%.

There are signs that the structure of domestic bond markets (which deal in securities with a maturity of over one year) in EMEs is converging towards that of developed countries. The share of straight fixed rate debt has risen since 2000, especially in Latin America. At the same time, the share of floating rate debt has declined. For instance, EMEs in Asia have almost totally phased out floating rate debt, which in 2000 had still accounted for 8%. As a result, exposure to movements in short-term interest rates appears reduced in many countries.

Moreover, currency-linked debt has been phased out in a number of countries in Latin America, especially Brazil, as part of macroeconomic policies aimed at reducing vulnerability to external shocks. Consequently, currency mismatches, an exacerbating factor in many earlier crises, have been substantially reduced. Even so, some countries in the survey maintain a significant share of currency-linked debt, including Peru (although the share has fallen, from a high of 42% in 2000 to 14% in 2007) and Argentina (where that form of debt has recently increased slightly to a share of 23%). In Venezuela, the share of currency-linked debt has gone up sharply. Inflation-linked bonds have, however, increased in Latin America, from 13% in 2000 to 25% in 2007.

Maturity of domestic central government debt outstanding[1]

Average original[2] and remaining maturity in years

	2005		2006		2007	
	Original	Remaining	Original	Remaining	Original	Remaining
Latin America	7.5	3.9	13.7	4.0	13.6	4.4
Of which:						
Brazil	...	2.3	...	2.6	...	3.0
Mexico	...	3.4	...	4.4	...	5.9
Asia, larger economies	10.1	7.0	11.2	6.9	10.9	7.1
Of which:						
India	14.0	10.0	16.9	10.0	14.7	10.0
Korea	6.1	4.1	6.6	4.2	7.0	4.4
Other Asia	8.0	5.5	9.1	5.6	10.1	7.0
Of which:						
Indonesia	7.6	7.6	11.5	7.1	13.3	12.7
Malaysia	8.6	5.0	8.4	5.2	10.0	5.4
Central Europe	6.6	4.0	7.4	4.4	8.1	4.6
Of which:						
Hungary	...	4.1	...	4.3	...	4.7
Poland	6.2	3.6	6.9	3.9	8.0	4.3
Other	7.9	4.4	8.3	4.4	8.2	4.0
Of which:						
Turkey	4.3	2.1	4.7	2.4	4.9	2.0
South Africa	16.0	8.1	16.8	8.3	17.3	8.3
Total	8.8	5.0	10.1	5.1	10.1	5.3

[1] This table updates Table D4 in CGFS (2007). It includes bonds, notes and money market instruments. Regional totals are based on the countries listed in Table D4 and weighted by the corresponding amounts outstanding. [2] These estimates should be regarded as indicative and may not be strictly comparable across countries. The detailed country data are available on the BIS website (www.bis.org/statistics/secstats.htm).

Sources: CGFS Working Group survey; BIS. Table B

The gradual extension of the maturity of central government domestic debt has continued through a general lengthening of the residual maturity of fixed rate bonds (Table B). In Asia, a significant lengthening of residual maturity of Indonesian debt is particularly notable. There has been a further extension in the average residual maturity in the case of Brazil (to three years) and Mexico (to six years). However, the residual maturity of Turkey's debt has fallen to only two years.

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[1] "Financial stability and local currency bond markets", *CGFS Publications*, no 28, June 2007 (www.bis.org/publ/cgfs28.htm). [2] The data collected on the basis of the CGFS report include local currency issuance by non-residents. [3] CGFS (2007), Table D5.

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International banking activity amidst the turmoil[1]

The recent period of financial turmoil has had a significant impact on banks' global balance sheet positions. This piece uses the BIS international banking statistics to trace the longer-term developments in the interbank market which contributed to the funding difficulties experienced during the turbulence. It concludes with an analysis of banks' bilateral interbank exposures, at the level of national banking systems, and discusses the emerging signs of a credit contraction.

JEL classification: F34, G15, G21.

Over the last decade, the growth in securitisation, prime brokerage and proprietary trading activity has contributed to an unprecedented expansion in banks' international balance sheets. The most recent period of turmoil has forced banks to bring offloaded assets back on their balance sheets, and the associated rise in counterparty and credit risk concerns has led to severe liquidity problems in the interbank market (Borio (2008)).

This special feature examines the effect that the financial turbulence had on international banking activity through end-2007, as captured in the BIS international banking statistics.[2] In an effort to understand how stresses spread so far from their original source (ie US subprime mortgages), the first section tracks the longer-term build-up of banks' international balance sheets, and their debt security claims on the US non-bank sector in particular. The data point to a sectoral divergence in funding patterns between US and European banks in the US dollar segment of the interbank market, which may have exacerbated the liquidity squeeze.

The next two sections examine the shifts in banks' global banking books since the onset of the credit turmoil in mid-2007, with particular emphasis on what these shifts reveal about banks' willingness to lend to each other. There is some evidence suggesting that banks sought to mobilise liquidity, especially in

[1] The views expressed are those of the authors and do not necessarily reflect those of the BIS. The authors thank Jhuvesh Sobrun for assistance with the graphs.

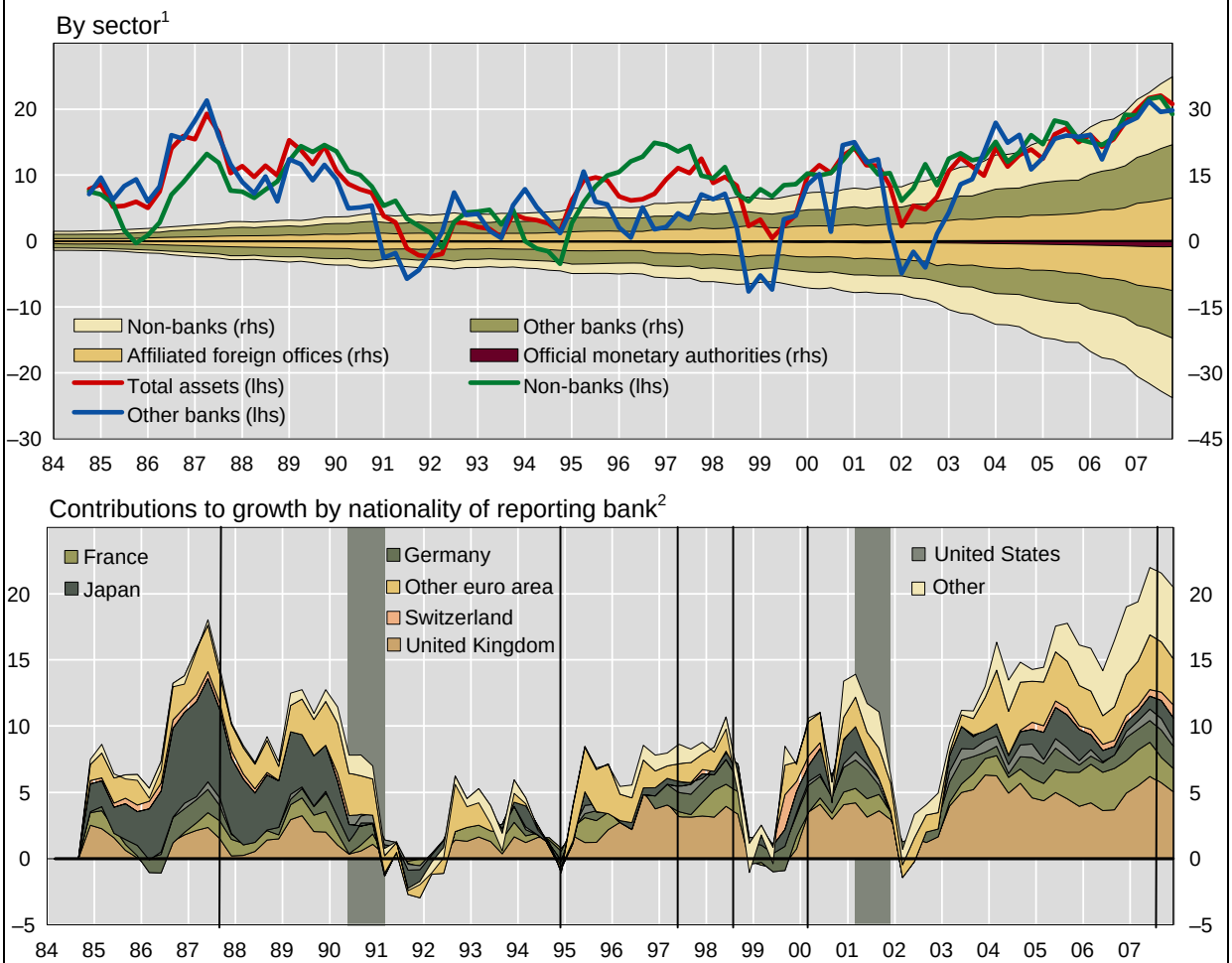
[2] These include the locational banking statistics, broken down by residency and by nationality, and the consolidated banking statistics, on both an immediate borrower (IB) and an ultimate risk (UR) basis. Combined, these data provide aggregate information on the maturity, currency and instrument of internationally active banks' foreign claims and liabilities, broken down by the residency of the borrower, residency of the bank and nationality of the bank.

the US dollar market segment, by tapping their foreign affiliates for funds and scaling back their local operations in the United States. The *bilateral* exposures between national banking systems are analysed in the third section. The expansion in banks' international positions since 2000 went hand in hand with a build-up of bilateral interbank exposures. Many of these exposures contracted during the second half of 2007, particularly those of US- and UK-headquartered banks. The final section concludes.

The build-up of international bank balance sheets

International banking activity has in recent years expanded at the fastest pace since the mid-1980s. The year-on-year growth in banks' total international claims, which had been accelerating steadily since early 2001, peaked at 22% in the third quarter of 2007, a level last approached prior to the 1987 stock market collapse (Graph 1). As a consequence, banks' international balance sheets more than trebled over this period, with total international assets

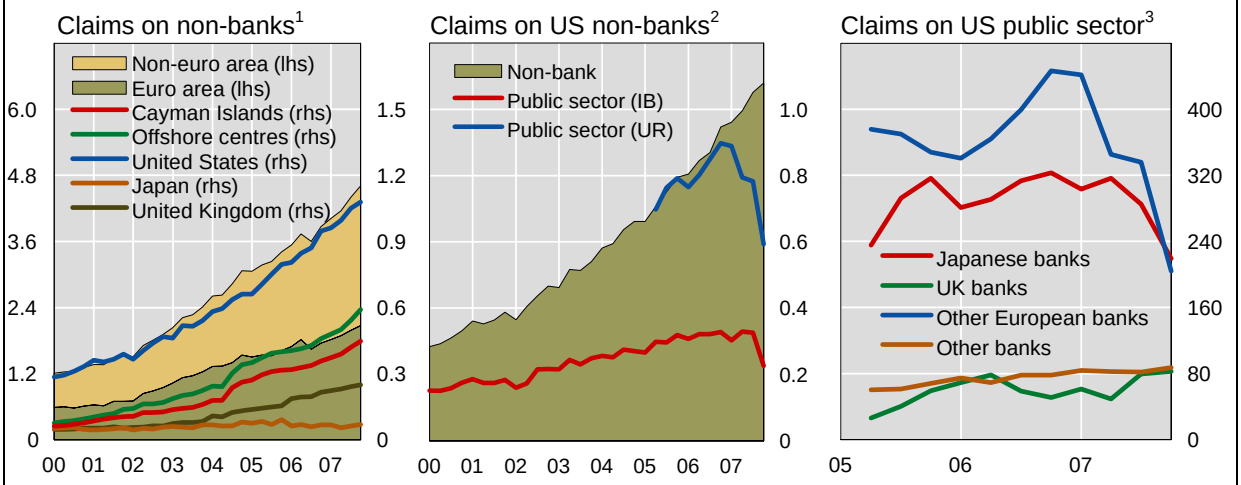
Growth in international bank claims



[1] Lines indicate annual growth rates, in per cent. The positive (negative) shaded areas indicate stocks of assets (liabilities), in trillions of US dollars. [2] The vertical lines mark: Q3 1987 stock market correction; Q4 1994 Mexican peso devaluation; Q2 1997 Asian financial crisis; Q3 1998 Russian default and LTCM; Q1 2000 Nasdaq peak and Q3 2007 subprime-related turmoil. The shaded bars mark US recessions (NBER definition).

Sources: BIS locational banking statistics by nationality; BIS calculations. Graph 1

Banks' holdings of international debt securities



[1] BIS reporting banks' international debt securities claims on non-banks located in the countries shown in the legend. In trillions of US dollars at constant Q4 2007 exchange rates. [2] The shaded area represents banks' cross-border debt securities claims on non-banks located in the United States, reported in the BIS locational banking statistics. The lines show claims (loans and debt securities) on the US public sector, reported in the BIS consolidated banking statistics. Claims on an IB basis include claims (in all currencies) on the public sector booked by offices outside the United States, plus locally booked claims in foreign currencies. Claims on a UR basis also include US dollar-denominated claims booked by the US offices of foreign banks. In both series, part of the recent decline is due to a reclassification in reporting (see next footnote); in trillions of US dollars. [3] Consolidated (UR basis) claims (loans and securities) on the US public sector reported by those banks listed in the legend; in billions of US dollars. The decline in Japanese banks' reported holdings in part reflects a reclassification of claims from the public sector to the non-bank private sector in the fourth quarter of 2007.

Source: BIS locational banking and consolidated banking statistics. Graph 2

growing from less than $12 trillion at end-2000 to more than $37 trillion by end-2007.

Loans to non-bank borrowers expanded since 2000 ...

Growth in credit to non-bank borrowers contributed greatly (39%, or $10 trillion) to this expansion. This development coincided with the rise of the structured finance industry, the expansion of banks' proprietary trading activities and the growth in their hedge fund prime brokerage business. Banks' claims (primarily loans) on non-bank entities increased from less than $4 trillion at end-1999 to $14 trillion by the end of 2007, with claims on non-bank borrowers located in the United States, the United Kingdom and the Cayman Islands accounting for 21%, 16% and 6% of these positions, respectively.

... as did debt security claims

A substantial share (33%, or $4.6 trillion) of banks' total international claims on the non-bank sector are holdings of international debt securities (Graph 2, left-hand panel). While holdings of European government bonds account for much of this, holdings of securities issued by non-banks in major financial centres, including the United States, the United Kingdom and the Cayman Islands, make up nearly $2 trillion of the total. Many of the claims vis-à-vis the United States are international holdings of US Treasury securities and other claims on US government-owned entities. However, a rough estimate, obtained by subtracting claims on the US public sector reported in the consolidated banking statistics (IB basis), suggests that the share of banks' cross-border holdings of debt securities issued by US non-bank *corporates*,

which includes debt issued by investment vehicles and securitised mortgage products, has been on the rise (Graph 2, centre panel).[3]

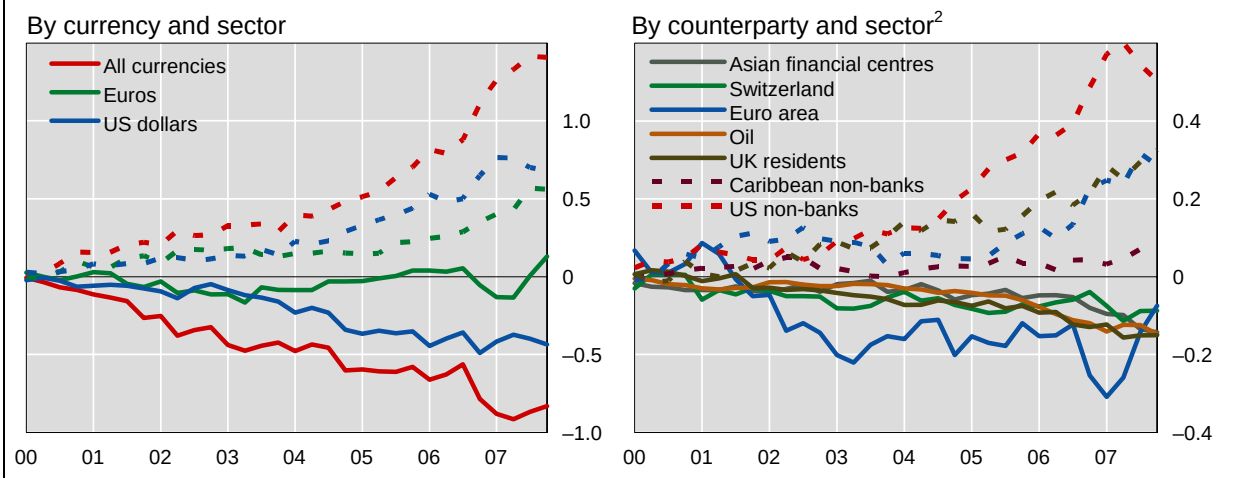
Roughly one quarter of the overall increase in banks' total international assets since end-1999 has been booked by banks located in the United Kingdom. Since then, net claims (claims minus liabilities) of these banks on non-bank borrowers have grown by more than $1 trillion (to $1.5 trillion), half of which is denominated in US dollars. At the same time, their net liabilities to banks increased by a similar amount (to $1.7 trillion), a *sectoral transformation* which is portrayed in Graph 3 (left-hand panel). As shown in the right-hand panel, the growth in net liabilities to banks in Switzerland, the euro area, Asian offshore centres and oil-exporting countries has been used to finance claims on non-banks, primarily in the United States.

US banks channel US dollars to the interbank market …

Which national banking systems have been behind this sectoral transformation? The BIS locational statistics by *nationality* allow for a (partial) reconstruction of the global balance sheets of banks of a given nationality, thus providing some information, albeit incomplete, on these banks' net funding

Cumulative net claims of banks in the United Kingdom[1]

In trillions of US dollars



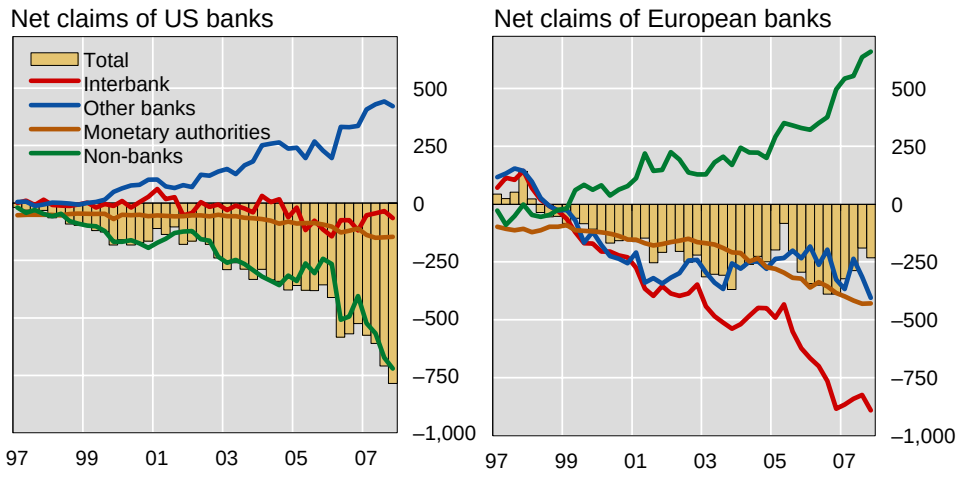
[1] Net claims are claims minus liabilities, expressed at constant end-Q4 2007 exchange rates. These flows are estimated by combining data from several reporting countries, which helps in identifying the residency of the holders of banks' debt security liabilities. Thick lines refer to cumulative net interbank claims and dotted lines to cumulative net claims on non-banks, booked by banks located in the United Kingdom. [2] Asian financial centres = Hong Kong SAR, Macao SAR and Singapore; Caribbean financial centres = Aruba, Bahamas, Bermuda, Cayman Islands, Netherlands Antilles and Panama; Euro area = euro area member states excluding Slovenia; Oil = OPEC member states (excluding Indonesia) plus Bahrain and Russia.

Source: BIS locational banking statistics by residency. Graph 3

[3] The comparison between the consolidated and locational statistics in the centre panel of Graph 2 should be interpreted with caution for several reasons. First, the locational statistics include a larger set of reporting countries than the consolidated statistics. Second, the consolidated statistics include both loan and debt securities claims on the US public sector (although the former are likely to be a small share of the total). Finally, the locational statistics include cross-border holdings by foreign offices of US-headquartered banks, while the consolidated statistics do not.

US dollar positions by bank nationality[1]

In billions of US dollars



[1] Net claims are claims minus liabilities. The interbank component (red line) is broken down into claims on affiliated foreign offices (not shown), claims on other banks and claims on official monetary authorities. Net claims booked by offices located in all BIS reporting countries are aggregated by the parent region indicated in the panel heading.

Source: BIS locational banking statistics by nationality. Graph 4

requirements in a particular currency.[4] Overall, these data indicate significant differences in the global claims patterns of European and US banks. Graph 4 portrays aggregated net claims, broken down by sector, booked by offices of US and European banks located in all reporting countries.[5] As shown in the left-hand panel, US banks have borrowed US dollars from non-banks, and have channelled these funds to other (unaffiliated) banks in the interbank market. By mid-2007, their total net claims on other banks (excluding inter-office claims) reached $443 billion, up from virtually nil in 1999.

… to fund European banks' investments in non-banks

At the same time, European banks have borrowed from other banks to fund US dollar investments in non-banks (Graph 4, right-hand panel). Their net liabilities to all banks, which include both uncollateralised loans and repo financing, grew to more than $800 billion by end-2007, much of this vis-à-vis other banks and official monetary authorities. These funds were channelled into credit to non-banks. A closer look at the underlying data reveals that the US dollar-denominated net claims on non-banks booked by offices of German, UK and Swiss banks in the United Kingdom have expanded by a combined $499 billion since 2000.

[4] The *BIS locational statistics by nationality* provide, for each reporting country, banks' total cross-border positions (in all currencies) and positions vis-à-vis residents (in foreign currencies), broken down by the *nationality of the parent bank*. Positions are broken down by sector (non-bank, other bank and inter-office) and by currency, but not by residency of the borrower.

[5] These data should be interpreted with caution since they exclude US dollar-denominated claims on residents booked by offices in the United States and claims on all counterparties booked by offices in non-reporting countries. The figures presented in Graph 4 tracking net claims on "other banks" exclude inter-office borrowing. However, the US dollar positions reported by France and Germany do not distinguish these from inter-office positions, and are treated as positions vis-à-vis "other banks".

These diverging positions of US and European banks suggest that the latter face relatively large US dollar funding requirements. This may help in understanding the liquidity squeeze in this market since mid-2007. Indeed, market commentary has suggested that European banks in particular had difficulty obtaining US dollar funding as the tensions in the interbank market unfolded in the second half of 2007 (Baba et al (2008)).[6] Interbank borrowing tends to be short-term, whereas banks' investment in non-banks is of varying maturities. While the associated term risk may have been hedged, the build-up of European banks' US dollar liabilities to other banks used to fund their US dollar non-bank assets may have required a frequency of rollovers in the interbank market that became difficult to maintain as market volatility increased.

Developments in the second half of 2007

The turmoil in financial markets which erupted in mid-2007 produced widespread losses and had a severe and immediate impact on interbank markets. Interbank rates in various jurisdictions and currencies remained elevated through May 2008, despite the unprecedented steps taken by central banks to enhance market liquidity (Borio and Nelson (2008), Michaud and Upper (2008)). The size and structure of internationally active banks' exposures to US mortgage-related structured products was not well understood, and the impact of the turmoil on interbank markets was not anticipated.

Global activity remains robust …

The global perspective afforded by the BIS international banking statistics sheds some light on these aspects of the current turmoil. The data for the second half of 2007 contain few signs of an abrupt retreat from international lending. Indeed, yearly growth in overall claims only began to fall in the fourth quarter of 2007 (although claims of some banking systems dropped noticeably; see the next section). Moreover, total international claims grew by $2.2 trillion in the second half of 2007, with interbank activity accounting for a stable share (62%).

… although investments in US non-banks waned

That said, there are significant movements in the data which appear to be related to the turmoil. Banks located in the United Kingdom began to reduce their net long positions on non-banks in the United States discussed in the previous section (Graph 3, right-hand panel). Between end-June and end-December 2007, their gross claims on non-banks in the United States fell by $77 billion. Similarly, banks in offshore centres, primarily the Cayman Islands, reduced their claims on non-banks in the United States, by $14 billion. The BIS consolidated statistics, which aggregate worldwide claims of banks headquartered in a particular country, show that European-headquartered (primarily Swiss, Dutch, Belgian and Irish) banks' foreign claims on the non-bank private sector in the United States dropped by $283 billion in the second

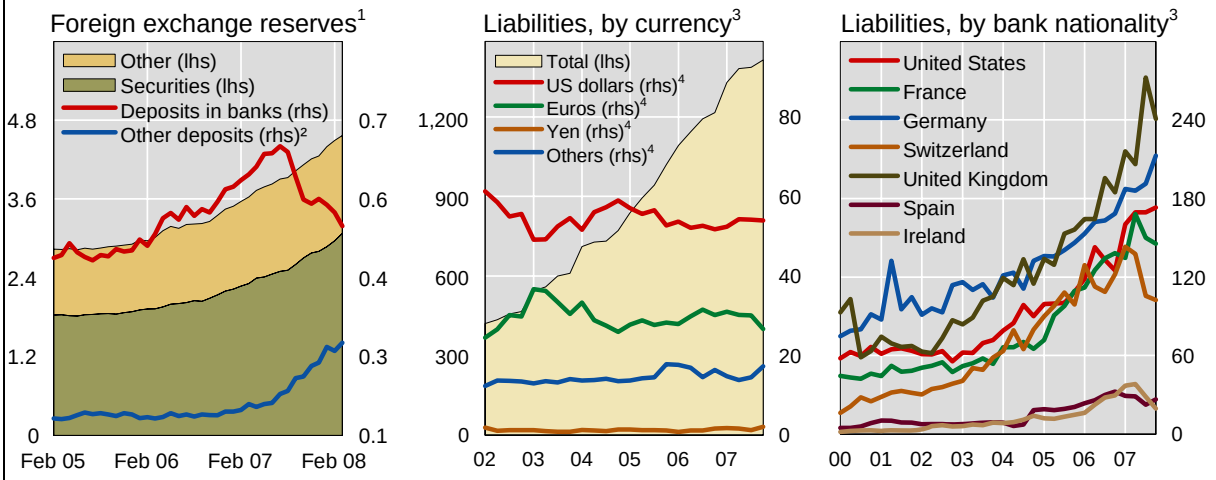
[6] In an effort to alleviate European banks' US dollar shortage, the ECB and the Swiss National Bank entered into a reciprocal currency arrangement with the Federal Reserve in order to provide dollars to their counterparties.

half of 2007. These contractions in credit stand in sharp contrast to the unusually large expansion in credit to emerging markets in the second half of 2007 (see Highlights section on page17).

Some central banks withdraw reserves …

Despite the efforts of central banks to enhance market liquidity, a number of official monetary authorities reduced their holdings of foreign exchange reserves in the international banking system. Such reserve placements have become a significant source of funding for both US and European banks (Graph 4); reporting banks' total liabilities vis-à-vis these entities reached $1.4 trillion at the end of 2007, up significantly since 2002 (Graph 5, centre panel). However, IMF data on foreign exchange reserves held in banks abroad show significant decreases for some countries since mid-2007 (Graph 5, left-hand panel). For example, the monetary authorities in Australia, Brazil, Chile, the Czech Republic, India, Russia and the United Kingdom reported a combined decline of $109 billion in this stock. Further reductions brought this total to $161 billion by the end of the first quarter of 2008.[7] Consistent with this, the BIS banking statistics indicate that overall growth in reporting banks' liabilities to official monetary authorities slowed.[8] Deposit liabilities reported by the offices of Swiss, French and Irish banks in all reporting countries fell the most in the second half of 2007 (by $35 billion, $23 billion and $17 billion, respectively). Similarly, deposits placed in UK-headquartered banks exhibited a noticeable decline in the fourth quarter.

Deposits placed by official monetary authorities



[1] Holdings of foreign exchange reserves by 63 monetary authorities which report SDDS data to the IMF; in trillions of US dollars. [2] Currency and deposits with other national central banks, the BIS and the IMF. [3] Liabilities booked by BIS reporting banks vis-à-vis official monetary authorities; in billions of US dollars; expressed at constant end-Q4 2007 exchange rates. [4] As a percentage of total liabilities.

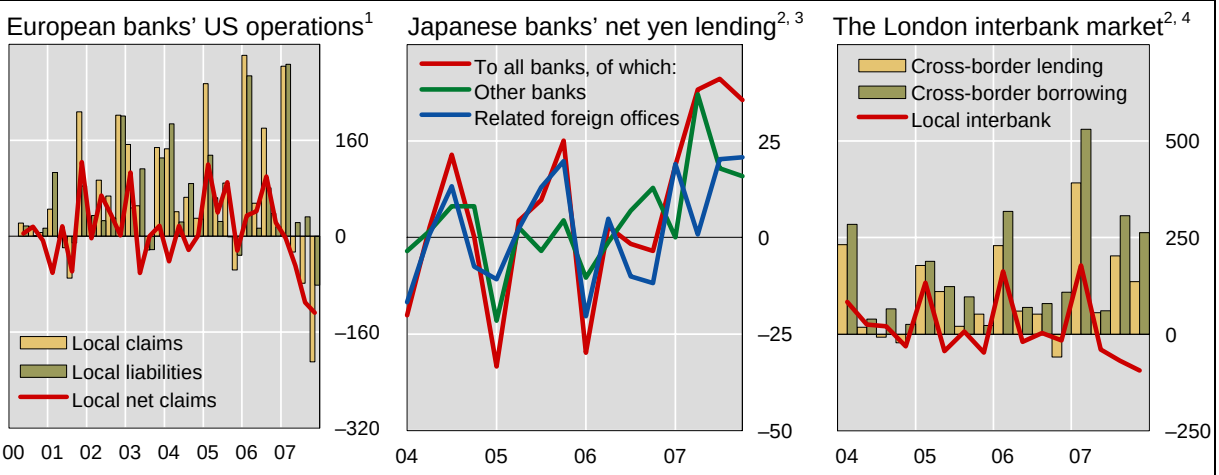
Sources: BIS locational banking statistics by residency and nationality; IMF. Graph 5

[7] Across all countries reporting these data, the overall decrease in the second half of 2007 came to $92 billion. By end-March 2008, the overall decrease reached $149 billion.

[8] The BIS statistics include reporting banks' positions vis-à-vis official monetary authorities in all countries (aggregated), not only those countries which provide a more detailed breakdown of their reserve holdings in the IMF Special Data Dissemination Standard (SDDS) templates.

Global search for funds

In billions of US dollars



[1] Change in local currency positions on US residents booked by European banks' offices in the United States, reported in the BIS consolidated banking statistics (IB basis). [2] Flows expressed at constant end-Q4 2007 exchange rates. [3] Change in Japanese banks' cross-border yen positions booked by their offices in Japan and the euro area, from the locational banking statistics by nationality. [4] Change in lending and borrowing by banks (all nationalities) located in the United Kingdom, split into cross-border interbank transactions and local interbank transactions (excluding sterling), from the locational banking statistics by residency.

Source: BIS consolidated and locational banking statistics. Graph 6

… even as commercial banks mobilise liquidity

Against this backdrop, the pattern of cross-border interbank flows, across locations and currencies, suggests that banks sought to mobilise liquidity, especially in the US dollar market segment. They tapped their foreign affiliates, scaled back their local operations in the United States and borrowed from those banking systems which seemed to be less affected by the turmoil. European banks in particular reduced their US dollar claims booked by their offices in the United States (Graph 6, left-hand panel), resulting in an estimated net outflow from these offices of $239 billion in the second half of 2007. At the same time, banks have put their US Treasury holdings to work to raise funds, as evidenced by the significant decline in holdings in 2007 (Graph 2, right-hand panel), especially for those European banking systems known to be affected by the turmoil, such as Swiss banks. In contrast, Japanese banks, which were less affected by the turbulence, channelled funds into the interbank market from their headquarters in Japan, as evidenced by a surge in their net yen-denominated lending to affiliated offices and other banks abroad (Graph 6, centre panel).[9]

Banks channel funds to London

The international redistribution of funds between deficit and surplus banks in various locations contributed to an expansion in overall interbank claims, much of which were targeted at banks located in London. Accordingly, the volume of *cross-border flows* in and out of the United Kingdom remained robust, with banks located there lending $336 billion to, and borrowing $564 billion from, banks abroad after the onset of the turmoil. The difference of

[9] Swiss banks contributed dollar and euro funding, possibly as a result of prearranged credit lines being drawn down. The consolidated banking statistics on an ultimate risk basis show that the substantial increases in Swiss banks' interbank loans to their German, UK and US peers were matched by equivalent declines in credit commitments outstanding.

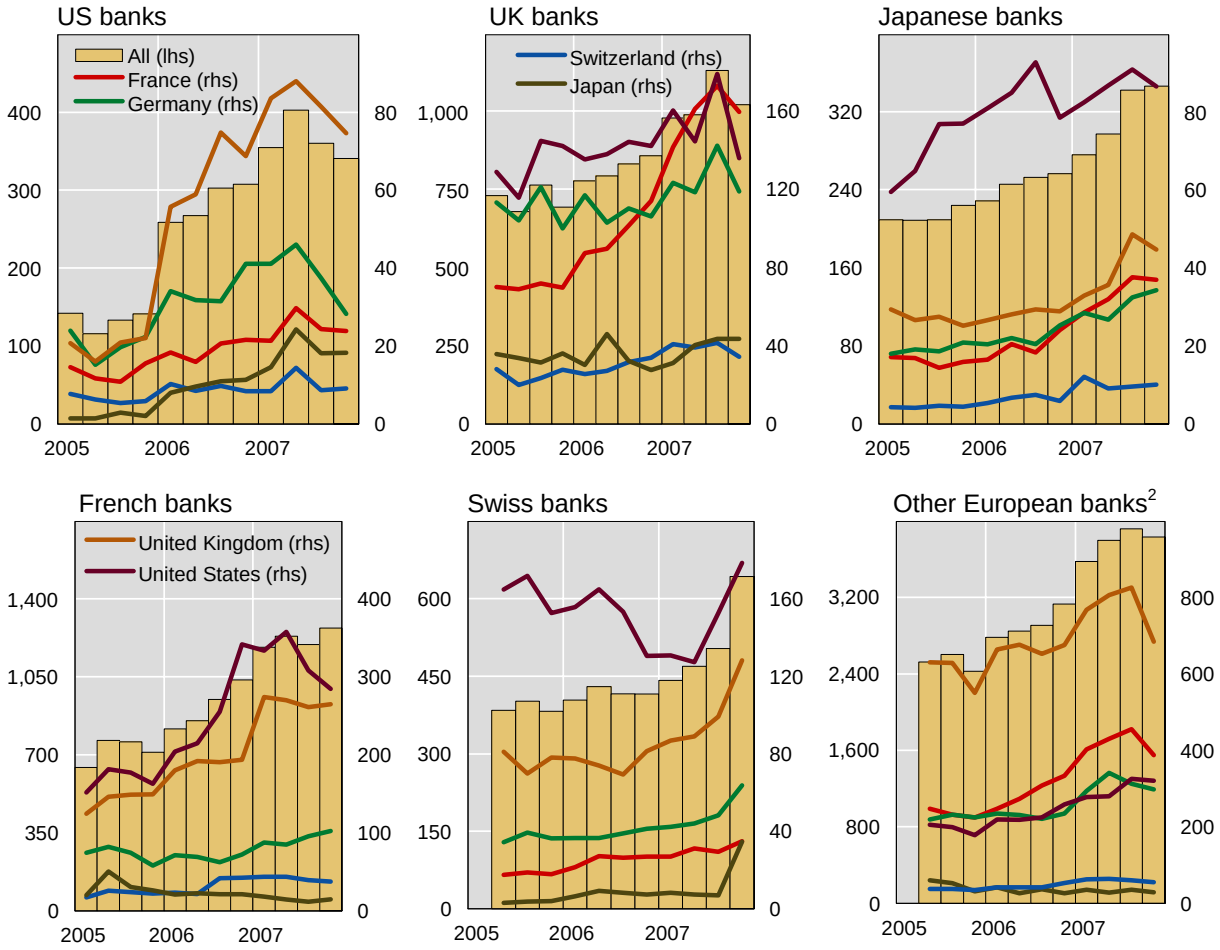
$228 billion represents a net inflow of funds from banks abroad (Graph 6, right-hand panel). However, banks in London apparently did not extensively recycle the additional funds supplied to them from offshore but may have hoarded the liquidity, as evidenced by the observed shrinkage in local interbank positions (Graph 6, right-hand panel). Foreign currency lending *between* banks within the United Kingdom contracted by $154 billion (or 15%) during the second half of 2007 (primarily in the US dollar and euro segments), suggestive of heightened concerns about credit and counterparty risk, a topic taken up in the next section.

Bilateral exposures of national banking systems

From the preceding focus on funding and liquidity risk, this section shifts the discussion to an analysis of counterparty risk in the interbank market. From this perspective, the BIS consolidated statistics on an ultimate risk (UR) basis

Bilateral interbank exposures of selected banking systems[1]

By bank nationality, in billions of US dollars



[1] Shaded bars indicate total interbank exposures of reporting banks headquartered in selected countries (panel headings). Lines indicate foreign claims vis-à-vis banks of the nationality indicated by the legend, where nationality is defined by the residency of the ultimate obligor. Data are not adjusted for exchange rate changes. Spanish and Swiss banks began reporting in Q2 2005. [2] Austrian, Belgian, Danish, Dutch, Finnish, German, Greek, Italian, Irish, Norwegian, Portuguese, Spanish and Swedish banks.

Source: BIS consolidated banking statistics on an ultimate risk basis. Graph 7

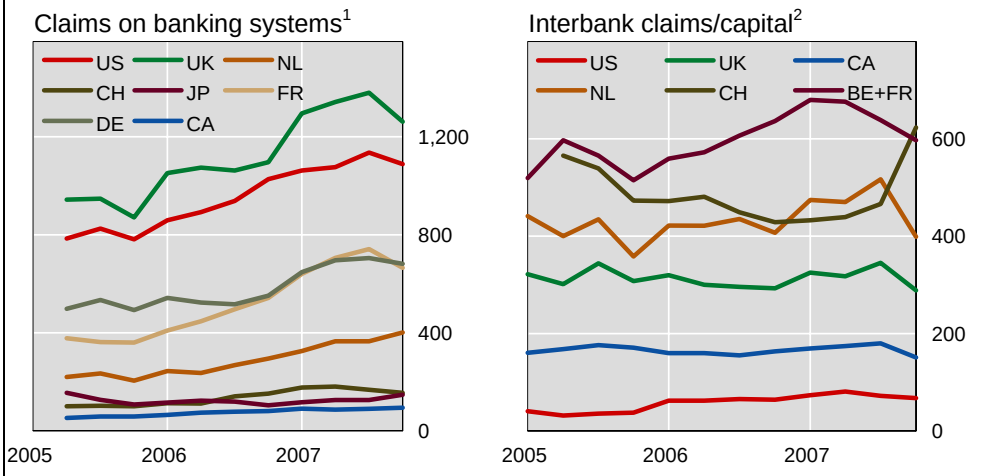
provide relevant information at the level of national banking systems, including both cross-border and local positions. These statistics can be used to track *bilateral* positions of national banking systems, where nationality is defined as the country of residence of the bank headquarters (regardless of the location of their respective offices), thus shedding light on the overall structure of global interbank exposures.[10]

Many of the bilateral interbank exposures in the international banking market have expanded significantly since 2005 (Graph 7). By the second quarter of 2007, French banks' claims on US and UK banks had grown to $357 billion and $270 billion, respectively. Similarly, UK-headquartered banks' exposures to French, German and US banks each exceeded $120 billion by mid-2007. By contrast, US-headquartered banks' foreign claims on other banking systems are relatively small. Although their overall exposures reached $403 billion by mid-2007 (from $116 billion in 2005), exposure to individual national banking systems never exceeded $100 billion.

Interbank exposures contracted …

Tentative signs of a credit contraction in some segments of the interbank market emerged in the second half of 2007. Claims on UK, French and US banks dropped the most, followed by those on German and Swiss banks

Global interbank exposures



Banks headquartered in CA = Canada; CH = Switzerland; DE = Germany; FR = France; JP = Japan; NL = Netherlands; UK = United Kingdom; US = United States; BE + FR = Belgian and French banks combined. The ratios in the right-hand panel are computed using Tier 1 capital of internationally active banks reporting the consolidated banking statistics. Semiannual balance sheet data (CH, FR, UK) are converted to quarterly frequency by interpolation (cubic spline) up to the most recent available quarter. Data are not adjusted for exchange rate changes, since currency breakdowns are not reported in the consolidated banking statistics.

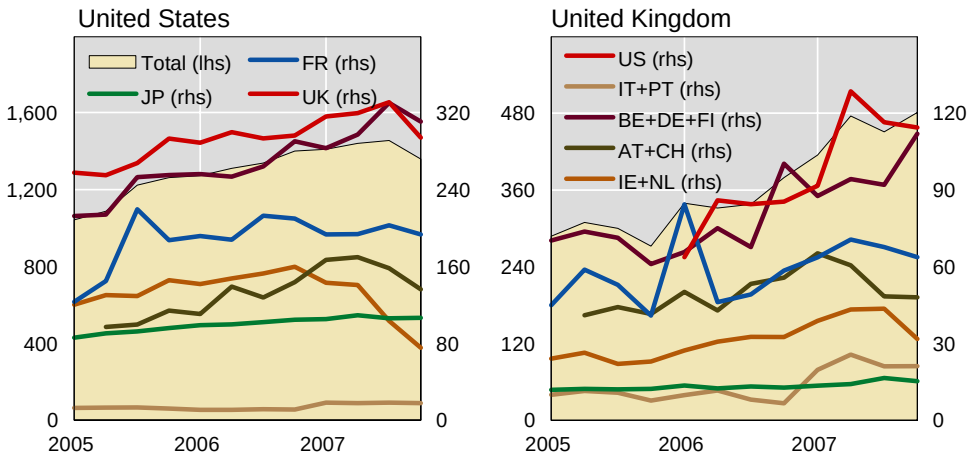
[1] Foreign claims by domestically owned banks in all reporting countries on the national banking systems identified in the legend, in billions of US dollars. [2] Foreign claims on unaffiliated banks reported by banks of the nationality identified in the legend, as a percentage of their Tier 1 capital.

Source: BIS consolidated banking statistics on an ultimate risk basis. Graph 8

[10] For example, on a UR basis, interbank claims reported by the United States vis-à-vis the United Kingdom provide an estimate of US banks' global claims on UK banks (as opposed to US banks' claims on banks located in the United Kingdom, as in the BIS consolidated statistics on an immediate borrower (IB) basis). See McGuire and Wooldridge (2005) for a description of the BIS consolidated banking statistics.

Credit commitments[1]

In billions of US dollars



AT+CH = Austria and Switzerland; BE+DE+FI = Belgium, Germany and Finland; FR = France; IE+NL = Ireland and Netherlands; IT+PT = Italy and Portugal; JP = Japan; UK = United Kingdom; US = United States.

[1] Unused credit commitments booked by BIS reporting banks of the nationalities shown in the legend, vis-à-vis entities (banks and non-banks) of the nationalities of the panel headings, on an ultimate risk basis. The initial starting values for Austria, Spain, Sweden, Switzerland and the United States are backcasted when calculating the total prior to their reporting of credit commitments. For a description of credit commitments and other contingent exposures in the BIS statistics, see McGuire and Wooldridge (2005).

Source: BIS consolidated banking statistics on an ultimate risk basis. Graph 9

(Graph 8, left-hand panel).[11] US banks, in turn, trimmed their exposures to almost all major banking systems, particularly UK and German banks, reducing total foreign claims on the banking sector by $62 billion (Graph 7). This was the first substantial decline in interbank claims reported by US banks since the inception of the ultimate risk statistics (Q1 2005). UK banks' foreign claims also contracted in the fourth quarter, particularly vis-à-vis US, German, French and Swiss banks. The single largest reduction in bilateral interbank exposures in the second half of 2007 was reported by French banks vis-à-vis US banks, at $73 billion.

... as did credit commitments

Similarly, while foreign credit commitments booked by BIS reporting banks remained flat overall, those extended to borrowers in advanced economies have declined since the onset of the turmoil.[12] In particular, several banking systems reduced these contingent exposures vis-à-vis entities in the United States and the United Kingdom (Graph 9). Vis-à-vis the latter, US banks reduced their commitments the most (by 11%). The 6% drop in commitments vis-à-vis the United States was the first on record, and was reported quite uniformly across several major banking systems. As entities draw down existing lines, credit commitments should fall as claims rise. However, in this case, the drop seems to signal a more general retreat by some banking

[11] This occurred in spite of a positive valuation effect. The depreciation of the US dollar over the period tends to overstate end-of-period stocks of other currencies when expressed in dollars.

[12] Credit commitments stand at $4.7 trillion (UR basis), or 17% of total foreign claims.

systems (eg Dutch and Swiss banks), since the fall in their credit commitments to US entities coincided with a reduction in their foreign claims (especially vis-à-vis non-banks).

This recent contraction notwithstanding, the size of banks' foreign exposures remains quite large for some national banking systems. Scaled by their total assets (ie including domestic assets), banks' foreign exposures (to all sectors) have been relatively stable for most banking systems since at least 2005, but the levels differ greatly. For example, foreign exposures (UR basis) account for less than 20% of US banks' total assets, 30–50% of Canadian, UK, Belgian and French banks' total assets, and over 50% of Swiss and Dutch banks' total assets.

Interbank exposures are large relative to Tier 1 capital

Perhaps more importantly, *interbank* exposures remain large relative to capital, even after taking into account the recent contraction (Graph 8, right-hand panel). US banks' interbank exposures are relatively small, at roughly 67% of their Tier 1 capital, although up from 37% at end-2005. At the other end of the spectrum are Swiss, Belgian and French banks, with their respective international interbank exposures at six times their Tier 1 capital. During the second half of 2007, the only major banking system to report a decline in Tier 1 capital for its internationally active banks was Switzerland. Swiss banks also expanded their global interbank claims the most (by $174 billion), thus driving up their ratio of interbank claims to capital. Other major systems reduced their respective ratios by matching higher capital with a moderate expansion or, in the case of Canadian, Dutch, UK and US banks, an outright contraction in global interbank claims by the end of 2007.

Concluding remarks

This feature has explored the impact the financial market turmoil had on international banking activity through end-2007. European banks, which had significantly expanded their claims on US non-banks since 2000, were confronted with large dollar funding needs at a time when their exposure to US mortgage-related products cast a shadow on their financial condition. As a result, the pattern of international banking flows since the onset of the turmoil conveys a picture of a global search for funds, especially in the US dollar segment. Moreover, there are signs that national banking systems started to unwind their international exposures, especially their claims on other banking systems and their exposures to US non-bank entities.

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Managing international reserves: how does diversification affect financial costs?[1]

As reserve accumulation has gathered pace in recent years, and as foreign exchange (FX) reserve holdings have risen far above conventional measures of reserve adequacy, a vigorous debate has begun as to whether part of the reserves should be invested in riskier assets to reduce their financial costs. Estimates from hypothetical reserve portfolios of selected emerging market economies over the period 1999–2007 suggest that the reduction in financial costs from holding riskier assets would generally have been small relative to GDP. Accounting practices and profit distribution rules are likely to play an influential role in asset allocation decisions.

JEL classification: G11, G18, G28.

Since the early part of this decade, official reserves held by emerging market economies have grown rapidly, and exceeded $4.5 trillion as of the third quarter of 2007. Such FX reserves must commonly be financed by domestic currency liabilities. In many emerging economies, the interest on domestic currency liabilities tends to be higher than that earned on the central bank's foreign currency assets. Consequently, central banks often incur a running loss from carrying low-yielding FX reserves on their balance sheets. Furthermore, any appreciation of the domestic currency against the foreign reserve currencies reduces the value of reserve assets in local currency terms.

As the absolute cost of holding FX reserves has increased with size, the return on the reserves themselves has attracted growing public attention (Summers (2006)). In particular, fiscal revenues can be lower if profits available to be transferred from the central bank to the government decline. Partly in an attempt to reduce the net financial costs of holding larger reserves, some central banks have broadened the range of assets in which FX reserves are invested. Such diversification might not only improve returns but could also mitigate portfolio risks. Nevertheless, the investment universe considered by most central banks is still dominated by fixed income securities, and the management of FX reserves continues to be rather conservative.

[1] The author thanks David Archer, Claudio Borio, Piti Disyatat, Dietrich Domanski, Már Gudmundsson, Frank Packer and William White for useful comments. The views expressed are those of the author and do not necessarily reflect those of the BIS.

This special feature attempts to inform the reserve diversification debate by examining the following three questions. First, for a set of 12 emerging market countries over 1999–2007, how might greater allocation to longer-duration bonds and/or equities have affected the returns and volatility of their FX reserves? Second, how significant were these return differences relative to the GDP of the examined countries? Third, how might central bank objectives and institutional constraints, such as profit transfer arrangements, influence the portfolio choices of central banks?

The rest of this article is organised as follows. The first section sets out the framework used for the analysis. The second documents the returns and volatility of different notional portfolios, representative of possible central bank choices. The third assesses the returns net of the financing cost (the overall "financial cost") for the various portfolios in relation to GDP, taking into account the actual size and evolution of the reserves. The fourth discusses the asset allocation choice in the light of the existing institutional arrangements in central banks. The final section concludes.

Framework of the analysis

The asset allocation decision can be thought of as the result of the maximisation of a given objective function subject to a set of constraints. For FX reserves, one way of formulating the returns objective could be to minimise the net financial cost arising from holding reserves. An important constraint is that the volatility of returns be kept to some acceptable level, partly in order to avoid large fluctuations in central bank profits or capital.

Both returns and their volatility are a function of the numeraire currency (unit of account) in which they are computed. Choices of numeraire appear to range considerably among central banks, from that of a single foreign currency (typically the US dollar), to a basket of currencies (eg the Special Drawing Right (SDR)) or the domestic currency. The choice of numeraire should ultimately depend on the uses to which the reserves are to be put and on the institutional factors affecting the risk tolerance of the reserve manager (Borio et al (2008a)). For example, if reserves are to be used to finance emergency imports, then an argument could be made for a numeraire that corresponds to a basket of such imports.

Domestic currency is used as the numeraire

As the topic under investigation is the potential reduction in financial costs due to diversification of reserves into riskier assets, the domestic currency is used as the unit of account. There are at least two additional reasons why the domestic currency might be adopted as numeraire. First, the central bank might be concerned about the impact of fluctuations in the value of reserves on its profitability, profit transfers to the government and capital, since these are invariably measured in domestic currency. Second, the reserves could be viewed as domestic wealth whose value is to be maximised.[2]

[2] See Borio et al (2008a) and McCauley (2008) for further discussion of the choice of numeraire. The view of reserves as domestic wealth has made notable inroads since a number of countries have accumulated significant "excess reserves", above those required for

Since detailed data on the composition of reserve portfolios by country are not publicly available, this paper will examine notional (hypothetical) portfolios only. We choose as a "benchmark" portfolio one which is representative of a "conservative" asset allocation. In this case, it is assumed that reserves are invested entirely in government securities with a one- to three-year maturity, or a duration of roughly 1.8 years. In most central banks, the portfolio duration of FX reserves lies between nine months and 2.5 years, so that the one- to three-year government securities sector is reasonably representative of actual central bank portfolio choices.

Conservative benchmark portfolio …

Two less "conservative" portfolios are then considered. The first differs from the benchmark portfolio only in terms of a longer duration of the government securities. This portfolio is assumed to mirror the one- to 10-year maturity sector, which has an average duration of roughly four years. The second alternative portfolio allows investments in all traded government bonds (one- to 30-year sector) such that duration exposure is roughly six years, and in addition includes a 20% exposure to equities. Such a portfolio would be broadly representative of pension fund investments, although the share of equities in pension funds will typically be somewhat higher still. Data used in this study to support the analysis are based on total returns on major stock market indices as well as on government bond market indices.

… is compared to alternative portfolios

Some assumptions are also needed concerning the currency composition of the portfolios. For each of the above portfolios, three different currency compositions are considered, meant to be representative of choices normally made by central banks. The first assumes that the currency composition of the sample countries' reserves generally follows that of developing countries as disclosed in IMF data, which implies an average US dollar exposure of 65%;[3] the second assumes a higher share of US dollars of 80%, indicative of dollar-pegging countries; and the third assumes a more balanced currency composition, in line with that of the SDR basket, with a dollar share of around 40%.[4]

Assumptions about currency composition

The sample period for the analysis is 1999–2007. This covers the years following the Asian crisis, when rapid reserve accumulation took place. It is arguably long enough to provide useful insights about performance, given the frequency with which strategic asset allocation decisions are reviewed. At the same time, care must be taken when drawing conclusions, since ex post returns can often be poor predictors of future realised returns. That said, in many asset allocation deliberations, historical performance is used as an important input into the analysis.

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liquidity purposes. McCauley also cites empirical evidence suggesting that the domestic currency has been gaining ground as the numeraire in recent years.

[3] The US dollar share in the currency composition of developing countries' reserves has varied from 71% in 1999 to 61% in 2007.

[4] The currency composition of the SDR basket has evolved from 43% US dollars, 28% euros, 17% Japanese yen and 12% pounds sterling in 1999 to 39% US dollars, 39% euros, 11% Japanese yen and 11% pounds sterling in 2007.

The sample of countries considered includes 12 emerging market economies: Algeria, Brazil, China, India, Korea, Malaysia, Mexico, Nigeria, Russia, South Africa, Taiwan (China) and Thailand. The choice of sample is motivated by two considerations: to provide a good geographical coverage, and to include major countries that have accumulated reserves rapidly since 2000.

Risk-return trade-offs

Portfolio volatility is dominated by exchange rates

Reserve portfolios are generally not hedged against currency risk. Returns and volatility of returns measured in domestic currency therefore tend to be dominated by exchange rate movements. Thus, as a preliminary step, to better highlight the characteristics of individual asset classes, we eliminate the return and volatility component of returns resulting from exchange rate movements. We do so by comparing the annual return, volatility and return per unit of volatility risk of the various notional portfolios using the currency composition of the respective portfolio as numeraire. The results are shown in Table 1.

While estimated returns increase for those notional portfolios that take on riskier assets, they do so less rapidly than volatility, so that returns per unit of volatility decline. For example, the extension of duration for the bonds by four years and the addition of 20% equities reduces the return per unit of risk by roughly a factor of two. A conclusion one can draw from this exercise is that, ignoring currency effects, central banks would have increased volatility more than returns by taking on additional duration and equities during the period. Of course, it must also be remembered that this inference is based on comparisons of different notional portfolios, for a specific sample of countries, and over a limited time period.

The results differ considerably when incorporating the exchange rate component of returns and volatility. Tables 2 and 3 show the annual returns and volatility of returns of various notional portfolio compositions for each of the different emerging market economies in the sample using their domestic currency as the numeraire. Over the period of the study, excess returns over the benchmark portfolio between 0.4% and 1.2% would have been secured with relatively little increase in volatility (and in some cases even a reduction). Again, these results are calculated over a specific time period, and would not necessarily predict future performance well.

Risk-return characteristics of portfolios measured in different currency baskets

1999–2007, in per cent

	One- to three-year sector bonds			One- to 10-year sector bonds			20% equities + 80% bonds[1]		
	DEV[2]	FIX[3]	SDR[4]	DEV	FIX	SDR	DEV	FIX	SDR
Annual returns	4.2	4.5	3.9	4.8	5.0	4.4	5.0	5.0	4.9
Annual volatility	1.7	1.9	1.5	3.1	3.3	2.8	4.0	4.2	3.6
Return/volatility	2.5	2.4	2.7	1.5	1.5	1.6	1.3	1.2	1.3

[1] Equities refer to the local stock market indices, such as the S&P 500 or EURO STOXX 50, and bonds refer to the one- to 30-year sector of the government bond market. [2] Composition of currency reserves of developing countries. [3] Fixed weights of 80% US dollars, 15% euros and 5% pounds sterling. [4] Composition of the SDR basket.

Sources: IMF; Bloomberg; JPMorgan Chase; author's calculations. Table 1

Local currency returns and excess returns of different portfolios

Annual averages in per cent, 1999–2007

	Total returns			Excess returns over one- to three-year sector bond portfolio					
	One- to three-year sector bonds			One- to 10-year sector bonds			20% equities + 80% bonds[1]		
	DEV[2]	FIX[3]	SDR[4]	DEV	FIX	SDR	DEV	FIX	SDR
Algeria	5.5	5.2	5.7	0.5	0.4	0.5	0.9	0.8	1.2
Brazil	5.9	5.5	6.1	0.5	0.4	0.5	0.9	0.8	1.2
China	3.9	3.6	4.1	0.5	0.4	0.5	0.9	0.7	1.1
India	4.5	4.2	4.7	0.5	0.4	0.5	0.9	0.7	1.1
Korea	2.2	1.9	2.4	0.5	0.4	0.5	0.9	0.7	1.1
Malaysia	3.7	3.4	4.0	0.5	0.4	0.5	0.9	0.7	1.1
Mexico	7.0	6.7	7.3	0.5	0.4	0.5	0.9	0.8	1.2
Nigeria	8.8	8.4	9.0	0.5	0.4	0.5	1.0	0.8	1.2
Russia	5.6	5.3	5.8	0.5	0.4	0.5	0.9	0.8	1.2
South Africa	6.6	6.3	6.8	0.5	0.4	0.5	0.9	0.8	1.2
Taiwan, China	5.1	4.8	5.7	0.5	0.4	0.5	0.9	0.7	1.1
Thailand	4.1	3.8	4.3	0.5	0.4	0.5	0.9	0.7	1.1

[1] Equities refer to the local stock market indices, such as the S&P 500 or EURO STOXX 50, and bonds refer to the one- to 30-year sector of the government bond market. [2] Composition of currency reserves of developing countries. [3] Fixed weights of 80% US dollars, 15% euros and 5% pounds sterling. [4] Composition of the SDR basket.

Sources: IMF; Bloomberg; JPMorgan Chase; author's calculations. Table 2

Financial cost of acquiring reserves through FX intervention

The analysis so far has considered the returns and risks associated with various portfolios without taking into account how these portfolios have been financed. Ultimately, what matters is the net return, or conversely, the net financial cost, ie the costs of financing the reserves minus the return on the reserves. This difference is referred to as the "financial cost" of reserves, and is the focus of the analysis that follows.

The bulk of the reserves held by most emerging market countries have been acquired through sterilised intervention and hence have typically been financed through issuance of domestic securities. In this case, the financial cost of reserves to the central bank would be the interest cost required to service the domestic currency liabilities less the investment income (including capital gains and losses) from the reserve holdings measured in domestic currency.

In calculating the financial cost figures, the assumption made here is that the FX reserves are financed by three-month bills issued by the central banks in the domestic currency.[5] FX reserve assets (excluding gold) reported on a

[5] The assumption that reserves are fully backed by domestic currency liabilities is a reasonable one for a number of emerging market countries, but there are notable exceptions. For example, in the case of Russia, a substantial part of the FX reserve accumulation is done through taxation of oil revenues rather than issuing domestic currency bonds. Moreover, a significant proportion of government liabilities includes foreign currency debt. Hence, the estimate of the financial costs under the assumptions made here must be interpreted with caution.

Volatility of benchmark portfolio and excess volatility of riskier portfolios

Annual averages in per cent, 1999–2007

	Benchmark portfolio			Increase in volatility when riskier portfolio is held[1]					
	One- to three-year sector bonds			One- to 10-year sector bonds			20% equities + 80% bonds[2]		
	DEV[3]	FIX[4]	SDR[5]	DEV	FIX	SDR	DEV	FIX	SDR
Algeria	4.4	4.7	4.4	0.7	0.8	0.6	1.5	1.4	1.5
Brazil	21.2	21.1	21.8	0.2	0.3	0.1	–1.2	–1.1	–1.2
China	3.3	2.6	4.9	0.8	1.1	0.3	1.3	1.7	0.7
India	5.1	5.1	5.8	0.4	0.5	0.1	0.2	0.4	0.0
Korea	9.5	9.6	9.6	0.3	0.4	0.1	–0.9	–0.7	–1.2
Malaysia	3.4	2.7	4.9	0.7	1.0	0.2	1.0	1.4	0.6
Mexico	8.5	7.7	10.0	0.4	0.5	0.1	0.5	0.7	0.2
Nigeria	6.5	6.2	7.4	0.4	0.5	0.1	–0.0	0.1	–0.1
Russia	5.2	5.3	5.7	0.4	0.5	0.2	0.2	0.2	0.3
South Africa	17.8	18.4	17.0	–0.0	0.0	–0.2	–0.8	–0.7	–0.9
Taiwan, China	5.7	5.9	6.0	0.7	0.8	0.4	0.1	0.3	–0.3
Thailand	7.5	7.7	7.8	0.4	0.5	0.2	–0.2	0.0	–0.5

[1] Increase in volatility relative to the one- to three-year sector bonds. [2] Equities refer to the local stock market indices, such as the S&P 500 or EURO STOXX 50, and bonds refer to the one- to 30-year sector of the government bond market. [3] Composition of currency reserves of developing countries. [4] Fixed weights of 80% US dollars, 15% euros and 5% pounds sterling. [5] Composition of the SDR basket.

Sources: IMF; Bloomberg; JPMorgan Chase; author's calculations. Table 3

quarterly frequency and three-month deposit rates have been used to compute the financial cost for each quarter and then aggregated to determine the annual cost of holding FX reserves. A more detailed discussion of the methodology used to estimate the financial cost of reserves is described in the box.

To provide some perspective on the economic significance of alternative portfolio choices, the financial cost estimates are presented as percentages of nominal GDP. Table 4 reports results for the period 1999–2007, first in terms of the financial costs of the one- to three-year sector benchmark "conservative" portfolio, and then in terms of the reduction in financial costs compared to the benchmark portfolio offered by the two alternative return-oriented portfolios. Both the estimated financial costs for the benchmark and the estimated reduction in costs for riskier portfolios are presented for each of the three currency compositions described above.

Fairly limited cost savings when riskier assets are held

On balance, these ex post estimates of the financial costs of reserves over the period 1999–2007 suggest that altering the asset and currency composition of the reserve portfolio for selected emerging market countries would have produced cost savings that, while sizeable in absolute terms, would have been fairly limited in relation to the size of the respective economies. Key observations from Table 4 are as follows:

- For the benchmark portfolio, estimates of the annual financial costs of FX reserves across the selected emerging market economies average to between 0.0% and 0.3% of GDP, depending on the assumed currency composition of reserves.

Methodology for computing estimates of financial cost

The financial cost for the FX reserves, estimated in domestic currency terms, will be equal to the domestic borrowing costs minus the income earned on the reserve assets (interest income plus capital gains or losses). Our methodology for computing these estimates is described below.

We assume that at the beginning of each quarter the reserve currency composition is rebalanced and invested to replicate the chosen investment benchmarks. Suppose investments in the *i*th foreign currency contain *m* benchmarks to be replicated. These benchmarks could comprise government bonds, stocks or other asset classes. Denoting the allocation to each of these benchmarks by W_{ik} and their total return index values at time *t* by $I_{ik}(t)$, the index value of the investments in the *i*th reserve currency at time *t*+1 is given by

$$I_i(t+1) = I_i(t) \times \left(\sum_{k=1}^{m} w_{ik} \frac{I_{ik}(t+1)}{I_{ik}(t)} \right)$$

At the end of each quarter, the domestic currency value of the investments made in the *i*th reserve currency will depend on two variables: the total return (capital gains plus interest income) on the benchmark index and the return from exchange rate changes. Suppose $A_i(t)$ denotes the local currency equivalent amount invested in the ith reserve currency at time *t* and $S_i(t)$ denotes the domestic exchange rate of the *i*th reserve currency, ie the number of domestic currency units required to purchase one unit of the reserve currency. Then at time *t*+1, that is, one quarter ahead, the value of this investment in domestic currency terms will be

$$A_i(t+1) = A_i(t) \times \frac{I_i(t+1)}{I_i(t)} \times \frac{S_i(t+1)}{S_i(t)}$$

The investment income from the *i*th reserve currency during the quarter measured in domestic currency terms will be given by

$$Income_i(t+1) = A_i(t+1) - A_i(t)$$

The total income in domestic currency terms on the reserve assets will be the sum of the incomes on each reserve currency holding and is given by

$$Income(t+1) = Income_{USD}(t+1) + Income_{EUR}(t+1) + Income_{JPY}(t+1) + Income_{GBP}(t+1)$$

On the liabilities side of the balance sheet, taking the total reserves at time *t* to be $A(t)$ and the three-month domestic interest rate to be $R(t)$, the interest expense is given by

$$Expense(t+1) = 0.25 \times A(t) \times \frac{R(t)}{100}$$

If GDP(*t*+1) denotes nominal GDP at current prices in domestic currency terms, then the financial cost during one quarter as a percentage of GDP is given by

$$FinancialCost(t+1) = 100 \times \frac{Expense(t+1) - Income(t+1)}{GDP(t+1)}$$

The annual financial cost as a percentage of GDP will be the sum of these costs over four consecutive quarters. It is useful to note here that a positive value for the financial cost would indicate that holding reserves involves a net income loss under the assumption that the reserve assets are fully backed by domestic liabilities. Similarly, a negative value for the financial cost would amount to an income gain for the central bank.

- A notable exception is Brazil, whose annual financial costs over the period 1999–2007 are estimated as close to 1% of GDP. This can be attributed to the high domestic interest rates in Brazil along with a substantial appreciation of the Brazilian real since 2003.
- For a number of countries, holding foreign exchange reserves may actually have provided an additional source of government revenue; that

Holding FX reserves has been a source of revenue for some countries

is, net financial costs are estimated to have been negative over the period. These countries include Algeria, South Africa, Taiwan (China) and Thailand.[6]

- On average, estimates of the financial costs of reserves are not greatly affected by changes in their currency composition. For many countries, alternative currency compositions (eg shifting from an 80% dollar share to the SDR basket, or from the second to third columns in Table 4) would have resulted in a reduction in estimated financial costs of less than 0.2% of GDP.
- The impact on financial costs of diversifying the asset mix to include equities and extend duration varies across countries. On the one hand, moving from short-dated bond holdings to a portfolio with extended duration and a 20% exposure to equities would have reduced the estimated financial costs for China, India, Korea and Malaysia over the period by between 0.3% to 0.6% of GDP. The estimated financial costs for Brazil, Mexico and South Africa, on the other hand, would have declined only marginally given a similar shift in asset composition (0.0% to 0.1% of GDP).

While the above financial cost estimates were measured relative to the size of the domestic economy, diversification benefits might also be measured

Estimates of average annual financial cost and its reduction for riskier portfolios

As a percentage of nominal GDP, 1999–2007

	Financial cost (benchmark)			Change in financial cost when riskier portfolio is held[1]					
	One- to three-year sector bonds			One- to 10-year sector bonds			20% equities + 80% bonds[2]		
	DEV[3]	FIX[4]	SDR[5]	DEV	FIX	SDR	DEV	FIX	SDR
Algeria	–0.8	–0.6	–1.1	–0.3	–0.3	–0.3	–0.6	–0.6	–0.6
Brazil	1.0	1.1	1.0	–0.0	–0.0	–0.1	–0.1	–0.1	–0.1
China	–0.0	0.1	–0.2	–0.1	–0.2	–0.1	–0.4	–0.4	–0.4
India	0.3	0.4	0.2	–0.1	–0.1	–0.1	–0.3	–0.2	–0.3
Korea	0.4	0.5	0.3	–0.1	–0.1	–0.1	–0.3	–0.2	–0.3
Malaysia	0.2	0.3	0.0	–0.2	–0.2	–0.2	–0.6	–0.5	–0.6
Mexico	0.2	0.3	0.2	–0.0	–0.0	–0.0	–0.1	–0.1	–0.1
Nigeria	1.1	1.2	1.0	–0.1	–0.1	–0.1	–0.2	–0.2	–0.2
Russia	0.7	0.8	0.6	–0.1	–0.1	–0.1	–0.7	–0.7	–0.7
South Africa	–0.1	–0.1	–0.1	–0.0	–0.0	–0.0	–0.0	–0.0	–0.0
Taiwan, China	–1.3	–1.0	–1.6	–0.4	–0.3	–0.3	–0.8	–0.8	–0.9
Thailand	–0.1	0.0	–0.2	–0.2	–0.2	–0.2	–0.3	–0.2	–0.3

[1] Computed relative to the financial cost of investing in the one- to three-year sector bonds. [2] Equities refer to the local stock market indices, such as the S&P 500 or EURO STOXX 50, and bonds refer to the one- to 30-year sector of the government bond market. [3] Composition of currency reserves of developing countries. [4] Fixed weights of 80% US dollars, 15% euros and 5% pounds sterling. [5] Composition of the SDR basket.

Sources: IMF; Bloomberg; JPMorgan Chase; author's calculations. Table 4

[6] As mentioned earlier, financial costs for Russia are significantly lower than the estimates here because reserve accumulation has been sterilised through taxation rather than issuing debt. For Nigeria, it is less clear to what extent reserve accumulation has been funded through surplus oil revenues.

in relation to the size of the central bank balance sheet. Central banks' credibility as regards reserve management, and to some extent their independence, might be adversely affected when large profit swings are reported. Consequently, the volatility of the revenue stream of central banks may need to be considered when the merits of alternative asset allocation choices are debated. In practice, accounting treatment of profits and losses determines how the volatility flows through the income statement. The next section discusses this and provides some perspectives on how accounting practices might influence the composition of reserves.

Central bank objectives and FX reserve allocation

The objectives and constraints of central banks, and hence the optimal asset composition of FX reserve portfolios, differ from those of institutional investors such as pension funds. While in principle the three objectives that central banks trade off in their reserve allocation decisions – safety, liquidity and return – are similar, the overarching goal of securing monetary and financial stability deeply influences their reserve management decisions, which remain subordinate to it. Indeed, it is precisely in the pursuit of this goal that central banks are typically structurally exposed to very large amounts of exchange rate risk: this is a policy decision that reserve management takes as given.

The main implication of this overarching aim is that central banks tend to favour liquidity and safety over return, and therefore be averse to volatility, which in turn can inhibit return-seeking behaviour. Here, the domestic governance environment and the central bank's relationship with the government and the body politic can play a significant role (Borio et al (2008b)). Especially if higher volatility – and hence even temporary losses – results from seeking higher returns, the central bank may come under closer public scrutiny and see its reputation at risk. Moreover, rules for profit remittances to the government may reinforce this aversion to volatility. While such rules vary widely, they tend to be asymmetric: profits are remitted but losses do not lead to automatic recapitalisation of the central bank (Ferhani (2007)). In this context, higher volatility of returns available for distribution increases the likelihood that central bank capital is eroded over time. This, in turn, may be perceived as undermining the central bank's budgetary, and thus possibly also operational, independence. Additionally, in some countries an advance estimate of the profit remittances to the government may need to be provided. Such a practice is also likely to constrain central banks from investing in riskier assets whose income stream cannot be predicted with the required level of confidence.

Profit remittances are asymmetric

More return-oriented investment strategies across asset classes may also be discouraged by arrangements that only selectively buffer the impact of volatility in returns on reported profits. It is not uncommon for central banks to exclude the unrealised gains on foreign exchange from the income statement (Bakker (2007)). Exchange rate effects are further moderated by maintaining a currency revaluation account to absorb some of the FX valuation losses. By

contrast, provisions to buffer the non-FX-related volatility arising from market movements on bonds and other assets are generally more limited.[7]

Conclusions

Estimates of the financial costs of holding FX reserves in the period 1999–2007 for a sample of emerging market countries suggest that the reduction in financial costs from extending duration and diversifying into equities would have been sizeable on average in absolute terms, but generally small relative to GDP. In addition, the debate on the diversification benefits of FX reserves into riskier asset classes cannot ignore the broader institutional arrangements, including the fact that central banks are likely to face significant public scrutiny of their investment performance, and concerns about capital losses and independence.[8]

In circumstances where reserves have been built up through quasi-fiscal surpluses that represent national wealth or through a transformation of non-renewable commodities into financial assets, the cost-benefit analysis might lead to different conclusions because funding costs are not involved. Managing such reserves can be done more in the spirit of "real money" managers or endowment funds. A possible remedy to reduce income volatility for the central bank could be to transfer the riskier assets to stabilisation funds or sovereign wealth funds with a mandate quite different from the management of FX reserves.

The financial costs discussed in this paper provide a very narrow definition of the overall costs associated with FX reserve holdings. Intervention to resist exchange rate appreciation may involve a consideration of macroeconomic costs and benefits that are of greater importance than the financial cost of the reserves themselves. Nevertheless, central banks have been constantly seeking ways to improve their reserve management practices and governance frameworks, and the focus on achieving beneficial risk-return trade-offs from a more structured investment process is likely to increase going forward.

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[7] In fact, many central banks mark down their bond prices to market, if this is lower than the price at which the bond was acquired, while price appreciation is not reflected in the accounting profits until the bond is sold or has matured.

[8] Further, the potential benefits of broadening the asset universe would also need to be weighed against the necessary investments in infrastructure, resources and organisational arrangements needed to support the implementation of new strategies. See, for instance, Borio et al (2008a) for a discussion on the operational framework of FX reserve management.

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Credit derivatives and structured credit: the nascent markets of Asia and the Pacific[1]

Nascent markets for credit derivatives and structured credit in Asia and the Pacific were poised for rapid growth when the global financial turmoil hit. While there has been no significant deterioration in the quality of the underlying names, credit markets in the region have been swept up in the global widening of spreads and aversion to structured finance.

JEL classification: G12, G13, G15.

In recent years, new instruments have transformed the global markets in credit risk. Indeed, the use of such instruments as credit default swaps (CDS), traded CDS indices and collateralised debt obligations (CDOs) has evidently contributed to an overall narrowing of credit spreads over nearly five years. Since mid-2007, however, as the global financial turmoil has unfolded, CDS spreads have widened sharply and issuance of CDOs has stalled. While the markets that involve Asia-Pacific names have largely avoided any fundamental deterioration in the quality of underlying assets, they have been swept up in the global widening of spreads and the slowdown in structured credit deals.

The three most significant instruments in the transformation of global credit markets have been single-name CDS contracts, traded CDS indices and CDO structures.[2] These innovations all serve to reallocate credit risk among investors. A single-name CDS contract is an over-the-counter derivative in which the buyer pays a fixed premium in return for protection against losses in the event of default by a specified borrower. CDS contracts are most actively

[1] The authors are grateful for useful discussions with Claudio Borio, Anthony Cheng, Ian Croft, Mark Drabkin, Peter Eastham, Ingo Fender, Már Gudmundsson, Robin Gvozden, Jacob Gyntelberg, Anirban Lahiri, Yi Li, Mico Loretan, Frank Lu, Sheree Ma, Frank Packer, Dipesh Patel, Allan Redimerio, David Rosa, Mike Scherrer, Ashish Sekhri, Miwa Suzuki and Haibin Zhu. We thank Emir Emiray for excellent research assistance. The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS.

[2] The 2007 BIS Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity showed that positions in global over-the-counter credit derivatives had increased more than elevenfold since June 2004, to reach $51 trillion in June 2007. CDS contracts accounted for 88% of that total. Data from the Securities Industry and Financial Markets Association show that the total global issuance of CDOs increased about fourfold between 2004 and 2006, to reach $552 billion in 2006.

traded in the form of CDS indices, which consist of standardised portfolios of single-name CDS contracts. A CDO is a securitisation where the risk of a credit portfolio is transformed into tranches of varying risks by means of a subordination structure. The possibility of arbitrage transactions across the three instruments ties their prices closely together.

By the late 1990s, these instruments had started to reference borrowers in Asia and the Pacific. CDS contracts became available for names from the region and collateral portfolios for CDOs began to include these entities. The first CDS indices focusing on the region began trading in 2003. Nonetheless, these markets remained relatively small and illiquid compared to their counterparts in Europe and the United States. They were in fact seen as mere appendages to the larger markets, with investors coming largely from outside the region.

It was not until late 2006 that these Asia-Pacific markets began to emerge as potentially serious markets in their own right. There was a surge in bond issuance in the region, much of it by new large borrowers. Single-name CDS contracts were written on these new names, CDS indices were reconstituted to include them, and CDOs were structured to take advantage of the diversification opportunities they offered. The traded indices gained liquidity, which spilled over into single-name CDS contracts. All this activity, however, has now been severely dampened by the global financial turmoil.

This special feature provides an overview of the credit risk markets in Asia and the Pacific, focusing on the instruments that involve local names as underlying assets. We start with the single-name CDS market, then discuss traded CDS indices before surveying the CDO market, all based on debt issued by entities from the region.[3] Finally, we discuss how these markets have fared during the recent episode of market turbulence.

Credit default swaps

One out of four CDS names is from Asia and the Pacific

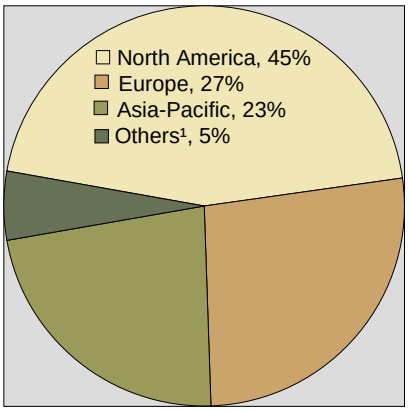
There are now an impressive number of names from the region that can be traded in the form of single-name CDS contracts. The left-hand panel of Graph 1 is constructed from the Markit database, which has the most comprehensive global coverage, and shows that Asia-Pacific names comprise almost a quarter of all those traded around the world. For a breakdown by economy within the region, we combine Markit data with a list assembled from three major dealers in Hong Kong of Asia-Pacific names that were traded as of early December 2007 and early January 2008. Our list shows a total of 921 names. In terms of the number of names from each economy, Japan, India, Taiwan (China), Australia, Hong Kong SAR and Korea dominate the market. There are also CDS contracts for names from Malaysia, Indonesia, China, Thailand and Singapore (Graph 1, right-hand panel).

As is the case in Europe and North America, the CDS market in Asia and the Pacific is concentrated in borrowers considered to have some but not too

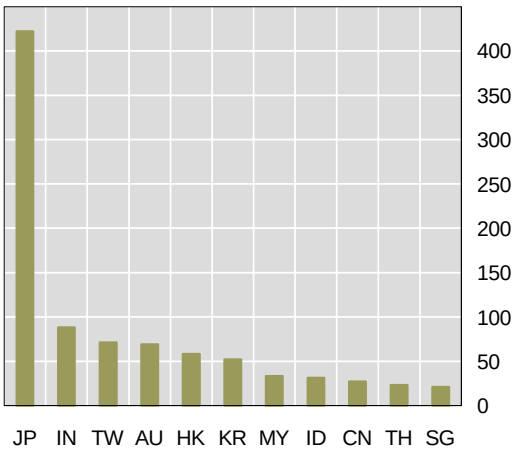
[3] Note that there are significant Asian investments in global CDS and CDO markets which are mainly based on North American and European assets.

CDS names by geographical location

Distribution by region



Number of names by economies in Asia and the Pacific



AU = Australia; CN = China; HK = Hong Kong SAR; ID = Indonesia; IN = India; JP = Japan; KR = Korea; MY = Malaysia; SG = Singapore; TH = Thailand; TW = Taiwan, China.

[1] Comprises Africa, the Caribbean, Latin America, the Middle East, offshore centres and supranationals.

Sources: Citibank; Deutsche Bank; Markit; Merrill Lynch. Graph 1

much credit risk. Indeed, close to four fifths of the traded names in the region have ratings between A and BB. The typical maturity is five years. Credit events tend to be defined so as to include bankruptcy, failure to pay and restructuring.[4] Almost all large banks make markets for single-name CDS in the region. However, only a small number of names are traded every day. These are those that are part of a traded CDS index, and they trade at bid-ask spreads of 10 to 20 basis points.

The market tends to be limited to international investors

The Asia-Pacific CDS market still tends to be limited to *international* investors. One reason for this is that the local currency bond markets in the region still tend to accept only issuers with the highest ratings from the point of view of *domestic* investors, who would therefore see little need for protection in the form of CDS contracts.[5] From the perspective of international investors, however, what is highly rated by domestic rating agencies might not be so highly rated by international rating agencies. Depending on the economy, domestic AAA names are often rated only A or BBB internationally, and foreign investors would thus be interested in hedging the concomitant credit risks.

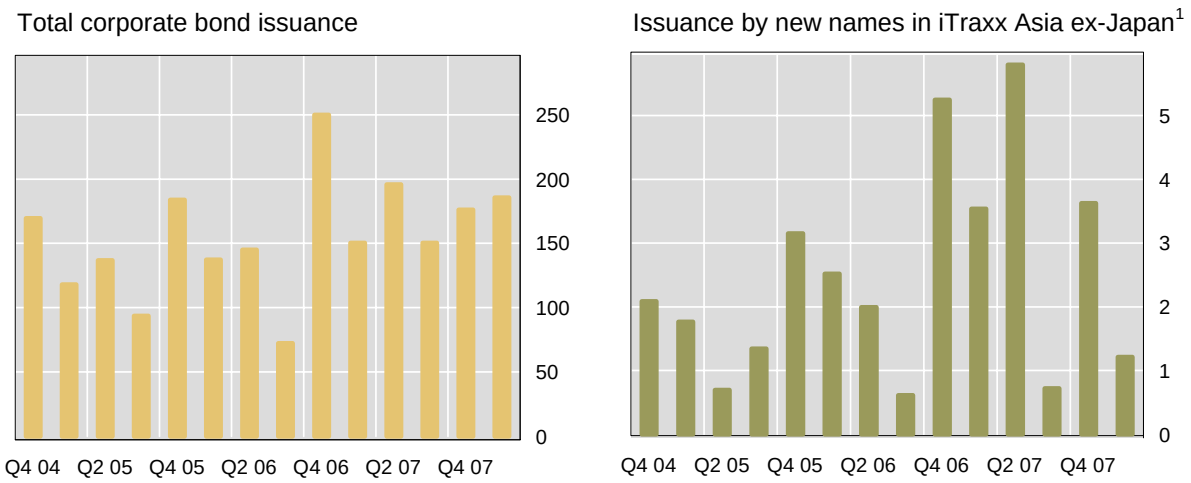
How do names come to be traded in the CDS market? Apart from the existence of significant credit risk, a critical factor is the availability of information about the entities that would allow a meaningful evaluation of the risk. Large companies that are listed on major stock exchanges and owe significant amounts of debt enter the CDS market readily. New names tend to enter this market when they go through an IPO or issue convertible bonds, since banks and investors then have good information about their credit quality.

[4] For details on contractual terms on single-name CDS, see Packer and Zhu (2005).

[5] See the discussion in Gyntelberg et al (2005) on the credit quality gap in Asia.

Bond issuance in Asia and the Pacific

In billions of US dollars



[1] The total amount of bonds issued by 11 investment grade names and 11 high-yield names newly included in the iTraxx Asia ex-Japan Index Series 8 on 21 September 2007.

Sources: Dealogic; Markit; authors' calculations. Graph 2

Late 2006 saw a surge in CDS activity

Starting in the fourth quarter of 2006, a surge of non-government bond issuance in the region led to heightened activity in single-name CDS contracts. As shown in Graph 2, issuance was up substantially over this and the following few quarters. Many of the issuers were large borrowers who had come to the market for the first time. Single-name CDS contracts for these borrowers became so important that they were made part of the most actively traded CDS indices for the region. These names included many Chinese and Indian banks on the investment grade side and several Chinese property development companies on the non-investment grade side.

Traded CDS indices

CDS indices are the most actively traded instruments

CDS indices are by far the most actively traded instruments in global credit markets, and those in the Asia-Pacific region are no exception. There are currently three groups of indices, with names from three separate subregions, namely Asia (excluding Japan), Japan and Australia. These indices consist of the more liquid CDS contracts, which can thus be traded as portfolios. For the Asia (excluding Japan) subregion, two iTraxx indices now trade actively: an investment grade (IG) index (50 names) and a high-yield (HY) index (20 names). For Japan, there is the iTraxx Japan index with 50 IG names and a sub-index, the Japan HiVol, consisting of the 25 names with the widest spreads among the 50 in the larger index. The iTraxx Australia index has 25 IG names from Australia and New Zealand. Table 1 shows the major characteristics of each of these indices.

Trading activity in the two iTraxx Asia ex-Japan indices received a big boost in 2007 after they were reconstituted to include large new issuers. These indices now often trade at bid-ask spreads of no more than 1 basis point. The iTraxx Japan and Australia indices even offer first-to-default (FTD) baskets, which allow investors to take positions in the loss distribution of a credit

The current Asia-Pacific CDS indices				
iTraxx index	Names	Economies	Maturities (years)	Average ratings[1]
Asia ex-Japan IG	50	8[2]	5	A3/A–
Asia ex-Japan HY	20	8[3]	5	Ba2/BB
Japan	50	1	3, 5, 10	Baa1/BBB+
Japan HiVol	25	1	5	Baa3/BBB–
Australia	25	2[4]	5, 10	A3/A–

[1] BIS calculation based on Moody's/Standard & Poor's ratings. [2] The breakdown of names by economy is: China: five; Hong Kong SAR: six; India: six; Korea: 14; Malaysia: seven; Singapore: seven; Taiwan (China): two; Thailand: three. [3] The breakdown of names by economy is: China: two; Hong Kong SAR: seven; India: three; Indonesia: two; Korea: one; the Philippines: two; Singapore: two; Vietnam: one. [4] The breakdown of names by economy is: Australia: 24; New Zealand: one.

Sources: International Index Company; JPMorgan Chase. Table 1

portfolio.[6] Nonetheless, trading volumes in the Asia-Pacific indices in general are still dwarfed by volumes in the US CDX index and the iTraxx Europe index, which are the world's two most actively traded credit instruments.

Collateralised debt obligations

Different types of CDOs

CDOs can be either balance sheet or arbitrage …

Collateralised debt obligations (CDOs) are securitisations that transform credit risk by means of a subordination structure. Two basic types are balance sheet CDOs and arbitrage CDOs. In a balance sheet CDO, assets are taken from a single bank's balance sheet. In arbitrage CDOs, the manager assembles the collateral pool by buying bonds from the market. Balance sheet CDO deals have been arranged mainly to achieve regulatory capital relief and reduce constraints on fresh lending capacities. To save on regulatory capital, banks put in a CDO those loans that require relatively high capital charges for a given level of risk. Arbitrage CDOs, by contrast, are designed to profit by arbitraging between market spreads and expected losses, where the former tend to be much larger than the latter.[7] In practice, however, it is sometimes difficult to distinguish between balance sheet and arbitrage CDOs.

… and either cash or synthetic

CDOs can be further classified into cash and synthetic CDOs. In a cash CDO, the manager assembles a collateral pool of debt, transfers it to a special purpose vehicle (SPV) and uses the cash flow from the collateral to pay principal and interest to investors in the CDO. In a synthetic CDO, the manager assembles CDS contracts rather than actual debt. Compared to a cash CDO, a synthetic CDO has the advantage that the manager can quickly assemble a sufficient number of names by going to one or two CDS dealers.

[6] The Japan FTD Diversified (HiVol) basket comprises the six most liquid names from different sectors in the Japan (Japan HiVol) index. The Australia FTD Diversified basket is made up of the five most liquid names from different sectors in the Australia index, while the FTD High Beta basket consists of five non-financial entities with the highest spread from the top 15 most liquid names.

[7] See Amato and Remolona (2003, 2005).

The Asia-Pacific varieties

The history of CDOs in Asia is short compared to that in the United States and Europe. As in those regions, the first Asian CDO deals were balance sheet transactions motivated by banks' efforts to economise on capital, and were issued by Japanese banks in the late 1990s. Outside Japan, in December 2001, DBS Bank securitised USD 1.5 billion of CDS on corporate loans in the first Asian synthetic balance sheet CDO deal. Since then, the focus of CDO markets in Asia has shifted from traditional balance sheet CDOs to synthetic arbitrage CDOs and more recently to single-tranche arbitrage CDOs. The left-hand panel of Graph 3 shows that the growth in the Asia-Pacific CDO market peaked in 2006, while the right-hand panel shows that Japan and Korea accounted for more than half of the region's deals in 2005–07.

The focus has shifted to synthetic arbitrage CDOs

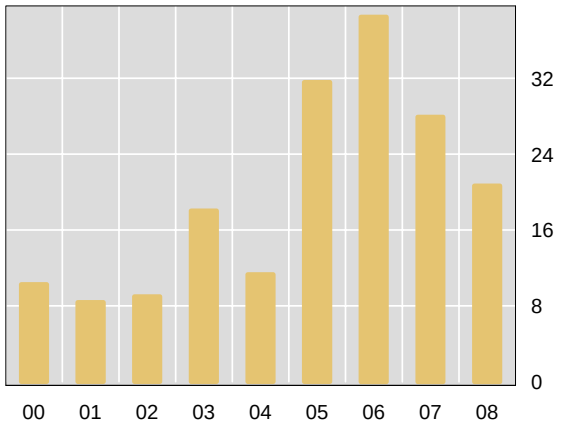
While Australia, Hong Kong SAR, Japan, Korea and Singapore have had the most active CDO markets in the region, a few banks in China, India and Malaysia have recently also completed several balance sheet CDO deals, drawing on their own loan portfolios. The most popular forms of collateral have been corporate loans and bonds, but leveraged loans, distressed loans and asset-backed securities have also been used. Banks and insurance companies form the main investor base for CDOs backed by both Asian and global assets.

In recent years, some banks from the region have structured synthetic CDOs by drawing from their own portfolios a geographically diversified collateral pool with a substantial amount of Asian exposure. Table 2 shows three examples of these deals. In each case, more than half of the underlying assets are from the Asia-Pacific region. In contrast to balance sheet CDOs, only a few arbitrage CDO transactions have relied on collateral pools consisting mainly of regional assets. This is partly because within-region diversification benefits are rather limited.

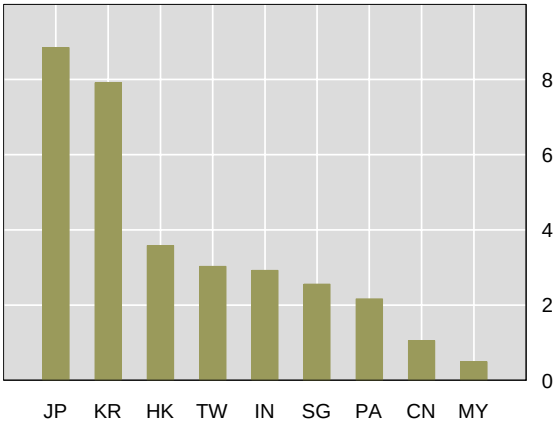
CDO issuance with Asia-Pacific names

In billions of US dollars

By year[1]



By economy[2]



CN = China; HK = Hong Kong SAR; IN = India; JP = Japan; KR = Korea; MY = Malaysia; PA = Australia and New Zealand; SG = Singapore; TW = Taiwan, China.

[1] Data from 2000 to 2004 are from Dealogic, Fitch IBCA, JPMorgan Chase, Moody's, Standard & Poor's, Thomson Financial Securities Data and national rating agencies. Data from 2005 to 2008 are from Standard & Poor's. The 2008 value is annualised based on the amount of issuance by end-March. [2] Average amount between 2005 and 2007.

Source: Standard & Poor's. Graph 3

Three Asia-Pacific synthetic balance sheet CDOs			
	ALCO 1 Ltd	Sealane Ltd[1]	Asiamea CLO Ltd
Portfolio size	USD 1.53 billion	USD 3 billion	USD 1.5 billion
Collateral pool	Corporate loans	Trade finance obligations	Mostly corporate loans[2]
Closing date	December 2001	November 2007	December 2007
Final maturity	2009[3]	November 2012	December 2013
Geographical distribution of collateral	100% Asia and the Pacific (Singapore, Hong Kong SAR, Malaysia, Taiwan (China), Japan, Australia, Korea)	84.5% Asia[4] (Hong Kong SAR, United Arab Emirates, Singapore, China, India, Malaysia, Korea)	61.4% Asia[5] (Hong Kong SAR, United Arab Emirates, Korea, China, Singapore, India, Thailand)
Originator	DBS Bank	Standard Chartered Bank	Standard Chartered Bank
Tranches by rating[6]	Super-senior, NR, 87.5% Mezzanine, AAA~BBB, 8% Equity, NR, 4.5%	Super-senior, NR, 89% Mezzanine, AAA~BBB, 10% Equity, NR, 1%	Super-senior, NR, 92% Mezzanine, BB+, NR, 6.75% Equity, NR, 1.25%

[1] Sealane (Trade Finance) Ltd is the issuer, and Sealane (Trade Finance) LLC the co-issuer. [2] Corporate loans and other obligations. [3] The mezzanine notes were redeemed back by 2006 as per the notes' option redemption provisions. [4] As well as the seven economies cited, includes 16 economies from Asia, the Americas, Europe and the Middle East. [5] As well as the seven economies cited, includes 29 economies from Asia, the Americas, Europe and the Middle East. [6] NR = not rated.

Source: Standard & Poor's. Table 2

Single-tranche CDOs

Single-tranche CDOs are a recent innovation

A more recent innovation in the CDO markets that has spread to Asia is the single-tranche CDO, a synthetic arbitrage CDO in which the sponsor sells only one tranche from the capital structure, usually to satisfy an investor's request for a particular level of credit quality. Most single-tranche CDO deals in Asia have been based on portfolios of global names with a small number of Asian names included. An example of a single-tranche CDO deal based substantially on Asian names is the Silk Road Plus series, which was launched in Singapore in 2006 and sold more broadly than most private deals.

For sponsors of single-tranche CDOs, hedging the credit risk is a challenging task. For European and North American names, this risk can largely be hedged using CDS indices as well as single-name CDS contracts. For Asian names, some sponsors use CDS indices to hedge part of the unsold credit risk but others do not hedge at all. Because of their liquidity, the iTraxx Asia ex-Japan indices are a popular hedging instrument for single-tranche CDOs with Asian names.

How the region's markets have fared in the global turmoil

No actual losses from default in traded names …

So far there have been no actual losses from default in traded names from Asia and the Pacific during the current financial market turmoil. There is also still no evidence of any significant deterioration in the credit quality of these names. Indeed, average credit ratings in the region have drifted upwards. The structured investment vehicles and the more complex CDO structures that have caused so much trouble in the US and European credit markets have not been

seen in Asia. Yet the recent turbulence in global financial markets has, to some degree, spilled over into the region's credit markets.

… yet spreads on CDS indices have risen sharply …

This spillover has been most evident in the spreads on traded CDS indices. As shown in the left-hand panel of Graph 4, the iTraxx Asia ex-Japan index has risen sharply since mid-2007, along with the major CDS indices of Europe and the United States. In addition, the growth of CDO issuance in Asia and the Pacific has stalled since 2007, as shown by the left-hand panel of Graph 3, following the decline in global CDO issuance.

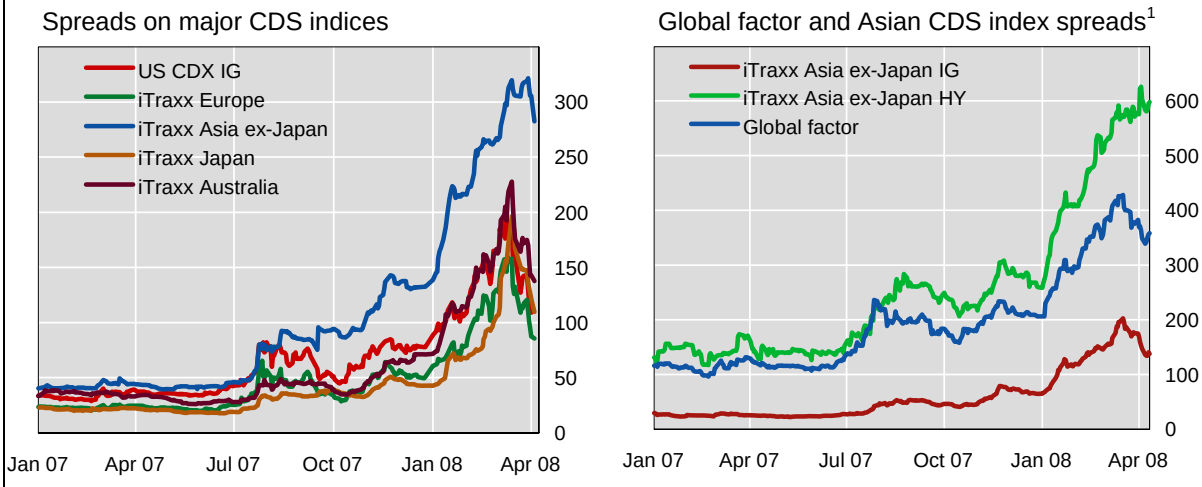
In the case of CDS spreads, one explanation for the spillover is that the spreads are driven primarily by risk premia rather than expected losses from default, and these premia depend largely on the changing risk aversion of global investors.[8] As mentioned above, the CDS market for Asian names is confined to international investors, with domestic investors finding little use for it. To measure the extent to which movements in CDS spreads for Asian names can be attributed to global risk aversion, we can use principal component analysis to extract the common factors that explain the movements of various CDS indices around the world. The right-hand panel of Graph 4 shows the most important of these factors. We can attribute to this global factor 95% of the daily movements of the iTraxx Asia ex-Japan IG index and 98% of the daily movements of the iTraxx Asia ex-Japan HY index. Unless we believe that default risks can be so highly correlated between Asia and the rest of the world, it is plausible to interpret the global factor as something that tracks global investor risk aversion, which has risen sharply since mid-2007.

… probably driven by global investor risk aversion

The arbitrage opportunities opened up by the widening of CDS spreads have so far not led to an increase in arbitrage CDO deals, as they would have

Spreads on CDS indices and the global factor

In basis points



[1] The global factor is an index constructed from the first principal component of the movements in the following eight indices from the United States, Europe and Asia and the Pacific: US CDX IG, US CDX Crossover, iTraxx Europe, iTraxx Europe Crossover, iTraxx Japan, iTraxx Australia, iTraxx Asia ex-Japan IG and iTraxx Asia ex-Japan HY.

Sources: JPMorgan Chase; Thomson Financial Datastream; authors' calculations. Graph 4

[8] Amato and Remolona (2003, 2005) decompose CDS spreads and show that the larger portion of the spread is accounted for by risk premia rather than expected losses from default.

in the past. On the contrary, such CDO issuance has shrunk for Asian names as well as for others. Since the diversification requirements of arbitrage CDOs require non-Asian names, the fact that global investors have become suspicious of CDOs in general has dampened such activity everywhere.[9]

Conclusion

Credit risk market innovations such as single-name CDS contracts, traded CDS indices and CDOs have made significant inroads in Asia and the Pacific. Single-name CDS referring to almost a thousand Asia-Pacific entities now trade in the market. There are actively traded CDS indices, separately covering names in Asia (excluding Japan), Japan and Australia. Synthetic CDO deals have been put together with names from within the region, albeit in combination with names from elsewhere.

In 2006, a surge of bond issuance in the region provided a major boost to the use of these innovations. This growth, however, has been interrupted by the recent global financial turmoil, which has caused spreads to widen sharply even for Asian names and reduced investors' interest in structured credit. Nonetheless, active trading in CDS indices has continued and the markets in the region are likely to resume their growth once global conditions settle down. These markets have been confined to international investors, and greater issuance of local currency debt by lower-rated borrowers in the region would induce more active participation by domestic investors.

Meanwhile, Asian market participants will draw lessons from the recent global market turbulence. They have seen the limitations to the use of complex financial structures and the inadequacies of risk management approaches used by financial institutions. Although the borrowers in Asia-Pacific credit markets appear to have strong fundamentals, the authorities in the region may wish to strengthen market oversight and encourage more robust risk management before fostering the further development of new credit risk instruments.

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[9] See Financial Stability Forum (2008) for a narrative of the global developments.

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Asian banks and the international interbank market[1]

Banks in the Asian economies most affected by the Asian financial crisis generally continue to enjoy comfortable liquidity in the international interbank market. The apparent international illiquidity of banks in Korea is concentrated in foreign banks. Foreign banks' offshore funding of local currency assets may in places have created a new vulnerability of local markets and banks to global bank liquidity crunches.

JEL classification: E58, F32, F34, G15, G18, G21.

Ten years ago, Asian banks were vulnerable to a change in the risk perceptions of global bankers because Asian banks had borrowed dollars at short term to finance long-term projects. Despite the build-up of official foreign exchange reserves since the crisis, growing international interbank claims on Asian banks raise the issue of the resilience of their own operations in the international interbank market. Liquidity could be tested not only by global banks' reassessment of Asian banks' creditworthiness but also by global banks' response to their own liquidity difficulties.

The combination of BIS banking data and national data suggests that banks in Malaysia, the Philippines and Thailand enjoy a comfortable excess of international interbank placements over their borrowing from this market. Their international liquidity mirrors that of their domestic banking systems. The practice of central banks there of managing domestic liquidity by selling dollars spot and buying them back forward has also boosted the international liquidity of banks. Banks in Korea do show a rapid build-up of international interbank debt, which stands well in excess of claims on banks abroad. Even so, this apparent international liquidity mismatch is concentrated in *foreign* banks operating in Korea, and hence the situation differs from that in 1996–97. Korean banks are thought by market participants to manage their dollar liquidity prudently.

Events since the middle of 2007, however, have thrown into relief new vulnerabilities. A curtailment of international interbank credit to Asian banks could reflect more the liquidity needs of the major international banks

[1] Our thanks go to Eric Chan for research assistance and to Ben Craig, Corrinne Ho, Heinz Herrmann, Kyungsoo Kim, Patrick McGuire and Philip Wooldridge for discussion. All errors remain the responsibility of the authors. The views expressed are those of the authors and not necessarily those of the BIS or the Deutsche Bundesbank.

themselves than any change in Asian banks' creditworthiness. More subtly, to the extent that foreign banks use offshore dollars to fund Asian local currency claims on non-banks, Asian banks and fixed income markets could be adversely affected in the event that global banks were to call dollar funding home. Again, such offshore funding bulks largest in Korea among the economies most affected by the Asian crisis. In 2007, Korean policy sought to limit such offshore funding in order to attenuate the associated liquidity risk, albeit at the expense of segmenting the onshore and offshore won markets.

This special feature combines BIS and national data to produce measures of the international interbank liquidity of banks in the economies most affected by the Asian crisis and qualifies the measure in the case of Korea. It then identifies a hitherto less appreciated vulnerability that can arise in a global banking liquidity crunch.

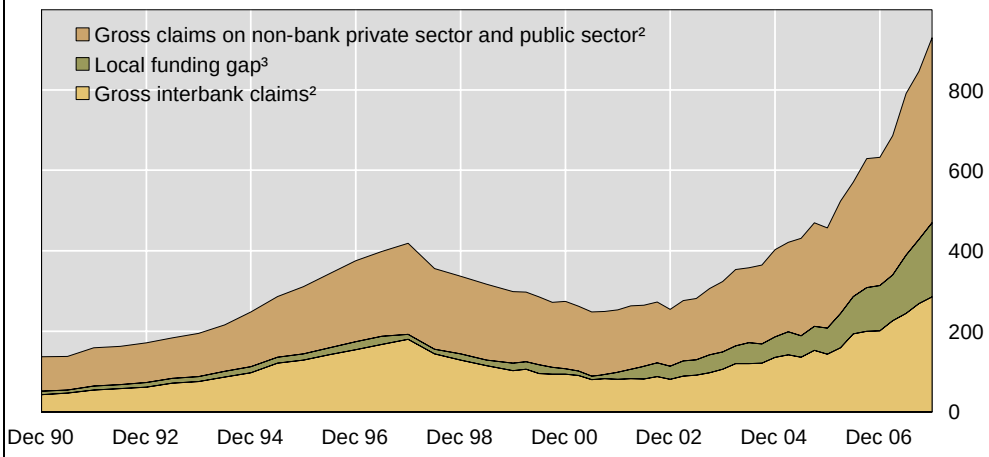
Asian banks' international interbank liquidity: where do we stand?

Asian banks built up their borrowing from the international interbank market in the early 1990s, suffered a run in 1997–98 (Radelet and Sachs (1998), Bussière and Mulder (1999)) and spent the next five years paying down their debts to banks abroad. Since the US dollar's peak in 2002, Asian banks have once again begun to increase their borrowing from banks abroad. By 2006, Asian banks had reached pre-crisis levels of borrowing, raising the question of where their liquidity position stands (Graph 1).[2]

To assess the vulnerability of Asian banks to a curtailment of funding in the international interbank market, one would ideally like to have the time profiles of maturing foreign currency obligations. Against this, one would set

Consolidated claims vis-à-vis major Asian economies[1]

In billions of US dollars



[1] China, India, Indonesia, Korea, Malaysia, Taiwan (China) and Thailand. [2] Cross-border claims and local claims denominated in foreign currency. [3] Excess of local currency assets over local currency liabilities.

Sources: BIS; authors' calculations. Graph 1

[2] See Turner (2007) for a review of Asian banks' income, costs and non-performing loans.

holdings of maturing interbank deposits with high-quality counterparties and top-quality, liquid securities. In practice, neither such time profiles, nor holdings of liquid securities such as US Treasury bills, nor measures of off-balance sheet commitments in foreign currency are available. Our measure is thus restricted to international interbank assets and liabilities, which are all taken to be short-term. The gap between an ideal measure and the proxies used should be borne in mind in interpreting the results of the present analysis.

Comparing international interbank assets and liabilities ...

What follows uses a combination of BIS and national data to measure the position of banks in Asia vis-à-vis the international interbank market. BIS data are relied on for the claims of international banks on Asian banks.[3] The liabilities to these banks reported by BIS area banks, however, include deposits from the official sector, notably official reserves. Some 30% of reserves are deposited in banks (Wooldridge (2006)), and less than 25% of identified holdings of dollar reserves (McCauley (2007)). Official reserves can be purged from the BIS data using the data disclosed under the Special Data Dissemination Standard (SDDS), which identify the location of bank deposits.[4]

Malaysia, the Philippines and Thailand

... suggests liquid positions for banks in three countries ...

By these measures, banks in Malaysia, the Philippines and Thailand enjoy a comfortable excess of interbank assets over liabilities. In Graph 2, global banks report larger liabilities to banks in these countries (blue lines) than consolidated claims on these banks (green lines). Both the overall liquidity of their banking systems and central bank liquidity management have contributed to the international liquidity of banks in these countries.

First, these banking systems have tended to feature excess liquidity owing to weak credit growth in relation to domestic deposit growth. This can be seen in the ratios of loans to deposits standing well below 1 (Graph 3). Such relatively restrained loan growth does not draw in offshore funding the way rapid loan growth tends to do (IMF (2007, p 24)).

... owing in part to the use of swaps for domestic liquidity management

A second factor is the practice of the central banks in these countries of using foreign exchange swaps to manage domestic liquidity.[5] Injections of

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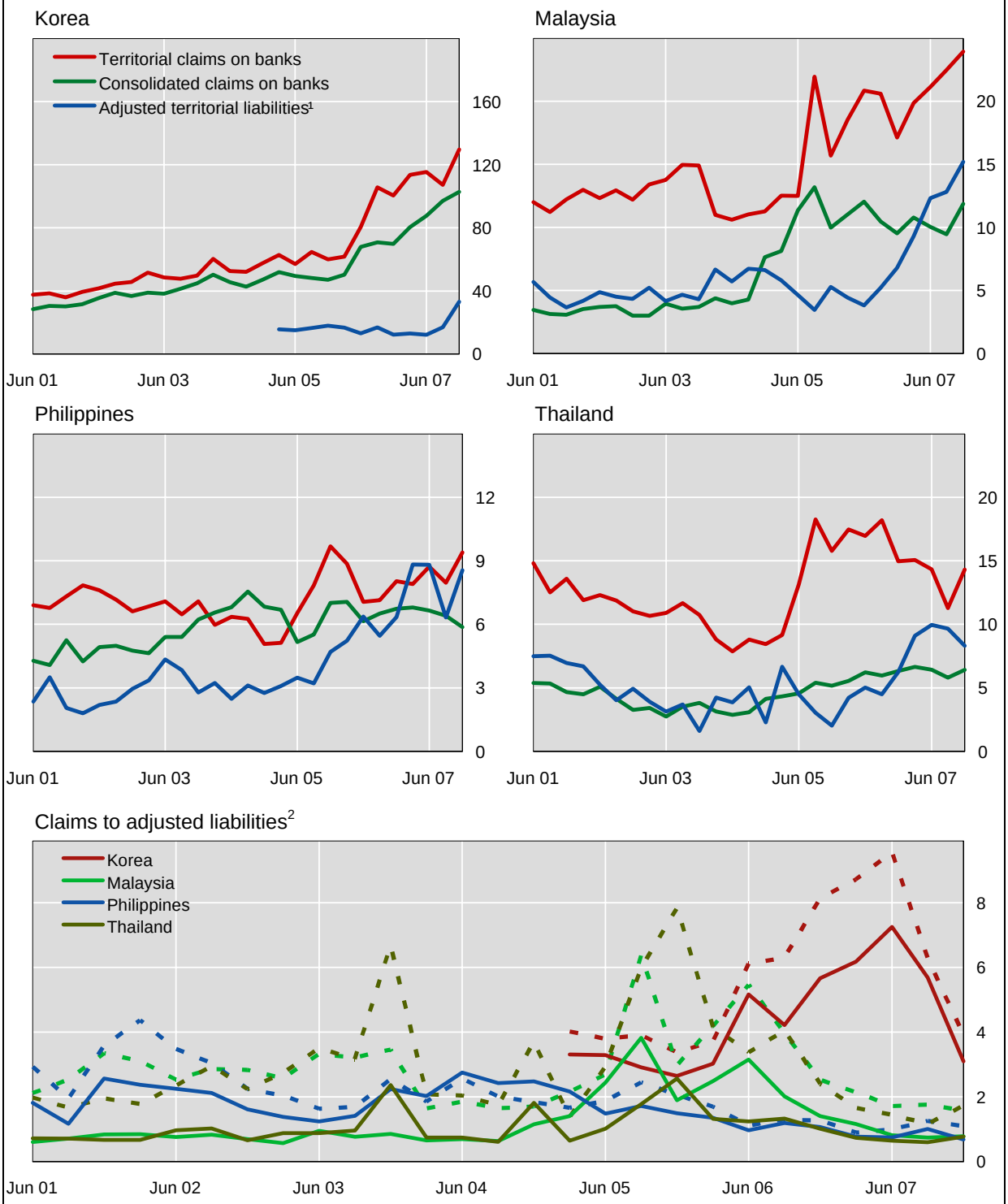
[3] The international banking statistics of the BIS provide internationally comparable measures of exposure to national banking systems of the contributing banks on a locational and a consolidated basis. Banks from most of the major financial centres around the world (the so-called "BIS reporting banks" headquartered in more than 30 participating jurisdictions) report their claims on entities abroad either based on their "locational" residency, including positions vis-à-vis banks' foreign offices, or on a consolidated basis. Whereas the locational set is compatible with data compilation for balance of payments statistics, the consolidated set nets out intragroup positions. Thus consolidation means that cross-border lending – representing an important part of overall international banking – is captured as lending to unaffiliated end borrowers in a given jurisdiction abroad. For an introduction on how to use the international banking statistics of the BIS, see Wooldridge (2002). For information on recent enhancements to the statistics, see McGuire and Wooldridge (2005); for a guide, see BIS (2006).

[4] Thailand reports substantial repos with banks outside Thailand, and Malaysia a small amount with banks outside Malaysia, that are also excluded from the cross-border liabilities compiled by the BIS.

[5] G10 central banks used to do likewise, in some cases with the intention of providing dollar liquidity to domestic banks. BIS (1964, p 132) identifies "certain central banks [that] have

Interbank exposure for selected Asian countries

In billions of US dollars



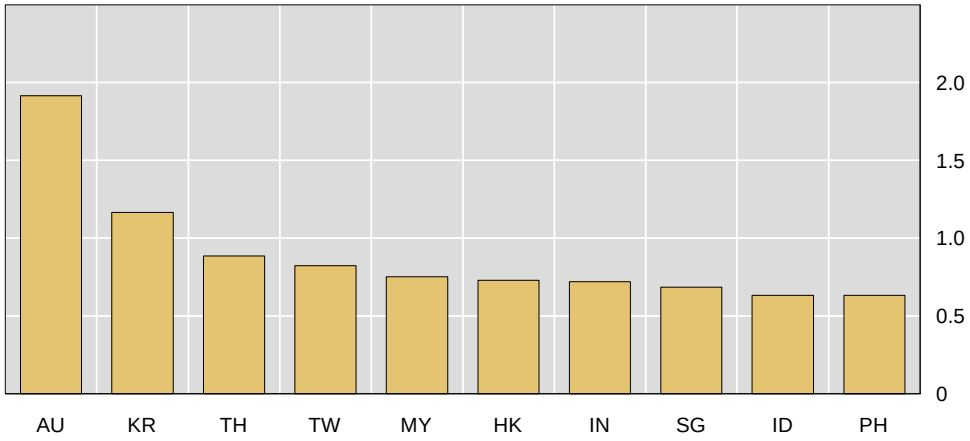
[1] Territorial liabilities less SDDS reported reserve holdings in banks outside the country. [2] Dotted lines represent the ratio of territorial claims to adjusted territorial liabilities, while solid lines represent the ratio of consolidated claims to adjusted territorial liabilities.

Sources: IMF, SDDS templates; BIS; authors' calculations. Graph 2

facilitated the holding of dollars by their commercial banks – by way of swaps or deposits – for reasons connected to domestic monetary policy".

Loan/deposit ratio of banking systems in Asia and the Pacific

At end-November 2007



AU = Australia; HK = Hong Kong SAR; ID = Indonesia; IN = India; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; TW = Taiwan, China.

Sources: Bloomberg; CEIC; authors' calculations. Graph 3

bank reserves resulting from purchases of dollars are sterilised through various means, including by selling the dollars spot for domestic currency and by buying the dollars forward. Swap counterparties, including banks in the country, end up holding dollar liquidity until the dollars are sold back to the central bank in the forward leg of the swap. Central banks in all three countries have reported substantial increases in forward purchases of dollars as a result of using swaps to sterilise dollar purchases over the last two years (Table 1).

That foreign exchange swaps provide dollar liquidity to local banks may be an unappreciated beneficial side effect of the use of this instrument. Asian central banks have in recent years tended to prefer to drain liquidity through repurchases against domestic government paper or the issue of central bank paper, in part in order to develop domestic bond markets. Foreign exchange swaps have often almost been treated as an instrument of last resort, used when other instruments were limited or the need to drain urgent. Rate of return may also be an important consideration – central bank paper would normally pay a lower rate than that implied by swaps. Against these considerations, foreign exchange swaps may seem a more attractive option if the boost to the international liquidity of banks headquartered in the country is taken into

Net positions in forwards in foreign currencies vis-à-vis domestic currency

In billions of US dollars

	End-2005	End-2007
Indonesia	0.0	0.0
Korea	28.4	22.5
Malaysia	0.0	13.8
Philippines	0.5	10.8
Thailand	3.8	19.1

Source: IMF, SDDS templates. Table 1

account. However, policymakers may view bank dependence on the official sector for foreign currency liquidity as undesirable.

Korea

Banks in Korea do not appear to be in such a comfortable position. To some extent, faster credit growth, boosting loans above deposits, has attracted offshore funding. And the Korean authorities have recently reported a decline in forward purchases of dollars (Table 1). Two factors need to be taken into account, however, before drawing any conclusion.

Foreign banks' operations account for the less comfortable liquidity position of banks in Korea

First, foreign banks operating in Korea account for more than 40% of the cross-border interbank liabilities of banks in Korea. Moreover, Korean data by maturity show that foreign banks account for the bulk (60%) of short-term external liabilities of banks in Korea (Table 2). This sharply contrasts with the situation before the Asian financial crisis, when domestic Korean banks accounted for about 70% of short-term external liabilities. Were the loan books of banks in Korea to deteriorate, as in 1996–97, one would not expect foreign banks suddenly to withdraw dollar funding from their own affiliates as they did from unaffiliated Korean banks 10 years ago (CGFS (2004, pp 1, 14)).

Second, Korean bank supervisors' rules requiring that Korean banks maintain strong foreign currency liquidity are seen by market participants as effective. After the crisis, Korea's prudential authority, the Financial Supervisory Service, introduced regulations to limit the maturity mismatches in banks' foreign currency books (Chung (2000)). In particular, foreign currency assets of less than three months' maturity must represent a minimum of 80% of such liabilities, while such assets maturing in a month must be 90% of corresponding liabilities and such assets maturing in seven days must exceed corresponding liabilities. Half the funding of foreign currency assets of over three years' maturity must be done with liabilities of similar tenor. "Fitch notes that in regards to the […] three-month ratio, over the period [from] end-2002 to 30 September 2007, Korea's banks predominantly maintained a ratio of just over 100% – well above the minimum 85% required" (Tebbutt et al (2008, p 3)).

In sum, the combination of BIS international banking data and disclosures on reserve holdings suggests that banks in Malaysia, the Philippines and Thailand have the foreign currency liquidity to withstand a change in counterparty risk assessments. Of course, without finer data by maturity, and information on possible liquidity drains from off-balance sheet commitments, the data reviewed provide only a broad indication. In the case of banks in

Nationality and short-term external position of banks in Korea

In billions of US dollars

Bank nationality	June 1997			December 2007		
	Liabilities	Assets	Liabilities/ assets	Liabilities	Assets	Liabilities/ assets
Korean	47.2	34.3	1.4	53.5	34.1	1.6
Other	20.9	6.1	3.4	78.8	9.4	8.4
Total	68.1	40.4	1.7	132.3	43.5	3.0

Source: Bank of Korea. Table 2

Korea, foreign banks account for much of the interbank borrowing from abroad.

Foreign banks and the local funding gap

An unappreciated vulnerability …

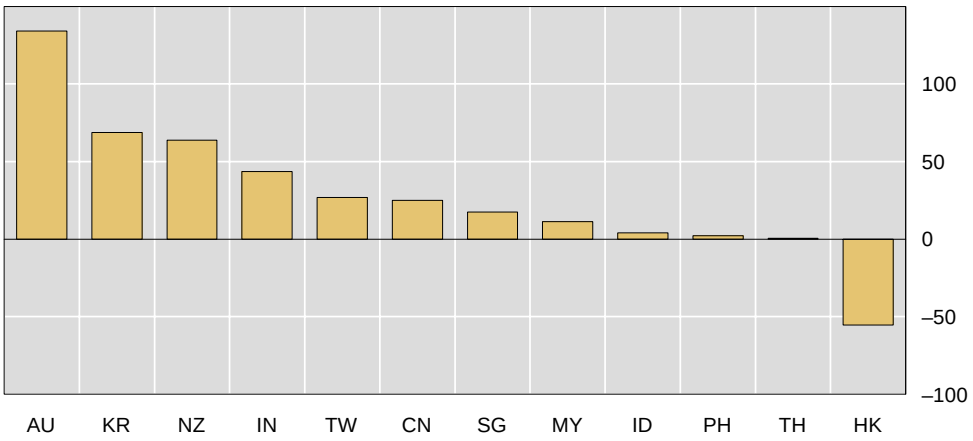
The international financial turmoil of the past year has highlighted a new vulnerability associated with foreign bank operations in Asian countries that are funded offshore. In 1997, foreign banks curtailed their lending to Asian banks as evidence accumulated of their deteriorating loan quality. More recently, global banks have faced the prospect of a sudden need for dollar liquidity and increased difficulty raising it from the interbank or capital markets. Under these circumstances, global banks might not only try to reduce their foreign currency claims on local banks, in a manner similar to, though for a reason other than, their behaviour in 1997. In addition, foreign banks might seek to reduce their funding of their own offices in local markets or even raise funds locally through such offices. Such a withdrawal of funding of own offices could produce instability in domestic money and capital markets.

… from dollar funding of local currency assets …

To better understand this vulnerability, it is necessary to appreciate why foreign branches in local markets finance local assets with dollars borrowed offshore. Some foreign banks enjoy relatively strong local currency asset growth while others respond to arbitrage opportunities. Some foreign banks succeed more in selling local currency loan products – mortgages, personal or credit card loans, for instance – than they do in selling deposits. Rather than relying on uncollateralised interbank funds, the foreign bank may find it cheaper to borrow dollars from abroad and to swap them for local currency, thereby funding the local currency assets. In other cases, foreign branches acquire local currency assets almost incidentally as part of an arbitrage. For

Foreign banks' net local claims in Asia and the Pacific[1]

In billions of US dollars

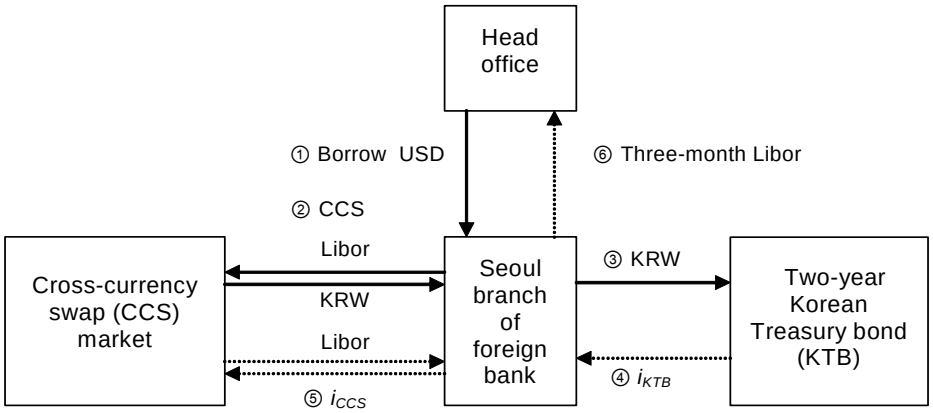


AU = Australia; CN = China; HK = Hong Kong SAR; ID = Indonesia; IN = India; KR = Korea; MY = Malaysia; NZ = New Zealand; PH = Philippines; SG = Singapore; TH = Thailand; TW = Taiwan, China.

[1] Positions of foreign banks' local affiliates denominated in local currencies and vis-à-vis local residents; claims minus liabilities, at end-December 2007.

Source: BIS. Graph 4

Foreign bank in Korea funds won government bond with dollars



1. Seoul branch of foreign bank borrows three-month dollars from its head office. 2. Seoul branch of foreign bank enters cross-currency swap, exchanging floating rate US dollars for fixed rate won. 3. Seoul branch of foreign bank invests won in two-year Korean Treasury bond. 4. Seoul branch of foreign bank receives fixed rate won on two-year Korean Treasury bond. 5. Seoul branch of foreign bank pays fixed rate won to counterparty in cross-currency swap market, profiting by the difference between the yield on the Korean Treasury bond and the fixed rate agreed with the swap counterparty ($i_{KTB} - i_{CCS}$). 6. Seoul branch of foreign bank receives three-month Libor from swap counterparty and passes it on to head office. Figure 1

example, if exporters seek to hedge their cash flows by selling US dollar receipts forward in great volume, the local currency interest rate implied in forwards can fall relative to domestic money and market yields. Then, a foreign bank branch can profit by borrowing dollars offshore, swapping them for local currency and investing the proceeds (in what might be seen as a carry trade).

For both reasons, BIS reporting banks' net local currency assets, dubbed the local funding gap, have increased substantially in the region (Graphs 1 and 4). Looking across countries, the sums involved are small for Malaysia, the Philippines and Thailand. Again, Korea, with its robust bank credit growth and strong hedging pressure from exporters, has seen foreign banks' net won assets expand sharply. This has given rise to several policy concerns.

… leading to policy concerns …

The widening of the local funding gap has been seen as weakening the monetary transmission mechanism and apparently adding risk to Korea's international balance sheet. Korean exporters, especially shipbuilders, have sold forward their dollar receipts from contracts extending over several years (Bank of Korea and FSS (2008)). These long forward sales of dollars against won pushed down won yields in cross-currency swaps. Foreign banks responded by borrowing dollars offshore, swapping them for won and acquiring government bonds (Figure 1, adapted from Kim (2007)). As a consequence, foreign banks came to own 15% of Korean government and monetary stabilisation bonds (Kim (2007)). This heavy buying was thought to have kept Korean bond yields from rising in response to higher policy rates and thereby to have limited the effectiveness of the policy tightening. The concern with the liquidity of the Korean external balance sheet arose because the foreign banks were funding their holdings of Korean public securities with dollars borrowed offshore at short term. The Korean authorities took the view that the resulting

build-up of short-term external debt[6] was leading to a deterioration of the international liquidity of Korea (see box).

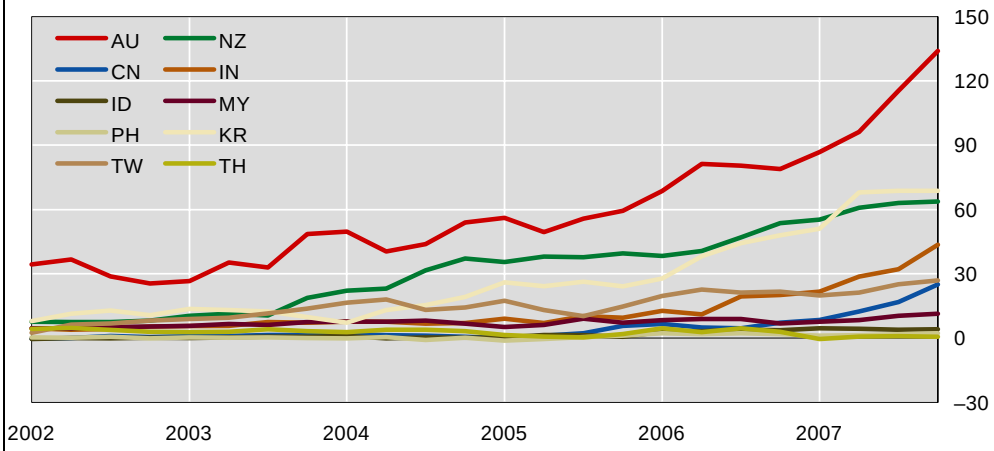
... and policy responses

The Korean authorities took several measures in April 2007 to stem the build-up of short-term interbank debt by foreign banks (IMF (2007), Bank of Korea and FSS (2008), Tebbutt et al (2008)). Moral suasion induced foreign banks not to respond to strong incentives to swap dollars borrowed abroad for Korean won. Moreover, limits were reinstated on lending in foreign currency to Korean firms, another source of demand for funds from abroad. Finally, starting in 2008, limits on tax deductibility of debt to affiliates, originally intended to limit the opportunities for shifting income offshore, would be reduced, as a further measure to limit bank inflows (but only borrowings from affiliates).

These policies appear to have worked, although at a cost. Foreign banks in Korea expanded their net won assets sharply in the second quarter of 2007, but these levelled off in the remainder of the year (Graph 5). Huge arbitrage opportunities opened up between the offshore forward or cross-currency swap, on the one hand, and the onshore certificate of deposit or government bond yield, on the other (Graph 6).[7] Even before the strains in global interbank markets, a foreign bank could borrow won against dollars at rates 100 basis points below money market or government bond yields – and 200 basis points since then. Foreign investors, including hedge funds, picked up the slack to

Foreign banks' net local claims on banks in Asia and the Pacific[1]

In billions of US dollars



AU = Australia; CN = China; ID = Indonesia; IN = India; KR = Korea; MY = Malaysia; NZ = New Zealand; PH = Philippines; TH = Thailand; TW = Taiwan, China.

[1] Positions of foreign banks' local affiliates denominated in local currencies and vis-à-vis local residents; claims minus liabilities.

Source: BIS. Graph 5

[6] Strictly speaking, net domestic assets have as their counterpart net foreign currency liabilities, including locally borrowed dollars. In practice in the countries under examination in Asia, net domestic currency assets can be taken as a proxy for net foreign currency external liabilities.

[7] These deviations from covered interest rate parity arise from insufficient swapping of dollars for won. See Baba et al (2008) for deviations from covered interest rate parity arising from heavy swapping of euros for dollars in late 2007.

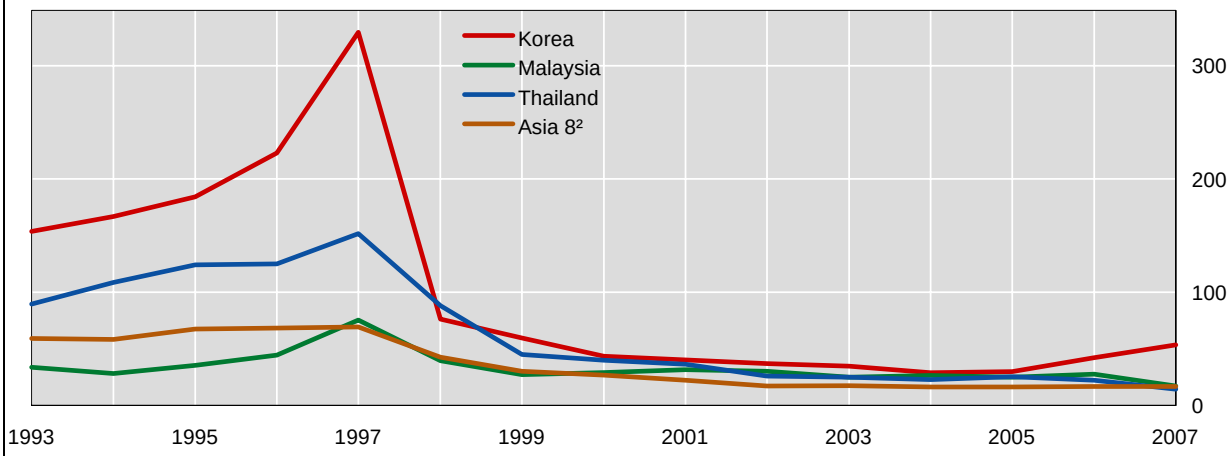
The Asian financial crisis: international liquidity lessons

While the debate continues over the role played by such underlying factors as excessive investment, currency appreciation, overleveraging of banks and firms, and corporate governance in the Asian financial crisis (eg Ito et al (2007)),[①] the importance of international liquidity management commands wide agreement. Economies with stronger international liquidity weathered the risk reassessments, while those with weaker positions suffered an international run. Since short-term international interbank borrowing often represents the bulk of a country's short-term foreign debt, lessons drawn regarding national liquidity relate closely to the position of banks in the international interbank market.

An often cited measure of international liquidity shows a very different position today than in 1997–98 for Asian economies. Consider international short-term debt, defined as international claims of BIS reporting banks with a maturity of one year or less (on not only banks, but also firms and governments) plus international debt securities with a remaining maturity of one year or less in relation to foreign exchange reserves. (There can be double-counting in this measure to the extent that BIS reporting banks hold the short-term and maturing securities.) For an average of eight Asian countries, namely China, India, Indonesia, Korea, Malaysia, the Philippines, Taiwan (China) and Thailand, short-term debt was climbing more rapidly than reserves before the 1997 crisis (see graph). In Indonesia, Korea and the Philippines, foreign exchange reserves eventually covered less than half of overall foreign short-term debt. Since the end of 1998, this coverage has diametrically changed. As current accounts have swung into surplus and foreign exchange reserves have climbed, short-term debt has fallen well below official reserves.

Total short-term debt to foreign exchange reserves[1]

In per cent



[1] Short-term debt is the sum of such debt in the consolidated banking statistics (Table 9A, column B) and short-term securities (Table 17B); there may be double-counting, but see text regarding short-term debt not included. [2] China, India, Indonesia, Korea, Malaysia, the Philippines, Thailand and Taiwan (China).

Sources: IMF; BIS; authors' calculations.

This measure, however, is subject to two important qualifications. First, it does not capture the short-term debt that overseas affiliates of domestic banks and firms have contracted offshore. At a certain point in the Korean crisis, the revelation of a very substantial sum in offshore borrowing by Korean banks and chaebol outside Korea shook sentiment as market participants understood that this borrowing also represented a claim on Korean reserves and borrowing capacity (Blustein (2001)). Such data, even when collected by the authorities, are rarely published, with the result that the relevant short-term debt is usually understated.

BIS consolidated banking data can be used to obtain a partial measure of offshore loans that are guaranteed by residents of a given country. So-called inward risk transfers capture, inter alia, global banks' claims on the branches of a given country's banks that are located in London or New York. While these data do not come with a maturity breakdown, the amounts involved provide some indication of short-term debts contracted offshore by offshore affiliates. In the cases of Korea, the Philippines and Thailand, inward risk transfers are less than 10% of short-term debt on an

immediate borrower basis. Only in the case of Malaysia do inward risk transfers (at $6 billion) represent a substantial fraction (28%) of short-term debt on an immediate borrower basis ($21 billion).

Second, and more fundamentally, juxtaposing international reserves of the official sector and the short-term debt largely contracted by the private sector ignores all the issues that arise when the official sector has to provide liquidity to the private sector (Hawkins and Turner (2000)). While the existence of large official reserves doubtless makes less likely a run on private banks perceived to be benefiting from an umbrella, the first line of defence of a nation's banks against international illiquidity is, and should be, their own asset-liability management (BCBS (2008)).

[1] The pervasiveness of an aggregate currency mismatch has been questioned (Cho and McCauley (2003)).

some extent. Despite a 15% withholding tax, they purchased $33 billion of Treasury and monetary stabilisation bonds in 2007, up from less than $2 billion in 2006. Nevertheless, the won fixed income markets remained segmented.

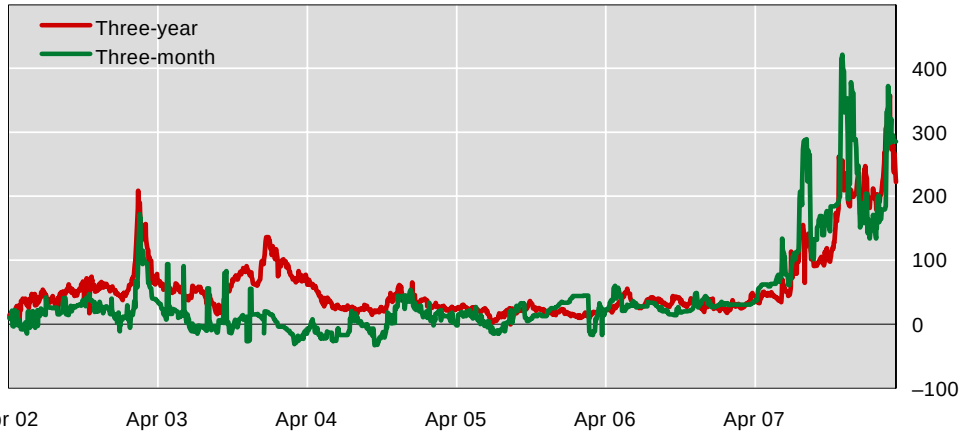
The vulnerability arising from a withdrawal of foreign banks' international funding of domestic assets could show up in domestic bank funding markets or in domestic bank asset markets. Were foreign banks to seek to replace international funding with domestic funding, domestic bank funding markets could be disturbed. In addition, foreign branches could be forced to liquidate holdings of government bonds in the domestic market.

Some observers discerned elements of such a scenario in the strains in Korean fixed income markets in December 2007. As the 2008 limit on tax-deductible debt to offshore affiliates approached, the response of foreign banks was said to have contributed to sharp volatility in the government bond market, where, as noted, foreign bank holdings were substantial. Moreover, 90-day certificate of deposit yields ratcheted up from 5.4% to almost 5.9%.

In sum, external foreign currency funding of local currency assets represents a potential, and hitherto not well appreciated, vulnerability. In the

Gap between Korean won on- and offshore yields

In basis points



Offshore won yields are derived from either the offshore cross-currency swap (three-year) or the non-deliverable forward (three-month). Onshore won yields are the three-year Treasury bond yield or the three-month certificate of deposit yield.

Sources: Bloomberg; authors' calculations. Graph 6

event of a liquidity squeeze on the major global banks represented among foreign banks, liquidity and pricing strains could be transmitted to domestic bank funding markets and the bond market. For some purposes, the local funding gap should be added to the short-term debt from the BIS consolidated banking statistics (Graph 2 or box graph).

Conclusions

Banks in Malaysia, the Philippines and Thailand appear to enjoy comfortable liquidity in the international interbank market. The apparent international illiquidity of banks in Korea is concentrated in foreign banks, while Korean banks are considered to manage near-term foreign currency cash flows cautiously. Foreign banks' funding of local currency assets with funds sourced offshore may in places have created a new vulnerability of local markets and banks to a global bank liquidity crunch.

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Recent initiatives by the Basel-based committees and groups

During the period under review, the Basel Committee on Banking Supervision (BCBS) released a paper on the management and supervisory challenges related to liquidity risk. Several committees and groups collaborated through the Financial Stability Forum (FSF) on initiatives aimed at enhancing the resilience of the financial system. In this context, the BCBS announced steps to strengthen the banking system, and the Joint Forum published an updated version of its 2005 report on credit risk transfer. The FSF released a report bringing together these and other initiatives to enhance market and institutional resilience. Table 1 provides an overview of these and other developments.

Basel Committee on Banking Supervision

BCBS releases paper on liquidity risk management and supervisory challenges …

On 21 February, the BCBS released a paper entitled *Liquidity risk: management and supervisory challenges*. The paper draws on the work of the Committee's Working Group on Liquidity, established in December 2006 to review liquidity supervision practices in member countries. This mandate included an evaluation of the type of approaches and tools used by supervisors to assess liquidity risk and banks' management of liquidity risks arising from financial market developments.

The market turmoil that began in mid-2007 has highlighted the crucial importance of market liquidity to the banking sector. The contraction of liquidity in certain structured product and interbank markets, as well as an increased probability of off-balance sheet commitments coming onto banks' balance sheets, led to severe funding liquidity strains for some banks, and to central bank intervention in some cases. In response to these market events, the Working Group's original mandate was expanded and it has also made initial observations on the strengths and weaknesses of liquidity risk management in times of difficulty. These observations, together with those provided by the review of national liquidity regimes, formed the basis of the report, which was submitted to the Basel Committee in December 2007.

… highlighting factors affecting liquidity risk management …

The report highlights financial market developments that affect liquidity risk management, paying particular attention to the liquidity management challenges posed by increasingly complex financial instruments, the rapid growth of securitisation, collateral usage, intraday liquidity needs and cross-

border flows. The paper subsequently discusses national supervisory regimes and their components, focusing on their key features, the diversity in liquidity regimes and the implications of diverse regimes for supervisors and cross-border firms. Initial observations from the current period of stress are then recorded. Finally, the report outlines potential future work related to liquidity risk management and supervision, including an update to the BCBS's *Sound practices for managing liquidity in banking organisations*. Possible areas of focus here comprise: the identification and measurement of the full range of liquidity risks, stress testing, the role of supervisors, the management of intraday liquidity risks arising from payment and settlement obligations (working with the Committee on Payment and Settlement Systems (CPSS)), the management of cross-border flows and the role of disclosure.

… describing national supervisory regimes …

… and outlining potential future work

On 16 April, the BCBS announced a series of *steps* to help make the banking system more resilient to financial shocks. These include:

BCBS announces enhancements to Basel II and other measures …

- Enhancing various aspects of the Basel II Framework, including the capital treatment of complex structured credit products, liquidity facilities to support asset-backed commercial paper (ABCP) conduits, and credit exposures held in the trading book. At the same time, the Committee noted the importance of prompt implementation of the Basel II Framework, as this will help address a number of the shortcomings identified by the financial market crisis.
- Strengthening global sound practice standards for liquidity risk management and supervision, which the Committee will issue for public consultation in the coming months.
- Initiating efforts to strengthen banks' risk management practices and supervision related to stress testing, off-balance sheet management, and valuation practices, among others.
- Enhancing market discipline through better disclosure and valuation practices.

These measures will be introduced in a manner that promotes long-term bank resiliency and strong supervision, while seeking to avoid potentially adverse near-term impacts as the process of repricing of risk and deleveraging continues in financial markets. The Committee's actions are also aimed at supporting the FSF's Working Group on Market and Institutional Resilience, which on 12 April released its report to the G7 Finance Ministers and central bank Governors (see Financial Stability Forum section below).

… with a view to making the banking system more resilient to financial shocks …

The Committee reiterates the importance of implementing the Basel II Framework as it better reflects the types of risks banks face in an increasingly market-based credit intermediation process. Basel II is just now being implemented in most Basel Committee member countries and many jurisdictions around the globe.

… while reiterating the importance of Basel II implementation in this context

The market turmoil has already provided important lessons that will help guide the Committee in further strengthening certain aspects of the Framework. The BCBS is introducing a number of measures to help ensure sufficient capital, to capture off-balance sheet exposures more effectively and to improve regulatory capital incentives.

Initiatives by Basel-based committees and groups

Press releases and publications over the period under review

Body	Initiative	Thematic focus	Release date
BCBS	*Liquidity risk: management and supervisory challenges*	• Financial market developments that affect liquidity risk management • National supervisory regimes and their components • Initial observations from the current period of stress • Potential future work	February 2008
	Steps to help make the banking system more resilient to financial shocks	• Enhancing certain aspects of Basel II • Strengthening liquidity risk management and supervision • Strengthening banks' risk management practices • Enhancing market discipline	April 2008
Joint Forum	*Credit risk transfer – developments from 2005 to 2007*	• Update of 2005 report to reflect continued growth and rapid innovation in the CRT markets	April 2008
	Cross-sectoral review of group-wide identification and management of risk concentrations	• Expansion on previous reports • Assessment of progress made in the identification and management of firm-wide risk concentrations	
	Customer suitability in the retail sale of financial products and services	• Survey of how supervisors and firms deal with the risks posed by the mis-selling of retail financial products	
Markets Committee	*Monetary policy frameworks and central bank market operations*	• Update of the December 2007 version	April 2008
CPSS	*Statistics on payment and settlement systems in selected countries*	• Statistics for 2006	March 2008
FSF	*FSF meeting in Rome*	• Current challenges in financial markets • Steps being taken to address them • Policy options going forward	March 2008
	Report on enhancing market and institutional resilience	• Factors and weaknesses underlying the current market turmoil • Recommendations in five areas	April 2008

Source: Relevant bodies' websites (www.bis.org, www.fsforum.org). Table 1

In particular, the Committee will revise the Framework to establish higher capital requirements for certain complex structured credit products, such as so-called "resecuritisations" or collateralised debt obligations referencing asset-backed securities (ABS CDOs), which have produced the majority of losses during the recent market turbulence. The Committee will also strengthen the capital treatment of liquidity facilities extended to support off-balance sheet vehicles such as ABCP conduits. More detailed proposals will be published

later this year. Finally, the BCBS will strengthen the capital requirements in the trading book, where the current value-at-risk based treatment for assessing capital for trading book risk does not capture extraordinary events that can affect many exposures to complex, less liquid structured products.

BCBS to monitor Basel II requirements and capital buffers over the credit cycle

The BCBS will monitor Basel II minimum requirements and capital buffers over the credit cycle. To the extent that this analysis reveals any shortcomings in capital cushions, the Committee will take appropriate measures to help ensure Basel II provides a sound capital framework for addressing banks' evolving and complex risk profiles.

Pillar 2 guidance to be issued

The market turmoil has revealed significant risk management weaknesses at banking institutions. Pillar 2 (the supervisory review process) provides supervisors with additional tools to assess banks' risk management and internal capital management processes. The Committee will issue Pillar 2 guidance in a number of areas to help strengthen risk management and supervisory practices. These relate to the management of firm-wide risks; banks' stress testing practices and capital planning processes; the management of off-balance sheet exposures and associated reputational risks; risk management practices relating to securitisation activities; and supervisory assessment of banks' valuation practices.

Towards global sound practice standards for the management and supervision of liquidity risk

Banks need to have strong liquidity cushions to weather prolonged periods of financial market stress and illiquidity. In July, the BCBS will publish for consultation global sound practice standards for the management and supervision of liquidity risk. These standards will address many of the shortcomings witnessed in the banking sector. Among other weaknesses, these relate to stress testing practices, contingency funding plans, and management of on- and off-balance sheet activity as well as contingent commitments. The Committee will coordinate rigorous follow-up by supervisors to ensure banks adhere to these fundamental principles. The Committee has also launched an initiative to review the need for more consistency in global liquidity regulation and supervision of cross-border banks as a way to enhance their resiliency to financial market stress.

Weaknesses in bank transparency and valuation practices for complex products have contributed to the build-up of concentrations in illiquid structured credit products and the undermining of confidence in the banking sector. The Committee is taking concrete action to promote stronger industry practices in this area.

Joint Forum

The Joint Forum released three publications in April: an update of its 2005 report on credit risk transfer, a cross-sectoral review of group-wide identification and management of risk concentrations and a report on customer suitability in the retail sale of financial products and services.

Joint Forum issues update of its 2005 report on credit risk transfer …

Credit risk transfer (CRT) has grown quickly, often with complex products, and provides concrete benefits to the global financial system. The benefits of CRT are well understood and have not changed since the Joint Forum's first

CRT report in 2005.[1] CRT allows credit risk to be more easily transferred and potentially more widely dispersed across the financial market. It has made the market pricing of credit risk more liquid and transparent. At the same time, however, CRT also poses new risks, and a failure to understand and manage some of these risks contributed to the market turmoil of 2007.

Like the Joint Forum's 2005 report, this *report* focuses on the newest forms of CRT, those associated with credit derivatives. These provided the impetus for the 2005 report, and their continued evolution and growth motivated this update.

Several developments in CRT markets are important for understanding the evolving risks of CRT and its role in the market turmoil of 2007. Since 2005, CRT activity has become significant in two new underlying asset classes: asset-backed securities (ABS) and leveraged loans. Investor demand for tranched CRT products, such as ABS CDOs and collateralised loan obligations (CLOs), has been high. This demand has encouraged substantial origination and issuance of products in these underlying asset classes. ABS CDOs have focused their portfolios on US subprime residential mortgage-backed securities (RMBS), while CLOs have focused on leveraged loans sourced from corporate mergers and acquisitions and leveraged buyouts.

… noting the growth of indices …

Across all CRT asset classes, the growth of indices since 2005 is an important development. Indices now represent more than half of all credit derivatives outstanding, up from virtually nothing in 2004. They are widely used to trade investment grade corporate credit risk across the major markets (Asia, Europe and North America), and have also been created in the ABS and leveraged loan markets, in the form of the ABX and LCDX, respectively. In each of these markets, indices provide a relatively liquid and transparent source of pricing, though the corporate versions are much more liquid than those in other market segments. Market participants have come to view credit derivative indices as a key source of pricing information on these markets. The liquidity and price transparency that indices provide has enabled credit risk to become a traded asset class.

… and the growing complexity of CRT products …

The 2005 report noted the growing complexity of CRT products, and this trend has continued. The report discussed in some detail the complex risks of CDOs, with a particular focus on investment grade corporate CDOs. The 2008 report focuses to a significant degree on ABS CDOs, which are an order of magnitude more complex than investment grade corporate CDOs, since their collateral pool consists of a portfolio of ABS. Each of these ABS is itself a tranche of a securitisation whose underlying collateral is a pool of hundreds or thousands of individual credit assets. Referring to this complexity, one market participant described ABS CDOs as "model risk squared".

As CRT products have become more complex, investors in CRT have grown more diverse and global. More market participants have become comfortable investing in CRT, which is an important factor explaining its growth. On balance, CRT activity has transferred credit risk out of the United

[1] See "Recent initiatives by Basel-based committees and the Financial Stability Forum", *BIS Quarterly Review*, June 2005, pp 93–9.

States into global markets. In addition, since 2005, hedge funds have become an important force in CRT markets.

… which raise issues for rating agencies

The combination of complex products and new investors has presented a business opportunity for credit rating agencies. For a number of years, rating agencies have rated CRT products using the same letter ratings (AAA, AA and so on) originally developed for corporate bonds. Riding the wave of growth of CRT, in recent years structured finance securities have contributed an increasing share of rating agencies' earnings.

All these factors together set the stage for the market turmoil of 2007. Market discipline had been weak as investors in ABS CDOs failed to penetrate complex CRT structures sufficiently to see the underlying risk exposures to the subprime mortgage market. In some cases, investors were too willing to rely solely on credit ratings as a risk assessment tool. Originators saw little incentive, financial or reputational, to monitor the quality of subprime mortgages that could be sold so easily into the securitisation market. It was not until the subprime mortgage market came under stress due to weakening house prices that investors in ABS CDOs became aware that they were also at risk.

Recommendations for market participants and supervisors

Supervisors remain concerned about several aspects of the CRT market: these include complexity and valuation issues, as well as liquidity, operational and reputational risks, and the broader effects of the growth of CRT. To address these concerns and other issues, the report concludes with recommendations directed at market participants and supervisors, with the intention that they use them and the recommendations from the 2005 report as a single package to improve risk management, disclosure and supervisory approaches for credit risk transfer.

Joint Forum review of group-wide identification and management of risk concentrations

On 25 April, the Joint Forum published a *Cross-sectoral review of group-wide identification and management of risk concentrations.* The paper expands on previous reports[2] and explores the extent to which financial conglomerates active in two or more of the banking, securities and insurance sectors currently identify and manage risk concentrations at the firm-wide level. The report also discusses how current and emerging risk techniques, including stress testing and scenario analyses, are employed to identify potential concentrations. It should be noted that the bulk of the work undertaken in compiling this report took place before the market turmoil in the latter half of 2007. Specific

[2] In December 1999, the Joint Forum published its *Risk Concentrations Principles*, which provided supervisors with principles for ensuring the prudent management and control of risk concentrations in financial conglomerates through the regulatory and supervisory process. In November 2001, the Joint Forum published *Risk management practices and regulatory capital: cross-sectoral comparison*. This report noted a trend towards convergence of sectoral approaches to risk management and capital, while remaining neutral as to the extent to which such convergence would increase in the future. The Joint Forum's August 2003 publication, *Trends in risk integration and aggregation*, observed two important trends: (i) a greater emphasis on the management of risk on an integrated firm-wide basis; and (ii) related efforts to aggregate risks through mathematical risk models. However, the 2003 paper noted that firms varied considerably in the practical extent to which important risk management decisions were centralised and that risk aggregation methods were still in the early stages of development.

comments on these events are provided in boxes but the focus of the report is on the management of risk concentrations more generally.

The Joint Forum notes that risk concentrations at most financial conglomerates are still chiefly identified, measured and managed within separate risk categories and within business lines. For instance, credit exposures are considered within banking business units, catastrophe risk concentrations within an insurance business unit and so on. This can be characterised as "silo management".

The report makes two other broad observations: first that, when compared with other risk types, the management of liquidity risk tends not to be as well integrated in a scheme of cross risk analysis (probably because it is not measured in the same way as other risks); and second, that insurance-led conglomerates seem to be somewhat more experienced in undertaking the design of integrated cross risk scenario analysis, perhaps because the nature of insurance business risks, particularly in the property and casualty business, makes them less readily amenable to linear analysis.

Joint Forum paper on customer suitability in the retail sale of financial products and services …

On 30 April the Joint Forum released a paper on *Customer suitability in the retail sale of financial products and services*. The report considers how supervisors and regulated firms across the banking, securities and insurance sectors deal with the risks posed by the mis-selling of retail financial products, including related regulatory requirements, both with regard to disclosure of information to retail investors and requirements for firms to determine whether recommended investment products are suitable for such investors.

… based on a survey of some 90 institutions

Based on a survey of some 90 financial firms around the world, a key finding of the report is that the notion of suitability is recognised in regulatory requirements across all sectors, but to a varying extent. An interesting observation is that disclosure requirements for conflicts of interest (for example, ownership structures of the sales agent, or remuneration to be received) are generally less rigorous for sales of insurance than for other products. The survey further discusses, by country and institution type, issues such as the identity of the entity liable for the mis-selling of products, dispute resolution procedures and the application of robust suitability policies.

Financial Stability Forum

FSF discusses policy options at its 19th meeting …

At its *19th meeting* in Rome on 28–29 March, the FSF discussed the current challenges in financial markets, the steps being taken to address them and policy options going forward. It reviewed the report delivered to G7 Finance Ministers and central bank Governors on enhancing market and institutional resilience (see below). It also took stock of efforts by the hedge fund industry to review and enhance sound practice benchmarks, in particular those of the UK-based Hedge Fund Working Group and the US-based Asset Managers' Committee and Investors' Committee, with a view to increasing transparency and improving risk management practices. Finally, the FSF discussed work under way at the IMF and OECD with regard to sovereign wealth funds (SWFs), consisting of efforts to identify a set of voluntary best practice

guidelines relating to the governance, institutional arrangements and transparency of SWFs.

… and releases report on enhancing market and institutional resilience …

On 12 April the FSF Chairman presented the *Report of the Financial Stability Forum on enhancing market and institutional resilience* to the G7 Finance Ministers and central bank Governors. The report identifies the factors and weaknesses underlying the current market turmoil and makes recommendations in five areas.[3]

The report's findings and recommendations are the product of an intensive collaborative effort of the main international bodies and national authorities in key financial centres. They draw on a large body of coordinated work, comprising that of the BCBS, the International Organization of Securities Commissions (IOSCO), the International Association of Insurance Supervisors (IAIS), the Joint Forum, the International Accounting Standards Board (IASB), the CPSS, the Committee on the Global Financial System (CGFS), the IMF, the BIS and the national authorities. Insights were also gained from private sector market participants.

… identifying causes …

The report sets out to identify the causes underlying the current financial market turmoil. It summarises how a weakening in the US housing market led to a steady rise in delinquencies and, from early 2007 onwards, sharply falling prices for indices based on subprime-related assets, acting as a trigger for a broad reversal in market risk-taking. This entailed a severe contraction of activity in the term interbank market, a substantial rise in term premia (especially in the United States and Europe) and dysfunction in a number of related short-term financial markets. As the turmoil spread, increased risk aversion, reduced liquidity, market uncertainty about the soundness of major financial institutions, questions about the quality of structured credit products, and uncertainty about the macroeconomic outlook fed on each other. Both bank-based and capital market channels of credit intermediation slowed. At the time of writing, eight months after the turmoil broke out, deleveraging continues to pose significant challenges for large parts of the financial system in a number of countries.

… and weaknesses underlying the recent financial market turmoil

The report identifies the following underlying financial system weaknesses as having contributed to the financial turmoil: poor underwriting standards (especially in the US subprime sector); shortcomings in firms' risk management practices; poor investor due diligence; poor performance by credit rating agencies in respect of structured credit products; incentive distortions, especially for originators, arrangers, distributors and managers in the originate-to-distribute (OTD) chain, as well as with respect to compensation schemes in financial institutions; weaknesses in disclosure; feedback effects between

[3] In September 2007, the G7 Finance Ministers and central bank Governors asked the FSF to undertake an analysis of the underlying causes and weaknesses behind the recent market turmoil and to set out recommendations for increasing the resilience of markets and institutions going forward (see "Recent initiatives by the Basel-based committees and groups", *BIS Quarterly Review*, December 2007, pp 97–102). An interim report was published in February 2008 (see "Recent initiatives by the Basel-based committees and groups", *BIS Quarterly Review*, March 2008, pp 103–6).

valuation and risk-taking; and weaknesses in regulatory frameworks and other policies.

To address these weaknesses, the report makes a number of recommendations, focusing on five main areas: strengthened prudential oversight of capital, liquidity and risk management; enhancing transparency and valuation; changes in the role and uses of credit ratings; strengthening the authorities' responsiveness to risks; and robust arrangements for dealing with stress in the financial system.

Recommendations in respect of implementing and enhancing Basel II ...

In order to strengthen the prudential oversight of capital, liquidity and risk management, the report urges prompt implementation of the Basel II Framework. It also outlines specific proposals with respect to strengthening aspects of the framework dealing with securitisation and off-balance sheet activities (see section above on the BCBS) and makes a number of recommendations for improving the operational infrastructure for OTC derivative instruments.

... improving transparency and valuation ...

In an effort to enhance transparency and valuation, the FSF strongly encourages financial institutions to make robust risk disclosures at the time of their mid-year 2008 reports using the leading disclosure practices summarised in the report. Further guidance to strengthen disclosure requirements under Pillar 3 of Basel II will be issued by 2009, including standards for disclosures regarding off-balance sheet vehicles and valuations. In addition, standard setters will take urgent action to improve and converge financial reporting standards for off-balance sheet vehicles, and develop guidance on valuations when markets are no longer active, establishing an expert advisory panel in 2008. Particular attention will be paid to transparency in structured products, as market participants and securities regulators will expand the information provided about securitised products and their underlying assets.

... credit ratings ...

In respect of changes in the role and uses of credit ratings, the report recommends that rating agencies implement the revised IOSCO Code of Conduct Fundamentals for Credit Rating Agencies to manage conflicts of interest in rating structured products and improve the quality of the rating process. It further proposes that they differentiate ratings on structured credit products from those on bonds and expand the information they provide. Regulators will review the roles given to ratings in regulatory and prudential frameworks.

... authorities' responsiveness ...

Among actions to strengthen the authorities' responsiveness to risks, a college of supervisors will be put in place by end-2008 for each of the largest global financial institutions.

... and arrangements for dealing with stress

Finally, within the context of establishing robust arrangements for dealing with stress in the financial system, central banks will enhance their operational frameworks and authorities will strengthen their cooperative arrangements for dealing with stress.