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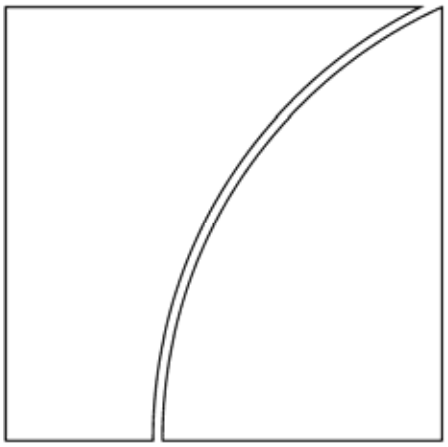

International banking and financial market developments

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: credit retrenchment triggers liquidity squeeze

Concerns about exposures to US mortgages cast a dark shadow over global financial markets during the period from end-May to 24 August 2007, with deepening losses on mortgage-related products spilling over to markets for other risky assets. As uncertainty about the extent and distribution of these losses spread through the financial system, investors fled to safe havens and liquidity demand surged. This caused a pronounced squeeze across major financial markets, prompting central banks around the globe to inject large amounts of liquidity.

Triggered by declining confidence in the valuation of mortgage-related and structured credit products, spreads rose sharply across the credit universe, increasingly affecting higher-rated products and assets other than credit. The price of credit risk, a measure of investor appetite for credit market exposures, jumped upwards, suggesting that a large part of the ongoing repricing was due to changes in investor sentiment towards risk.

Government bond yields plunged as investors fled risky assets and turned to the relative safety of government securities. The downward pressure on bond yields also seemed to partially reflect a reassessment of risks to the growth outlook in the light of the deteriorating situation in the US housing market, and heightened fears of a credit crunch in the wake of the turmoil in credit markets. Apart from the impact on bond yields, the combination of the flight to safety and surging liquidity demand was evident from a sizeable drop in Treasury bill rates that occurred while interbank money market rates rose considerably.

Equity markets sold off under the weight of mounting losses from the repricing of credit risk, with housing-related and financial sector stocks underperforming the wider market. In line with sharply reduced appetite for risk, estimates of implied equity market risk tolerance dropped significantly. Foreign exchange markets also saw substantial increases in volatility, as carry trades were rapidly unwound. Emerging market equities and bonds, however, proved relatively resilient, reflecting broadly favourable economic conditions.

Credit markets sell off as mortgage exposures are reassessed

Global credit markets experienced considerable volatility and saw spreads rise sharply across the board, as uncertainties about the size and distribution of losses from US subprime mortgage exposures caused investors to adjust their positions. Between end-May and late July 2007, the US five-year CDX high-yield index rose by 270 basis points to around 525, while the corresponding US investment grade index widened by some 45 basis points to a high of 81 in early August. In Europe, the five-year iTraxx Crossover CDS index climbed by 280 basis points to 471 in late July, while the headline iTraxx Europe investment grade index increased by 48 basis points to a high of 68. In the process, all four indices surpassed the levels realised during the spring 2005 sell-off. By 24 August, credit spreads were somewhat off their peaks, but still more than 70% above the lows seen in early June (Graph 1, left-hand and centre panels).

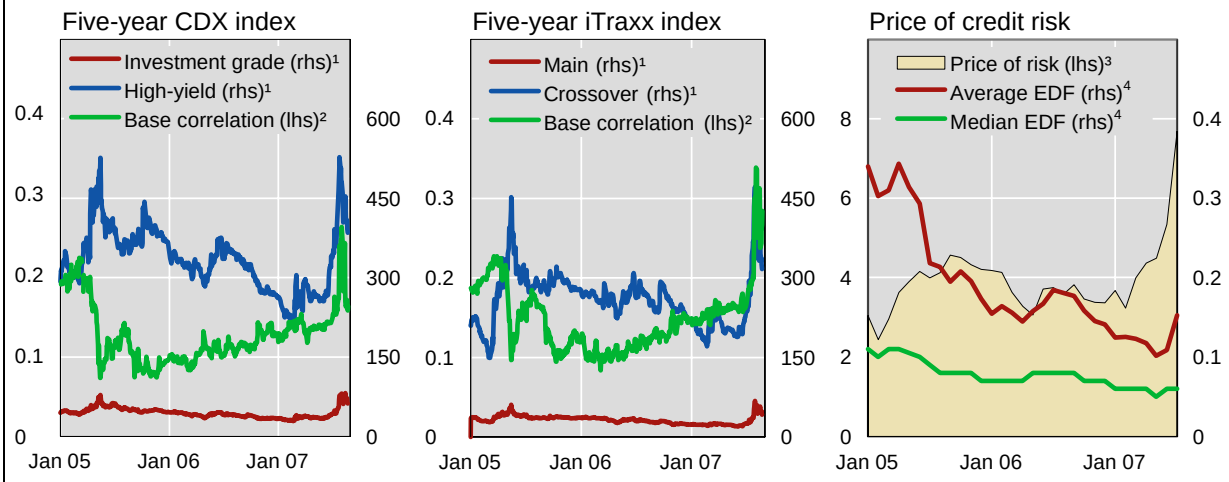
Signs of stress in subprime mortgage markets …

These increases in credit spreads coincided with a significant reduction in investor risk tolerance. The price of credit risk, as extracted from risk neutral and empirical default probabilities of non-investment grade companies, increased markedly (Graph 1, right-hand panel). At the same time, default correlations implied by tranched index products surpassed the peaks they had reached in February. To the extent that this reflected an increase in the weight investors attached to systematic as opposed to credit-specific risk factors, it suggested higher expectations of a turn in the credit cycle.

… trigger sharp repricing of mortgage-backed securities

The general repricing of credit risk developed in three stages, with the first starting in mid-June. The immediate triggers of this early stage were renewed signs of stress in the US subprime mortgage market. On 15 June, Moody's cut the ratings of 131 securities backed by subprime home loans, because of rising delinquency levels on the underlying mortgages (Graph 2, left-hand panel).

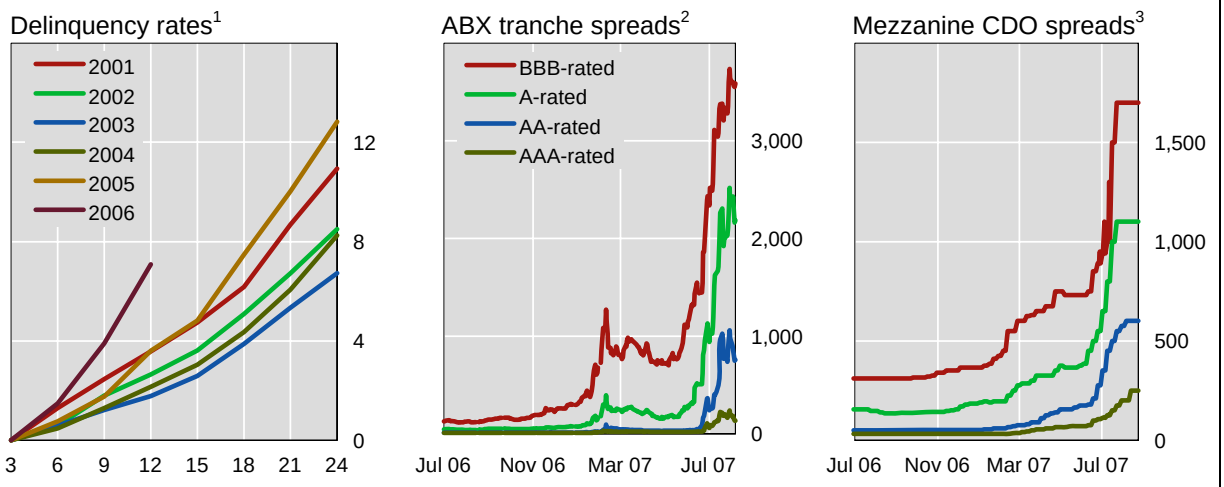
Credit spreads and price of risk



[1] On-the-run CDS mid-spread, in basis points. [2] Implied default correlation based on prices for on-the-run 0–3% loss tranches; 20-day moving averages. [3] 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. [4] In per cent.

Sources: Markit; Merrill Lynch; Moody's KMV; BIS calculations. Graph 1

US subprime mortgage market



[1] Subprime mortgage delinquency rates (60+ days) by cohort year, in per cent. Number of months of seasoning plotted on the horizontal axis. [2] JPMorgan Chase home equity (ABX.HE 2006-2) floating closing on-the-run spreads, in basis points. [3] Spreads over Libor of tranches of CDOs backed by mezzanine tranches of ABSs, in basis points. Stale quotes reflect limited market liquidity.

Sources: JPMorgan Chase; LoanPerformance. Graph 2

Moody's also announced that the ratings of about 250 mortgage-backed securities (MBSs) were to be reviewed for downgrade. This was followed, on 20 June, by news that two large hedge funds managed by Bear Stearns were close to being shut down as a result of gross exposures of some $20 billion to securities backed by subprime mortgage loans. The combination of these events and concerns about distressed sales of asset-backed securities (ABSs) based on mortgage loans, including collateralised debt obligations (CDOs) containing tranches of subprime mortgage-backed ABSs, caused credit spreads for these products to widen (Graph 2, centre and right-hand panels). Increases in corporate spreads, however, were much more contained.

As mortgage-related losses worsen …

Losses on mortgage exposures worsened from mid-July, when a succession of negative news releases related to the US housing market led to a second stage of more widespread and pronounced adjustments across credit markets. On 10 July, S&P put $7 billion worth of 2006 vintage ABSs backed by residential mortgage loans on negative ratings watch. This was followed on the same day by news that Moody's was lowering the ratings on $5 billion worth of subprime mortgage bonds and reviewing those on 184 CDO tranches. One day later, the number of US foreclosures nationwide for June was reported to be 87% above its level the previous year. As a result, spreads on high-yield credit default swaps (CDSs) in the United States and the crossover index in Europe widened by 44 and 49 basis points, respectively, on 10 and 11 July alone. Later in the month, on 26 July, the release of the National Association of Home Builders (NAHB) index for June indicated that new home sales had slid by 6.6%, and the largest US homebuilder reported a quarterly loss. Once again, a two-day span (26–27 July) saw outsized movements in major credit indices, with increases of 59 and 71 basis points in the high-yield US and European crossover indices, respectively. Further reports of troubles at mortgage lenders, rising dealer haircuts on collateral posted by hedge funds, and related fears of imminent margin calls added to the negative sentiment (Table 1).

Timeline: Key events over the period	
Date	Event
15 June	Moody's downgrades the ratings of 131 ABSs backed by subprime home loans and places about 250 bonds on review for downgrade.
20 June	News reports suggest that two Bear Stearns-managed hedge funds invested in securities backed by subprime mortgage loans are close to being shut down.
22 June	One of the troubled hedge funds is bailed out through an injection of $3.2 billion in loans.
10 July	S&P places $7.3 billion worth of 2006 vintage ABSs backed by residential mortgage loans on negative ratings watch and announces a review of CDO deals exposed to such collateral; Moody's downgrades $5 billion worth of subprime mortgage bonds.
11 July	Moody's places 184 mortgage-backed CDO tranches on downgrade review; further reviews and downgrades are announced by all major rating agencies in the following days.
24 July	US home loan lender Countrywide Financial Corp reports a drop in earnings and warns of difficult conditions ahead.
26 July	The NAHB index indicates that new home sales slid by 6.6% year on year in June; DR Horton, the largest homebuilder in the United States, reports an April–June quarter loss.
30 July	Germany's IKB warns of losses related to the fallout in the US subprime mortgage market and reveals that its main shareholder, Kreditanstalt für Wiederaufbau (KfW), has assumed its financial obligations from liquidity facilities provided to an asset-backed commercial paper (ABCP) conduit exposed to subprime loans.
31 July	American Home Mortgage Investment Corp announces its inability to fund lending obligations; Moody's reports that the loss expectations feeding into the ratings for securitisations backed by Alt-A loans will be adjusted.
1 August	Further losses exposed at IKB lead to a €3.5 billion rescue fund being put together by KfW and a group of public and private sector banks.
6 August	American Home Mortgage Investment Corp files for Chapter 11 bankruptcy, leading to a term extension on outstanding ABCP by one of its funding conduits.
9 August	BNP Paribas freezes redemptions for three investment funds, citing an inability to appropriately value them in the current market environment; the ECB injects €95 billion of liquidity into the interbank market; other central banks take similar steps.
17 August	The Federal Reserve's Open Market Committee issues a statement observing that the downside risks to growth have increased appreciably; the Federal Reserve Board approves a 50 basis point reduction in the discount rate and announces that term financing will be provided for up to 30 days.

Sources: Bloomberg; *Financial Times*; *The Wall Street Journal*; company press releases. Table 1

… price effects spill over into other markets …

In the wake of the negative news flow, market liquidity for mortgage-related securities and structured credit products rapidly disappeared, casting doubts on the assumptions underpinning their model-based valuations. Amid concerns about forced sales of better-quality assets, mark to market losses mounted, increasingly including on assets at the more senior levels of the capital structure and those outside the residential mortgage sector. Signs of spillovers into commercial real estate markets were particularly pronounced, possibly reflecting concerns about the extent to which the phenomenon of weakening loan covenants might have spread from the residential to the commercial side of the mortgage business. The CMBX family of indices, which provides a measure of the cost of insuring against defaults in securities backed by commercial mortgage loans, has seen its BBB spreads widening by more than 200 basis points from their lows in June (Graph 3, centre panel).

… including commercial mortgage-backed securities …

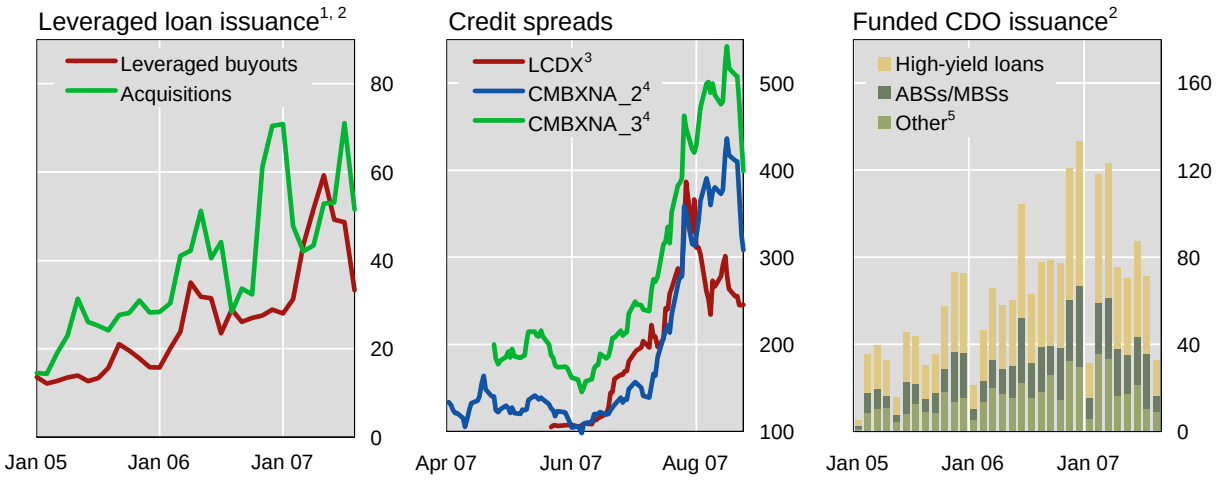
Reflecting this more difficult environment, issuance volumes collapsed across credit markets. In the LBO market, which helps to finance the leveraged

... and leveraged buyouts

buyouts of listed companies, the value of announced takeovers had reached new highs in the first half of 2007 (Graph 3, left-hand panel). According to S&P, this activity had left banks needing to arrange funding for some $230 billion of announced purchases, and therefore vulnerable to the sharply reduced appetite for credit risk. As the deal pipeline for collateralised loan obligations, the main vehicle for institutional demand in US and European loan markets, and similar products dried up, the LBO market came under strain. In the process, the newly formed LCDX index, referencing five-year credit default swaps on 100 equally weighted syndicated US loans, jumped from around 120 basis points in May to more than 350 basis points in late July, before dropping back to around 250 basis points by late August (Graph 3, centre panel).[1] As a result, a number of ongoing deals were reportedly delayed, restructured or pulled from the market, as in the case of Alliance Boots. Primary bond market and ABS issuance came under similar pressures.

The ensuing sell-off during June and July had some similarities with developments in 2002, the most recent major sell-off in corporate credit markets. Back then, following high-profile reports of accounting irregularities, BBB and high-yield US corporate bond spreads increased by more than 50%, with bonds issued by like-rated European borrowers performing in a similar fashion. However, in contrast to the events in 2002, the current sell-off was characterised by a larger and more rapid relative spread increase in the high-yield segment (Graph 4, left- and right-hand panels). While part of this difference is explained by different spread levels, part may have been due to more widespread use of leveraged trades and CDS short positioning in recent times, as compared to the earlier period (Graph 4, centre panel).

Credit spreads and issuance data

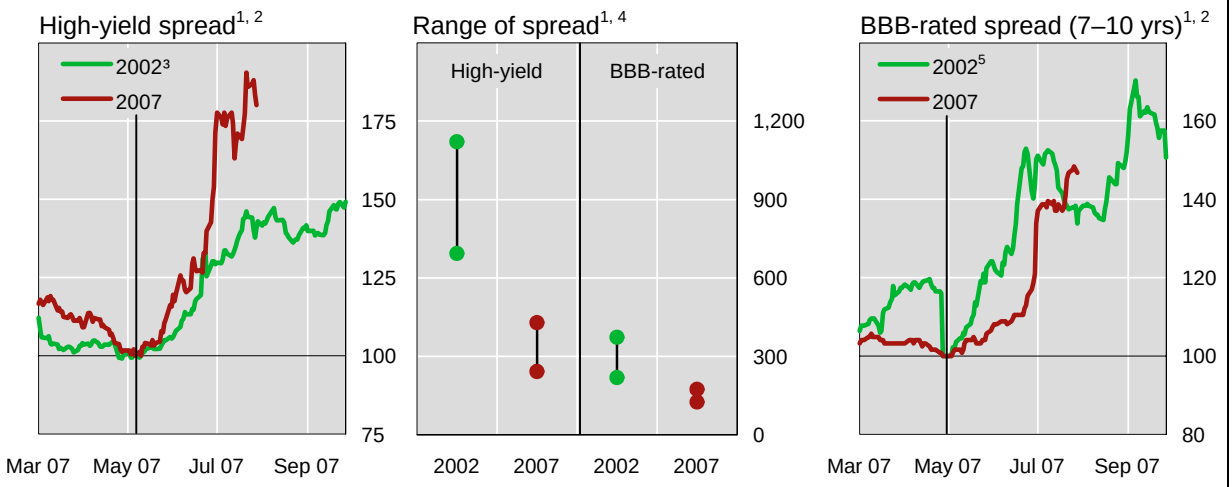


[1] Three-month moving averages, in US dollars. [2] Data corresponding to August 2007 are partial. [3] Index spreads for five-year CDSs on syndicated US loans. [4] Index spreads for BBB tranches of commercial mortgage-backed securities (index series 2 and 3). [5] Emerging market debt, high-yield bonds, investment grade debt, private equity, hedge funds and trust-preferred securities.

Sources: Bloomberg; International Index Company; JPMorgan Chase; Loanware; Markit. Graph 3

[1] Spreads on its European counterpart LevX, which has been trading since October 2006, also increased; both indices trade at narrower spreads than corresponding CDX and iTraxx high-yield indices, given the secured nature of their underlying loan portfolios.

Credit spread adjustments: 2002 vs 2007



[1] Merrill Lynch corporate bond indices; options-adjusted spreads over US Treasuries. [2] Vertical lines indicate relative low points in spreads, indexed at 100. [3] 6 March–2 October. [4] Indicates the highest and lowest spread levels realised during the current and 2002 episodes, in basis points. [5] 4 April–31 October.

Sources: Merrill Lynch; BIS calculations. Graph 4

Uncertainties about credit-related losses ...

The ongoing repricing entered a third stage at the end of July, when attention turned to uncertainty over financial system exposures outside the United States. While the flow of negative news from the US mortgage market seemed to abate, uncertainties persisted about the size and distribution of credit risk exposures and related losses from the ongoing adjustment in credit spreads. Moreover, whereas earlier concerns had focused on hedge funds and US financial institutions with direct involvement in mortgage origination and distribution, by late July news about losses had increasingly spread internationally. Related concerns crystallised on 30 July, when Germany's IKB revealed that its main shareholder had assumed its financial obligations from liquidity facilities provided to an ABCP conduit exposed to subprime loans. This came as a surprise, just 10 days after the announcement of a preliminary operating result of €63 million for the April–June quarter. Further losses at IKB and other financial institutions were exposed in early August. These were followed by announcements on 9 August that illiquid markets had forced a number of investment funds to stop redemptions, while a number of ABCP issuers had drawn options to extend the maturity of outstanding securities earlier in the same week. In the wake of these events, activity in the ABCP markets almost ground to a halt, while concerns about banks being forced to take ABCP exposures onto their balance sheets added to fears about an impending credit crunch (see box).

... feed concerns about counterparty risks ...

... which cause liquidity demand to surge

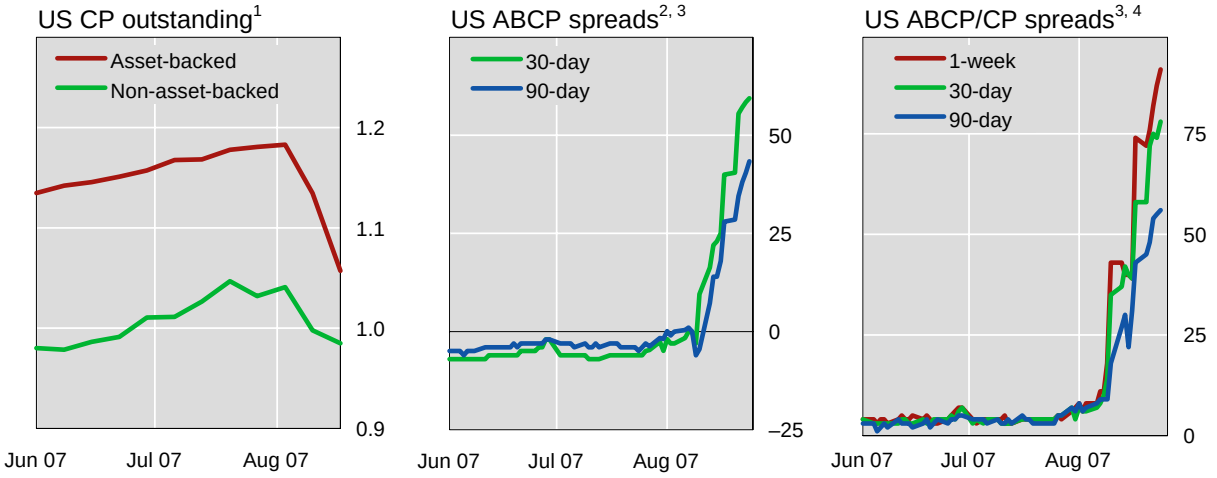
As nervousness about funding needs and banks' conditional liabilities intensified, surging liquidity demand started to spill over into short-term money markets, causing overnight interest rates to soar. In this environment, on 9 August the ECB injected €94.8 billion of liquidity into the interbank market. This followed the announcement that an extraordinary fine-tuning operation would take place in which funds would be provided on demand at the prevailing

Liquidity risk and ABCP mechanics

One of the markets that saw spillovers from the ongoing repricing of credit risk was the market for collateralised short-term financing. As uncertainty about credit losses related to subprime exposure surged, investors began to shun any instrument for which such losses were deemed possible. This included asset-backed commercial papers (ABCPs), which are collateralised short-term instruments that are continuously rolled over to provide financing to an issuing programme. ABCP exposure to mortgage-related assets had grown to an estimated $300 billion, about a third of this in programmes based on structured investment vehicles (SIVs),[①] and investors had become increasingly unsure about the exact nature and quality of these assets.[②] With major banks providing liquidity backstops to ABCP programmes, resulting rollover risks quickly translated into concerns about banks' contingent liabilities. These, in combination with uncertainties about banks' exposures to the general repricing of risky assets, contributed to surging liquidity demand in the interbank market. Consequently, on 9 August the ensuing environment of heightened counterparty risk and liquidity hoarding led to a sharp rise in short-term interbank rates, which was countered by large-scale central bank liquidity injections.

ABCPs, just like other securitisations, pool large quantities of homogeneous assets with predictable cash flows or marketable securities into a special purpose vehicle that issues short-term securities against this collateral.[③] The pools are tranched into securities with different levels of seniority and with maturities typically ranging from one day to nine months. ABCP collateral includes assets such as automobile loans, credit card receivables and mortgage loans as well as senior CDO tranches. According to market estimates, the total amount of outstanding ABCPs topped $1.5 trillion at end-March 2007. US ABCP programmes accounted for some 75% of this amount, while the $260 billion European market made up much of the rest. The US ABCP market, in turn, represents around 55% of the total US CP market (Graph A, left-hand panel).

ABCP markets



[1] In trillions of US dollars. [2] ABCP yield minus the corresponding Libor rate, in basis points. [3] ABCP and CP yields for A1+ rated issues. [4] ABCP yield minus the corresponding CP yield, in basis points.

Sources: Federal Reserve Bank of New York; Bloomberg; BIS calculations. Graph A

The bulk of ABCP tranches receive prime credit ratings (A1 or P1), the highest short-term ratings assigned by credit rating agencies. To achieve these, the credit risk borne by ABCP investors is reduced by way of various structural and third-party credit enhancements, including overcollateralisation (the issuance of securities of lower aggregate value than the underlying collateral), subordination (the inclusion of tranches that absorb the first default losses) and letters of credit. In addition, because collateral assets tend to be less liquid and of longer maturity than the securities issued against them, liquidity backstops are required to protect ABCPs against timing mismatches and rollover risk.[④] These tend to be provided by highly rated financial institutions and take the form of loan or asset purchase agreements providing full coverage of maturing debt obligations. Alternatively, ABCP programmes may give the sponsor the option of extending the term

of the issued securities up to some maximum period. Such extendable notes, in exchange for compensation in terms of additional yield, thus pass part of the liquidity risk on to investors. By end-March, extendable notes constituted about $147 billion (13%) of outstanding US ABCPs. Of these, some $60 billion were mortgage-backed and an estimated $58 billion had external support of less than 100%, relying chiefly on the sale of underlying collateral assets for their repayments.

Strains in the ABCP market began in late July in the form of rising spreads relative to Libor (Graph A, centre panel). One of the first concrete signs that credit market woes were spilling over into ABCPs came on 30 July. Rhineland Funding, a conduit managed by German bank IKB and exposed to MBSs, had failed to find investors that would allow it to roll over maturing paper, causing IKB's main shareholder to step in with an emergency liquidity line. In the wake of this event, rising uncertainty about the credit quality of underlying asset pools meant that some conduits, particularly so-called single seller programmes purchasing mortgage assets from only one originator, experienced increasing problems rolling over maturing funds.

These problems came into focus on 6 August, following the news that a conduit called Broadhollow Funding had exercised an option to extend the term on $1.6 billion worth of outstanding paper financing warehouse pools of mortgage loans. Other conduits with total outstandings of about $5 billion of ABCP followed with term extensions during the same week. These events raised concerns about the effects of liquidation in an already weak market, and about contingent liabilities for liquidity providers, which would have to cover any shortfalls resulting from valuation losses on liquidated assets and the corresponding par values. In the wake of the above-mentioned extensions, ABCP spreads thus widened across the maturity spectrum, outstanding volumes fell and maturities shortened for those issues that were successfully rolled over.

Problems quickly spread to outside the core US and European markets. Coventree, a Canadian ABCP sponsor, ran into rollover problems that led to the extension of some $238 million worth of outstanding paper and the triggering of liquidity backup lines on another $660 million. Further extensions and emergency funding requests followed over the next few days, as Coventree and other sponsors sought recourse to liquidity support on the basis of "market disruption event" clauses. While these were initially contested by some of the liquidity providers, a group of banks later agreed to help roll over maturing paper through conversions into floating rate notes to ease liquidity pressures in the market. Similarly, Australian issuer RAMS Home Loans Group extended $4.9 billion worth of outstanding US ABCPs.

In comparison to the upheaval in the ABCP market, particularly among programmes backed by mortgage collateral or the issuance of extendable notes, the broader CP market performed somewhat more positively. Despite substantial spillovers from the ABCP market, spreads between non-asset-backed CP and Libor widened much less than those for ABCP, with large parts of the observed volatility due to the sharp swings in Libor rates resulting from broad liquidity concerns (Graph A, right-hand panel). This was consistent with relatively positive assessments of the credit quality of corporate issuers, as opposed to concerns about losses on ABCP collateral pools. It also contrasted with market developments in 2001–02, when problems facing CP issuers had been related to concerns about corporate risk in the wake of ratings downgrades and the WorldCom scandal, whereas ABCP markets had continued to provide reliable short-term funding.

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[1] While traditional ABCP conduits fund themselves exclusively through commercial paper (CP) issuance, SIV-based programmes tend to rely on a mixture of ABCP issuance and medium-term financing. SIVs and similar structures are estimated to have grown to an overall portfolio size of about $395 billion and tend to invest in tradable securities with investment grade ratings, such as senior tranches of CDOs. In contrast to traditional conduits, SIVs are marked to market. [2] On similar cases of bank run-type effects in securities markets, see BIS, "A depositor run in securities markets: the Korean experience", *BIS Quarterly Review*, June 2003, and Borio, "Market distress and vanishing liquidity: anatomy and policy options", *BIS Working Papers*, no 158, July 2004. [3] ABCP pools are often sourced in primary or secondary markets or obtain their assets from multiple originators. This is in contrast to traditional types of CP, which are backed by a single corporate issuer. [4] Liquidity backup lines developed in the early 1970s, after the default of Penn Central caused a drying-up of the CP market, and give issuers recourse to short-term bank loans in case of market disruptions or failure to roll over maturing paper.

4% refinancing rate and against the usual collateral. Later that day, the US Federal Reserve added $24 billion in open market operations, and other central banks took similar steps. Further central bank actions, including a 50 basis point reduction in the US discount rate, were undertaken through the following

weeks, which helped to alleviate immediate pressures in overnight markets. However, as concerns about term liquidity persisted, money market rates remained unusually volatile into late August.

Bond yields plunge as investors flee risky assets

Bond yields fall …

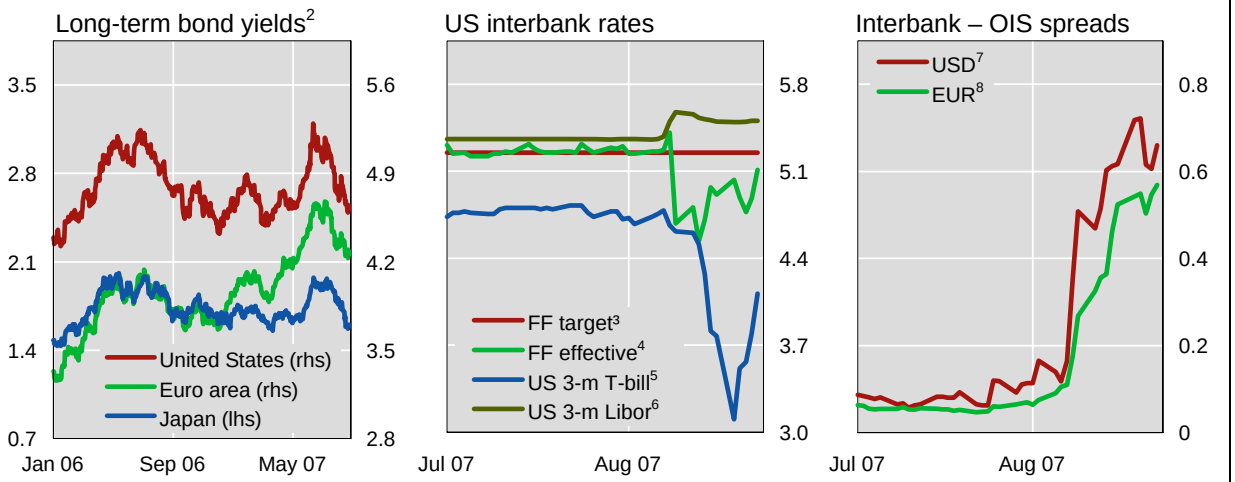
The period under review saw government bond yields in industrialised countries fall sharply as markets sold off and investors retreated from risky assets (Graph 5, left-hand panel). This drop more than offset a pronounced upward move in bond yields that had taken place in the first two weeks of June. Hence, while the yield on 10-year US bonds had risen by some 40 basis points in the first half of June, by late August it had dropped back by around 65 basis points. Similar swings, albeit a bit less pronounced, took place elsewhere. From their local peaks around mid-June, 10-year government bond yields in the euro area and Japan declined by around 40 basis points, bringing them to levels somewhat below those seen at the end of May.

The sharp rise in bond yields that occurred in early June, adding to increases that had taken place in May, was largely the result of perceptions among investors that the growth outlook had improved, in particular in the United States. This had also led to a scaling-back of investors' expectations of Federal Reserve rate cuts, which, in combination with rising term premia, placed significant upward pressure on yields.

… as investors flee risky assets …

As credit markets started to sell off in the second half of June, bond yields began to fall for two reasons. First, the turbulence in credit markets, which soon spread to other markets, prompted a flight to the relative safety of government bonds, as investors scaled back their holdings of risky assets. This manifested itself in a reversal of the rise in estimated term premia that had taken place in May and early June. The flight to safety was particularly evident

Interest rates[1]



[1] End-of-day data, in per cent. [2] Ten-year government bond yields; for the euro area, German bund. [3] Federal funds target rate. [4] Federal funds effective rate. [5] US three-month Treasury bill rate. [6] US three-month Libor rate. [7] Spread between three-month eurodollar rate and three-month overnight index swap rate. [8] Spread between three-month Euribor and three-month EONIA swap rate.

Sources: Bloomberg; BIS calculations. Graph 5

in the US Treasury bill market, where rates plunged in August (Graph 5, centre panel). Second, news of the deteriorating situation in the US housing market brought about a reassessment among investors of risks to the economy as a whole. This was compounded by the intensity of the credit market sell-off beyond the subprime sector, which led to fears of an impending credit crunch. In this environment, investors seemed to take comparably little comfort from any benign macroeconomic news, such as the second quarter US GDP release on 27 July, which reported a better than expected annual growth rate of 3.4%.

… and liquidity demand surges

While the market turbulence started off as a credit-related sell-off, it subsequently evolved into a severe liquidity squeeze across various markets. The ABCP market was among the first to display clear signs of liquidity disruptions (see box), which soon spread to the interbank money market. As a result of this squeeze, money market rates spiked in early August (Graph 5, centre panel). While central bank liquidity injections alleviated some of the pressure in this market, notably for very short maturities, considerable liquidity shortages remained elsewhere. One sign of strain in money markets was the persistent widening of spreads between interbank rates and overnight index swap rates, reflecting perceptions of higher counterparty risk and increased preference for liquidity at maturities longer than overnight (Graph 5, right-hand panel). Such strains added to investors' worries about the fallout from the financial turbulence for the growth outlook. The surging liquidity preference, in combination with intensifying flight to safety, was also evident from a significant rise in inflows into money market funds that invest only in short-term government securities, which in turn increased the severe downward pressure on Treasury bill rates. On 20 August, the three-month T-bill rate fell to almost 3%, which, at more than 200 basis points below the Federal funds target rate, represented the lowest level relative to the policy target rate since 1982.

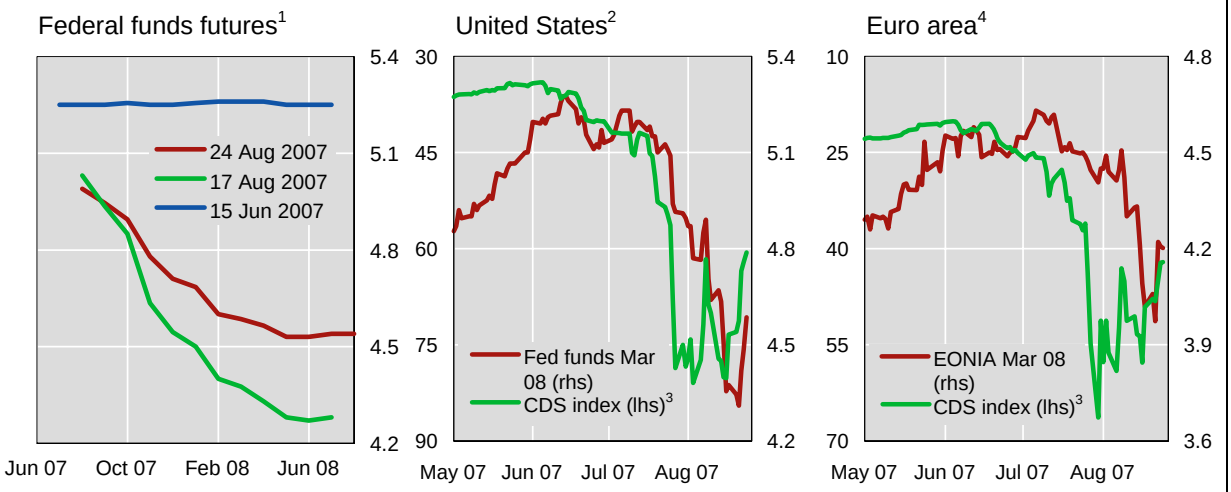
Investors expect Fed rate cuts …

In line with rising concerns about the risks to the US economy and growing fears of widespread market disruptions, expectations among market participants that the Federal Reserve would ease monetary policy gathered momentum (Graph 6, left-hand panel). While the pricing of federal funds futures contracts in mid-June had suggested that the Federal Reserve would remain on hold for the foreseeable future, investors began increasingly to price in easier monetary policy as risky asset markets sold off (Graph 6, centre panel). Although part of the observed downward shift in the federal funds futures curve reflected the fact that the effective federal funds rate was trading considerably below target in the second half of August (Graph 5, centre panel), futures prices seemed to also suggest that expectations of rate cuts intensified as the liquidity squeeze in money markets deepened. The decisions on 17 August by the Federal Reserve Board to lower the discount rate, and by the FOMC to release a statement noting an appreciable increase in downside risks to growth, were widely seen as confirmation by investors that the federal funds target rate was likely to be lowered sooner rather than later.

… while ECB hike expectations are scaled back

With investors viewing the European economy as less vulnerable than that of the United States, much of the decline in euro bond yields seemed initially to reflect a general flight to safety, rather than any significant reassessment of the macroeconomy. However, as the market turmoil deepened, investors gradually

Monetary policy expectations and credit spreads



[1] In per cent. [2] Federal funds futures rate for March 2008 and US investment grade CDS index (CDX.NA.IG.8). Left-hand scale in basis points, right-hand scale in per cent. [3] Inverted scale. [4] Approximate implied EONIA forward rate for March 2008, based on EONIA swap prices, and European investment grade CDS index (iTraxx Europe Series 7). Left-hand scale in basis points, right-hand scale in per cent.

Sources: Bloomberg; BIS calculations. Graph 6

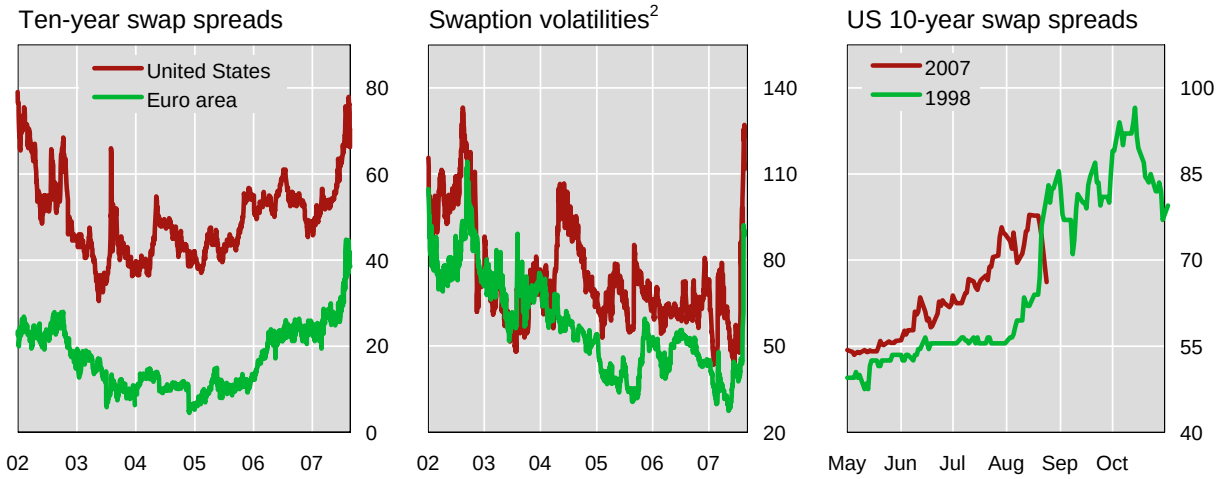
became concerned also about risks to the European banking sector and the outlook for economic growth. Accordingly, expectations of further ECB rate hikes began to dissipate as the sell-off gathered pace and liquidity concerns in markets became more acute (Graph 6, right-hand panel).

In Japan, as in other markets, bond yields were subject to downward pressure in July and August as investors sought safer havens. The volatile situation in markets also contributed to some moderation in the pace of monetary policy tightening expected by market participants. At the same time, a number of macroeconomic data announcements were seen as indicating a softer economic outlook than had been anticipated. In this environment, investors' concerns about the fallout from the market turbulence, in combination with a sizeable appreciation of the yen, may have added to the decline in Japanese bond yields.

Swap spreads rise ...

The flight of investors away from risky assets into government bonds led to a substantial increase in swap spreads (Graph 7, left-hand panel). Between end-May and mid-August, the US 10-year swap spread rose by about 20 basis points to close to 80 basis points, levels not seen in over five years. Similar developments were observed in swap markets denominated in other currencies. Apart from the impact of the flight to safety, increased hedging activity in an environment of reduced market liquidity also contributed to the upward pressure on swap spreads. Moreover, comments by market participants suggested that part of the widening of spreads might have been due to heightened concerns among investors about systemic risks. Some began to draw parallels with the autumn of 1998, when the collapse of LTCM had triggered fears of instability in the banking system as a whole. However, the recent rise in US 10-year swap spreads was less sharp than at the time of the LTCM crisis (Graph 7, right-hand panel). In the second half of August, swap spreads narrowed to some extent as markets recovered somewhat.

Swap spreads and swaption volatilities[1]



[1] In basis points. [2] Implied volatilities, three-month swaptions on one-year swap rates.

Sources: Bloomberg; BIS calculations. Graph 7

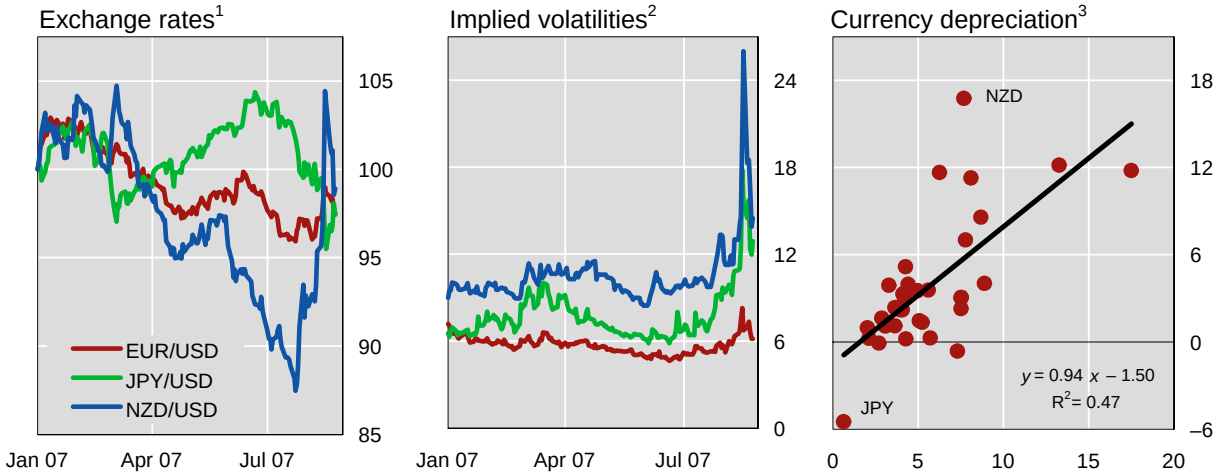
... swaption volatilities surge ...

After having reached historical lows earlier in the year, implied swaption volatilities in the United States and the euro area rose significantly as the credit sell-off progressed (Graph 7, centre panel). While implied volatilities rose across the maturity spectrum, the most pronounced increases were seen for short-term rates, suggesting that uncertainty about the monetary policy outlook had intensified. In addition to greater uncertainty, an increase in the required compensation for exposure to interest rate volatility risk may also have contributed to the general rise in swaption volatilities.

... and carry trades are unwound

In parallel with rising volatility across markets, foreign exchange markets saw extraordinary swings in exchange rates as investors began unwinding carry trades. Low-yielding currencies such as the Japanese yen appreciated

Exchange rates and implied volatilities



[1] 1 January 2007 = 100. [2] One-month at-the-money implied volatilities. [3] Depreciation of various currencies vs the US dollar (in per cent), in the period 25 July to 16 August 2007 (when the VIX rose from 17% to 31%), plotted against the average short-term interest rate for the previous six months. For details, see J Cairns, C Ho and R McCauley, "Exchange rates and global volatility: implications for Asia-Pacific currencies", *BIS Quarterly Review*, March 2007.

Sources: IMF, *International Financial Statistics*; Bloomberg; Datastream; BIS calculations. Graph 8

considerably, while high-yielding ones, notably the New Zealand dollar, fell sharply (Graph 8, left-hand panel). Other currencies that felt the impact of unwinding carry trades included the Australian dollar. In mid-August, the Reserve Bank of Australia intervened in currency markets after the Australian dollar had fallen by 11% against the US dollar and 18% against the yen, compared to July peak levels. Implied volatilities on foreign exchange rate options rose across the board, with particularly sharp increases seen for carry trade currencies (Graph 8, centre panel). Because traders rely on calm conditions in currency markets to generate a steady cash flow from carry trades, the surge in volatility added to incentives to unwind such trades. The exchange rate movements seen in July and August were therefore fully consistent with historical experience during high-volatility episodes, when high-yielding currencies tend to depreciate while low-yielding ones tend to serve as safe havens (Graph 8, right-hand panel). In line with this, exchange rate movements in late August suggested that some carry trade positions were re-established as markets entered a period characterised by lower volatility.

Credit turmoil spreads to equity markets

Equities are hit by market turbulence …

As the turbulence in the credit markets gathered momentum, the retreat from risky assets spread to other asset classes – including equity markets, which saw broad-based declines in stock prices in the second half of July and in August. Compared to the level seen at the end of May, the S&P 500 Index had by mid-August lost 8%, before recovering in subsequent days to end 3.3% lower on 24 August (Graph 9, left-hand panel). Equities outside the United States retreated even more, with the Dow Jones EURO STOXX index falling by around 7% and the TOPIX by almost 10% between end-May and 24 August. These losses wiped out much of the gains that had accumulated in US and European equity markets since the beginning of the year, while bringing Japanese equities considerably below their end-2006 levels.

… as premia rise and risks are reassessed

The declines in equity prices were due in part to rising risk premia, although fundamentals played a role too, as investors reassessed the risks of the deteriorating housing market for US profits and the economy as a whole. The significance of adverse news related to the housing market was apparent in the week of 23–27 July, in which the S&P 500 Index fell by 4.9% – its largest weekly decline since 2002. This plunge took place as a number of homebuilding companies posted losses for the second quarter. At the same time, one of the largest US home loan lenders, Countrywide Financial Corp, reported lower than expected earnings and warned that difficult conditions were likely to persist. On top of this, concerns grew among investors that the boom in global mergers and acquisitions (M&As), which had been fuelling rising equity prices for some time, might be coming to an end.

Bank equities suffer …

Equities in the construction and banking sectors suffered particularly from the negative housing news and the resulting credit market turmoil. The worst performer in the S&P 500 Index from end-May was the Homebuilding Sub-index, which by 24 August had fallen by more than 33%. The S&P Bank Index also fared worse than the index as a whole, declining by almost 7% between

end-May and 24 August, while the Investment Banking Sub-index fell by 17% during this period, after having lost more than 25% at one point in mid-August. Share prices of banks in Europe and Japan performed similarly, declining by some 11% and 18% between end-May and late August, respectively (Graph 9, centre panel). This largely reflected investors' anticipation of losses related to speculation in the subprime market and other credit products, as well as expected declines in bank profits due to lower M&A-generated fees. Despite such losses, the overall decline among US banks had not, by late August, been as severe as in 1998, when the financial sector had suffered a major blow following the LTCM/Russian default crises (Graph 9, right-hand panel).

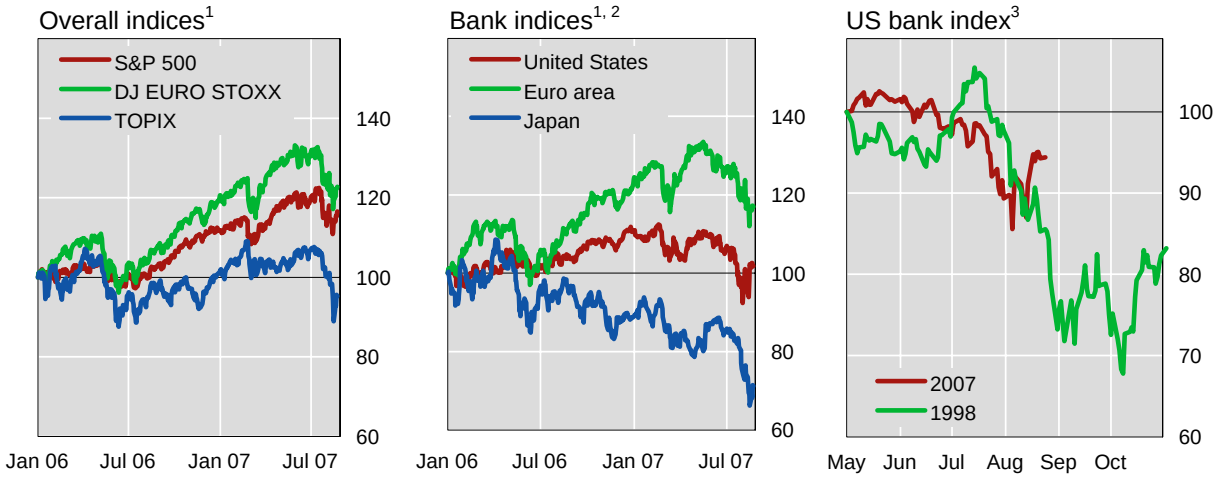
… on concerns about future profits

The equity sell-off occurred in an environment of solid corporate earnings and with macroeconomic conditions that still appeared relatively favourable. In the United States, two thirds of reporting S&P 500 companies exceeded second quarter earnings expectations, while just over 20% reported lower earnings than expected. These proportions were close to recent historical experience. The average year-on-year profit growth was almost 11% (on a share-weighted basis), which seemed to indicate robust profitability in the corporate sector. Second quarter profit growth among S&P 500 banks was even more brisk, at an annual rate of almost 16%. However, markets focused less on backward-looking data, such as profits, and more on risks to future economic growth and earnings resulting from the turmoil in credit markets and beyond.

Implied volatilities surge …

As in previous sell-offs, implied equity index volatilities rose sharply, as the market retreat gathered pace. The S&P 500 VIX implied volatility index, which had settled at around 13% after the February–March sell-off, rose steadily in July and August, reaching an intraday peak of 37.5% on 16 August (Graph 10, left-hand panel). Similar developments were apparent in Europe, where one-month implied volatility on the DJ EURO STOXX 50 Index exceeded 30% in mid-August. Implied volatilities subsequently fell back in late August as

Equity markets

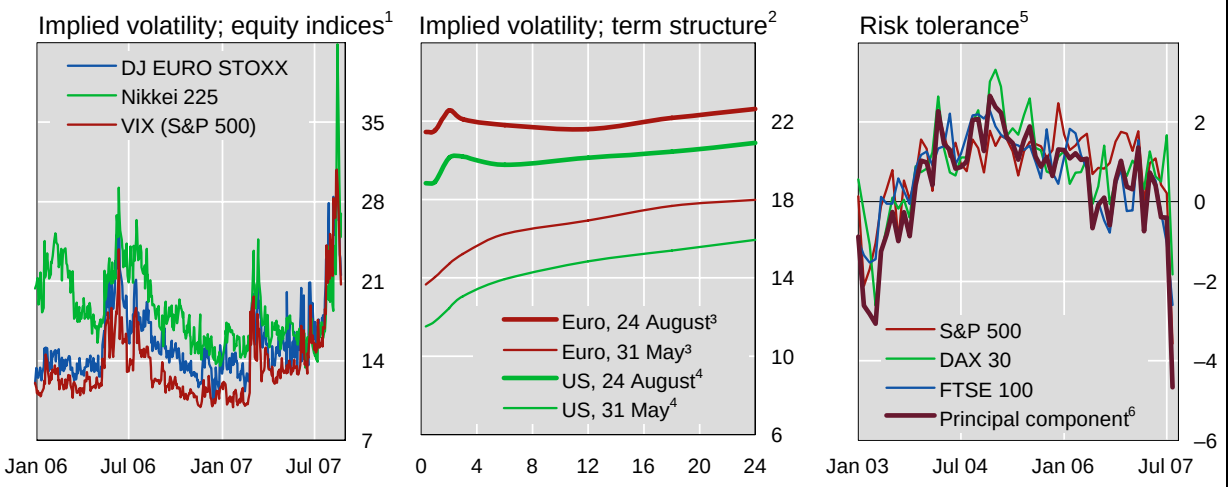


[1] In local currency; 3 January 2006 = 100. [2] For the United States, S&P Bank Index; for the euro area, DJ EURO STOXX Bank Index; for Japan, TOPIX Banks Index. [3] 1 May 1998 and 2007 = 100.

Source: Bloomberg.

Graph 9

Equity market volatility and risk tolerance



[1] Volatility implied by the price of at-the-money call option contracts on stock market indices; in per cent. [2] Volatility implied by the price of at-the-money call and put option contracts on stock market indices (on 31 May 2007 and 24 August 2007), in per cent. The horizontal axis refers to the maturity of the options in months. [3] DJ EURO STOXX 50. [4] S&P 500. [5] Derived from the differences between two distributions of returns, one implied by option prices, the other based on actual returns estimated from historical data. [6] First principal component of risk tolerance indicators estimated for the S&P 500, DAX 30 and FTSE 100.

Sources: Bloomberg; Chicago Mercantile Exchange; Eurex; London International Financial Futures and Options Exchange; BIS calculations. Graph 10

some of the turbulence in markets faded. Nonetheless, by 24 August implied volatility term structures remained substantially above the levels seen at the end of May (Graph 10, centre panel). The fact that the term structures had flattened considerably seemed to indicate that markets did not expect volatility to return any time soon to the low levels seen in early 2007. Higher volatility risk premia resulting from a reduced appetite for risk probably also contributed to the increase in implied volatilities. A clear sign of such a reduction in investor risk appetite was a sharp drop in the estimated risk tolerance implied by equity option prices and returns (Graph 10, right-hand panel).

... while risk appetite plummets

Emerging markets show relative resilience

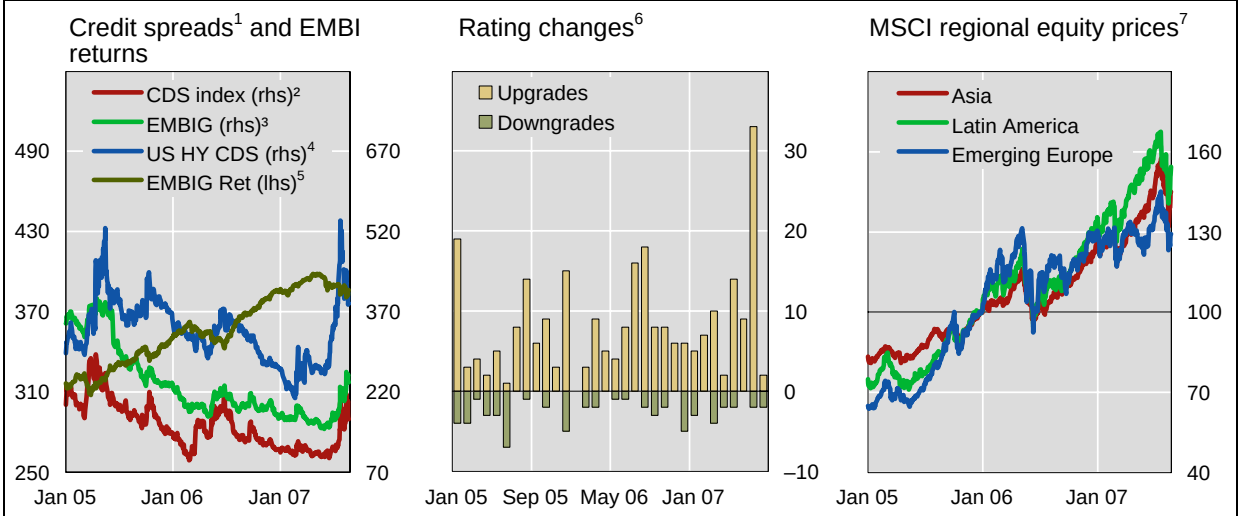
Emerging market bonds show initial resilience ...

In line with the general repricing of risk, emerging market spreads rose significantly from late June to late August. Nonetheless, the rise was not as sharp as in industrialised country credit markets, and emerging market spreads also showed some initial resistance to the widening of spreads seen in other markets. The EMBI Global spread index increased from an all-time low at 151 basis points in early June to a peak near 260 in mid-August, its highest point in eight months. By end-August, spreads had tightened back to 238 basis points. While losing some 2.5% in return terms, the index outperformed most measures of similarly rated corporate credit. Over the same period, the five-year emerging market CDX index widened by about 70 basis points to around 170, after reaching a peak near 230 basis points in early August. This was, however, still lower than the levels seen during the 2005 sell-off (Graph 11, left-hand panel).

... but spreads increase in the wake of general risk repricing

It was only during the second stage of the credit market correction that reduced risk appetite spilled over into emerging market debt, following renewed

Emerging market credit spreads and equity prices



[1] In basis points. [2] CDX five-year on-the-run CDS mid-spread for 14 emerging market issuers. [3] EMBI Global index; sovereign spread over government bond yields. [4] CDX five-year on-the-run CDS mid-spread for 100 high-yield corporate names. [5] EMBI Global index; cumulative total return index as calculated by JPMorgan Chase. [6] Monthly long-term foreign and local currency sovereign rating changes from Fitch, Moody's and Standard & Poor's; August 2007 data are partial. [7] In local currency; 31 December 2005 = 100.

Sources: Bloomberg; JPMorgan Chase. Graph 11

subprime-related jitters starting in mid-July. With spread correlations of emerging market debt and ABX BBB tranches returning to the elevated levels last seen in February, the EMBI Global saw spreads increase by about 50 basis points in the five-day period up to 26 July. Spreads experienced a further, similar increase in mid-August, when concerns about liquidity demand began to permeate across global financial markets, before recovering somewhat late in the month. At the individual country level, spread movements seemed to largely reflect established patterns, with higher risk credits, such as Argentina and Ecuador, tending to lead the market in either direction. Despite increased market volatility, positive rating changes continued to outnumber negative ones by a wide margin, thus providing relative support (Graph 11, centre panel). Market commentary also pointed to positive technical factors, with large coupon and amortisation payments, expected buybacks and a low level of sovereign issuance all contributing to favourable supply side effects.

Emerging market equities also correct

Emerging market equities also proved relatively resilient to the market turbulence, while being drawn into the ongoing repricing of risky assets from late July. In the wake of the ensuing correction, the MSCI index lost about 15% of the value it had reached at its high on 23 July, before recovering in late August. Overall, the index still gained 3.5% in local currency terms (2.5% in US dollar terms) between end-May and 24 August (Graph 11, right-hand panel). At the regional level, Asian markets outperformed other emerging equity markets. For instance, investors in the Shanghai stock market pushed valuations to successive all-time highs, before seeing the index temporarily retreat. In part, this resilience may have reflected continuing expectations of strong macroeconomic performance, with data pointing to solid economic and corporate earnings growth in emerging Asia.

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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 first quarter of 2007. The discussion of the international debt securities market and exchange-traded derivatives markets draws on data for the second quarter of this year.

The international banking market

Locational banking statistics

Exceptional expansion driven by interbank activity …

Activity in the international banking market surged in the first quarter of 2007. BIS reporting banks' total cross-border claims expanded by $2.2 trillion (to $28.5 trillion), considerably more than the previous largest quarterly increase recorded a year earlier. The expansion drove the annual growth rate to over 20% for the first time since 1987. Greater interbank lending accounted for 74% of the rise in activity.[2] Banks in the United Kingdom alone attracted $565 billion in interbank deposits, while Swiss banks' inter-office transfers contributed over $500 billion to claims. Brisk interbank activity was accompanied by robust lending to non-bank entities. Claims on non-banks increased by $552 billion in the first quarter of 2007 (20% year-on-year), following a similar increase in the previous quarter.

… and large net transfers of funds …

The expansion in gross claims also contributed to an extraordinary volume of *net* flows through the international banking system (Graph 1). A comparison of the panels in the graph shows that interbank flows made up a substantial share of total net flows. Interbank flows dominated in the case of flows to and from Switzerland, and flows from the United States to the euro area. In other cases, net flows involving non-banks were predominant.

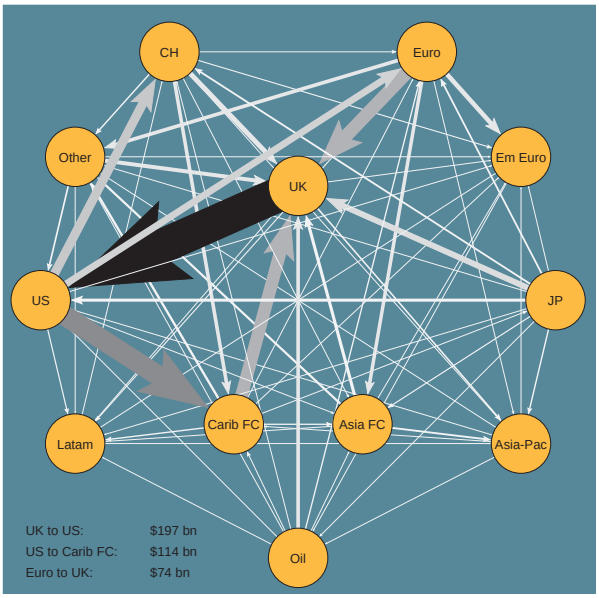
[1] Queries concerning the locational banking statistics should be addressed to Goetz von Peter, concerning the consolidated banking statistics and international debt securities statistics to Ryan Stever, and concerning the derivatives statistics to Christian Upper.

[2] Accordingly, growth in loans outstripped that in securities holdings. The share of securities holdings in total claims fell by 1 percentage point to 21%, in contrast to the long-term trend.

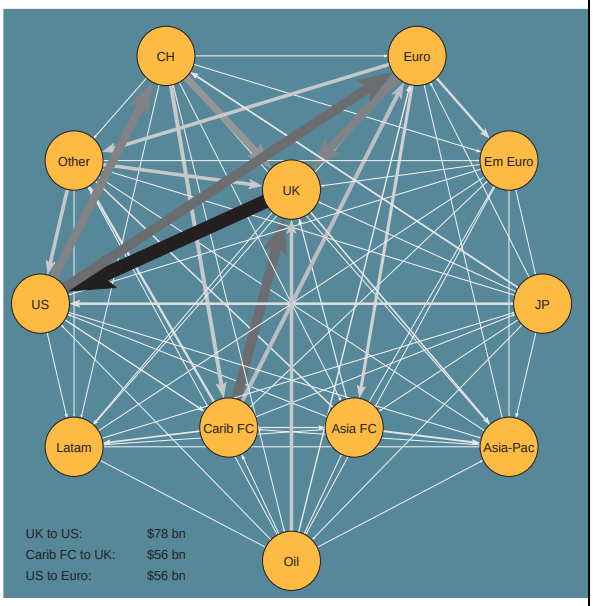
Net flow of funds through the international banking system[1]

Exchange rate adjusted flows, first quarter of 2007

Total net flows



Interbank net flows



Asia FC = Asian financial centres (Hong Kong SAR, Macao SAR and Singapore); Asia-Pac = China, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Taiwan (China) and Thailand; Carib FC = Caribbean financial centres (Aruba, the Bahamas, Bermuda, the Cayman Islands, the Netherlands Antilles and Panama); CH = Switzerland; Em Euro = emerging Europe (Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, Turkey and Ukraine); Euro = euro area member states excluding Slovenia; JP = Japan; Latam = Argentina, Brazil, Chile, Colombia, Mexico and Peru; Oil = OPEC member states (excluding Indonesia) plus Russia; Other = Australia, Canada, Denmark, New Zealand, Norway and Sweden; UK = the United Kingdom, Guernsey, the Isle of Man and Jersey; US = the United States.

[1] The thickness of an arrow is proportional to the amount of net bank flows between countries/groups, and is comparable across panels. An arrow points from A to B if net flows in this direction are positive, calculated as net interbank claims (assets minus liabilities) of banks in A on banks in B, plus net claims of banks in A on non-banks in B, minus net claims of banks in B on non-banks in A. (This last component is missed if B is not a reporting country.) The graph does not show intraregional flows or reporting banks' lending to domestic residents. See also P McGuire and N Tarashev, "Tracking international bank flows", *BIS Quarterly Review*, December 2006.

Source: BIS locational banking statistics. Graph 1

The largest net transfer of funds during the quarter ($197 billion) was from residents of the United Kingdom to those of the United States, primarily in US dollars. This was mostly due to an increase in claims reported by banks in the United Kingdom on non-banks in the United States (interbank flows accounted for $78 billion). Even so, non-banks in the United States placed more deposits overall than they borrowed from BIS reporting banks.[3] As a result, for the United States the net inflow from the United Kingdom was largely offset by net outflows to Caribbean offshore centres ($114 billion), Switzerland ($51 billion) and the euro area ($38 billion), leaving a relatively small overall net inflow ($13 billion) to the United States.[4] The net transfer of funds between the United States and Caribbean financial centres was driven mostly by non-banks in the United States sending dollars to banks located in the Caribbean.

[3] This development is broadly in line with evidence of somewhat weaker demand for most loan types in the United States.

[4] The net inflow was less than the quarterly average of $35 billion since 2000. Total capital inflows into the United States during the quarter were $176 billion.

Japanese residents continued to send funds to almost all regions, leading to a net outflow of $87 billion overall. Non-bank activity accounted for most of the net flow from Japan to the United Kingdom: banks in the United Kingdom reduced their yen claims (including equity claims) on non-banks in Japan, and non-banks in the United Kingdom withdrew part of their dollar deposits in Japan. Flows between the United Kingdom and Switzerland were predominantly in pounds sterling. Indeed, sterling-denominated activity accounted for an unusually large share (18.8%) of the overall expansion. This raised the pound's market share to a historical peak (7.7%), at the expense of the US dollar, whose share in the stock of claims fell by 1 percentage point to 42%.

… finance external imbalances

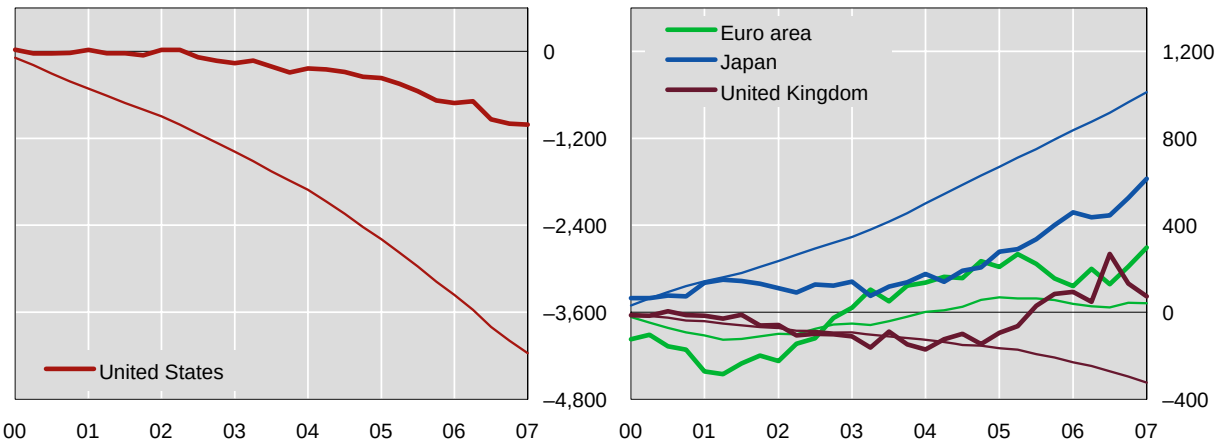
Transfers of funds through the international banking system can play an important role in the financing of current account imbalances (Graph 2). As of the first quarter of 2007, 24% of the total cumulated funds channelled to US residents since 2000 were routed via the banking system, up from 12% three years earlier. This is mirrored in the external position of Japan, where net bank outflows amounted to 61% of Japan's cumulated current account surpluses, up from 35% three years earlier. Net bank flows need not coincide with current account developments: while they did for the United States, Japan and, to a lesser extent, the euro area, net bank outflows from the United Kingdom since 2005 suggest that current account deficits have been financed by flows via financial markets.

Credit to emerging markets accelerates …

Claims on emerging markets continued to accelerate. Of the $156 billion in new claims, emerging Europe again attracted the largest share (37%), followed by Asia-Pacific (33%), Latin America (21%) and Africa and the Middle East (9%). Within a decade, emerging Europe has overtaken the other emerging regions as the one to which BIS reporting banks extend the greatest share of gross credit (Graph 3, left-hand panel).

External positions and the international banking market

In billions of US dollars

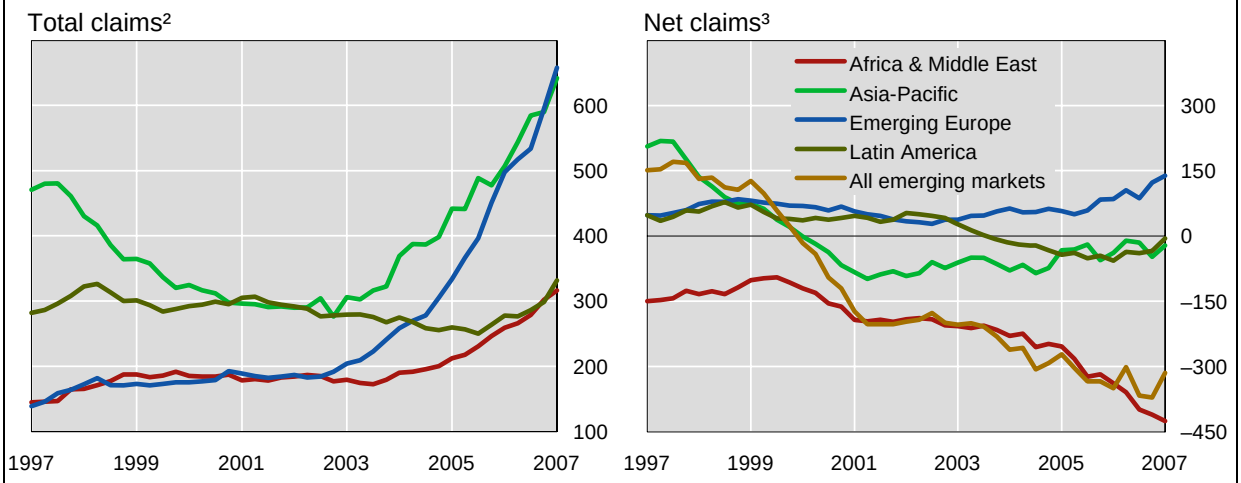


The thick lines represent net bank flows, the thin lines the current account balance. Flows are cumulated from 2000 Q1 onwards; positive net bank flows represent net outflows from the country or region to the rest of the world.

Source: BIS locational banking statistics. Graph 2

Claims on emerging markets by region[1]

In billions of US dollars



[1] Excluding offshore financial centres. Claims are expressed at constant 2007 Q1 exchange rates. [2] BIS reporting banks' cross-border loans and securities claims on emerging markets. [3] Total claims minus total liabilities.

Source: BIS locational banking statistics. Graph 3

... leading to net inflows overall

The most recent quarter registered considerable *net* inflows to emerging markets for the first time in four years, to the tune of $51 billion. This is in contrast with the long-term trend, in which new credit to emerging markets has typically fallen short of their deposit placements with BIS reporting banks (Graph 3, right-hand panel). In the most recent quarter, however, there were substantial net inflows into all regions except Africa and the Middle East. While banks' net positions vis-à-vis emerging Europe and Africa and the Middle East have therefore diverged further, their net claims on Latin America and Asia-Pacific have moved close to zero. Indeed, almost the entire stock of deposits by Asia-Pacific residents ($663 billion) is channelled back into the region, mostly in the form of loans ($500 billion).

The distribution of flows within these regions was in some cases uneven. In emerging Europe, virtually all countries experienced positive net inflows. Among the main recipients were a number of smaller markets, including Croatia, Cyprus and Malta. Total net inflows to the region would have been even larger had it not been for a net outflow of $30 billion from Russia as a result of $45 billion in deposit placements with BIS reporting banks.[5] Similarly, deposit placements by residents of Kuwait, Libya and South Africa, in the amount of $21 billion, materially contributed to net outflows from Africa and the Middle East. Net inflows to Asia-Pacific were driven by greater claims on China, India and Korea, mostly in the form of lending to banks. By drawing down deposits placed with BIS reporting banks, China has become a net borrower for the first time since 1999. In Latin America, over half of net inflows went to Brazil ($17 billion), while Colombia, Mexico and Peru jointly received another $10 billion, over half of which was in the form of claims on non-banks.

[5] IMF data indicate that Russia's official reserves placed with banks outside the country increased by $10 billion during the first quarter of 2007.

Consolidated banking statistics

Foreign claims expand to $25 trillion …

The surge in claims in the first quarter of 2007 was also evident in the BIS consolidated banking statistics, which track international banking activity from the creditor's perspective.[6] BIS reporting banks' total foreign claims on an ultimate risk (UR) basis reached $25 trillion in the first quarter, up from $17 trillion two years ago. A change in reporting led to a notable increase in Italian banks' foreign claims.[7] Elsewhere, French, German and UK banks' claims grew the most, primarily driven by lending to the non-bank private sector.

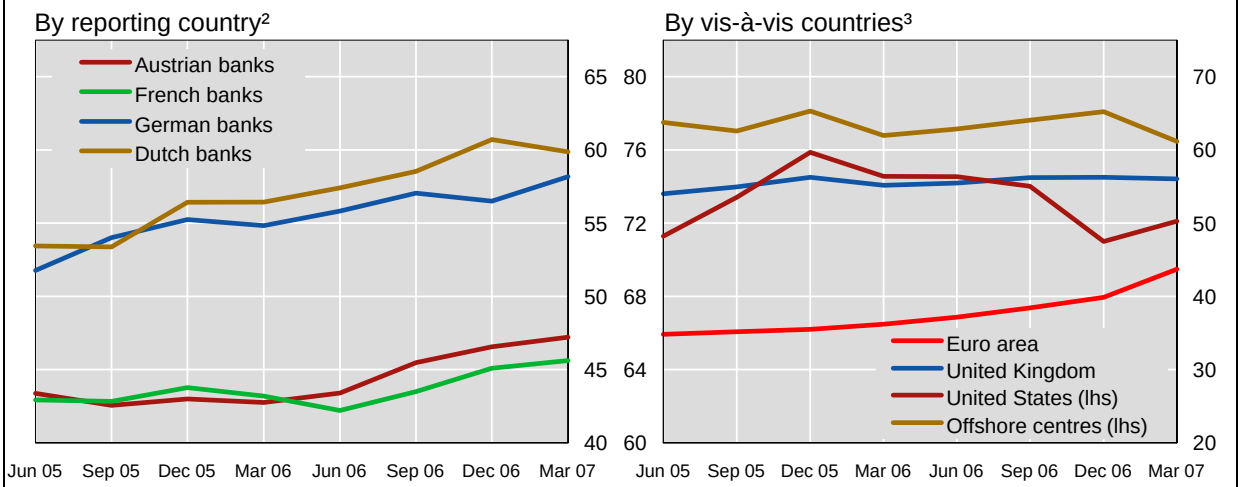
… due partly to interbank lending …

Interbank lending accounted for a substantial portion of the increase in claims. Foreign claims (UR basis) on banks grew to $7 trillion, or 29% of total foreign claims (unchanged from a year ago). Banks around the reporting area, but particularly French, Italian and Dutch banks, channelled funds to banks in the United Kingdom. In turn, UK banks' interbank lending expanded by $121 billion (primarily to banks in the euro area and the United States), pushing their share of claims on this sector to 28% of their total foreign claims.

Banks in the reporting area continued to direct funds to the non-bank private sector. Overall, reporting banks' claims on these borrowers grew by $1.5 trillion to $13.6 trillion, or 54% of their total foreign claims (UR basis).

Reporting banks' claims on the non-bank private sector[1]

Percentage shares



[1] Foreign claims on an ultimate risk basis reported by domestically owned banks of 24 reporting countries. [2] Share in respective reporting countries' total foreign claims on all residents. [3] Euro area reporting banks' total foreign claims on respective vis-à-vis countries.

Source: BIS consolidated banking statistics on an ultimate risk basis. Graph 4

[6] The BIS consolidated banking statistics are based on the *nationality* of the reporting bank, net out inter-office positions, and are available on an immediate borrower (IB) and an ultimate risk (UR) basis. Foreign claims are cross-border claims plus local claims extended from foreign offices. Unlike foreign claims (IB basis), claims expressed on a UR basis take into account third-party guarantees, and are allocated back to the residence of the ultimate obligor.

[7] Italian banks' foreign claims (UR basis) rose by $649 billion, nearly twice the increase in the previous quarter, due to a change in reporting that led to a reclassification of a number of subsidiaries, particularly those located in Germany.

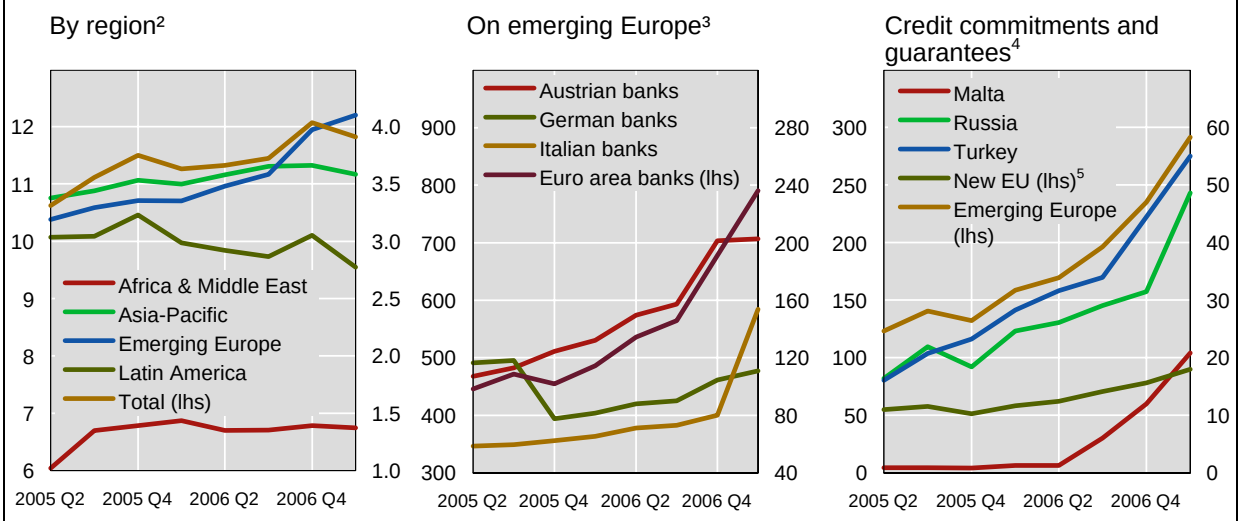
Claims of euro area banks, in particular German and French banks, grew the most, pushing their foreign claims (UR basis) on the non-bank private sector to 53% of their total foreign claims in the most recent quarter, up from 48% in June 2005 (Graph 4, left-hand panel).[8] These banks increased their exposures to non-bank private sector borrowers in Germany, the United Kingdom and the United States the most in the first quarter of 2007, although new claims on such borrowers in emerging economies also grew noticeably (Graph 4, right-hand panel).

… and an increase in claims on the non-bank private sector

This increase in credit to non-bank borrowers has, over the longer term, contributed to a shift in reporting banks' portfolios towards emerging market borrowers. Foreign claims (UR basis) on these borrowers reached $3 trillion, or 12% of total foreign claims worldwide (up from 10% two years ago). This coincides with the 6% rise in the share of claims on the non-bank private sector over the same period. Much of this shift has been driven by increases in credit granted to borrowers in emerging Europe, primarily from banks headquartered in the euro area (Graph 5, left-hand panel). In the most recent quarter, foreign claims on these borrowers expanded by 15% to just over $1 trillion. Austrian and Italian banks have the largest exposures to emerging Europe, although German, French and Belgian banks' exposures have been on the rise as well (Graph 5, centre panel).

Along with greater credit, banks have continued to extend guarantees and credit commitments to borrowers in emerging Europe. However, whereas much of banks' direct loan exposures are to borrowers in the newest members of the European Union, guarantees and credit commitments have been extended to

Foreign claims on emerging markets[1]



[1] Worldwide consolidated positions of domestically owned banks of 24 reporting countries. [2] Share in total foreign claims on all regions, in per cent. [3] Total foreign claims by reporting country, in billions of US dollars. [4] Credit commitments and guarantees extended by banks in all reporting countries, in billions of US dollars. [5] The Czech Republic, Hungary and Poland.

Source: BIS consolidated banking statistics on an ultimate risk basis. Graph 5

[8] The jump in Italian banks' claims on this sector is primarily the result of the reclassification mentioned above.

Guarantees to emerging Europe expand

borrowers elsewhere in the region (Graph 5, right-hand panel). Total guarantees extended to the region reached $118 billion, surpassing (in the fourth quarter of 2006) the stock of guarantees extended to borrowers in Asia-Pacific. Borrowers in Turkey and Russia have been the largest recipients. Similarly, credit commitments to the region reached $174 billion in the first quarter, up from less than $100 billion a year earlier. These have been extended primarily to borrowers in Poland, Russia and Turkey.

Reporting banks' share of claims on Latin America declines

In contrast to emerging Europe, reporting banks' relative exposure to Latin America has been on the decline. Total claims on the region reached $692 billion in the first quarter of 2007, up from $575 billion a year earlier. Yet this rise has been sluggish compared with other emerging markets (only 2% in the most recent quarter), and, as a result, reporting banks' share of total claims on this region has fallen (Graph 5, left-hand panel). Spanish and US banks, the largest creditor banking systems to the region, saw modest declines in their exposures in the most recent quarter. In both cases, a reduction in exposure to the Mexican public sector seemed to play a role.

The international debt securities market

International bond and note issuance expanded significantly in the second quarter of 2007, as $1 trillion in net issuance pushed year-on-year growth to 18% from 8% the previous quarter. The amount of bonds and notes outstanding rose to nearly $20 trillion, double that of just four years ago.

Strong issuance fuelled by dollar- and yen-denominated securities

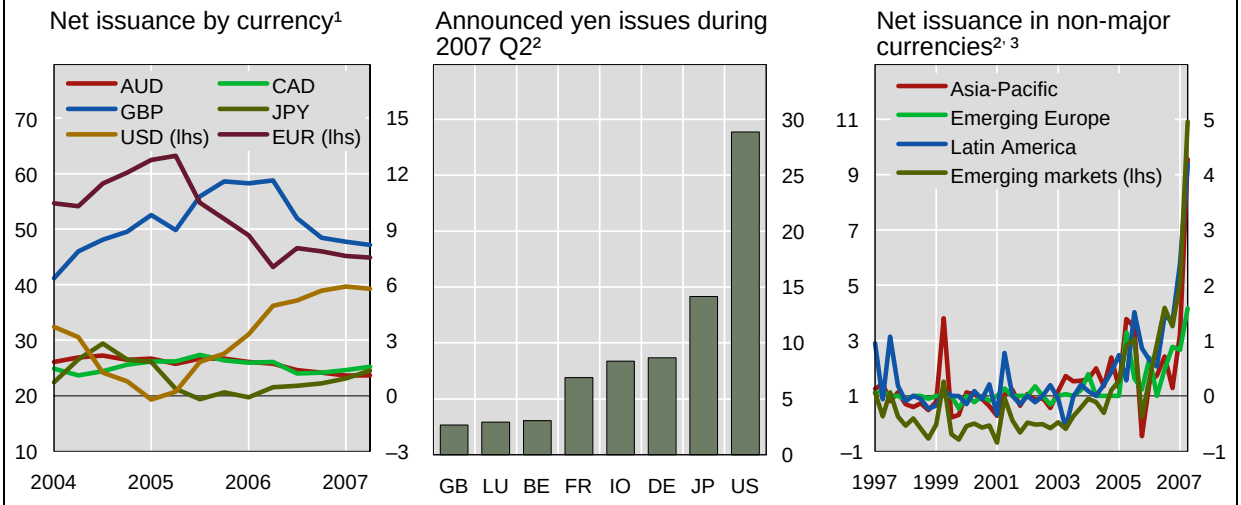
The robust growth in net issuance was fuelled by advances in dollar bonds and notes, and also in yen-denominated securities. Dollar-denominated net issuance rose by 17% year on year (40% growth over the last quarter), and accounted for nearly 40% of total issuance (Graph 6, left-hand panel). Yen-denominated net issuance soared to $28 billion, nearly twice the previous high over the last 10 years. The yen share has been on an upward trend since the second quarter of 2006 (Graph 6, left-hand panel).

Particularly active yen issuers from the United States, France and Germany

Yen-denominated gross issuance was primarily driven by new bonds and notes from US and euro area private financial institutions. Indeed, the $7 billion in yen-denominated securities from Japanese firms accounted for only 14% of global yen issuance (Graph 6, centre panel). Private financial institutions from the United States borrowed $14 billion in yen-denominated bonds and notes, almost twice the previous record high for this sector. French and German financial institutions recorded nearly $8 billion in yen-denominated announcements.

The surge in net issuance across all currencies was mostly due to the expansion of private non-bank financial institution and corporate borrowing. Private non-bank financial institutions were responsible for a full 48% of global net issuance. The $200 billion from US firms was more than 25% greater than the previous high of $156 billion just two quarters earlier. The $158 billion in net issuance by euro area private non-bank financial institutions was also exceptionally robust. Within the euro area, Spanish borrowing by this sector was the strongest for the third consecutive quarter at $51 billion.

International bond and note issuance



BE = Belgium; DE = Germany; FR = France; GB = United Kingdom; IO = international organisations; JP = Japan; LU = Luxembourg; US = United States.

[1] Four-quarter moving averages of percentage share in total net issuance. [2] By nationality of issuers, in billions of US dollars. [3] Currencies other than the US dollar, euro, sterling and yen.

Sources: Dealogic; Euroclear; ICMA; Thomson Financial; BIS. Graph 6

Net issuance from the emerging economies of Latin America, Asia and Europe was strong, despite subdued borrowing by emerging market sovereigns. Among all regions, the $20 billion from emerging Europe was the highest, with over a third of this amount accounted for by Russian private financial institution debt. Latin American non-government net issuance expanded by over 75% year on year, with Venezuelan and Brazilian borrowing almost entirely from non-government entities. Throughout the emerging markets, this shift towards non-government debt has been evident for some time. Over the last three years, the government share of emerging market bonds and notes outstanding has fallen consistently, from 57% in the third quarter of 2004 to 42% in the latest quarter.

Surge in non-government borrowing in the emerging markets

Private financial institutions and corporations from emerging Asia helped push net borrowing by the region to $19 billion, bringing year-on-year growth to 24%. Record dollar-denominated net issuance by Korean borrowers accounted for nearly a third of Asian offerings. The two other major borrowers from Asia, Indian and Chinese firms, had net issuance of $4 billion and $3 billion, respectively. As in the rest of Asia, this was mostly from financial institutions and corporate borrowers and included a large yuan-denominated bond issue from the China Development Bank.

Throughout the emerging markets, there was a surge in borrowing denominated in non-major currencies (Graph 6, right-hand panel). The $11 billion in net issuance (bringing bonds and notes outstanding to $48 billion) was twice the previous high. In addition to the $4 billion in Asian borrowing, net issuance was also strong in Latin America ($4 billion) and emerging Europe ($2 billion). Unlike borrowing denominated in the major currencies, this growth in emerging Europe and Latin America was fuelled by new government debt.

Derivatives markets

Stable turnover on derivatives exchanges

Trading volumes on the international derivatives exchanges remained stable in the *second quarter of 2007*. Combined turnover of interest rate, currency and stock index derivatives stood at $536 trillion between April and June, only marginally higher than in the previous quarter ($532 trillion). Rising equity valuations lifted turnover in derivatives on stock indices (13%), while trading in foreign exchange contracts expanded by 3%.[9] However, this barely offset slightly weaker activity in the much larger interest rate segment (–1%). Turnover in commodity derivatives, which are not included in the above totals as notional amounts are not available, increased by 6% when measured in terms of the number of contracts traded.

Valuation effects drive up volume of stock index contracts

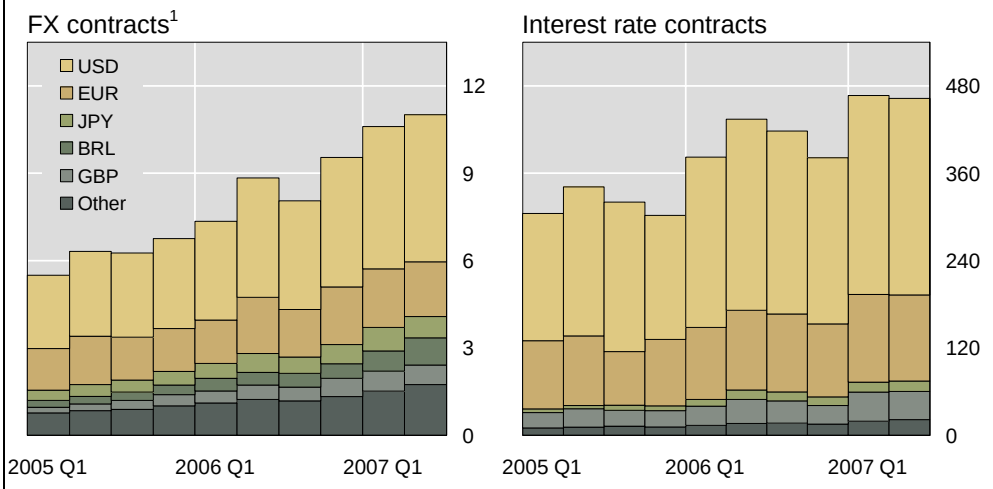
Turnover in futures and options on stock indices reached a new high of $68 trillion in the second quarter of 2007, 13% more than in the first three months of the year, but this reflected mainly valuation effects. Turnover measured in terms of the number of contracts traded rose by only 3%, well below its long-term average. In part, the low growth in activity is due to a basis effect, since volumes in the first quarter had been boosted by hectic trading in the aftermath of the sell-off that shook financial markets in late February.

Low overall growth hides sizeable shifts in FX segment

In the foreign exchange segment of the international derivatives exchanges, a modest expansion (3%) in aggregate turnover masked sizeable shifts between currencies (Graph 7, left-hand panel). Weaker activity in contracts with one leg in the euro (–6%) and yen (–11%) contrasted with a rapid increase in derivatives on the Brazilian real (34%). Derivatives markets in Brazil have grown rapidly in recent years, and turnover in contracts on real-dollar reached $0.9 trillion in the second quarter, overtaking yen-dollar

Turnover of exchange-traded derivatives

Quarterly data, in trillions of US dollars



[1] Because two currencies are involved in each transaction, the sum of transactions in individual currencies comes to twice the total turnover.

Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 7

[9] All growth rates in this section refer to quarter-on-quarter increases, unless otherwise noted.

($0.7 trillion) as the second most actively traded currency pair behind euro-dollar ($1.7 trillion). A sharp rise in activity was also recorded in contracts on the Canadian dollar (26%).

Turnover in interest rate contracts stagnates despite positive seasonal factors

Activity in interest rate derivatives declined slightly (Graph 7, right-hand panel), as the usual seasonal pickup in trading failed to materialise.[10] At $463 trillion, turnover in interest rate contracts in the second quarter of 2007 was slightly below the $467 trillion recorded in the previous three months. A relatively small decline in activity in the three major currencies offset sizeable increases in turnover in many smaller markets. For example, turnover in contracts on Brazilian short-term interest rates increased by 37% in the second quarter, thus mirroring the rapid growth in foreign exchange contracts. Rapid growth was also recorded in money market contracts denominated in Swiss francs (23%), Australian dollars (19%) and Swedish kronor (17%). In the long-term segment, turnover in derivatives on Korean and Japanese bonds increased by 31% and 30%, respectively. However, these increases were not sufficient to offset the relatively small declines in activity in contracts denominated in US dollars (–1%), euros (–2%) and pounds sterling (–4%), since turnover in these currencies dwarfs trading in other markets.

First credit derivatives traded on an exchange

Credit derivatives began to trade on an exchange in March 2007, when Eurex introduced a futures contract on the iTraxx Crossover Index. In June, several Chicago exchanges followed suit and launched credit contracts. In contrast to the Eurex derivative, which works like a futures contract on a credit default swap (CDS) index, the US contracts resemble CDSs with fixed recovery rates. They also have relatively long maturities (up to 10 years), compared to at most one year for the Eurex future. Whether exchange-traded credit derivatives will play an important role in the future remains to be seen. With a turnover of $148 million in the second quarter, and open interest of $127 million at the end of June, the market for credit futures is still very small in comparison to the over-the-counter CDS market, whose notional amount outstanding stood at $29 trillion at end-2006.

[10] Estimates of seasonal factors driving turnover in interest rate derivatives are presented in *BIS Quarterly Review*, March 2006, pp 45–6.

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Evidence of carry trade activity[1]

Interest rate differentials have been a driving force behind exchange rate movements in recent years. This has focused market attention on the role of currency carry trade positions, and on the possibility that a sudden unwinding might adversely affect financial stability. However, carry trades are notoriously difficult to track in the available data. This special feature first outlines the investor base and trading strategies used in carry trades, and then explores various sources of data to gauge activity.

JEL classification: F31, F32, G15.

Low exchange rate volatility and persistent interest rate differentials have underpinned significant cross-currency positioning in recent years. These positions have often taken the form of currency carry trades, or leveraged cross-currency trading strategies. To the extent that this carry trade activity has been, and may continue to be, an important driver of exchange rate developments, it is useful to gauge what the available data can say about its significance.

The effect of carry trade activity on exchange rates is typically asymmetric, and can be significant. The build-up of these positions generally contributes to a steady strengthening of target currencies (associated with high interest rates) and a weakening of funding currencies (associated with low interest rates), against the predictions of the uncovered interest parity (UIP) hypothesis (Burnside et al (2006, 2007)). However, when changes in interest rate expectations or volatility lead to a sudden unwinding of carry trades, there is a tendency for target currencies to depreciate and funding currencies to appreciate sharply (IMF (1998), Béranger et al (1999), Cairns et al (2007), Gagnon and Chaboud (2007)).

Perhaps the best known example is the sharp appreciation of the yen against the US dollar between 6 and 8 October 1998, following a prolonged period of depreciation. This was the sharpest move in major foreign exchange

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS. The authors thank Clara García and Jhuvesh Sobrun for excellent assistance with the data and graphs, and acknowledge that the discussion on risk reversals has benefited from access to unpublished work by William Melick and San Sau Fung.

rates since 1974 and was accompanied by a significant spike in volatility: one-month implied volatility reached 40% and bid-ask spreads widened markedly. Market analysts explained the move in terms of a sudden, massive reversal of carry trade positions, despite the lack of an apparent trigger.[2]

This special feature examines the extent to which any recent build-up of carry trade positions can be traced in various sources of data. The first section discusses different measures of the attractiveness of carry trades, the strategies used and the participating investors. The second assesses the extent to which capital flows through banks and foreign exchange market activity can be linked to the strategies and currency pairs identified in the first section. The key sources of data reviewed are the BIS international banking statistics, which can help track the magnitude and direction of capital flows (by currency) intermediated by the international banking system, and various statistics on foreign exchange trading.

What is a carry trade?

A currency carry trade is usually defined as a leveraged cross-currency position designed to take advantage of interest rate differentials and low volatility. The strategy involves borrowing funds at a low interest rate in one currency (the funding currency) and buying a higher-yielding asset in another (the target currency). Ex ante, the strategy is only profitable as long as the gains from interest rate differentials are not expected to be overwhelmed by exchange rate movements in the short to medium term; that is, UIP is not expected to hold. The use of leverage makes these positions particularly sensitive to changes in exchange rates or interest differentials.

Profitability

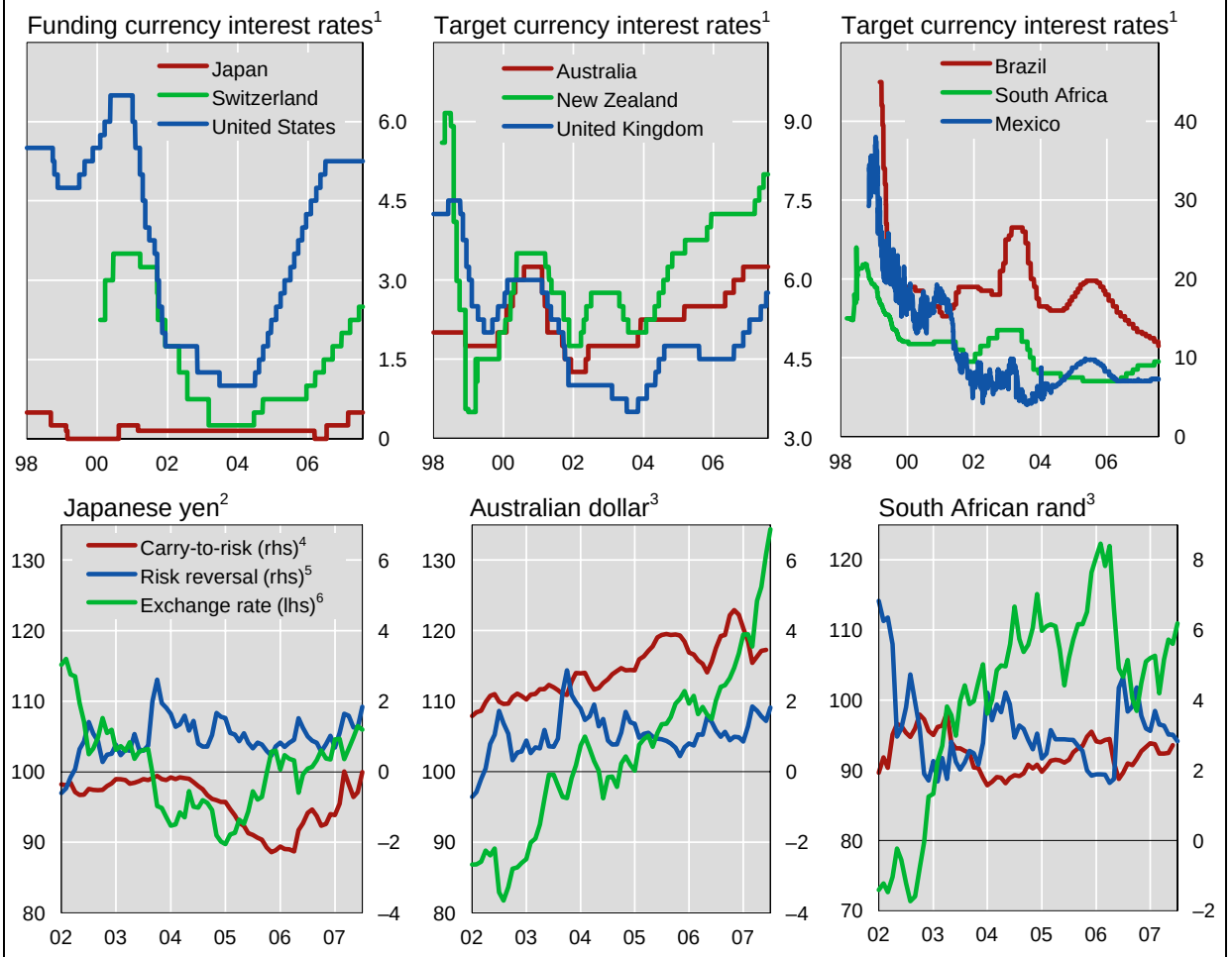
Over the past five years, official interest rates have been lowest in Japan and Switzerland, and the yen and the Swiss franc are the most commonly cited funding currencies (Graph 1). The Australian dollar, the New Zealand dollar and sterling have appreciated steadily and have been cited as popular target currencies, although a number of other currencies are often used as well (eg the Brazilian real and the South African rand). Since 2004, with the normalisation of policy rates from historically low levels, the US dollar has moved from being a funding currency to a potential target.

Carry-to-risk ratio tracks attractiveness

The carry-to-risk ratio is a popular ex ante measure of the attractiveness of carry trades. It adjusts the interest rate differential by the risk of future exchange rate movements, where this risk is proxied by the expected volatility (implied by foreign exchange options) of the relevant currency pair. By this measure, carry trade positions that were short yen and long target currencies such as the Australian dollar were increasingly promising from 2002 to 2005

[2] See McCauley and von Kleist (1998), Béranger et al (1999), Lyons (2002), Fan and Lyons (2003) and Cai et al (2001). Other episodes include the depreciation of the Icelandic króna in February 2006 and volatility spikes mostly in emerging market currencies in December 2005 and May–June 2006 (BIS (2007)).

Interest rates, exchange rates and carry trade attractiveness



[1] Central bank target interest rates, in per cent; for the Japanese yen, BOJ target rate; for the Swiss franc, Libor target rate; for the US dollar, federal funds rate; for the Australian dollar and the New Zealand dollar, cash rate; for the pound sterling, base rate; for the Brazilian real, Selic rate; for the South African rand, repo rate; for the Mexican peso, official overnight closing bank rate. [2] Against the US dollar. [3] Against the Japanese yen. [4] Defined as the three-month interest rate differential divided by the implied volatility derived from three-month at-the-money exchange rate options; quintuple scale (eg the number 2 represents a ratio of 0.4). [5] A positive value indicates a willingness to pay more to hedge against a yen appreciation. [6] 2002–06 = 100.

Sources: Bloomberg; JPMorgan Chase; national data; BIS calculations. Graph 1

(Graph 1, bottom centre panel). These positions have remained so on average, despite two bouts of higher volatility which led to significant, albeit temporary, declines in the attractiveness of some target currencies (eg the South African rand).[3] Over the longer term, however, the attractiveness of carry trades relative to other investments is less clear (Burnside et al (2006)).

Risk reversals – or the price difference between two equivalently out-of-the-money options – potentially provide an alternative market indicator of perceived risks in carry trades. If the risk associated with carry trade returns is

[3] A similar story is apparent from measures of realised carry trade profitability, such as the Sharpe ratio, which is calculated by adding ex post returns from exchange rate movements to those from interest differentials, subtracting the risk-free rate to obtain excess returns and normalising by historical rather than implied volatility. The inclusion of realised exchange rate movements increases the volatility of this ratio relative to the carry-to-risk ratio. A third measure, the carry return index (available on Bloomberg), cumulates the returns from interest rate differentials and exchange rate movements, but does not adjust by any measure of risk.

not generalised uncertainty about future values of the exchange rates, as the carry-to-risk measure implicitly assumes, but rather directional uncertainty, this will be more effectively captured by risk reversals calculated from out-of-the-money options. A strong correlation between the two measures is apparent in Graph 1. In addition, Gagnon and Chaboud (2007) argue that movements in risk reversals tend to post-date large exchange rate movements in periods of high volatility.

Directional uncertainty may also be important

Strategies and participants

There are a variety of ways to implement carry trades, each with different implications for what can be traced in different data sources. The simplest approach, which is particularly relevant for investing in emerging market assets, involves exchanging borrowed funds into the target currency in the spot market. The target currency can be held in some short-term asset (such as a bank deposit or short-term government paper) until maturity. Another approach relies on derivative contracts, including foreign exchange futures, forwards and interest rate swaps as well as more complex options. In addition, these strategies are likely to generate hedging activity, which might lead to more trades in the cash or derivatives markets.

Carry trades are implemented in spot and derivatives markets ...

These strategies can be implemented with varying degrees of complexity. For example, sophisticated algorithms can be used to decide when to open and close carry trade positions, as opposed to a simple buy and hold strategy. This allows investors to exploit high-frequency movements in exchange rates or interest rate expectations. While this way of implementing carry trades appears to be of secondary importance, it seems to have become more popular in recent years, in line with the growing success of algorithmic trading in foreign exchange markets.

... with different levels of complexity ...

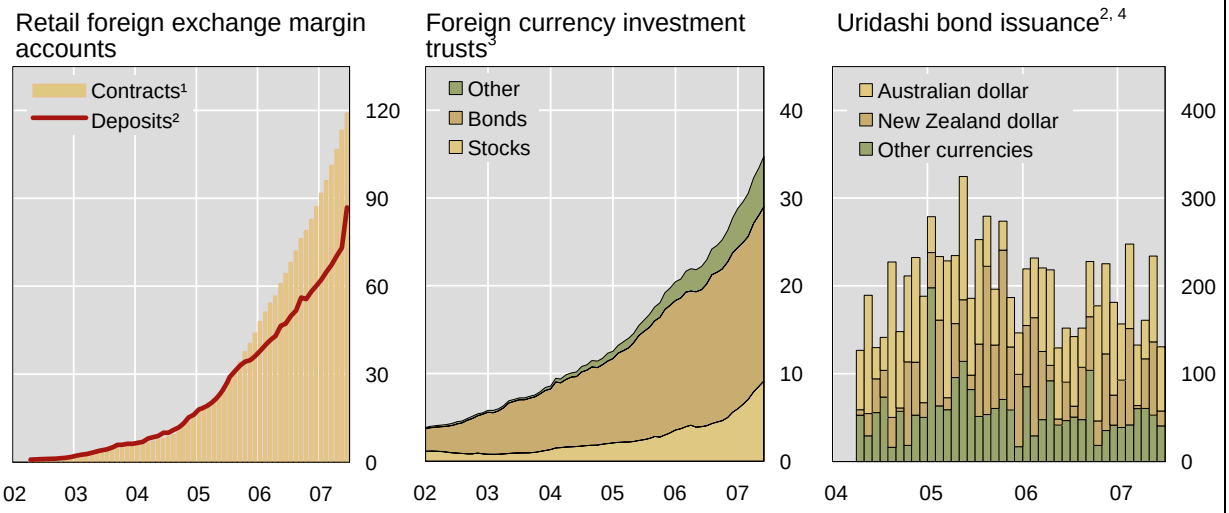
Traditionally, carry trades are used by large financial institutions, such as hedge funds and commodity trading advisors (CTAs) (Galati and Melvin (2004)). More recently, there has been an increase in the presence of retail investors using margin accounts to take leveraged positions across currencies. For example, data from Gaitame, one provider of foreign exchange margin trading facilities for Japanese retail investors, indicate that the number of accounts it manages increased from less than 2,000 at the beginning of 2003 to almost 120,000 in June 2007, with deposits worth almost 90 billion yen ($0.7 billion) (Graph 2, left-hand panel). Although the size of these investors in aggregate is still relatively small and the degree of leverage is not likely to be as significant as it is for large financial institutions, their activities have been cited in market commentary as a factor influencing the yen exchange rate over the past year.

... by financial institutions and retail investors

It is useful to distinguish the leveraged carry trades discussed above from two other investment strategies which are also designed to exploit interest rate differentials. One such strategy involves domestic retail investors trying to diversify their portfolio by purchasing higher-yielding assets denominated in a foreign currency. An example that has attracted much attention is the foreign currency investments made by Japanese households through investment trust funds, which increased on average by 1.2 trillion yen per month in the first six

Capital flows from portfolio diversification have grown

Portfolio diversification by Japanese households



[1] In thousands. [2] In billions of yen. [3] In trillions of yen. [4] Debt issued outside Japan and registered under Japanese securities laws for sale to Japanese investors.

Sources: Bloomberg; Gaitame; The Investment Trusts Association, Japan. Graph 2

months of 2007, pushing the stock of such investments to 35 trillion yen (Graph 2, centre panel). Strong demand by these investors in recent years has also supported the issuance of foreign currency denominated bonds targeted at Japanese retail investors (Graph 2, right-hand panel). A second strategy involves households borrowing in lower-yielding foreign currencies to finance purchases of domestic assets. For example, Swiss franc-denominated mortgages have become popular in some central and eastern European countries. However, unlike the leveraged carry trades of larger institutions, these types of foreign currency exposures are less likely to be unwound quickly in the event of market turbulence.

Tracking activity

While a precise tracking of carry trade positions is difficult, there are a number of data sources that provide information on one or more dimensions of carry trade activity. The BIS international banking statistics are a potentially rich source of information since they include a currency breakdown of banks' international assets and liabilities. In addition, data on foreign exchange trading can be useful, since carry trade activity leaves footprints in the data on futures positions and over-the-counter (OTC) transactions in the spot, swap or forward markets.[4]

Currency flows in the international banking system

The effect of carry trade activity on banks' balance sheets will depend on the structure of the trade and the role of the bank in the transaction. Banks can

[4] Data on hedge fund returns are another potential source of information. McGuire and Upper (2007) apply style analysis regressions to these data, and find that proxies for carry trade returns are statistically significant determinants of hedge fund performance.

serve as primary market intermediaries, providing loans in the funding currencies and taking deposits in the target currencies used by carry trade investors. At the same time, banks may themselves (via their proprietary trading desks) take outright carry trade positions, possibly generating a rise in liabilities denominated in the funding currencies and in assets denominated in the target currencies. Finally, banks may serve as counterparties in derivatives transactions with carry trade investors, which may or may not appear on balance sheet.

BIS data track currency flows through banks

The BIS international banking statistics can help to highlight activity which may be linked to carry trades, and to investigate more broadly the flow of capital through the international banking system denominated in the main carry trade funding and target currencies.[5] Although they are one of the few sources of bilateral capital flow data available *by currency* on a globally consistent basis, these statistics are far from ideal for tracking carry trade activity. First, banks report only their on-balance sheet positions. Thus, at best, the statistics will capture carry trade activity executed in the cash markets, or possibly secondary ripples in the cash markets caused by underlying activity in the derivatives markets. Leveraged accounts may rely on instruments like forwards, which do not appear on balance sheet. Second, the data do not explicitly distinguish between carry trade positions and other positions, which can reflect other corporate, household or interbank lending and borrowing. Finally, as discussed above, the balance sheet implications of carry trades will depend on the type of trade and the role of the bank in the transaction; only the overall net effect of the on-balance sheet components will be evident in the BIS data, making it difficult to explicitly identify activity.

Lending in the funding currencies has grown

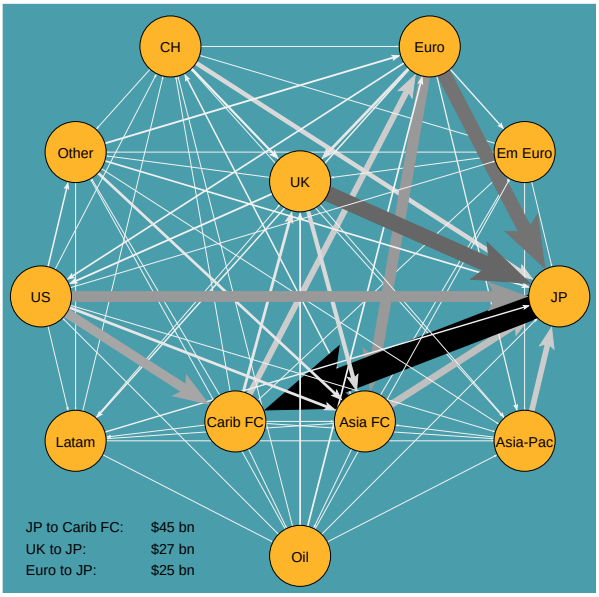
Subject to these caveats, these statistics provide some evidence consistent with a rising role of the yen and the Swiss franc as funding currencies. Global claims denominated in these currencies have, in absolute terms, been on the rise in recent years, although they remain a small (and declining) portion of reporting banks' total claims. Total yen-denominated claims reached $1.05 trillion in the first quarter of 2007, just shy of their most recent peak in the fourth quarter of 2005 (Graph 4, top left-hand panel). In contrast, Swiss franc-denominated claims have grown more steadily in recent years, reaching $678 billion in the first quarter of 2007 (Graph 5, top left-hand panel).

A better understanding of how these currencies are passed between banks and on to non-bank borrowers can help to shed light on the particular market segments where carry trade activity is likely to be evident. Graph 3 represents the global banking system as a network of interconnected nodes, each representing a financial hub or country grouping. The arrows that connect the nodes provide information about the direction and size of the net

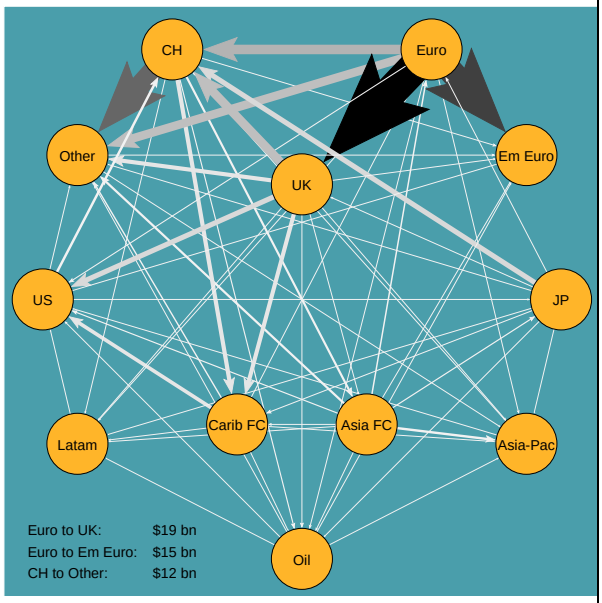
[5] The data include reporting banks' cross-border positions (assets and liabilities) in all currencies, and positions vis-à-vis residents in foreign currencies. Positions are broken down by instrument (loans or securities), sector (bank or non-bank) and residency of the counterparty. For a complete description, see BIS (2003a,b).

Cumulative net flows through the banking system: 2002 Q2–2007 Q1

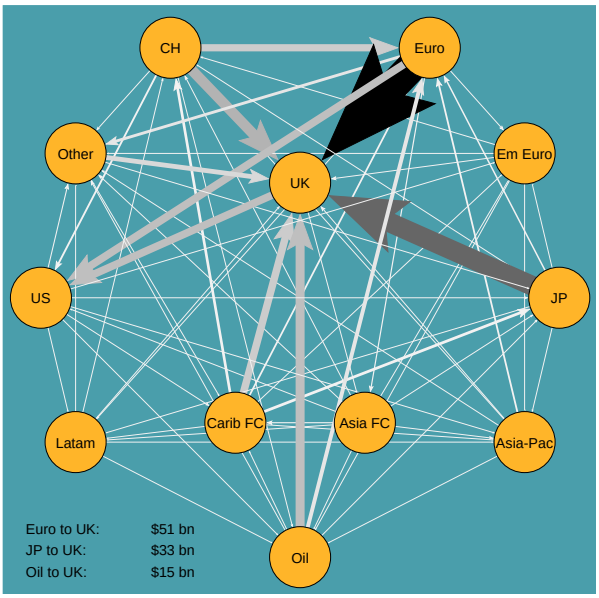
Japanese yen



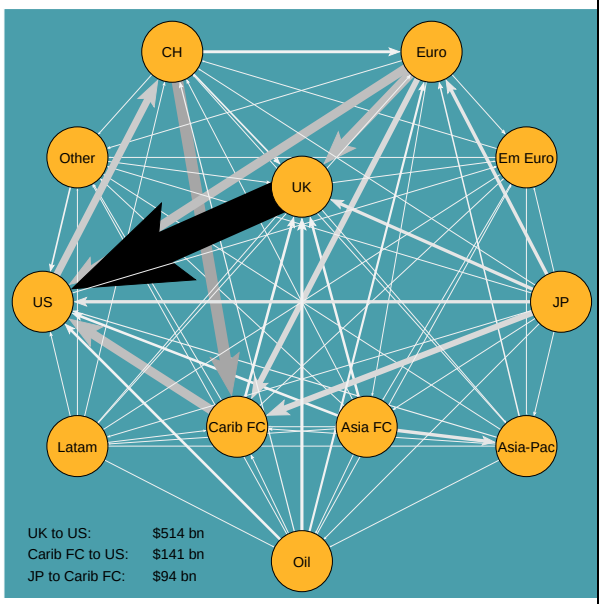
Swiss franc



Pound sterling



US dollar



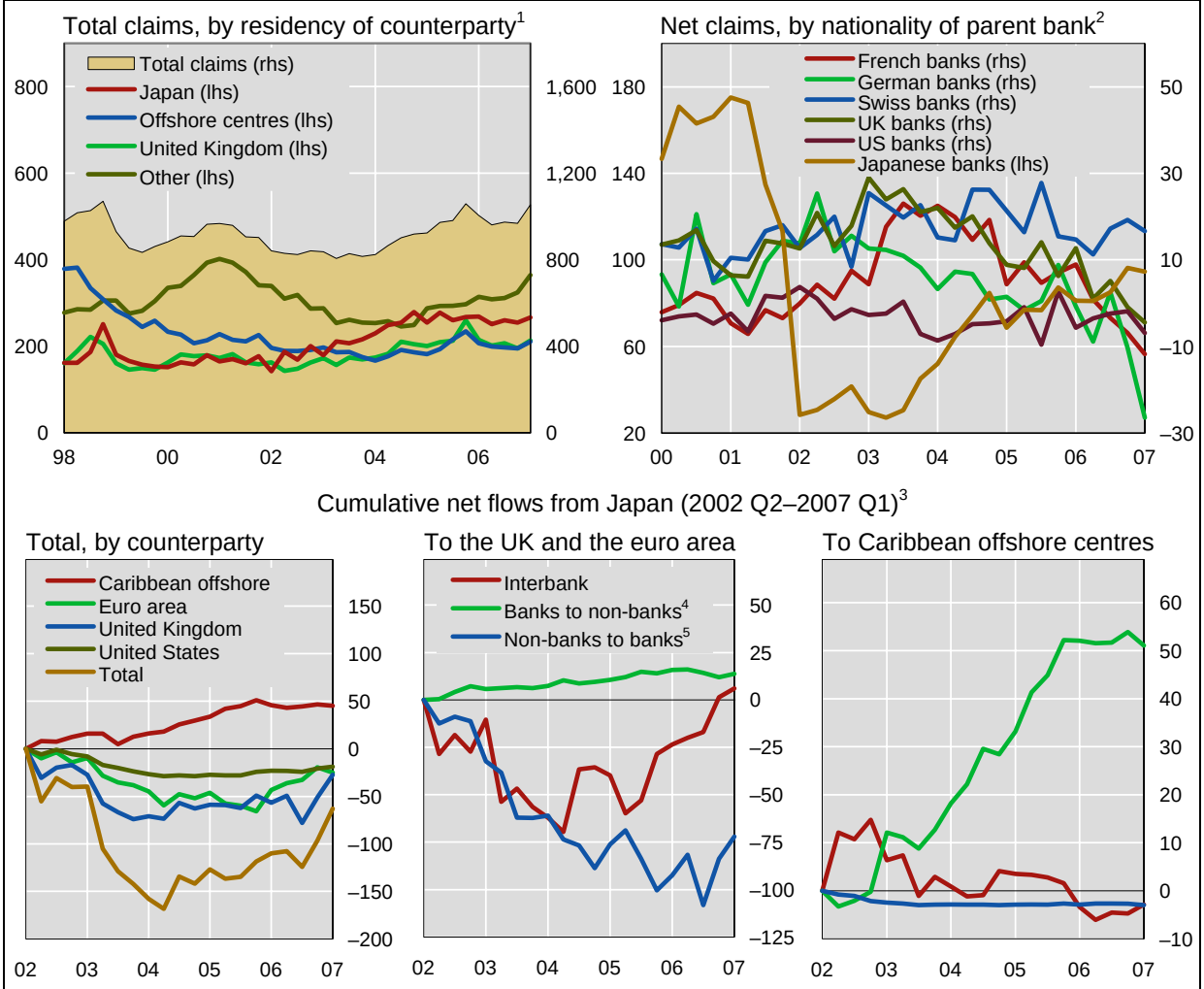
Asia FC = Asian financial centres (Hong Kong SAR, Macao SAR and Singapore); Asia-Pac = China, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Taiwan (China) and Thailand; Carib FC = Caribbean financial centres (Aruba, the Bahamas, Bermuda, the Cayman Islands, the Netherlands Antilles and Panama); CH = Switzerland; Em Euro =emerging Europe (Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, Turkey and Ukraine); Euro = euro area member states excluding Slovenia; JP = Japan; Latam = Argentina, Brazil, Chile, Colombia, Mexico and Peru; Oil = OPEC member states (excluding Indonesia) plus Russia; Other = Australia, Canada, Denmark, New Zealand, Norway and Sweden; UK = the United Kingdom, Guernsey, the Isle of Man and Jersey; US = the United States.

The thickness of an arrow is proportional to the amount of cumulative net bank flows between countries/groups. Net flows between A and B equal the sum of: (1) net claims (assets minus liabilities) of banks in A on non-banks in B; (2) net claims of banks in B on non-banks in A; and (3) net interbank flows between A and B. Some groups include countries which do not report data. The thickness of the arrows is scaled by the overall flows cumulated over the respective period, and thus is not directly comparable across panels. All figures at constant end-2007 Q1 exchange rates.

Source: BIS. Graph 3

BIS reporting banks' Japanese yen-denominated positions

In billions of US dollars, at constant end-2007 Q1 exchange rates



[1] BIS reporting banks' cross-border claims and claims on residents, by residency of counterparty. Excludes domestic claims on residents booked by banks in Japan, the United States and other non-reporting countries. [2] Net cross-border claims (assets minus liabilities) booked by offices in all reporting countries, by nationality of parent bank. Excludes domestic claims on residents booked by offices in Japan and the United States, and cross-border and domestic claims booked by offices in Hong Kong SAR, Singapore and other non-reporting countries. [3] See the note in Graph 3 for the definition of cumulative net flows. Positive values indicate a flow from Japan. [4] Cumulative net flows from banks in Japan to non-banks in the vis-à-vis region. [5] Cumulative net flows from non-banks in Japan to banks in the vis-à-vis region.

Source: BIS. Graph 4

flows of capital intermediated by banks, cumulated over the most recent five-year period (2002 Q2–2007 Q1).[6]

Lending to offshore centres can reflect carry trades

Offshore financial centres, which host a significant number of hedge funds and other speculative traders, are an obvious place to look for activity related to carry trades. As shown in Graph 3, the largest net flows of yen over this five-year period were from Japan to the Caribbean financial centres ($45 billion),

[6] The concept of net flow used here summarises changes in positions reported by banks located in both countries, and changes on both the asset and the liability side of their balance sheets. See McGuire and Tarashev (2006). Some values used in the analysis are based on estimated data, since some reporting countries, including the United States, Hong Kong SAR and Singapore, do not provide a detailed currency breakdown of banks' cross-border positions.

primarily the Cayman Islands (McCauley and von Kleist (1998)). These seemed to reflect purchases (by banks in Japan) of yen-denominated debt securities issued by non-banks in these centres (Graph 4, bottom right-hand panel). While these flows could, in principle, reflect yen funding for carry trades placed by hedge funds or other non-bank financial entities, it is impossible to distinguish them from other types of activity, for example purchases of securities issued by special purpose vehicles. In any event, these yen flows were relatively small; US dollar-denominated cumulative net flows from Japan to these financial centres totalled $94 billion over the same period.

Yen inflow to Japan reflecting purchases of securities …

The other large yen flows depicted in Graph 3 were actually net flows *into* Japan, although these masked large *outflows* via the interbank market. To see this, it is useful to analyse separately the three components of the total net flow figure. Overall, an estimated $63 billion flowed to residents of Japan between 2002 Q2 and 2007 Q1 (Graph 4, bottom left-hand panel). This was driven primarily by greater investment ($86 billion) in Japanese equity and debt securities by banks in the United Kingdom and the euro area. Yet, since mid-2004, an estimated $76 billion has been channelled *from* Japan through the interbank market to banks in these areas (Graph 4, bottom centre panel).

… overshadows outflows via the interbank market

Whether these interbank transfers were explicitly related to carry trade activity is difficult to determine. However, a partial reconstruction of banks' global balance sheet positions indicates a rise in European banks' yen liabilities, which outpaced their yen claims, possibly providing clues about the positioning of their counterparties. This can be seen in the top right-hand panel of Graph 4, which depicts global net yen claims (excluding inter-office positions) broken down by the *nationality* of the banking system.[7] UK, German and French banks' net claims (booked by only those offices located in countries which report data to the BIS) have all trended downwards as their liabilities in yen have grown. One interpretation is that banks have sold borrowed yen in the swap market to square forward purchases of yen from leveraged counterparties that were shorting the currency.

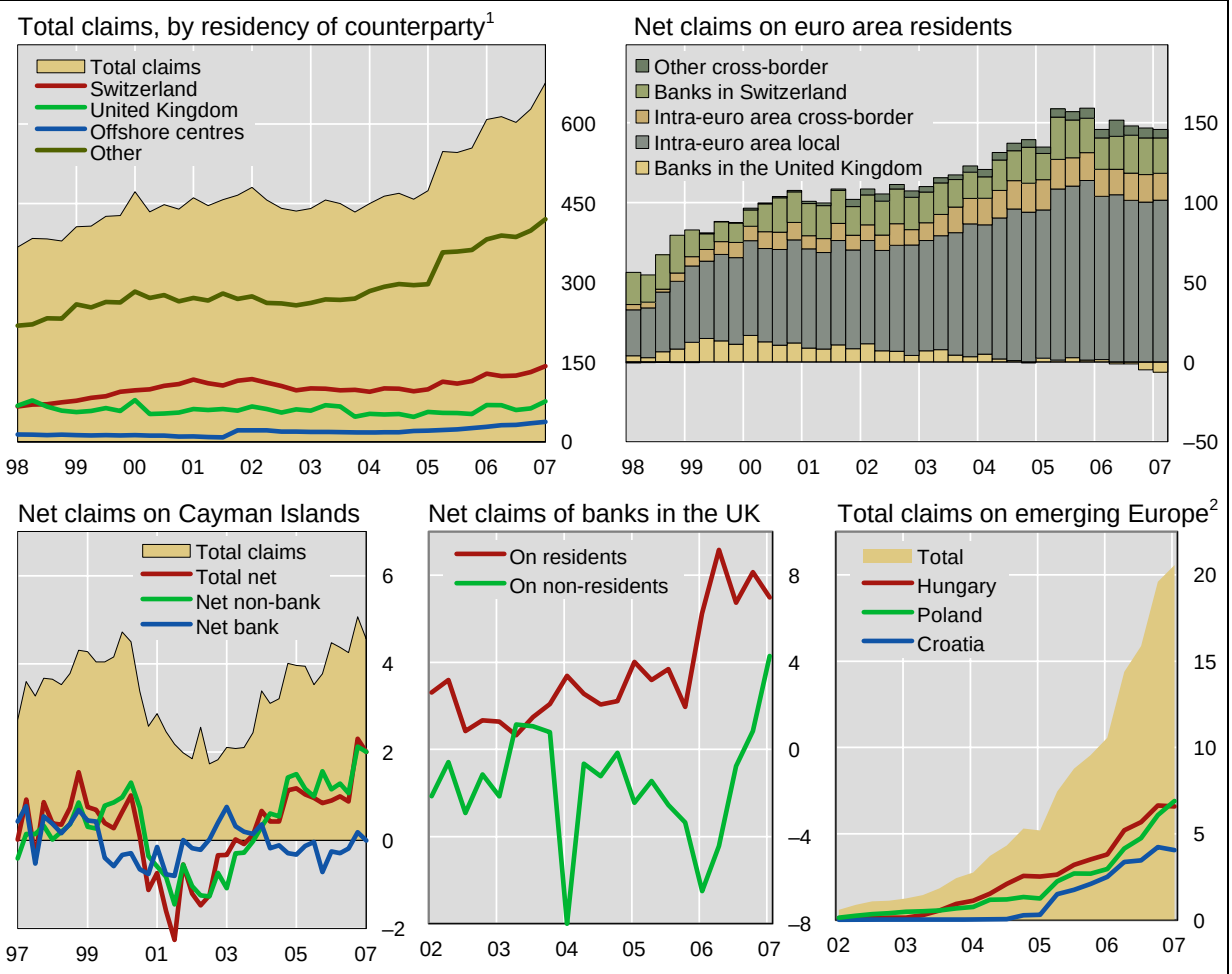
The growth in total Swiss franc-denominated claims is also consistent with the anecdotal evidence suggesting increased use of the franc as a funding currency (Graph 5, top left-hand panel). As with the yen, greater borrowing in Swiss francs by residents of major financial centres would be consistent with carry trade activity. As shown in Graph 3 (top right-hand panel), the largest cumulative net flows of Swiss francs over the 2002 Q2–2007 Q1 period, at $19 billion, were from the euro area to the United Kingdom, the result of a surge in interbank lending since end-2003. Banks in the United Kingdom, in turn, passed much of this on to resident and non-resident non-bank borrowers (Graph 5, bottom centre panel). Swiss franc-denominated net claims on the Cayman Islands have grown as well, although the level remains quite low (Graph 5, bottom left-hand panel).

Swiss franc lending to the United Kingdom picks up …

[7] These figures, based on the *nationality* breakdown of the BIS banking statistics, should be interpreted with caution since they do not fully capture banks' global yen positions (see Graph 4, footnote 2).

BIS reporting banks' Swiss franc-denominated positions

In billions of US dollars, at constant end-2007 Q1 exchange rates



[1] BIS reporting banks' cross-border claims and claims on residents, by residency of counterparty. Excludes domestic claims on residents booked by banks in Switzerland, the United States and other non-reporting countries. [2] Reported by banks in the euro area.

Source: BIS. Graph 5

At the same time, the bulk of global lending in Swiss francs takes place *within* the euro area, and thus will not appear in the linkages in Graph 3. Indeed, gross claims on residents of the euro area accounted for roughly half of the global stock of Swiss franc claims in recent years (Graph 5, top right-hand panel). These claims are booked primarily by banks located in Austria and Germany, and may in part reflect mortgage lending to residents in these countries.

... as does lending to emerging Europe

The growing popularity of Swiss franc-denominated mortgages in some eastern European countries also contributed to the rise in global Swiss franc claims. Between 2002 Q2 and 2007 Q1, an estimated total of $15 billion was transferred from banks in the euro area to the region (Graph 3, top right-hand panel), primarily to banks in Hungary, Poland and Croatia (Graph 5, bottom right-hand panel). In part, these cross-border interbank transfers have been used by domestic banks to hedge their Swiss franc-denominated mortgages.

Typically, mortgage loans in these countries are in domestic currency, but can be indexed to the Swiss franc or other foreign currency interest rates.

Tracking activity in target currencies difficult

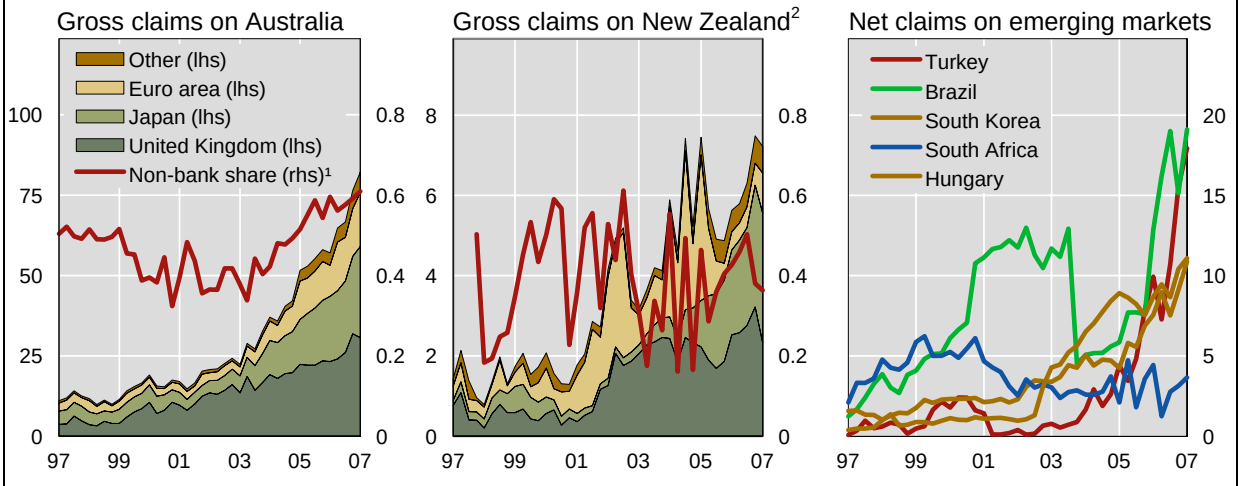
Tracking activity in potential target currencies is even more difficult because the BIS international banking statistics offer a less complete picture of activity in many of these currencies. Banks' on-balance sheet claims in sterling, for which information is available, have grown noticeably over the last five years, reaching $2.2 trillion in the first quarter of 2007, or 7.3% of total gross claims in all currencies (up from 6% in 2002 Q2). Banks around the reporting area, particularly those in the euro area and Japan, channelled a total of $127 billion to the United Kingdom over this period (Graph 3, bottom left-hand panel). These banks built up sterling positions on the asset side of their balance sheet, primarily by investing in debt securities issued by non-banks in the United Kingdom. However, as with the yen flows to the Caribbean, it is not possible to link this build-up explicitly to carry trades. Net sterling claims on these non-banks booked by banks in Japan almost tripled (to $58 billion) between 2002 Q2 and 2007 Q1, while those booked by banks in the euro area more than quadrupled (to $80 billion).

For many other target currencies, information is considerably less complete. For example, while it is impossible to calculate the total global positions in Norwegian kroner, the domestic currency positions reported by banks in Norway can be indicative, since greater liabilities reported by these banks could reflect carry trades placed by investors elsewhere. Banks in Norway have seen a sharp rise in their domestic currency liabilities to non-residents, from $6 billion in early 2002 to $40 billion in the first quarter of 2007. This outpaced greater cross-border claims by these banks, leading to a drop in their domestic currency cross-border net claims.

For other target currencies, reporting banks' cross-border positions in "residual currencies" can provide some information. This is because, in many cases, the residual currency is likely to be the domestic currency used in the

BIS reporting banks' claims in "residual currency"

In billions of US dollars



[1] Claims on non-banks as a share of total cross-border claims. [2] Excluding claims reported by banks in Australia.

Source: BIS.

Graph 6

borrowing country. Thus, cross-border claims could in principle reflect investments in assets denominated in these potential target currencies, and thus be linked to banks' on-balance sheet carry trade activity. For example, BIS reporting banks' claims on residents of Australia in residual currencies have more than doubled in the past three years, to $82 billion (Graph 6, left-hand panel). Elsewhere, reporting banks' net claims on residents of South Africa have changed little since 2004, but have grown to more than $15 billion vis-à-vis residents of Brazil (Graph 6, right-hand panel).

Evidence from foreign exchange markets

Carry trades will involve foreign exchange transactions at some point. If the trades require simultaneous short forward positions in the funding currency and long positions in the target currency, data on the size of net open positions by currency on futures exchanges would be relevant. Alternatively, if borrowed funds are exchanged into the target currency on the spot market, foreign exchange turnover data would be informative. Activity in other instruments, such as foreign exchange swaps, may also increase if they are used by intermediating institutions for hedging foreign exchange exposures.

Data from futures markets ...

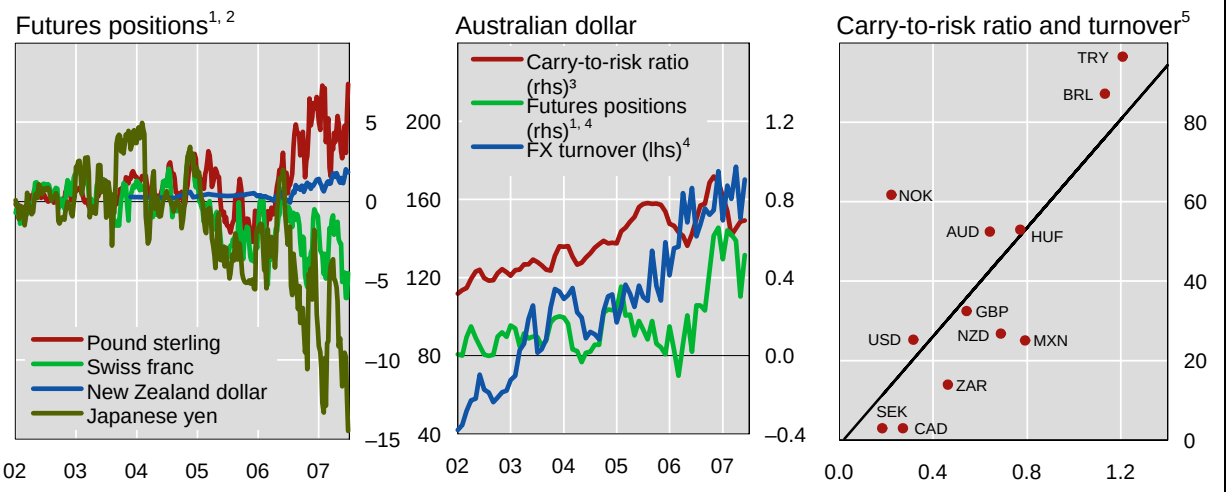
Data on the net open positions of non-commercial traders in different currency futures traded on the Chicago Mercantile Exchange have been the most widely used measure of carry trade activity in the futures market.[8] However, these data should be interpreted with caution for several reasons. First, while non-commercial traders are generally associated with speculative activity, it is possible that some commercial traders also take speculative positions. Second, the trades identified as speculative may not result from carry trades. Finally, a comparison with statistics from the BIS Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity shows that only a very small proportion of foreign exchange market activity is executed through exchanges.[9]

Subject to these caveats, however, the changes in net open futures positions are consistent with a build-up of carry trades over the past two years. The net long non-commercial open positions in sterling and the Australian and New Zealand dollars, and net short open positions in yen and Swiss francs, have increased significantly, particularly since the beginning of 2006 (Graph 7). Since then, the correlations between these net open positions and carry-to-risk ratios (against the yen for target currencies and against sterling for funding currencies) have generally been quite significant. For example, the correlation for Australian dollar positions is 0.55, and is 0.61 for sterling positions. In

[8] By volume, the Chicago Mercantile Exchange is the most significant exchange for foreign exchange futures. Other exchanges with non-trivial volumes of futures trading include the Bolsa de Mercadorias e Futuros, the Budapest Stock Exchange, the Tokyo International Financial Futures Exchange, Euronext London and the New York Board of Trade.

[9] That said, there is some evidence that arbitrage forces ensure that developments in the futures market reflect foreign exchange market activity. Furthermore, a large share of OTC turnover reflects traders' risk management activity (Klitgaard and Weir (2004)). Hence, activity in futures markets might have a significant impact on currency movements.

Foreign exchange market activity



[1] Net non-commercial long positions on the Chicago Mercantile Exchange; derived using average exchange rates of January 2007. [2] In billions of US dollars. [3] Defined as the three-month interest rate differential against Japan divided by the implied volatility of the Australian dollar/yen exchange rate. [4] In tens of billions of US dollars. [5] The horizontal axis refers to the average carry-to-risk ratio for the period April 2004–April 2006. The vertical axis refers to the percentage change of the foreign exchange turnover for the period April 2004–April 2006.

Sources: CFTC; JPMorgan Chase; national data; BIS calculations. Graph 7

contrast, the correlations for the yen and Swiss franc are –0.34 and –0.16 respectively, and appear to have become less significant over time.

… and turnover in other foreign exchange markets …

Most foreign exchange trading is done over the counter in the form of spot and swap transactions. Unfortunately, the most consistent and comprehensive data, which provide significant detail along dimensions such as the currencies being traded and the nature of the counterparties, are only available at low frequencies.[10] Higher-frequency data on turnover, available from some central banks, are useful for answering questions about the dynamics of foreign exchange markets, but generally contain less detail. A limitation of all these data is that they do not identify the nature of the trades or the counterparties involved, and thus provide only indirect evidence of carry trade activity.

… indicate that carry trades have been important since 2004

Overall, turnover data from OTC markets support the conclusions reached using futures data. The snapshot of activity in OTC foreign exchange markets provided by the 2004 triennial survey indicated that while foreign exchange turnover had increased across all currencies since 2001, growth was stronger for currencies associated with high policy interest rates (Galati and Melvin (2004)). This positive relationship appears to have continued to hold between 2004 and 2006 for currencies where data are available (Graph 7).

For currencies where turnover data are available monthly, the strength of correlations between foreign exchange turnover and the carry-to-risk ratio varies, but is sufficiently high to suggest that turnover is related to the implementation of carry trade strategies. The highest correlation exists for the

[10] The BIS triennial survey (BIS (2005)) collects separate data on transactions between banks, between banks and non-financial customers, and between banks and financial customers (eg hedge funds, CTAs, pension funds and insurance companies). Similar data for some large financial centres (Canada, Singapore, the United Kingdom and the United States) are also collected semiannually.

Norwegian krone (0.79), followed by the Australian dollar (0.53), the South African rand (0.36), the Mexican peso (0.28) and the New Zealand dollar (0.24). It is also worth noting that the size of the correlation may be mitigated to some extent by the fact that turnover can increase at times of higher volatility, particularly in periods when the exchange rate falls sharply and activity may be generated by the unwinding of carry trade positions (Graph 7).

Conclusion

This feature employed several datasets, including the BIS international banking statistics and data on turnover in foreign exchange markets, in search of evidence on the importance of global carry trade activity. Although it is difficult to draw concrete conclusions based on these data alone, taken together they do shed light on specific market segments where carry trade activity is likely to be evident. The growth in carry trades funded in yen and Swiss francs has probably contributed to increased activity in these currencies in the international banking markets, and to turnover patterns in the derivatives and foreign exchange markets which roughly correlate with the attractiveness of these trades. That said, the available data do not allow for a more refined measurement of the size of carry trade positions.

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The covered bond market[1]

The covered bond market offers investors an alternative to developed country government securities. The valuation of covered bonds is complex. While there is some evidence of differences in the pricing of these bonds by nationality of issuer, these appear to be only weakly related to differences in the respective legislative frameworks. Recent cases show the pricing of covered bonds to be robust to idiosyncratic shocks to issuer credit risk as well as more systemic shocks to the value of cover pools.

JEL classification: G11, G12, G15.

Over the past decade covered bonds, or securities issued by financial institutions that are secured by dedicated collateral, have become one of the largest asset classes in the European bond market and an important source of finance for mortgage lending. The collateral, or "cover pool", is usually put together so as to obtain the highest possible triple-A credit rating. As a consequence, covered bonds offer an alternative to developed country government securities for bond investors interested in only the most highly rated securities.

Drawing on the BIS international debt securities statistics and other data sources, this feature analyses the recent evolution of the covered bond market. Exploring the main issues involved in assessing the risk of covered bonds, the feature also documents significant divergences among the major rating agencies. An examination of the determinants of covered bond prices suggests that, while the nationality of the issuer matters, the related differences are generally small. At the same time, event study analysis of selected cases finds that the valuation of covered bonds in recent years has been rather robust to shocks to both issuer creditworthiness and the value of the underlying collateral.

What are covered bonds?

Dual nature of protection …

The defining feature of covered bonds is the dual nature of protection offered to investors. Covered bonds are issued by financial institutions, mostly banks,

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS.

Structured covered bonds

In recent years, mortgage lenders have increasingly turned to arrangements from structured finance to replicate features of traditional covered bonds. In many cases, this was motivated by the wish to issue covered bonds in countries lacking special legislation, such as the United Kingdom (where legislation was introduced earlier this year but had not been implemented at the time of writing), the Netherlands and the United States. In other cases, issuers resident in countries with covered bond legislation have issued outside the legal framework in order to obtain more flexibility, eg in terms of the assets entering the cover pools.

Like conventional covered bonds, structured issues offer investors recourse on the bond's issuer as well as on a special collateral pool. However, they achieve this through contractual arrangements involving a special purpose vehicle rather than through legislation. Rating agencies, in particular, play an important role in monitoring whether the contracted requirements are met.

There are two models of structured covered bonds. In the first model, used by UK and Dutch banks, the assets are held by a special purpose vehicle, which guarantees the bond issued by the originating bank. A slightly different model has been adopted by banks in the United States as well as by the French bank BNP Paribas. In this model, the bond is not issued by the bank that originated the mortgages but by a subsidiary, which then lends the funds to the parent. This loan is guaranteed by the cover assets, which remain on the parent's balance sheet. In case of insolvency of the parent, the issuer takes possession of the cover assets and continues to serve the bond.

which are liable for their repayment. They are also backed by a special pool of collateral – mostly high-grade mortgages or loans to the public sector – on which investors have a priority claim (see below). In the European Union, covered bonds are further defined by the Capital Requirements Directive (CRD), which limits the range of accepted collateral to debts of (highly rated) public entities, residential, commercial and ship mortgage loans with a maximum loan-to-value ratio of 80% (residential) or 60% (commercial), and bank debt or mortgage-backed securities (MBSs). While the CRD only recognises securities issued under special legislation as covered bonds, market participants tend to work with a more general definition that also includes bonds issued under private contractual arrangements using elements from structured finance. There have been a number of such "structured covered bonds" (see box), primarily in countries without covered bond legislation (eg the United Kingdom, the Netherlands and the United States).

… distinguishes covered bonds from other instruments

The dual nature of protection offered by covered bonds sets them apart from both senior unsecured debt and asset-backed securities (ABSs). The fact that they are secured by a collateral pool in addition to the issuer's creditworthiness results in a higher rating than "plain vanilla" bank bonds. In contrast to ABSs, the cover pool serves mainly as credit enhancement and not as a means to obtain exposure to the underlying assets. Cover pools tend to be dynamic in the sense that issuers are allowed to replace assets that have either lost some quality or have been repaid early. Unlike ABSs, which tend to have floating rates and where defaults and early repayments are usually fully passed through to investors, covered bonds generally pay fixed rates and have bullet maturities (Table 1).

Covered bonds, in particular the very large issues known as jumbos, also differ from ABSs in that they often trade in a liquid secondary market. Jumbos are issued on a regular basis and their liquidity is ensured by strict market-

Main characteristics of covered bonds and asset-backed securities		
	Covered bonds	Asset-backed securities
Motivation of issuer	Refinancing	Risk reduction, regulatory arbitrage, refinancing
Who issues	Generally originator of loans	Special entity
Recourse on originator	Yes	Generally no
Structure	Assets generally remain on balance sheet, but are identified as belonging to cover pool	Assets are transferred to special entity
Impact on issuer's capital requirements	None	Reduction
Legal restrictions on issuer or eligible collateral	Yes (if issued under covered bond legislation)	Generally none
Management of asset pool	Generally dynamic	Predominantly static
Transparency of asset pool to investors	Limited (but quality regularly controlled by trustees or rating agencies)	Generally high
Prepayment of assets	No pass-through as assets are replaced	Generally full pass-through
Tranching	None	Common
Coupon	Predominantly fixed	Predominantly floating

Table 1

making requirements. All these features suggest that covered bonds are seen not so much as an instrument to obtain exposure to credit risk, but rather as a higher-yielding alternative to government securities. In this respect, they are perhaps more comparable to the bonds issued by state-owned development banks such as KfW Bankengruppe or multilateral institutions such as the European Investment Bank.

Market profile

Rapid growth in market size …

Both the issuance and amounts outstanding of covered bonds have grown considerably since the mid-1990s. Announced issuance of covered bonds has increased from less than €100 billion in the mid-1990s to over €350 billion in 2006 (Graph 1). In mid-2007, the outstanding amount of covered bonds reached €1.7 trillion.

… as more countries introduce covered bond legislation

The geographical scope of covered bond issuance has broadened considerably over the past 10 years. For a long time, covered bonds were issued primarily in Germany (Pfandbriefe) and Denmark (realkreditobligationer). Pfandbriefe were also issued in Switzerland and Austria, albeit in much smaller amounts than in Germany. It was not until the mid-1990s that covered bond legislation was introduced in other countries, thus opening the way to the internationalisation of the market. At the time of writing, more than 20 European countries had enacted covered bond laws or were planning to do so in the immediate future.

In several of these countries, the enactment of legislation was followed by sizeable issuance. Although German institutions remained the primary issuers

of covered bonds in the first half of 2007 (€86 billion on an annualised basis), substantial issuance also took place in several other countries. For example, Spanish banks issued covered bonds to the value of €64 billion, while French issuance amounted to €53 billion (Graph 1). As a consequence, the share of German Pfandbriefe in total amounts outstanding fell from 80% in 2001 to less than one half in mid-2007.

Decline in German issuance

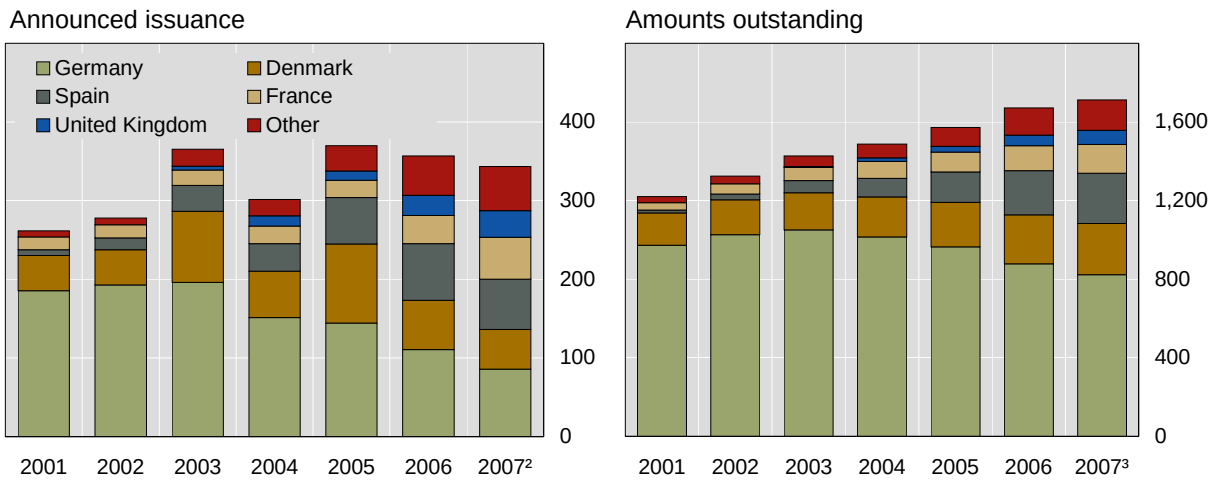
Contrasting with the rapid growth in other countries, issuance in Germany has fallen considerably after peaking at €200 billion in 2003. In part, this might be due to public entities increasingly raising funds in the bond market directly, thus bypassing Pfandbrief banks. In addition, the gradual withdrawal of public guarantees to public banks since 2005 has also reduced the volume of eligible collateral, since debt by these banks had constituted an important part of the cover pool of public Pfandbriefe.

Investor base

The structural differences between covered bonds and ABSs are reflected in distinct investor bases. Banks are the main investors in covered bonds, absorbing just under one half of all issuance in the primary market,[2] whereas almost one half of total ABS issuance is picked up by conduits and structured investment vehicles, with banks taking up less than one quarter (Graph 2). Accessing a different investor base is certainly one of the motivations for banks to issue covered bonds, in particular in countries where the alternative of issuing MBSs is readily available.

Issuance of covered bonds[1]

By residence of borrowers, in billions of euros



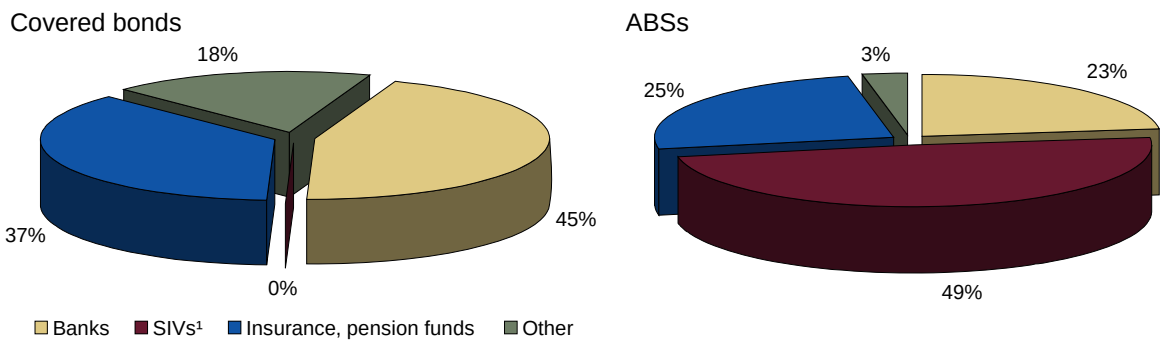
[1] As reported by Dealogic and Realkreditrådet. [2] Annualised, based on issuance up to end-June 2007. [3] As of end-June 2007.Sources: Dealogic; Realkreditraadet; BIS.

Graph 1

[2] In part, this may also be due to the favourable regulatory treatment of covered bonds. Under Basel I, triple-A rated covered bonds have a 10% risk weight in most countries, compared to 50% for residential MBS tranches with the same rating. This difference is expected to narrow under Basel II. See Fitch Ratings (2006b), Barclays (2007) and Deutsche Bank (2007).

Investors in covered bonds and ABSs

Purchases in the primary market by investor type, in per cent



¹ Structured investment vehicles.

Source: Barclays (2007). Graph 2

Issues in the risk assessment of covered bonds

Difficulties in assessing ...

Assessing the risk of covered bonds is not straightforward. In principle, the price of a covered bond should be higher than that of unsecured debt of the same issuer due to the presence of the cover pool. Similarly, it should also be higher than that paid on an ABS with the same underlying collateral given the recourse on the issuer, the absence of prepayment risk and the replacement of non-performing loans from the cover pool. The difference between the prices of covered bonds and other instruments of the same issuer should be higher if the defaults of the borrower and the value of the cover pool are little correlated, and lower if they are perfectly correlated.

The key question when valuing covered bonds is whether or not the cover pool will retain its value in the event of the bankruptcy of the originator. In principle, the insolvency of the originator could endanger the creditworthiness of covered bonds through two channels. First, the credit quality of the assets in the cover pool could deteriorate. Second, even if the cover assets retain their value, creditors of the originator could attempt to seize these assets in order to satisfy their claims. The covered bond legislation and contractual arrangements in place attempt to deal with both threats to the viability of the cover pool by imposing minimum standards for asset quality and by ensuring the bankruptcy remoteness of the cover pool.

Legislative frameworks tend to apply limits on the loan-to-value ratio (LTV) of mortgage loans as well as geographical and, in some cases, rating restrictions for public entities to ensure a high quality of the cover assets.[3] These are sometimes complemented by mandatory stress tests. Such tests are also used by rating agencies to ensure the creditworthiness of the cover pool of bonds issued both inside and outside a legislative framework.

[3] Covered bond legislation generally imposes an 80% cap on LTVs of mortgages on residential and 60% on commercial property, although some countries have tighter standards (Table 2). In most jurisdictions, larger loans might be granted, but the proportion in excess of the maximum LTV does not count as part of the cover pool. Public sector exposures are usually limited to highly rated industrial countries.

Legislative frameworks in selected jurisdictions							
	France	Germany	Ireland	Italy	Luxem-bourg	Portugal	Spain
Name of instrument	Obligations foncières	Hypotheken-pfandbrief (HP)/Öffentli-cher Pfand-brief (ÖP)	Asset-covered securities	Obbligazioni bancarie garantite	Lettres de gage hypo-thécaire (LGH) ou publique (LGP)	Obrigações hipotecárias (OH) sobre o sector público (OP)	Cédulas hipotecarias (CH)/Cédulas territoriales (CT)
Specialist bank principle	Yes	No	Yes	No	Yes	No	No
Cover asssets[1]	m/p	HP: m ÖP: p	m/p	m/p	LGH: m LGP: p	OH: m OP: p	CH: m CT: p
Structure of cover assets	Registered, remain on balance sheet	Registered, remain on balance sheet	Registered, remain on balance sheet	Transferred to special entity	Registered, remain on balance sheet	Registered, remain on balance sheet	No desig-nated cover pool, all eligible assets serve as cover
Issuer	Specialised bank	Originator	Specialised bank	Originator (guaranteed by special entity)	Originator	Originator	Originator
Max LTV[2]	80%/60%	60%/60%	75%/60%	80%/60%	60%/60%	80%/60%	80%/70%
Min collateral	100%	102%	103%[3]	110%	100%	105%	111%[4]
Hedge protection[5]	Yes	Up to 12% of cover	Yes	Yes	Yes	Yes	No
Indepen-dent monitor of cover pool	Trustee appointed by regulator	Trustee appointed by regulator	Trustee appointed by issuer and approved by regulator	Special supervision by Bank of Italy	Trustee appointed by issuer and approved by regulator	Auditor appointed by issuer and registered at regulator	No
Bankruptcy remote-ness of cover pool	Cover assets segregated in case of insolvency	Cover assets segregated in case of insolvency	Cover assets segregated in case of insolvency	Special entity remote from insolvency of parent	Cover assets segregated in case of insolvency	Cover assets segregated in case of insolvency	No, but priority to all eligible assets on balance sheet

[1] Main component of cover pool; m = mortgages, p = loans to the public sector. [2] Residential/commercial mortgages. [3] After proposed amendment. [4] Public assets: 142%. [5] Protection of hedging instruments in case of bankruptcy of originator.

Sources: Barclays (2007); Deutsche Bank (2007). Table 2

... the legal framework ...

Provisions aimed at ensuring the "bankruptcy remoteness" of the cover pool – ie its separation from any insolvency proceedings of the issuer – are an important part of covered bond legislation in any country (Table 2), as well as of the private arrangements underlying structured covered bonds. Under most legislative frameworks, the cover assets remain on the balance sheet of the

bank issuing the bond,[4] but are clearly identified as belonging to the cover pool. In the event of bankruptcy of the issuer, the cover assets are segregated from the remaining assets on the balance sheet and administered until the covered bonds become due.

There are two main exceptions to this general model: Spanish cédulas and Italian obbligazioni bancarie garantite. In Spain, cover assets remain on the balance sheet of the issuer but are not registered. In the event of bankruptcy, the bondholders have a preferential claim on all eligible assets on the issuer's balance sheet. In contrast to covered bonds issued in other jurisdictions, cédulas are accelerated, ie they are repaid early upon the insolvency of the issuer. However, the difference between Spanish legislation and that of other countries is likely to narrow: in late 2006 the Spanish ministry of finance presented a draft amendment to the legislation providing for the establishment of a cover registry, bringing the Spanish model more in line with those of other countries. The arrangements underlying Italian obbligazioni bancarie garantite (a different type of covered bonds is issued by Cassa Depositi e Prestiti) are close to those of the structured covered bonds issued by UK and Dutch banks in that assets are transferred to a special entity that guarantees the bond issued by the parent.

Beyond this broad framework, a series of finer points have to be addressed in order to ensure that the cover pool is effectively bankruptcy remote. For example, it has to be ensured that assets in the cover pool cannot be offset against any other claims that investors might have against the issuer.[5] Likewise, derivatives used to hedge interest rate risk arising from differences in duration between the bond and the cover assets have to remain in place even if the issuer has become insolvent.

Credit ratings and differences of opinion

… reflected in different approaches by rating agencies

The bankruptcy remoteness of a cover pool has never been tested in court, for the simple reason that there appears to have been no failure of an issuer of covered bonds since the early 20th century.[6] The difficulty in assessing the risk of covered bonds is exemplified by the differences in rating methodologies and ratings of the three major international rating agencies.

Moody's "joint default" approach

Moody's Investors Service targets the expected loss on covered bonds using a "joint default" approach, whereby the risk of a covered bond is viewed fundamentally as a function of the probability of the default of the issuer and the losses (if any) on the cover pool in the event of issuer default (Moody's

[4] The issuer might, but need not, be the originator of the assets. For example, French sociétés de crédit foncier or Irish designated credit institutions tend to belong to large bank groups and may purchase assets from their parent bank in order to refinance them with covered bonds.

[5] For this reason, exposures to borrowers in jurisdictions which do not recognise offsetting restrictions are usually limited either by legislation or by private contractual arrangements.

[6] In 1900, only one year after the seminal German Mortgage Law that unified and improved Pfandbrief legislation, three issuers incurred heavy losses following fraudulent trades by board members. One of the banks went bankrupt, while two others survived after Pfandbrief holders agreed to swap part of their bonds into equity (Born (1976), p 197).

Investors Service (2005)). One interesting aspect of the approach is that the estimated asset correlation of the issuer and cover pool can emerge as an important risk factor.

S&P's conditions for "delinking" ratings

Standard & Poor's approach focuses on conditions for "delinking" the covered bond rating from the senior unsecured issuer rating. In cases where the legal and regulatory framework ensures the servicing of covered bond obligations even after issuer default, and the issuer is capable of and committed to sufficient overcollateralisation levels, the covered bond rating can be effectively "delinked" from the issuer rating (Standard & Poor's (2004)).

Fitch's "discontinuity factor"

The Fitch Ratings methodology is also distinctive. It multiplies its estimates of the issuer default probability with a discontinuity factor, which depends on the perceived bankruptcy remoteness of the cover pool and other factors which could affect its value in the event of issuer default.[7] In subsequent steps, the rating is then adjusted depending on the result of a cash flow model-based stress test of the cover pool and on the estimated recovery value reflecting security features.

Different approaches result in differences of opinion

While publicly stated methodologies can mask common aspects and need not result in differences in ratings, there do in fact appear to be rather frequent differences among the agencies in the outcome of the rating process for covered bonds (Table 3). Despite the fact that many structured bonds have often been explicitly designed to obtain the highest possible triple-A rating, in around one quarter of the cases in which another opinion has been proffered, a lower rating has resulted. To be sure, differences of opinion are to some extent inevitable and healthy since they bring additional information and perspectives to the marketplace. An even greater frequency of disagreement has been documented for initial issue ratings of US corporate bonds with at least one triple-A rating (Cantor et al (1997)).

Covered bond ratings

	Number rated	% of (1) rated triple-A	% of (1) with multiple ratings	% of (3) with split ratings	% of (4) with issuer rating split in same direction
	(1)	(2)	(3)	(4)	(5)
France	520	100	73	1	75
Germany	8,872	96	54	26	12
Ireland	52	100	85	16	29
Luxembourg	145	99	30	2	100
Spain	147	85	63	12	55
Other	411	85	54	8	44
Total	10,147	95	55	23	13

Note: Only the ratings by Moody's Investors Service, Standard & Poor's and Fitch Ratings are used in the analysis.

Sources: Dealogic; BIS. Table 3

[7] In this context, Fitch takes into account the degree of asset segregation, liquidity gaps, the availability of alternative management and the covered bonds' oversight (Fitch Ratings (2006a)).

Disagreements over the creditworthiness of covered bonds appear to result primarily from differences of opinion concerning the protection offered by the cover and its structure rather than from different assessments of the risk associated with the issuer's default. Some researchers have documented a greater frequency of split ratings for banks than other issuers, attributing the result to the opacity of financial institution balance sheets (Morgan (2002)). Even so, only 13% of covered bonds with split ratings in our sample have split ratings of the original issuer (bank) in the same direction (Table 3).

The rapid growth of covered bonds in new and untested regional frameworks does not appear to have increased the tendency towards split ratings. In fact, ratings disagreements appear to be less frequent in the more recently emerging (and innovative) segments of structured bond issuance: the faster-growing markets of Spain and France, for instance, have relatively fewer split ratings (Table 3). By contrast, the largest share by far of split ratings is to be found in the most established covered bond market, that for German Pfandbriefe, which is also the market with the lowest average issuer rating.

Evidence from spreads on covered bonds

Spreads on covered bonds ...

Due to their additional protection, covered bonds trade at significantly lower yields than senior, unsecured bonds of the same issuer. Matching the daily yields of more than 4,000 covered bonds with the Merrill Lynch Financial Institution Bond indices of the same rating class as the covered bond issuer, we find that the yields on covered bonds are lower by an average of 14, 42 and 91 basis points for issuers in the broad rating categories of AA (Aa), A and BBB (Baa), respectively.[8]

Cross-country differences

The estimates presented above refer to sample means and do not take into account the notable differences that exist between the legislative frameworks of different countries (Table 2). Some preliminary evidence on whether cross-country differences in regulation (and other factors) affect the pricing of covered bonds can be obtained from a regression of covered bonds on country dummies as well as a set of control variables. The results of this exercise are shown in Graph 3.

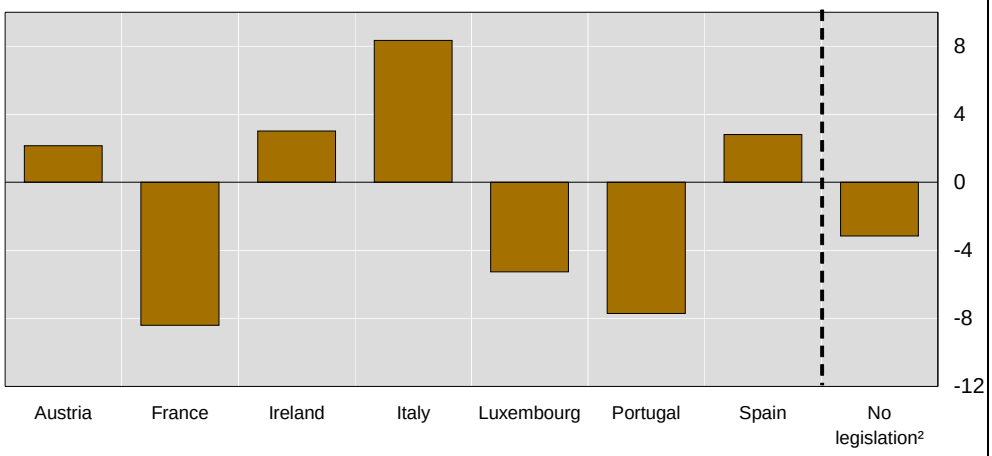
... driven by instrument characteristics ...

Many of the control variables are significant and for the most part have the expected sign. Spreads tend to rise with the maturity of the bond, as might be expected with an upwardly sloping curve for credit risk, although the effect diminishes for very large issues. Spreads decline with increases in amounts

[8] The value of the cover pool could be more precisely estimated by comparing the yield on covered bonds with that on senior unsecured bonds of the same issuer. In practice, however, this approach is not generally applicable as most covered bond issuers do not have any other bonds outstanding. It should also be noted that the above results do not imply that there is always a net benefit to firms in issuing covered bonds. As assets are dedicated to an issued bond, there is an effective increase in leverage since assets are effectively removed from the balance sheet. Because there are fewer assets on which existing (and future) debt and equity holders would have a claim in the event of bankruptcy, the total cost of capital might in some cases increase.

Cross-country effects[1]

Spreads relative to German issues, in basis points



[1] The columns refer to the estimated coefficients of country dummy variables in a regression of daily spreads on hypothesised explanatory variables. The sample consists of covered bonds in the Dealogic database from January 2003 to June 2006. The coefficients on the country dummies represent differences relative to the German benchmark (all estimates are significant at the 1% level). The dependent variable is the spread of the covered bond yield over the euro Libor swap rate with the matching maturity. The estimated intercept is 1.3 basis points. Apart from the country dummies, the other explanatory variables are: the maturity (and maturity squared) of the bond, the issue amount outstanding, a dummy for whether or not the bond is a jumbo (denotes an issue with over €1 billion outstanding), dummies for the bond's credit rating, the difference between the issuer's rating and the bond rating, and a dummy for whether any of the ratings of the major rating agencies disagree. In order to abstract from exchange rate effects, only euro-denominated bonds are considered. [2] Covered bonds from the Netherlands, the United Kingdom and BNP Paribas. There is no legislation that directly applies to the issuance of these securities.

Sources: Dealogic; BIS. Graph 3

outstanding, consistent with higher liquidity for large issues. As expected, lower-rated issues trade at wider spreads than triple-A bonds. Somewhat surprisingly, disagreement between rating agencies appears to coincide with lower spreads, but at less than 1 basis point the estimated difference is not economically significant.

… more than differences in legal frameworks

While the regression results document differences in spreads according to the country of issuer, they appear to be only weakly related to the broad structure of the legislative framework on which the bonds are based. For instance, estimated country effects for countries where covered bonds can only be issued by specialist lenders are often very different from each other. While spreads on French obligations foncières are among the lowest, those on Irish asset-covered securities are slightly higher than those in most other countries. Another country whose bonds trade at somewhat higher spreads is Spain, perhaps because the legal framework does not ensure the same degree of bankruptcy remoteness of the cover pool. It will be interesting to see how spreads are affected if the recently proposed amendment to the Spanish legislation, in particular the establishment of a register for cover assets, is enacted.[9]

The results also suggest that it might be possible to substitute private contractual arrangements for the legal framework for covered bonds. Indeed,

[9] The low spreads for Portuguese bonds might be explained by a scarcity premium resulting from the small size of the market.

covered bonds structured so as to compensate for the lack of special legislation tend to trade at spreads that are lower than those of any country bar France and Portugal, although this might also be related to the fact that the issuers of such bonds tend to be large and well-known financial institutions.

Recent case studies

Covered bond prices robust to …

As covered bonds typically have the highest ratings, it is only natural that there have been relatively few instances in which the creditworthiness of covered bonds has been seriously challenged. However, at certain moments some bonds could conceivably have been at much greater risk of default, either from a sharp decline in issuer credit quality or from a deterioration in the value of the cover pool. By examining the changes in market yields around specific episodes, it can be determined whether investors indeed perceived a significant change in the credit quality of the relevant covered bonds.

… issuer downgrades …

In 2005, the credit standing of Allgemeine Hypothekenbank Rheinboden AG (AHBR), a German issuer of covered bonds with more than $55 billion of these bonds outstanding and once Germany's largest mortgage bank, fell sharply. On 17 March 2005, Moody's announced both a two-notch downgrade of the bank's long-term bank deposit rating to Baa3 and a downgrade of the financial strength rating (which reflects the issuer's credit quality without taking into account potential outside support) from C– to D–. On 25 October 2005, Moody's cut the bank's financial strength rating to E, indicating that outside assistance would probably be required to save it.

In order to examine the extent to which these announcements resulted in abnormal changes in yield (ie changes that are not due to broader market movements), we estimate a linear model that relates the daily yield of each of AHBR's covered bonds from 1 July 2004 to a period a few weeks before the downgrade date to changes in the yield of Merrill Lynch's AAA Bond Index, and the maturity and maturity-squared of each bond. With this model, yields are predicted for each bond surrounding the downgrade dates. These predicted yields are compared to the yields that actually unfolded over the time period.

These results suggest that the credit quality of covered bonds can be robust even to very pronounced declines in issuer creditworthiness. Around the 17 March 2005 announcement of multiple downgrades, no abnormal change in yields can be detected. And despite the further decline in the financial health of AHBR announced in late October 2005, the most that the covered bond spreads widened during the period was by about 14 basis points (Graph 4, left-hand panel).

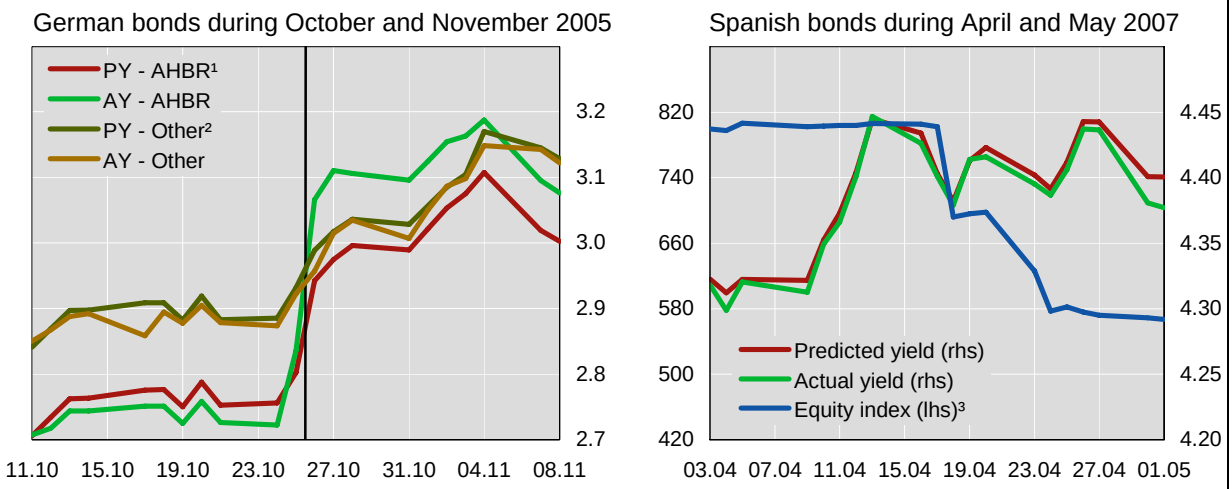
… and deterioration of the collateral pool

The same methodology can be applied when significant changes in the quality of the cover pool for covered bonds are perceived to have occurred. As mentioned previously, Spanish banks are frequent issuers of covered bonds. Since these bonds are usually covered by mortgages, any signs of stress in the Spanish real estate market might conceivably have led to a decline in the credit quality of the corresponding covered bonds.

In fact, following the same event study methodology described above, we find no evidence of significant abnormal changes in the yield of Spanish covered bonds around periods of stress in the Spanish real estate market. On

Shocks to covered bond valuations

Yield in per cent



The vertical line in the left-hand panel marks the date of the AHBR downgrade.

¹ PY = predicted yield of AHBR; AY = actual yield. ² Predicted yield of other German covered bonds. ³ Dow Jones Spanish Real Estate Equity Index.

Sources: Bloomberg; Datastream; Dealogic; BIS. Graph 4

18 April 2007, the Dow Jones Spanish Real Estate Equity index fell by nearly 15%, reflecting investors' concerns about the outlook for the Spanish housing market. Equity prices continued to fall over the next week, and by 25 April 2007 the cumulative decline had reached almost 30%. But despite this significant decline, spreads on Spanish cédulas hipotecarias were not greatly affected (Graph 4, right-hand panel). This could be due to the creditworthiness of the issue, to the large degree of overcollateralisation of most bonds, or to investors' belief that the LTV ceilings on mortgage loans would protect them from a limited decline in housing prices.

Conclusions

Covered bonds have developed from a national instrument to an important segment of the European bond market, competing with other highly rated securities such as sovereigns and sub-sovereigns. In 2006, covered bond issuance crossed the Atlantic when Washington Mutual sold the first US issue. What makes covered bonds special is the dual nature of protection that combines an obligation of the issuer with the added protection of dedicated collateral. However, assessing the value added by the cover pool is not straightforward. While both covered bond legislation and the contractual arrangements underlying structured issues contain numerous provisions to ensure that the cover assets retain their value in the event of the issuer's bankruptcy, few if any of these provisions have been tested in court.

An issue that has so far received only limited attention is how the availability of an instrument that allows banks to issue highly rated debt affects mortgage finance (CGFS (2006)). Covered bonds are long-term, fixed rate instruments and are therefore particularly suited to refinance fixed rate

mortgage loans. This is acknowledged, for example, by the UK Treasury, which motivated its recent draft covered bond legislation precisely with the need for instruments to refinance such loans.

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Global and regional financial integration: progress in emerging markets[1]

In recent years efforts have been made to deepen financial links between emerging markets within individual regions. Such regional financial integration lags the integration of emerging markets with global markets, but authorities in Asia in particular are taking steps to accelerate the process.

JEL classification: F36, F21, G11.

Since the early 1990s, financial systems in emerging economies have become increasingly integrated into the international financial system. This process was led by the forging of links with the major financial centres: for example, emerging market residents turned to New York, London and other international centres to raise foreign financing and purchase foreign assets. In recent years, efforts have also been made to promote integration among emerging markets within individual regions.

This special feature reviews measures of financial integration and the progress of integration in emerging markets from both a global and a regional perspective. The new members of the European Union come closest to achieving an integrated market, as a result of their close ties to major financial centres within the Union. At the same time, financial links among emerging markets are deepest in emerging Asia, where the authorities have taken collective actions to reinforce them. The following section explains what is meant by financial integration, and subsequent sections examine different measures of cross-border integration.

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS. The authors are grateful to Claudio Borio, Már Gudmundsson, Robert McCauley, Frank Packer and Eli Remolona for comments, and to Magdalena Erdem for assistance with empirical work and graphs.

Financial integration in an international context

An integrated financial market is one in which potential market participants face a single set of rules, have equal access and are treated equally (Baele et al (2004)). In an international context, progress towards a fully integrated market for financial instruments and services depends on a broadening and deepening of cross-border financial links.

Financial integration involves broadening and deepening links between markets

More concretely, the process of cross-border financial integration involves opening a country's financial markets and institutions to foreign players as well as permitting local market participants to invest abroad. This can be done by removing barriers to the cross-border flow of capital and financial services, such as capital controls and withholding taxes. An additional step towards an integrated market is the removal of obstacles which result in less favourable treatment of foreign capital and foreign financial institutions. One example of such discrimination is giving preference to domestic institutions in government bond auctions and privatisations. Links can be further deepened by harmonising national standards and laws, through either the mutual recognition of standards or the adoption of commonly agreed minimum standards.

Cross-border integration can proceed either globally or regionally. In other words, a country can integrate with the world as a whole or with the region where it is located. Global integration tends to take the form of increased financial links with major financial centres such as London and New York because network externalities give these centres an advantage in the provision of financial services (Gehrig (1998)). For the same reason, regional integration is facilitated by regional financial centres, as is the case of Hong Kong SAR and Singapore for emerging Asia.

Whether integration proceeds globally or regionally potentially impacts the types of benefits realised (see box). Business cycles are less correlated among distant economies, and so risk-sharing might be best facilitated through global integration. Geographical proximity is an important determinant of trade and financial flows, and therefore economic growth might be given a greater boost by regional integration.

Key drivers of integration are market participants' behaviour ...

Behind the broadening and deepening of cross-border financial links are three main forces. One is changes in the behaviour of local and foreign market participants (Wooldridge et al (2003)). For example, over the past two decades advances in communications and computing technology and the consequent increase in the availability of information have contributed to a weakening of investors' home bias. At the same time, an increasing number of firms has opted to raise capital in international markets, including through the cross-listing of shares on major stock exchanges.

A second driving force is unilateral action by national authorities. Beginning in the mid-1980s, authorities in many emerging markets liberalised their financial systems and implemented other market-oriented reforms. Progress in removing capital controls slowed after the financial crises of the late 1990s, but reform of local financial systems continued.

Global versus regional financial integration: a brief survey of benefits and costs

Financial integration has two major economic benefits: economic growth and risk-sharing. First, by facilitating the allocation of capital to its most productive use and promoting the development of the financial system, integration should enhance growth prospects. Second, by allowing for cross-border financing and investment, it facilitates portfolio diversification and, thereby, the sharing of idiosyncratic risks across countries. Such risk-sharing allows income to be insured against country-specific shocks and, thus, consumption to be smoothed over time.

How much of these benefits countries are able to reap depends, among other factors, on the extent of regional versus global integration. Regional financial integration is less likely than global integration to foster risk-sharing, insofar as business cycles tend to be more closely correlated among neighbouring countries than among distant ones. Financial integration has been found to allow for a better diversification of risk when countries are more specialised (Imbs (2004)).

The European experience and, more recently, that of Asia show that regional financial integration can bring additional benefits on the institutional side. Peer pressure has promoted the upgrading and harmonisation of local practices in the functioning of the financial system, including accounting, tax treatment and even regulation and supervision in the European case. Such institutional upgrades have been found to foster financial development.

Finally, the importance of local information and common time zones for financial markets could create a role for regional integration to improve welfare. Gravity models work well for financial and trade flows, suggesting that, even in an age of efficient global communications, financial markets still find significant advantages in geographical proximity (Portes and Rey (2000)). More specifically, information asymmetries or differences in investment styles could cause investors in neighbouring countries to act differently from those in distant countries, and so regional integration might help to diversify the global investor base.

Financial integration, whether regional or global, is not without costs. In a world with imperfect capital markets, financial integration can heighten a country's vulnerability to macroeconomic and financial crises. In particular, contagion and reversals in capital flows can result in higher output volatility and even lower average growth for a certain period of time, although it should still be higher in the long run, given the previously discussed benefits. Regional integration might be even more costly if sudden stops are more frequent within a region than globally.

Evidence about the link between financial integration and volatility is inconclusive (Rogoff et al (2006)). What seems clear is that countries with well developed financial systems are less vulnerable to crises, but it is also true that financially developed countries are generally financially integrated with the rest of the world (Lane and Milesi-Ferretti (2006)). More specifically, vulnerability is especially high if certain institutions and policies are not in place before a country liberalises its financial system (Demirgüç-Kunt and Detragiache (1999)). The string of international financial crises in the 1990s demonstrated that eliminating barriers to the international movement of certain types of financial capital might induce volatility if countries do not have strong institutions and sound macroeconomic policies. Some have also suggested that minimising the risks of integration requires the existence of well functioning domestic financial markets (Alfaro et al (2005)).

... and authorities' actions

A third force is multilateral action by a group of countries. Over the past decade, the international community has developed a range of standards to promote well functioning financial systems, and many countries have taken steps to harmonise national standards with these international ones. In addition, cross-border financial ties have been promoted through formal trade and investment agreements. Such agreements often give a greater impetus to regional than to global integration, in part because of the difficulties of reaching agreements among a large number of countries. The European Union is the best known example of a collective effort to achieve an integrated regional market. The 10 countries of the Association of Southeast Asian Nations (ASEAN) also aspire to closer integration, including the establishment of a regional economic union by 2015.

Multilateral actions can usefully promote integration, but they are neither necessary nor sufficient for its advancement. For example, agreements among Latin American authorities led to the creation of a large number of organisations to support regional cooperation, such as the Andean Development Corporation and the Latin American Integration Association. However, these were not accompanied by a deepening of financial links among market participants within the region.

Progress of financial integration

Emerging markets are clearly more closely integrated into the international financial system today than they were a decade or two ago. But how advanced is the process of global financial integration? How deep are the financial links? These are difficult questions to answer because there is no single indicator that captures all aspects of integration.

No single measure captures all aspects of integration

In general, financial markets can be considered fully integrated if the law of one price holds. The law of one price, which implies that assets with identical risks and returns command the same price, should prevail between markets where assets are perfectly mobile. If financial integration were sufficiently advanced, then capital would flow to where returns are highest and, in the process, risk-adjusted expected rates of return would tend to equalise across countries.[2]

Following from this, one implication of financial integration is that there need not be any relationship between saving and investment within a country. Feldstein and Horioka (1980) propose a simple test of this relationship:

$$\left(\frac{INV}{GDP}\right)_{i,t} = \alpha + \beta\left(\frac{SAV}{GDP}\right)_{i,t} + \varepsilon_{i,t}$$

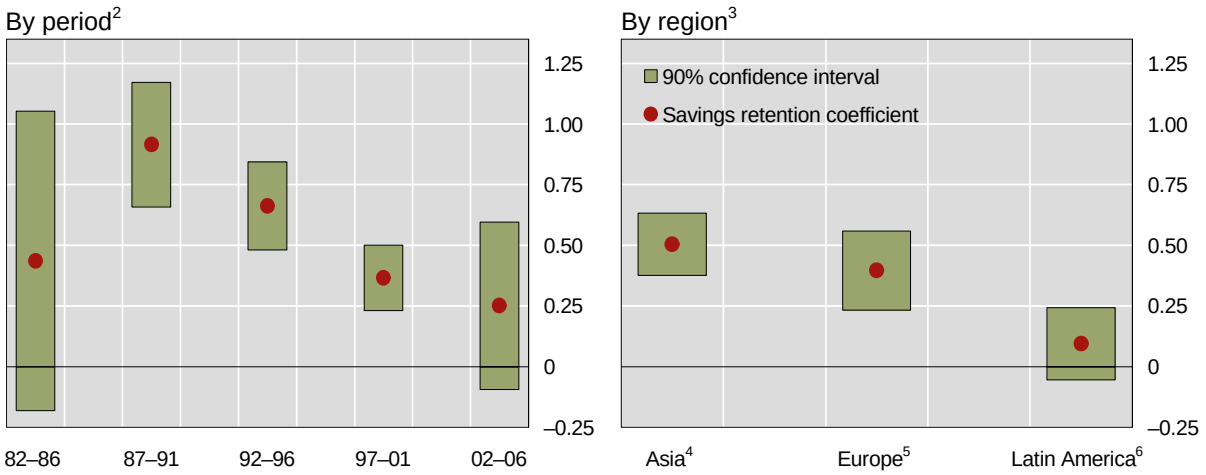
where *i* represents the country and *t* the time period. The coefficient β shows what proportion of a change in the domestic saving rate is retained in the country to finance investment. We collected data for 26 emerging markets (nine from Asia, 10 from Europe and seven from Latin America) over the 1982–2006 period. To control for cyclical fluctuations, we averaged the saving and investment rates over five-year intervals. The resulting coefficient β is plotted in Graph 1 for different periods and different emerging regions.

For the full sample of emerging markets, the savings retention coefficient rose during the 1980s, reflecting the decline in capital flows to emerging markets after the 1982 debt crisis (Graph 1). It fell sharply during the 1990s, from 0.92 in 1987–91 to 0.37 in 1997–2001, and then declined further to 0.25 in 2002–06. The most recent estimates are still well above the savings retention coefficient for mature economies, which we calculate to be about zero in 2002–06, and so emerging economies are not yet as integrated into global financial markets as are mature economies. Among emerging regions, the savings retention coefficient is lowest in Latin America, where it is close to zero over the full sample period. In Europe, it is around 0.4, and in Asia 0.5.

Relationship between saving and investment has weakened significantly

[2] More generally, the real interest rate would tend to equalise across markets.

Relationship between saving and investment[1]



[1] Investment as a percentage of GDP, regressed against a constant and savings as a percentage of GDP; variables are calculated as five-year averages; Newey-West standard errors. Gross domestic savings are calculated as GDP minus private and government consumption. Gross investment is calculated as gross fixed capital formation plus changes in inventories. [2] Pooled regressions including all countries listed in notes 4 to 6. [3] Pooled regressions including all periods. [4] China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. [5] Countries which joined the European Union on 1 May 2004, ie Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia; data for 1992–96, 1997–2001 and 2002–06 only. [6] Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.

Sources: IMF; authors' calculations. Graph 1

The extent to which risk-adjusted expected rates of return have converged across countries can also be measured directly, by comparing asset prices. Return correlations are the simplest price-based measures, but they can be difficult to interpret. A more meaningful measure is the relative importance of different risk factors in returns. Increased economic and financial links facilitate portfolio diversification, which in turn should reduce the impact of diversifiable risks, in particular country-specific macroeconomic shocks, on asset prices.

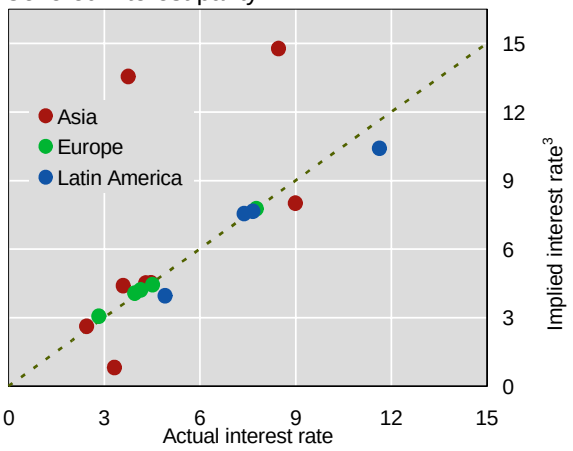
Country-specific factors are still important in emerging equity markets

Studies of US, European and other major equity markets typically find that country-specific factors had a significant impact on returns in the 1980s, but their importance declined relative to that of sector-specific factors in the late 1990s and early 2000s. By contrast, in emerging equity markets there is less evidence of a shift. For a sample of 26 emerging markets, Chen et al (2006) find that country-specific factors were more important than sector-specific factors throughout the 1994–2005 sample period. This implies that the integration of emerging equity markets into the international financial system lags the integration of major markets. Estimated country effects are lowest for Latin American equities and highest for Asian equities. One likely explanation for this difference is that a relatively large number of Latin American firms are cross-listed on major exchanges.

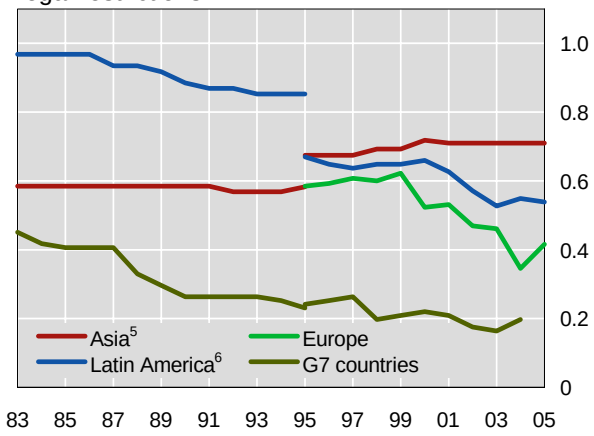
In fixed income markets, a specific (albeit narrow) example of the law of one price is covered interest parity. This states that the interest rate differential between two currencies is equal to the percentage difference between the forward exchange rate and the spot exchange rate. Covered interest parity does seem to hold in those countries which joined the European Union in 2004, at least for money markets in June 2007 (Graph 2, left-hand panel). However, it does not hold for several Asian and Latin American economies, suggesting the

Indicators of capital mobility[1]

Covered interest parity[2]



Legal restrictions[4]



[1] For a list of countries in each region, see Graph 1. [2] Three-month interbank interest rate, average in June 2007. [3] Derived from the theoretical relationship between spot and forward exchange rates against the US dollar, and US dollar Libor. [4] Average of 1/0 dummy variable indicating the existence of controls on capital account transactions; data for 1983–95 are from Miniane (2004); data for 1995–2005 are from various editions of the IMF's *Annual report on exchange arrangements and exchange restrictions*. [5] Prior to 1995, excludes China, Indonesia, Taiwan (China) and Thailand. [6] Prior to 1995, excludes Peru and Venezuela.

Sources: Miniane (2004); IMF; Bloomberg; national data; authors' calculations. Graph 2

existence of barriers that prevent investors from engaging in arbitrage between domestic and foreign markets.

Full integration might be impeded by market frictions. For example, home bias will persist so long as poor corporate governance in some countries makes it optimal for insiders to own large stakes in firms in that country and, consequently, difficult for foreign investors to acquire shares on the open market (Kho et al (2006)). Therefore, in assessing the progress of financial integration, it is useful to consider measures of capital mobility alongside the broader measures discussed above.

Impediments to capital mobility are lowest in the new EU members

One often cited indicator of capital mobility refers to the existence of legal restrictions on cross-border capital flows, based on information in the IMF's *Annual report on exchange arrangements and exchange restrictions*. The IMF defines a 1/0 dummy variable for a range of current and capital account transactions, with a value of one indicating the existence of restrictions. Following Miniane (2004), we aggregate several different categories of transactions to construct an index of capital controls. For the 10 countries which joined the European Union in 2004, this index shows a sharp reduction in restrictions on capital mobility starting in 1999 (Graph 2, right-hand panel). By 2005 the extent of restrictions in the new EU members was substantially less than in other emerging regions. Latin American countries began to eliminate restrictions in the late 1980s but did not do so as aggressively as the new EU members later did. The index shows little progress in emerging Asia. This is consistent with the picture shown by covered interest parity.

Such de jure measures of impediments to the free flow of capital have several shortcomings. First, the restrictions may not be binding; they may not be enforced or respected, or the capital flows may not have existed in the first place. Second, they cover a narrow aspect of all possible impediments, for

example missing idiosyncratic national practices that effectively discriminate against foreign market participants. Third, they capture regulations in place on a given day and so might not reflect temporarily imposed measures.

Quantity-based indicators of capital mobility overcome some of these shortcomings. The size of a country's international investment position shows how much of its wealth comes from or is placed abroad. Gross measures capture the progress of financial integration better than net measures because the latter underestimate the degree of integration in countries with similarly large external assets and liabilities. Furthermore, stock measures are better than flow measures because the latter are influenced by changes in short-term market conditions and thus can fluctuate markedly.

Gross external position of emerging markets in Asia and Europe is very large ...

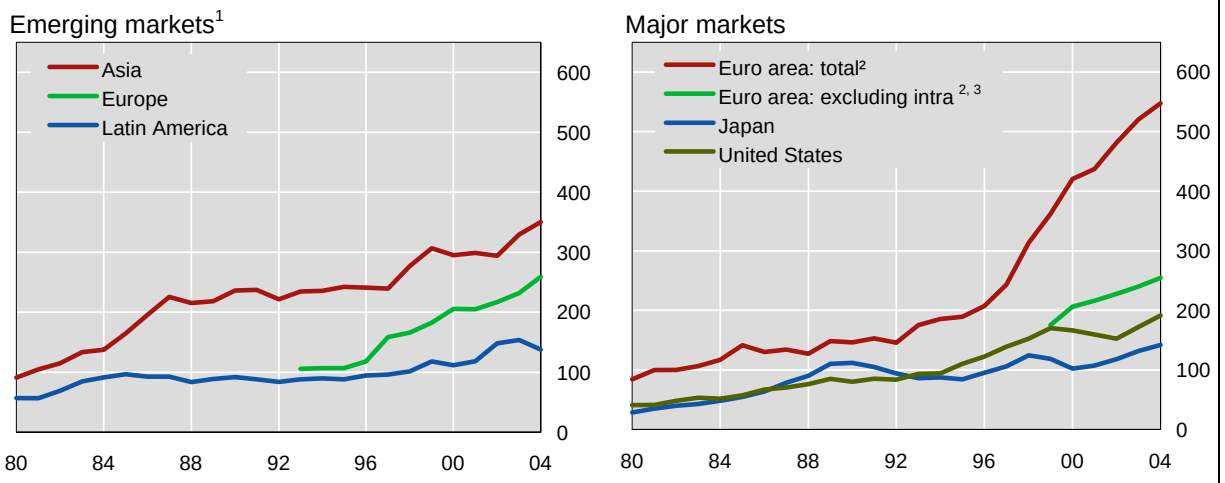
In Graph 3, countries' gross international investment position is estimated by summing the stock of external assets and liabilities. According to this measure, emerging markets in Asia are more closely integrated with international financial markets than are those in other regions. Asian economies' gross external position averaged 350% of GDP in 2004, compared to about 260% in the new EU members and 140% in Latin America. Latin America's level of financial openness was not far behind Asia's in the early 1980s, but in the latter part of the decade and again in the late 1990s the gap widened significantly. Even though most new EU countries were part of the Soviet bloc, in the early 1990s the region's integration with the rest of the world was similar to Latin America's. The pace of integration in the new EU countries then accelerated in the mid-1990s, around the time that they applied to join the European Union.

... but not as large as that of the euro area

The gross international investment position of emerging markets in Asia and Europe is larger than that of some major markets, when the size of the economy is taken into account. In 2004, external assets and liabilities equalled 190% of GDP in the United States and 140% in Japan. The one region that

Gross international investment position

Foreign assets plus foreign liabilities, as a percentage of GDP



[1] Equally weighted average of the countries in each region; for a list of countries, see Graph 1. [2] Eleven original members. [3] Excluding intra-euro area assets and liabilities.

Sources: Lane and Milesi-Ferretti (2006); IMF. Graph 3

stands out is the euro area. The combined external financial position of its members was well above that of any other region, close to 550% of GDP in 2004. This is mainly due to the impressive impetus given to regional financial integration by the launch of the single currency. Indeed, since 1999 intra-euro area activity has grown faster than the euro area's external positions vis-à-vis the rest of the world.

Global versus regional integration

Financial integration can proceed globally or regionally

The discussion above gave little regard to the geographical reach of financial integration. Below we focus on the closeness of financial links between emerging markets and three different groups of countries: other emerging markets within the same region, mature economies neighbouring the region, and major financial centres farther afield. The first set of links, among emerging markets within the same region, represents regional integration in the narrowest sense. The second set, with neighbouring economies, can also be considered regional integration, but in a broader sense. The third, with major financial centres, we will refer to as global integration.

Considering first price-based indicators, we propose a decomposition of individual country returns into what can be attributed to a global risk factor and what can be attributed to a regional risk factor. Specifically, we propose a decomposition of the return on country *i*'s bonds into three parts: the return on a global bond index ($R_{G,t}$), the excess return on a regional bond index ($ER_{R,t}$, measured as the difference between regional and global returns), and a country-specific error term ($\varepsilon_{i,t}$):

$$R_{i,t} = \beta_1 R_{G,t} + \beta_2 ER_{R,t} + \varepsilon_{i,t}$$

The coefficient β_1 captures non-diversifiable risk related to global economic and financial conditions, and so a higher β_1 can be interpreted as indicating greater global integration. The coefficient β_2 is a region-specific factor. If β_2 exceeds zero, it indicates that investors can and do diversify their portfolios across the region, suggesting a degree of bond market integration within the region unrelated to global integration.[3] Graph 4 shows the results of the decomposition, using weekly data for local currency government bonds.

Bond returns exhibit a regional risk factor, unrelated to global integration

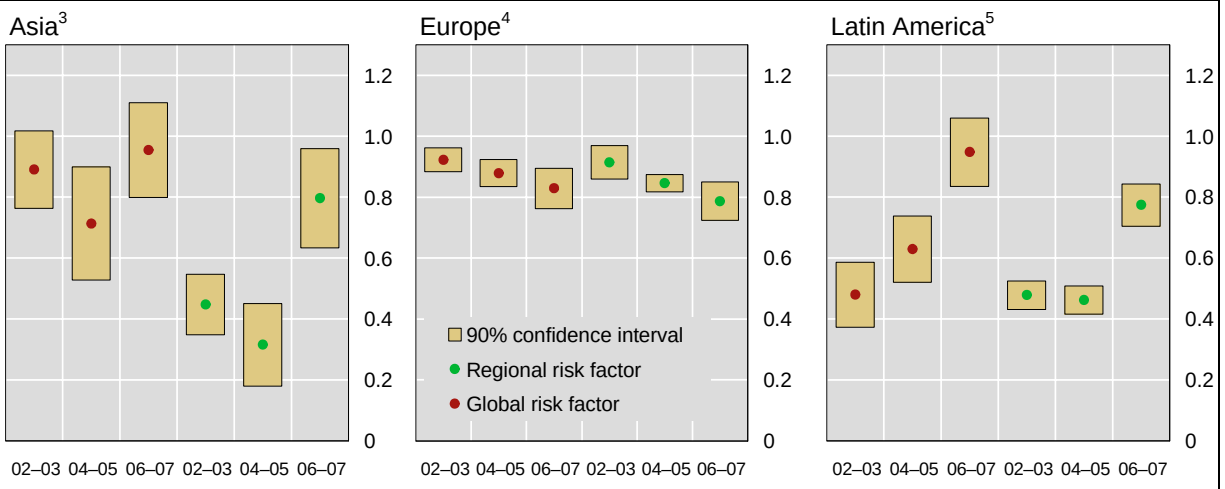
The size of the global risk factor in bond returns did not change significantly between 2002 and 2007 in Europe and Asia but did increase in Latin America. The regional risk factor is significant in all three regions, becoming more so in Asia and Latin America since 2004. The increase in these latter two regions implies that regional integration has facilitated the diversification of idiosyncratic country risk.

Certainly in Asia authorities have been proactive in promoting the integration of regional bond markets. In 2002 ASEAN members plus China, Korea and Japan launched the Asian Bond Markets Initiative. The focus of this initiative is on facilitating access to regional bond markets for a wider variety of issuers, as well as enhancing the market infrastructure. Other efforts to

[3] The emerging market bonds in our sample are not risk-free, and so the coefficient β_2 may also capture non-diversifiable default risk (Amato and Remolona (2005)).

Global vs regional factors in bond returns[1]

Local currency government bonds[2]



[1] Returns for country *i*, regressed against a composite return for developed markets and excess returns for regional markets (measured as composite regional returns less a composite developed market return); weekly returns over a two-year period; for 2006–07, January 2006 to July 2007. [2] Seven- to 10-year maturity; JPMorgan Global Bond Indices (Global and Emerging Market Broad). [3] China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Singapore and Thailand. [4] The Czech Republic, Hungary, Poland and Slovakia. [5] Brazil, Chile, Colombia, Mexico and Peru.

Sources: JPMorgan; authors' calculations. Graph 4

promote the development of local currency bond markets include the creation of the Asian Bond Fund 2 (ABF2) in 2004 by the 11 member institutions of the Executives' Meeting of East Asia-Pacific Central Banks (EMEAP). ABF2 invests in local currency bonds issued by sovereigns and quasi-sovereigns in eight of the 11 EMEAP countries, and the country and regional funds comprising ABF2 are listed on the region's exchanges. The process of creating the funds seems to have accelerated the process of market reform in several countries, including the relaxation of capital controls, the lifting of withholding taxes and the mutual recognition of jurisdictions within the region (Ma and Remolona (2005)).

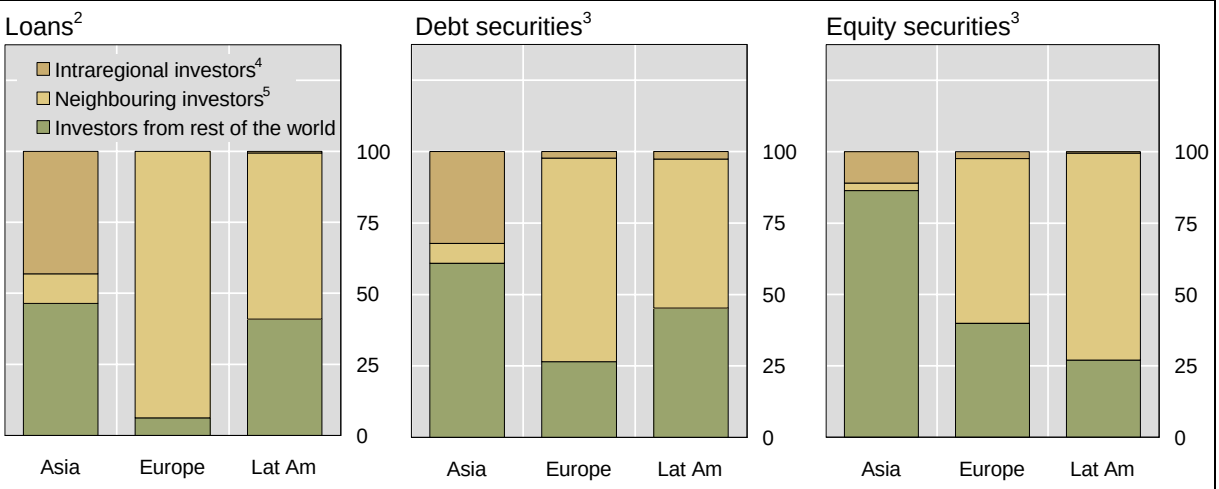
Substantial intraregional investment in Asia ...

Turning to quantity-based measures, one indicator of the progress of regional integration is the share of foreign investment financed by other countries within the same geographical area. By this measure, Asia is the most regionally integrated of the three emerging regions examined. About 30% of cross-border bond investment in Asia, and 40% of loans to Asian residents, are from entities domiciled within the region, in particular investors in Hong Kong and Singapore (Graph 5). Although intraregional investors account for only 10% of foreign investment in Asian equities, this is a larger share than in any other region. Indeed, there seems to be very little intraregional investment within the new EU countries and Latin America. If the financial centres in the Caribbean are grouped together with the countries in Latin America, the share of intraregional investment in that region is significantly higher, but it is still lower than in Asia.

Available data, however, tend to underestimate the degree of regional integration insofar as only a handful of emerging markets report details of their financial position abroad. In the same vein, residency-based data mask the

Sources of foreign investment[1]

As a percentage of the stock of foreign investment in the host region, at end-2005



[1] For a list of countries in each region, see Graph 1. [2] Cross-border liabilities, in the form of loans and deposits, to BIS reporting banks. [3] Derived from foreign portfolio assets reported by countries participating in the IMF's Coordinated Portfolio Investment Survey. [4] Investment by the residents of the region. [5] Investment by residents of mature economies neighbouring the region; for Asia, Japan; for Europe, EU 15 countries; for Latin America, Canada, the United States and Caribbean countries.

Sources: IMF; national data; BIS. Graph 5

ultimate origin of the funds. A large portion of the funds intermediated in offshore financial centres comes from the affiliates of entities headquartered elsewhere. For example, only 11% of all cross-border credit from banks in Hong Kong, Macao SAR and Singapore is originated by banks headquartered in those jurisdictions.

... much of it intermediated through offshore centres

The picture of regional integration is quite different if links to mature economies neighbouring the region are considered. In this case, the new EU members are the most regionally integrated: the 15 older members of the European Union play a much larger role in the new EU members than do the United States and other North American financial centres in Latin America, or Japan in Asia (Graph 5). Banks domiciled in the EU 15 account for almost all cross-border lending to borrowers in the new EU members, and EU 15 residents are by far the largest portfolio investors in the region. Only for equity investment is the relative importance of neighbouring regional investors greater in Latin America than in the new EU members. In emerging Asia, Japanese investors do not have a dominant presence, although in the late 1980s and early 1990s Japanese banks were the largest creditors to the region.

The new EU members are the most integrated with their more developed neighbours

The composition of investors' portfolios arguably provides a more representative picture of the importance of intraregional investment than the proportion of a country's foreign liabilities financed by investors within the region. The foreign assets of many emerging markets are, in absolute terms, much smaller than those of mature economies, and so the latter proportion is likely to be low even with heavy intraregional investment. Using data on the foreign portfolio assets of 43 countries, we construct a measure of regional bias in foreign portfolio allocations, similar to measures of home bias. Graph 6 compares the share of a country's outward equity investment directed to a particular emerging region with that region's share of global market

capitalisation. A ratio greater than one indicates that investors overweight their allocation to the region relative to the region's share of world market capitalisation, and a ratio less than one indicates that investors underweight the region.[4]

Investors in all emerging regions exhibit a regional bias in their equity allocations

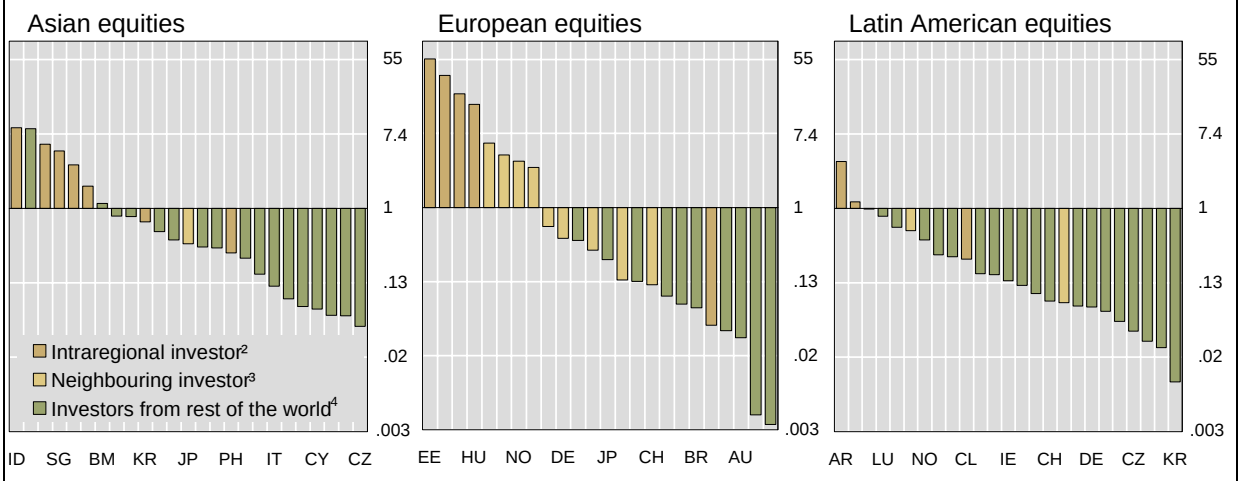
Looking first at those investors who overweight regional equities, almost all are domiciled within the emerging region or, to a lesser extent, in neighbouring mature economies. This is consistent with the existence of a regional bias among these investors. Indeed, focusing only on investors domiciled within the region, the majority overweight the region. Investors domiciled in developed countries neighbouring the region are less biased, with the majority underweighting the region. Among investors in the rest of the world, almost all underweight the region. These results hold for each region, although considering the small sample of regional investors the results should be regarded as suggestive rather than conclusive.

Local banks have a larger presence in Asia than in other emerging regions

Indicators based on cross-border investment, such as those in Graphs 5 and 6, can understate the degree of financial integration in those countries where foreign firms have large local operations. Since the mid-1990s, banks in particular have shifted from cross-border operations to serving customers through a local presence funded locally (McCauley et al (2002), BIS (2007)). In emerging Asia, the local operations of banks headquartered within the region are larger than those of Japanese banks (Graph 7). If UK banks HSBC and

Regional bias in foreign portfolio allocations[1]

Allocation to regional equities relative to market capitalisation of the region, at end-2005 (logarithmic scale)



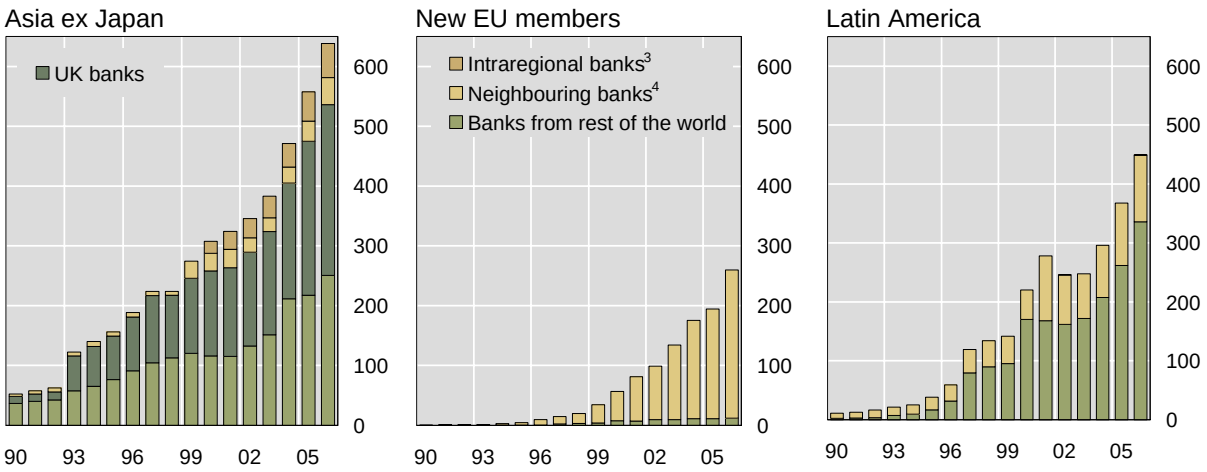
[1] Share of investment abroad allocated to the region, as a ratio of the share of the region in the world market capitalisation (excluding the capitalisation of the investor's home market); foreign portfolio investment is from the IMF's Coordinated Portfolio Investment Survey; market capitalisation is not adjusted for the investability of listed shares. [2] Investors domiciled within the region: for Asia, Hong Kong SAR, Indonesia (ID), Korea (KR), Malaysia, the Philippines (PH), Singapore (SG) and Thailand; for Europe, Cyprus (CY), the Czech Republic (CZ), Estonia (EE), Hungary (HU) and Slovakia; for Latin America, Argentina (AR), Brazil (BR) and Chile (CL). [3] Investors domiciled in mature economies neighbouring the region: for Asia, Japan (JP); for Europe, EU 15 (of which DE = Germany, IE = Ireland, IT = Italy, LU = Luxembourg), Norway (NO) and Switzerland (CH); for Latin America, Bermuda (BM), Canada and the United States. [4] Includes Australia (AU).

Sources: IMF; Standard & Poor's; World Federation of Exchanges; authors' calculations. Graph 6

[4] Investment in the home market is excluded from the numerator of the ratio, and the market capitalisation of the home market is excluded from the denominator, so that the ratio is not distorted by any home bias on the part of investors.

Local assets of foreign banks[1, 2]

By residency of immediate borrower, in billions of US dollars



[1] Claims on local residents booked by the local affiliates of BIS reporting banks, excluding local claims denominated in foreign currencies, cross-border claims and claims on residents of the jurisdiction where the parent bank is headquartered. [2] For a list of countries in each borrowing region, see Graph 1. [3] Assets of banks headquartered within the region: for Asia excluding Japan, banks from Hong Kong SAR, India, Singapore and Taiwan (China); for Latin America, banks from Brazil, Chile and Mexico. [4] Assets of banks headquartered in countries neighbouring the region: for Asia excluding Japan, banks from Japan; for new EU members, banks from EU 15 countries, Norway and Switzerland; for Latin America, banks from Canada and the United States.

Source: BIS. Graph 7

Standard Chartered are grouped with Hong Kong banks, then intraregional banks' local operations may well be larger than those of all others.[5] By contrast, in the new EU members and Latin America, banks headquartered within the region have no significant presence outside their home market. In large part this is because US and especially western European banks have taken over the largest banks in many countries within these two regions.

Conclusions

Financial integration is farthest advanced in the new EU members ...

The multifaceted nature of financial integration makes it hard to compare the progress of different emerging regions. That being said, available data point to significant integration over the past decade. The new EU members have reached a very high level of financial integration, comparable in some respects to that of the mature economies. The common institutional and regulatory framework provided by the European Union, together with the goal of joining the euro area, have resulted in extensive cross-border financial ties. At the same time, the geographical reach of integration in the new EU members is relatively limited; their integration almost entirely reflects the deepening of links with their neighbouring financial bloc.

By contrast, in Latin America the geographical reach of integration is broader than in the new EU members, involving neighbouring countries as well

[5] In the BIS consolidated international banking statistics, HSBC Bank and Standard Chartered Bank are classified as UK banks because their parent companies are headquartered in London. Both banks have larger operations in Asia than in the United Kingdom and are note-issuing banks in Hong Kong. Prior to 1993, HSBC was headquartered in Hong Kong.

as those farther afield. Yet the progress of integration has been much less rapid. Overall, financial integration in Latin America lags behind that in the new EU members.

... least advanced in Latin America, and Asia is somewhere in between

The situation in Asia is somewhere between those of Europe and Latin America. Geographical links are broader than among the new EU members. One respect in which Asia stands out from other emerging regions is that it has the largest share of foreign investment financed within the region. Indeed, intraregional links are more important than those with the largest neighbouring financial centre, Japan, although still secondary to links to global markets. Nevertheless, the progress of integration is closer to that of Latin America: for example, capital mobility continues to be restricted in several countries.

Regional integration can be promoted by financial centres and collective actions

Looking forward, regional integration offers significant room for advancing financial integration. The development of regional financial centres in order to take advantage of network externalities appears to be an important means of advancing regional integration. Certainly, Singapore and Hong Kong have played a pivotal role in the intermediation of financial activity within Asia. Furthermore, the European experience highlights the role authorities' collective actions can play in furthering regional integration. Asian authorities have been more proactive in this regard than those in other emerging regions. Regional integration, however, should not be understood as a substitute for global integration. Each potentially brings different benefits, and thus regional and global integration can be complementary.

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Securitisation in Latin America[1]

Securitisation can transform ordinarily illiquid or risky assets into more liquid or less risky ones. Despite the recent rapid growth of securitisation, the Latin American market remains in its infancy, as reflected in the size and type of assets involved in transactions. Because of its benefits, further encouragement should be given to promoting this financing technique in the region. However, careful attention should also be paid to the associated risks.

JEL classification: G150, G180, G210, O160.

Securitisation in Latin America has expanded rapidly in the last five years. However, the small average size of issues and their lack of secondary market liquidity suggest that the market for securitised assets remains in its infancy. Furthermore, there has been a high degree of heterogeneity in this regional development. Just two countries, Brazil and Mexico, accounted for three quarters of all domestic securitised issues launched in 2006. Although this partly reflects differences in the size of the economies and in the degree of development of regional financial systems, it may also be indicative of the relative novelty of the legal frameworks governing securitisation in some countries.

Structured finance can have a positive influence on the financial system because it can transform ordinarily illiquid or risky assets into more liquid or less risky ones. It thus offers an alternative source of long-term funding in both domestic and cross-border markets, and can foster the development of domestic bond markets. In turn, this could promote greater bank and financial market efficiency, as it implies greater competition to meet customer financing needs.

The securitisation process in Latin America has already contributed to enhancing the liquidity of domestic residential mortgages and consumer loans. This is similar to the experience in other regions of the world, such as Asia. However, the process has differed in various respects. First, the crises of the

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS. We thank Mark Salgado and Samuel Fox at Fitch Ratings for facilitating access to some of the data employed. We also thank Claudio Borio, Angus Butler, Jacob Gyntelberg, Gregor Heinrich, Frank Packer and Bill White for their comments and Rodrigo Mora for his assistance.

late 1990s and early 2000s delayed and in some cases interrupted the introduction of new laws to improve the legal structure required for the securitisation process. In Asia, such crises had the opposite effect as they seemed to encourage new legislation. Second, some instruments aimed at transforming credit risk, such as collateralised debt obligations (CDOs), are rather underdeveloped in the Latin American market. This contrasts with the experience in Asia, where these instruments have expanded rapidly (Gyntelberg et al (2007)).

This special feature analyses the key features of the securitisation process in Latin America. It starts with a brief description of how the process works. An assessment of the development of the market in the region in both the cross-border and the domestic segments follows. The next two sections highlight the main benefits derived from this financing technique and discuss some of the challenges and risks associated with it. A final section concludes.

The process of securitisation

Securitisation transforms illiquid or risky assets into liquid or less risky ones

The securitisation process allows institutions to pool non-marketable assets or cash flows into a larger marketable asset, which is then sold to investors in the form of securities. These are secured by the underlying pool of assets and its associated cash flow.[2]

Securitisation usually encompasses the issuance of securities through an off-balance sheet process involving a special purpose vehicle (SPV) or trust. In particular, once the originator has selected a pool of assets from its portfolio, these are then sold to the SPV.[3] This entity legally separates the underlying assets from the originator and finances the purchase of the assets by issuing securities to investors, while holding the assets in trust.[4] Once the securities are issued, the interest and principal of the underlying assets are collected and managed by a "servicer" and rechannelled to investors through the SPV. Often, the SPV also insures the pool of assets against default, thus improving the quality of the underlying assets through a process known as *credit enhancement*. This can take several forms, including overcollateralisation (according to which the value of the assets exceeds the value of the securities issued), insurance contracts, letters of credit, subordination of tranches that absorb losses first and the use of sponsor agencies (eg governments or multilaterals) to guarantee payments or reserve funds.

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[2] Different securitisation and more complex techniques exist today which can be applied to different asset classes and institutions. In developed markets, financial derivatives have allowed the introduction of synthetic securitisation in which the credit risk of the pool of securitised assets is transferred to a third party using credit derivatives rather than the direct transfer of ownership of assets.

[3] Usually homogeneous assets in terms of credit quality, maturity and interest risk are chosen.

[4] Legal separation is very important in the securitisation process as it determines whether, in the event of bankruptcy of the original holder, the assets pledged continue to service the issue on the terms originally agreed on, thus making the SPV "bankruptcy-remote".

Securitisation trends in Latin America

Securitisation has expanded rapidly …

Structured transactions have expanded rapidly in Latin America since 2003. The amount of new securitised transactions in the region reached a total of $20 billion in 2006, from only $6 billion in 2002 (Graph 1). Of the 2006 total, over $16 billion represented issues in local markets, while transactions in the cross-border market amounted to just $3.6 billion. Despite these favourable trends, the market for securitised products in Latin America remains small, in particular when compared with those of developed regions and other emerging markets, such as Asia (Gyntelberg et al (2007), Gyntelberg and Remolona (2006)).

…evolving from a cross-border market …

Broadly speaking, the development of securitisation in Latin America can be split into three stages. In the first stage, prior to the crises of the late 1990s, the market was dominated by cross-border transactions (Graph 1). At this stage, securitised assets or future flows were denominated in foreign currency, and financing was restricted to the largest, most financially sound and most creditworthy originators in each country.

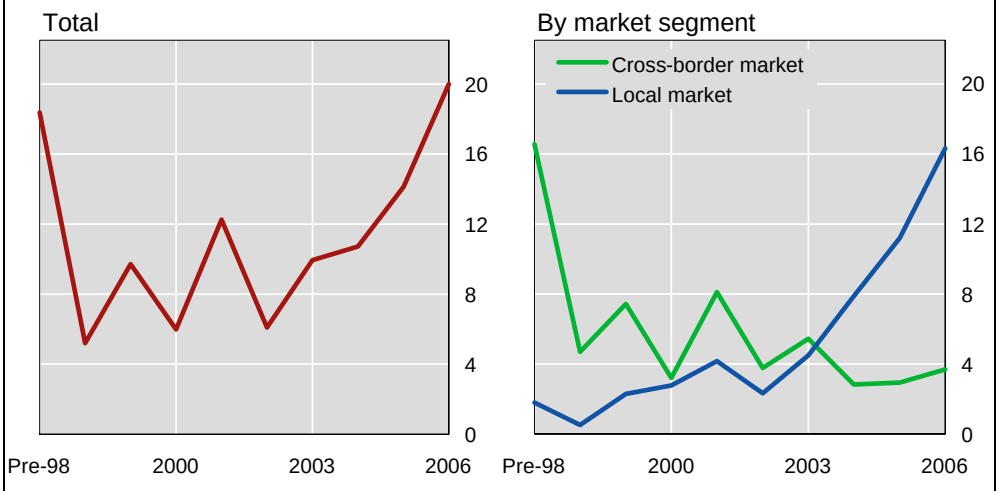
The second stage started with the advent of the financial turmoil in the late 1990s, followed by further market instability in the wake of the Argentine default in 2001 and the events surrounding the presidential election in Brazil in 2002. During this period, cross-border issuance was volatile at well below pre-crisis levels (Graph 1). Nonetheless, while other markets in the region were stagnant, structured finance actually began to expand in Chile and Colombia, partly due to the introduction of new legal frameworks, which lent an initial dynamism to mortgage-backed securities (MBSs).[5]

… to a local market …

The third stage began around 2003 with a vibrant market recovery in which second-tier originators, lacking access to international markets,

Latin American securitisation

In billions of US dollars



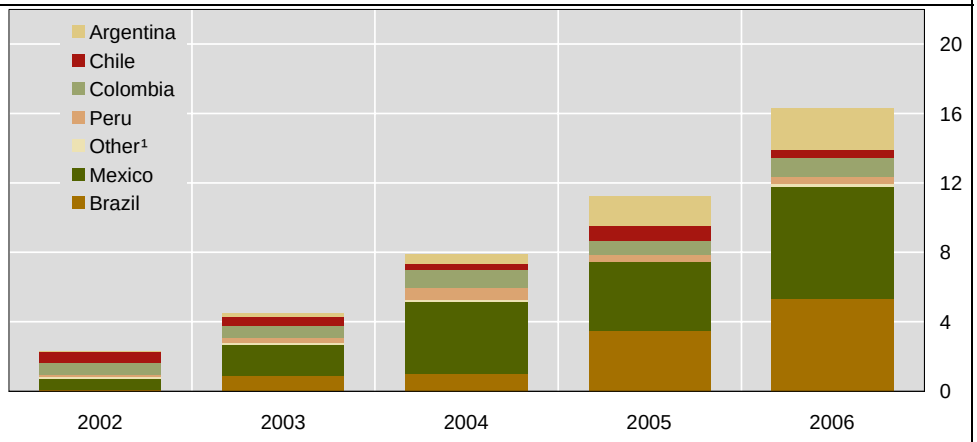
Source: Fitch Ratings.

Graph 1

[5] In Chile, a law that stimulated the market was the Ley de Mercado de Valores of 1981, last amended in 2002. In Colombia, it was the enactment of Law 546 of 1999.

Latin American local market securitisation issuance

In billions of US dollars



[1] Bolivia, Central America, Ecuador and Venezuela.

Source: Fitch Ratings. Graph 2

increasingly turned to low-cost financing through securitisation in domestic markets. The securitisation of commercial and residential mortgages, auto and consumer loans and trade receivables all began to expand rapidly, with the result that the cross-border market became overshadowed by the local market.

… with heterogeneous development across the region

A country breakdown of local market securitisation issuance indicates that developments in Brazil and Mexico were in large part responsible for the aggregate expansion in the region. A number of legal initiatives paved the way for a more viable securitisation process (see the box). In 2006, issuance in these markets reached $5.3 billion and $6.5 billion, respectively, representing together nearly three quarters of the region's total local market issuance (Graph 2). The Argentine securitisation market is the third largest in the region. Although it has also been expanding, its structure still reflects the effects of the 2001 crisis. In particular, guaranteed loans backed by the government (debt known as "préstamos garantizados") still accounted for about 15% of total domestic issuance in 2006. The Chilean and Colombian markets have lost some momentum in recent years, after showing promise in the second stage noted above. For instance, Chile has seen a significant slowdown since 2004, with issuance declining from a level of $273 million in 2003 to just $127 million in 2006.[6] This followed a prepayment crisis in the RMBS market and the emergence of alternative ways to fund mortgages in the form of credit notes. However, these markets are expected to resume growth in the near future, as is the Peruvian market.

Transaction breakdown

Traditional ABSs have surpassed future flow transactions …

The types of assets involved in securitised transactions also indicate that the market is maturing (Graph 3). The most telling transformation has been the shift away from future flow transactions in the cross-border market towards

[6] In 2004, prepayment rates jumped to unexpected levels due to the drop in local interest rates.

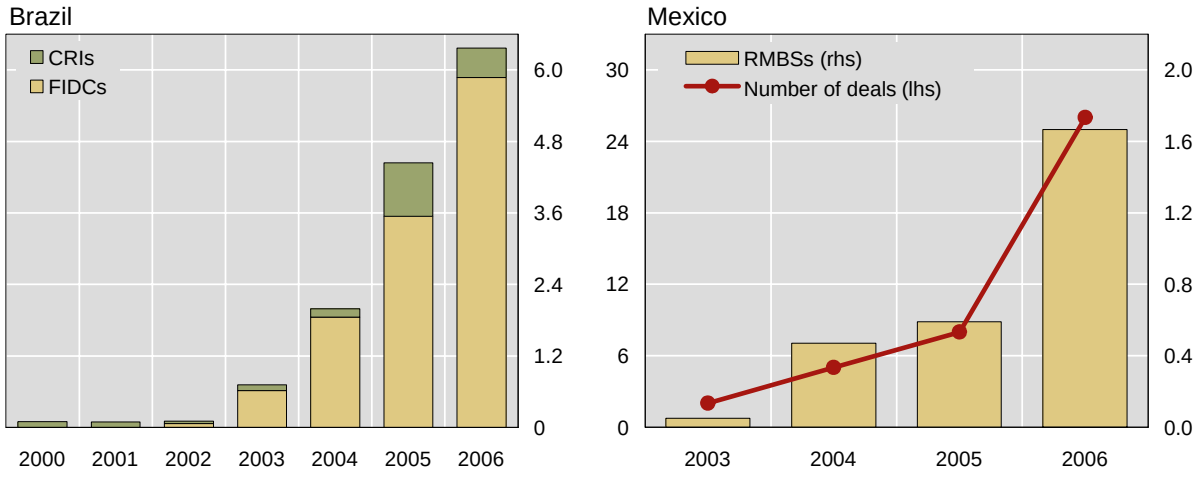
Elements of securitisation in Brazil and Mexico

Brazil and Mexico have become the two largest markets for structured securities in the region. In both cases, improved macroeconomic performance, fiscal and monetary management, and the introduction of new securitisation frameworks have accounted for the expansion.

In Brazil, the introduction in 2001 of Fundos de Investimentos em Direitos Creditórios (FIDCs) prompted the recent growth. FIDCs are "bankruptcy-remote", low-cost issuing vehicles, which have given companies an alternative to traditional bank credit. The types of underlying assets supporting these transactions include payroll-deductible personal loans (creditos consignados), vehicle loans, credit cards, utility bills and commercial flows. By sector, financial institutions lead the origination of receivables (40%), followed by service utilities and retail (26% each). Most of the deals nowadays are placed in the public capital markets, which contrasts with the use of private placements in the early stages of FIDC development. While FIDCs have experienced sustained growth since 2003, residential mortgage-backed securities (RMBSs) and commercial mortgage-backed securities (CMBSs) have exhibited a more volatile trend and remain underdeveloped, representing only 9% of all structured transactions executed in 2006. In this segment, the real estate backed Certificados de Recebíveis Imobiliários (CRIs) issued by securitisation companies represent most of the transactions.

Securitisation in Brazil and Mexico

In billions of US dollars



Sources: Comissão de Valores Mobiliários (CVM); Fitch Ratings.

Mexico has the largest RMBS market in the region. Much of this development is due to a strong political effort directed at offsetting a very large housing shortage (estimated at around seven million units) and to a number of legislative reforms. In 2001, the Mexican federal government established a federal mortgage institution (Sociedad Hipotecaria Federal – SHF). This development bank was created to grant loans and guarantees for the financing and construction of housing, and to help the securitisation of credits granted through the financial intermediaries. Acting as a wholesale mortgage bank and guarantor, the SHF: (i) provides long-term funding to financial intermediaries and hedges interest rate risk; (ii) provides mortgage insurance; and (iii) ensures timely payments on bonds. As a result, it has filled an important gap related to the lack of government guarantees, which are required in order to introduce MBSs in secondary markets. However, by law, the SHF will not be allowed to fund financial intermediaries after 2009. This means that alternative methods to fund mortgages will have to emerge, and there are plans to develop a securitisation market for mortgages as the main source of funding for the housing market. Also, although all the securities the SHF currently handles are fully backed by the federal government, this will change in October 2013, as the SHF will have to become self-supporting.

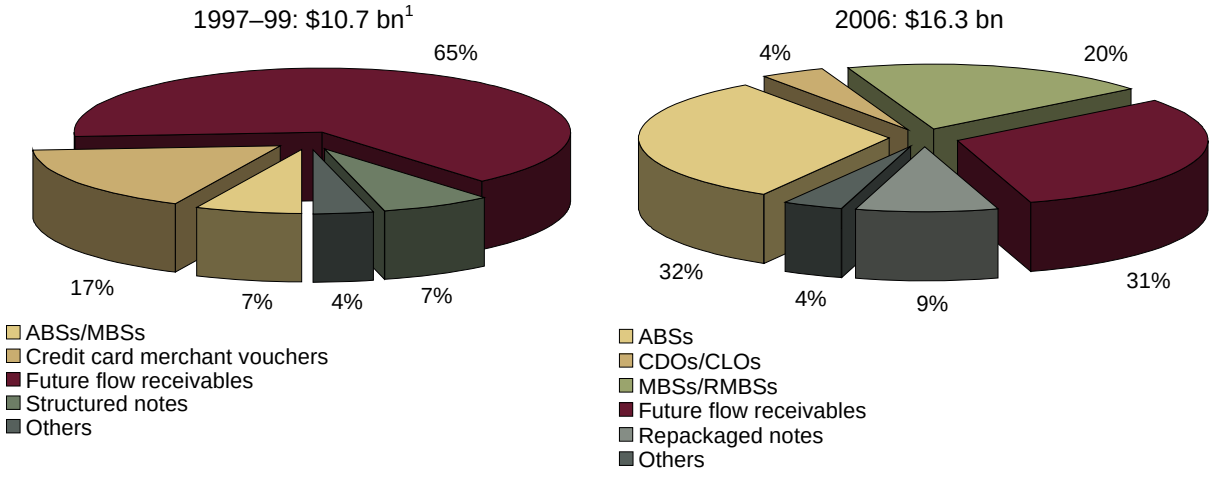
more traditional asset-backed securities (ABSs) in the local market. Indeed, while export receivables and credit card receivables dominated the market in the 1990s, by 2006 a more diverse asset structure had begun to emerge.

A number of specific developments have contributed to this change in the landscape. First, there have been placements of sub-investment grade structured issues. Second, CDOs began to make their appearance in 2006, with Brazil seeing the first CDO transaction in the local market.[7] Third, in Mexico there have been successful placements of ABSs in which the underlying collateral has income flows denominated in pesos while the bonds are denominated in hard currencies. Of course, such a structure creates a currency mismatch that requires developed swap markets to hedge exchange rate risk. Given that swap markets elsewhere remain underdeveloped, it is doubtful that other countries in the region will be able to emulate this feature of the Mexican market in the near future. These transactions have been encouraged by improving sovereign credit ratings and the maturing of local currency markets, which have obviated the need for the credit enhancing techniques characteristic of future flow transactions to access the market.

... but there is still little activity in CDOs

Despite the progress made so far, much remains to be done. For instance, with the exception of Brazil and Mexico, structured transactions tend to be dominated by one type of asset. In 2006, credit cards had a 45% share of all transactions in Chile, RMBSs had a market share of 60% in Colombia, and in Peru 46% of all transactions related to future flows (Fitch Ratings (2007b)).

Latin American local market breakdown by asset



[1] Includes national and global issues rated by Standard & Poor's.

Source: Authors' regrouping based on Fitch Ratings and Standard & Poor's. Graph 3

[7] In Argentina, collateralised loan obligations (CLOs) have been issued for a number of years. However, due to the sovereign default of December 2001, these operations have been essentially restricted to small and short-term transactions with export-oriented agricultural industries.

Benefits of securitisation

Securitisation can offer important benefits to the region. For instance, it may help complete financial markets,[8] mitigate sovereign risk, improve the resilience of markets in periods of stress, and provide a source of funding for the housing finance system.

Completing domestic financial markets

Securitisation can improve liquidity and credit quality …

Securitisation can help complete domestic financial markets in two principal ways. First, it can create liquid assets from the pooling of relatively illiquid ones, such as residential mortgages, household credits and other receivables. Second, it can improve the credit quality of the structured asset through credit enhancement techniques. In this way, securitisation can help bridge the credit quality gap between the instruments borrowers are able to offer and those investors prefer to hold. In the region, transactions aimed at creating instruments with better credit risk profiles than those of the underlying assets, such as CDOs, remain limited. Indeed, in 2006 such instruments accounted for only 3%, 10% and 6% of total assets in Argentina, Brazil and Mexico, respectively.

Mitigating sovereign risk

… mitigate sovereign risk …

Cross-border securitisation proved a viable funding option in Latin America for many years because it provided a vehicle to mitigate sovereign risk. Domestic firms often faced historical constraints in financing themselves abroad, even when they themselves had a good credit record, because of low sovereign ratings and perceived political risk. Structures known as future flow securitisations (FFSs) allowed some firms to successfully tap international capital markets in spite of these constrains, even in periods of stress.

FFSs are debt securities in which the originator arranges for future foreign currency receivables (income streams) to be transferred to an offshore account held by an SPV outside the jurisdiction of the originator's country. The offshore SPV is intended to make it difficult for the government to interfere, thus mitigating political risk. Furthermore, most FFSs are not only overcollateralised, as they have a greater income stream than necessary paid into the trust account servicing that debt, but also have built-in credit enhancements in the form of bond insurance. Also, by ensuring that the payments go to the offshore trust, the FFS structure mitigates sovereign transfer and convertibility risk.

Today, the popularity of FFSs has significantly decreased, partly because of currently low sovereign spreads and partly because of the expansion of domestic bond markets in the region. It seems probable that, as long as credit quality continues to improve, the need for cross-border FFSs will remain subdued.

[8] For a complementary analysis of local currency bond markets in Latin America, see Jeanneau and Tovar (2006).

Securing financing in turbulent times

... help secure financing in periods of stress ...

Domestic securitisation markets could help secure financing in periods of stress should international credit markets shut down. Argentina offers an interesting example in this regard. During the Argentine crisis, some securitised assets performed better than straight, unsecured debt or other products. In particular, consumer loans remained performing both during and after the crisis. This was possible for two reasons. First, the underlying bonds were issued in pesos, so originators with income flows in pesos were able to continue to service the payments on the underlying bonds despite the currency depreciation. Second, although there was a spike in delinquencies and defaults of the underlying assets, the credit enhancements were sufficient to prevent any payment defaults on the bonds (Fitch Ratings (2007b)).

Funding for housing finance

... and contribute to reducing the housing deficit in the region

The securitisation of residential loans can be an important alternative or enhanced source of funding for housing finance. The pooling of mortgages and the creation of new securities sold in the secondary market provides a mechanism through which loans can be made without their being funded by deposits. In this manner, securitisation addresses a possible maturity mismatch problem that could constrain the extension of housing loans. Further, it alleviates the geographical concentration of loan activity as well.

In the region, the need for new sources of funding for housing finance is particularly high; the housing deficit is currently estimated at around 54 million units. From this point of view, the development of secondary structured markets can also help fulfil an important social and economic development role.

Looking forward: challenges and risks

Favourable outlook for securitisation in the region, but ...

Asset securitisation in Latin America has experienced significant growth in the last five years. A more stable macroeconomic environment coupled with legislative changes has been the main factor behind this expansion. However, this market remains in its infancy; its size is small and the assets involved in the transactions are not well diversified. This section highlights some key challenges that could hamper the development of securitisation in the region, as well as some of the risks that can arise from structured operations.

Small scale of markets

... some markets are small ...

For securitisation to be economically viable, the volume of pooled assets must be such as to justify the cost of the process. In Latin America, some asset classes are not yet developed enough to warrant their pooling. For instance, given that corporate bond markets in the region are restricted to first-tier and highly rated companies, and that no market for second- or third-tier corporate bonds exists, the region has been unable to benefit from the securitisation of higher-risk corporate debt.

Legal framework

... legal frameworks can still be improved ...

Effective securitisation relies heavily on the legal framework of the country in which the operation takes place. Any regulation that hinders the transfer of the underlying asset to be securitised, or that results in an unclear allocation of property rights, will affect both the ease of the process and the range of eligible assets. A number of regulations aimed at improving the legal infrastructure for securitisation have been put in place in most countries in the region. However, some fine-tuning and improvements could further promote this financing technique.

In the case of Mexico, the development of securitisation remained limited for a long time owing to a ban on trusts ("fideicomisos") issuing debt, as well as to overly long foreclosure proceedings. For such reasons, securitisation only became possible after important legal amendments were introduced. In 1996, laws were passed allowing for more expedient foreclosure proceedings and an easier transfer of mortgages. In 2000 and 2003, further progress was made as regulations were introduced allowing Mexican "fideicomisos" to become SPVs. Furthermore, a 2001 amendment to the Securities Market Law of 1975 introduced the "certificado bursatil", which SPVs found attractive to issue.

In the case of Brazil, the structured market has benefited greatly from the introduction in 2001 of credit rights funds or FIDCs. Notwithstanding this and other regulatory changes introduced to stimulate the securitisation of a broader set of assets, RMBSs and CMBSs remain underdeveloped.[9] The lack of a clear and effective foreclosure process and legal issues related to the effective transfer of debt obligations have been important impediments to the development of mortgage securitisation.

Information constraints

... as can information disclosure ...

Asset securitisation is an information-intensive process. In order to structure a transaction, a number of facts regarding the nature of the assets pooled and their performance need to be disclosed. First-time originators in emerging markets often fail to take this aspect into consideration, increasing the time and costs of the structure (Fitch Ratings (2007a)). For these reasons, companies involved in securitisation need to be committed to developing appropriate information management systems as well as the capacity to support such transactions, including credit origination and servicing procedures.[10]

In Latin America, constraints on the availability and use of data complicate risk assessment and the overall process of securitisation. This is partly due to the lack of appropriate databases. Furthermore, some assets being securitised

[9] Law 9514 of 1997 introduced the legal framework for the creation of CRIs, ie mortgage-backed securities. The same law introduced the "alienação fiduciária", which transferred the ownership of the property from the borrower to the trustee for the duration of the loan.

[10] This might include complete and clear policies and procedures for: credit underwriting; the valuation, registration and monitoring of collateral; the standardisation and documentation of legal contracts; rigorous monitoring; provisioning; and information reporting systems.

have relatively short credit histories (eg mortgages), which complicates their analysis over a full economic cycle.[11]

Moreover, even if data are readily available, they need to be processed correctly. One potential problem is that the calculation of certain indicators may differ from one country to another. An illustration of this is the calculation of delinquencies. According to international standards, if a borrower is late in paying, then the entire outstanding exposure must be classified as delinquent. However, in emerging market countries, delinquency may be assessed differently. Many companies have outstanding pools of loans, leases or receivables with government agencies which fail to be serviced for a period of time but are eventually fully paid (Fitch Ratings (2007a)). For this reason, they are usually not classified as being in default, regardless of the length of time they have been delinquent. This can create unanticipated problems for investors. Securitised portfolios must be able to make timely payments to investors, as these payments are funded only by the cash flow generated by the underlying credits.

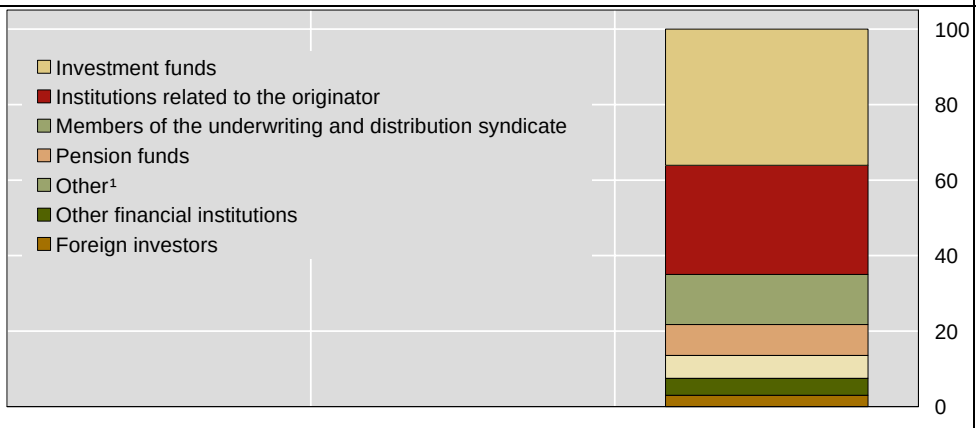
Broadening of the investor base

… and the investor base remains narrow

The existence of a significant demand for structured securities is obviously crucial for the development of these markets. Although the local investor base in the region has strengthened, its size remains small. In Brazil, for instance, the market began with just a few private local investors and a multilateral institution. Today this market is dominated by three main types of domestic investor, leaving foreign investors less well represented (Graph 4). Across the region, restrictions on investments by institutional investors and the resultant

Investor base in the Brazilian securitisation market, 2006

Issuance as a percentage of the total



[1] Commercial banks, individual investors, insurance companies, investment clubs and other institutional investors.

Source: Uqbar (2007). Graph 4

[11] Fitch Ratings lists a number of data requirements for securitisation. For instance, there are information needs regarding the characteristics of individual obligors (location, creditworthiness, etc), the structure of receivables (original amount, term, interest rate, currency denomination, outstanding balance and remaining term), and the characteristics of the underlying collateral.

lack of sophistication could help explain the still narrow investor base. This last point is well illustrated by the Mexican experience. There, pension funds could formerly only invest in government paper. When this changed, they lacked sufficient asset management expertise and thus focused on the obligations of top-tier companies only.

Risk considerations

Securitisation can create new risks due to ...

The development of asset securitisation can generate new sources of risk. Examples would include difficulties in evaluating credit risk, conflicts of interest associated with rating agencies, prepayment risk and the interest rate denomination of securities.

... difficulties in assessing credit risk ...

Investors' ability to assess the credit risk attached to structured products can be weakened by the complexity and financial sophistication involved in creating new instruments. Anecdotal evidence suggests that investors cannot always adequately assess the risks attached to the different tranches (eg mezzanine and equity tranche) that constitute the final product. The limited availability of good data on credit histories is another consideration, since this weakens the ability to forecast defaults on underlying obligations. Finally, the volatile macroeconomic environment that has historically characterised Latin American economies is also not helpful when credit risks are being evaluated.

... conflicts of interest associated with rating agencies ...

The reliance on credit rating agencies in structured finance markets can also be a source of risk. In early stages of the development of securitisation, new issues are relatively simple to rate as they involve homogeneous assets such as residential mortgages, for which default probabilities are relatively easy to calculate (albeit subject to data constraints) via the law of large numbers. However, as markets develop, less homogeneous assets are pooled through more sophisticated structures. In this context, rating agencies become more closely involved in the structuring and issuing process, and this may create conflicts of interest as their fees depend upon the completion of the securitisation process (BIS (2005)).

... prepayment risk ...

Prepayment risk may also be a concern, in particular for MBSs. In some countries, mortgage borrowers can prepay their mortgages at any time and can force issuers to call their securities. When investors face such a change in the duration of their portfolios, they attempt to return to their target duration by replacing the called securities with newly issued mortgages, standard fixed income securities or positions in government bond futures. In turn, this creates pressures on the price of fixed income securities and, consequently, interest rates. Such a destabilising spiral of events can heighten market volatility or slow market development, as occurred in Chile in 2004. Interest rates in Latin America have historically been more volatile than those in more developed countries. It remains an open question whether this greater volatility could translate into greater prepayment risk.

... and the interest rate denomination of the securities issued

Finally, the type of interest rate paid on securities issued to support the securitisation transaction can also be a source of risk. In Latin America, most transactions have involved securities that are either linked to an inflation index (eg RMBSs in Brazil or Mexico) or are set in such a way as to allow a mismatch between the rate of return on the collateral and that of the security issued.

Short-term interest rate and inflation-linked securities can provide a degree of investor protection which makes the transaction more attractive. However, particularly in a highly volatile environment, if the underlying pool of assets does not have the same cash flow characteristics as the bonds issued, then the cash revenues of the original assets may be insufficient to cover servicing requirements. Although credit enhancements offer a means of dealing with such mismatches, it is not clear how sufficient these enhancements would be in times of stress. As of today, few transactions in the region have involved fixed rate securities. In fact, only one such transaction has been made in the Mexican RMBS market (April 2006).

Concluding remarks

While securitisation in Latin America has grown rapidly in recent years, the market remains in the early stages of its development. Securitisation can offer important benefits to the region, in particular by consolidating the development of domestic financial markets and improving their resilience. Because of these benefits, further attention should be given to promoting and developing a sound infrastructure to support securitisation. In this regard, a number of challenges need to be addressed to ease the process and lower its costs. At the same time, the recent experience in developed markets provides a warning signal about some risks that can also be associated with the securitisation process.

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Corporate financial restructuring in Asia: implications for financial stability[1]

Corporate financial fragility preceding the Asian financial crisis heightened vulnerabilities. Many countries in the region undertook significant corporate financial restructuring after the crisis, with some countries bouncing back much faster than others. These sounder corporate financial practices bode well for financial stability.

JEL classification: G32, G38.

The 10th anniversary of the outbreak of the Asian crisis has been accompanied by numerous retrospectives on the causes of the crisis as well as the subsequent performance of the affected economies. Many regard the crisis as having been the consequence of fundamental economic problems greatly exacerbated by financial vulnerabilities.[2] The situation of the East Asian economies has improved considerably since then. Trade balances, foreign currency reserves, corporate governance, the depth of financial markets and quality of government regulation, as well as various indicators of public sector health, are now stronger than before in the five most affected countries – Indonesia, Korea, Malaysia, Thailand and the Philippines.

This special feature focuses on the dimension of corporate finance as an important factor underlying Asia's financial crisis and recovery. Problems in the corporate sector were in many respects mirrored in the financial sector. To the extent that the corporate sector was fragile – over-leveraged, unprofitable – the assets of the banking sector were more likely to be poor. It is therefore instructive from the point of view of financial stability to examine the health of the corporate sector in East Asian economies 10 years after the crisis swept through the region.

[1] The views expressed in this article are those of the author and do not necessarily reflect those of the BIS. The author would like to thank Claudio Borio, Már Gudmundsson, Robert McCauley, Frank Packer, Eli Remolona and Philip Wooldridge for helpful comments and suggestions.

[2] For example, see Corsetti et al (1998), Pomerleano (1998), Mishkin (2000), Radelet and Sachs (1998) and Geithner (2007). On recent improvements since the crisis, see Standard & Poor's (2006), Moody's (2007) and Truman (2007).

The special feature is organised as follows. The first section presents quantitative evidence of corporate financial fragility in East Asia, both before and after the crisis. The second explores reasons for the improvement in corporate financial conditions, with an emphasis on structural reforms. The third section concludes, offering a few general policy recommendations to strengthen corporate financial practices further.

Assessing corporate financial soundness in Asia

Before the crisis

Considerable corporate financial fragility preceding the crisis

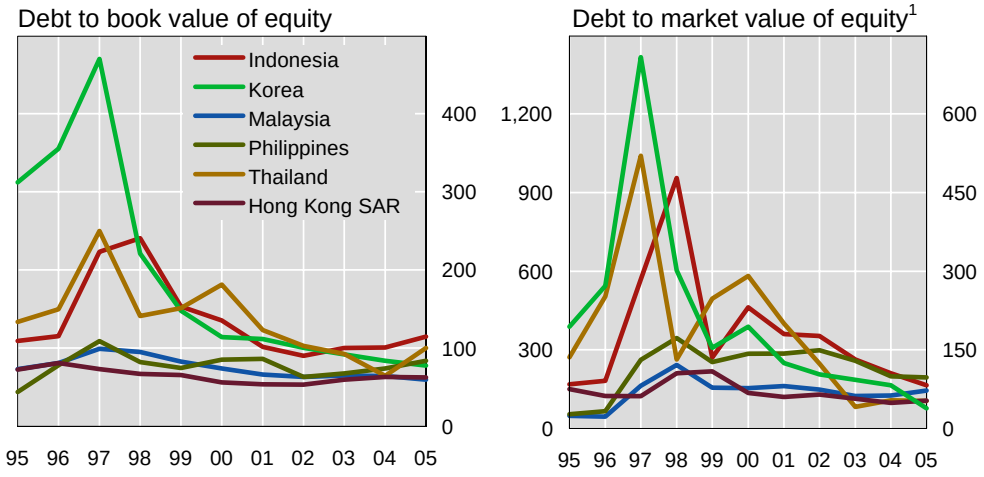
Quantitative financial indicators assessing the financial soundness of publicly listed firms – including ratios measuring performance, profitability and coverage, liquidity, and solvency – suggest considerable corporate financial fragility preceded the wave of financial crises in East Asia. High levels of capital expenditures combined with poor profitability were reflected in low and declining returns on equity and capital (Pomerleano (2007)). This special feature focuses on two illustrative financial indicators: leverage and the capacity to service debt (see discussion of data in Box 1).

Corporate leverage was high in Thailand and Korea ...

Benchmarking Asian crisis countries against corporate financial data in Hong Kong SAR and developed countries reveals that corporate leverage was quite high prior to the crisis in at least two of the five of the crisis-affected countries (Graph 1). In 1996 the two most leveraged countries – Korea and Thailand – had median debt-to-book-equity ratios for listed firms of 355% and

Median debt-to-equity ratios in selected Asian economies

In per cent



Comparative developed country figures for 1996 (2005) are: in the left-hand panel, France, 142 (165); Germany, 216 (131); Japan, 166 (114); Netherlands, 122 (126); Sweden, 122 (110); United Kingdom, 109 (101); United States, 127 (124); in the right-hand panel, France, 104 (82); Germany, 128 (69); Japan, 91 (92); Netherlands, 45 (59); Sweden, 56 (42); United Kingdom, 48 (45); United States, 37 (43).

[1] For Korea, left-hand scale.

Source: Author's calculations using Worldscope data. Graph 1

Box 1: Leverage measures and data sources

Firm-level data for the study come from the Worldscope database. The primary sample consists of firms from emerging markets for which data are available in Worldscope for the years 1995–2005. The emerging markets covered are Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines and Thailand. Comparisons are on occasion made with firms in the developed countries of France, Germany, Japan, the Netherlands, Sweden, the United Kingdom and the United States.

The companies selected for the analysis are general manufacturing firms, as well as extractive industries and utilities for which financial statements are available for the period 1995–2005. Traditional financial analysis employs several ratios to assess financial soundness, including ratios measuring performance, profitability and coverage, and liquidity and solvency. The analysis uses median values because they reveal more information than averages across firms in the sample. However, a number of important caveats are warranted.

First, as transparency and reporting have improved, Worldscope has extended the number of firms covered. For instance, in Malaysia the sample of firms increases from 88 in 1995 to 746 in 2005.[①] Thus the ratios might reflect not only within-firm trends in leverage and profitability but also trends resulting from changes in the composition of the sample. Second, the sample consists of publicly listed firms only, which may present a limited picture of corporate financial fragility in countries where unlisted firms account for a large share of economic activity. Third, the financial ratios used to measure risk do not capture off-balance sheet risks such as foreign exchange risk exposures and corporate risk management practices. Fourth, cross-border comparisons require additional care, given the differences in accounting conventions and local financial systems, despite efforts to adjust the data to international norms. Finally, the leverage ratios are likely to be distorted by the abrupt changes in exchange rates after the crisis. Unfortunately, we do not have data on the currency denomination of debt to make appropriate adjustments.

The two key ratios used in the main body of the analysis are:

Interest coverage ratio (ICR). Adjusted earnings from continuing operations before interest, taxes, depreciation and amortisation divided by gross interest incurred before subtracting capitalised interest and interest income.

Debt to equity. Long-term debt plus current maturities, commercial paper and other short-term borrowings divided by book (or market) value of shareholders' equity (including preferred stock) plus minority interest.

Interest coverage and leverage measures tend to be highly correlated with the credit ratings awarded by the major international rating agencies (see the table).

Standard & Poor's US corporate ratings and measures of debt burden

Three-year median (2002–04)

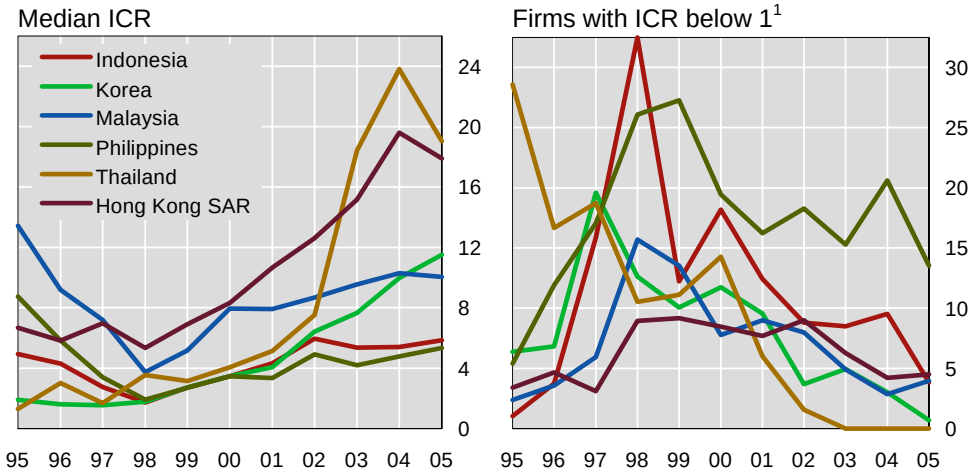
Indicator	AAA	AA	A	BBB	BB	B	CCC
EBITDA interest coverage (x)	25.5	24.6	10.2	6.5	3.5	1.9	0.9
Ratio of total debt to total debt plus equity (per cent)	12.4	28.3	37.5	42.5	53.7	75.9	113.5

EBITDA interest coverage adds depreciation and amortisation back to the numerator. The leverage measure reported is long-term debt plus current maturities, commercial paper and other short-term borrowings divided by long-term debt plus current maturities, commercial paper and other short-term borrowings plus shareholders' equity (including preferred stock) plus minority interest.

Source: Standard & Poor's. Table A

[①] For Indonesia, the corresponding numbers are 97 and 227, for Korea 94 and 319, for the Philippines 38 and 85, for Thailand 15 and 49, and for Hong Kong SAR 89 and 606.

Interest coverage ratio (ICR)



Comparative developed country figures for 1996 (2005) are: in the left-hand panel, France, 7.2 (12.2); Germany, 7.5 (11.6); Japan, 8.0 (29.6); Netherlands, 12.5 (9.8); Sweden, 9.3 (15.3); United Kingdom, 10.4 (10.4); United States, 10.0 (12.0); in the right-hand panel, France, 3.5 (1.4); Germany, 4.6 (3.9); Japan, 1.8 (0.9); Netherlands, 0 (1.4); Sweden, 1.9 (1.0); United Kingdom, 3.3 (12.0); United States, 0.4 (1.3).

[1] In per cent.

Source: Author's calculations using Worldscope data. Graph 2

150%, respectively.[3] By contrast, the corresponding median leverage ratios were 142% in France, 109% in the United Kingdom, 127% in the United States and 80% in Hong Kong SAR. Using market values of equity yields more pronounced results: Korea and Thailand had median debt-to-market value of equity ratios of 543% and 251%, respectively, well above the values presented for any of the comparator countries. High levels of leverage were likely to have been taken on in large part to fund rapid growth in fixed assets. For example, in 1996 and 1997, respectively, net growth of plant and equipment was 28% and 30% in Korea, and 34% and 45% in Thailand.

… while interest coverage was low in Thailand, Korea and Indonesia

The capacity to service this debt for three of the affected countries was already relatively depressed prior to the crisis. The interest coverage ratio (ICR) is calculated as the ratio of cash flows generated from operations to gross interest charges. In 1996 the median ICR of listed firms was 4.3 for Indonesia, 1.6 for Korea and 3.0 for Thailand, inordinately low compared to other countries (Graph 2). For instance, the comparable statistics were 5.8 for Hong Kong SAR, 7.2 for France, 7.5 for Germany, 8.0 for Japan, 10.4 for the United Kingdom and 10.0 for the United States. The right-hand panel of Graph 2 also shows that a significant percentage of firms in some countries in East Asia were unable to generate adequate cash flow to service debt even before the crisis. Nearly 20% of listed firms in Thailand had an interest coverage ratio below 1 and faced a risk of default in 1996. Of course, these percentages

[3] The leverage measures rise to even higher levels in 1997, though we cannot measure the extent to which this was due to the onset of the crisis in the second half of 1997, reflecting among other things the increase in the burden of foreign currency debt due to domestic currency depreciation. The leverage measures also rose considerably in 1997 in the other three crisis countries, Indonesia, Malaysia and the Philippines.

increased significantly for both Thailand and other Asian countries with the onset of the crisis.

After the crisis

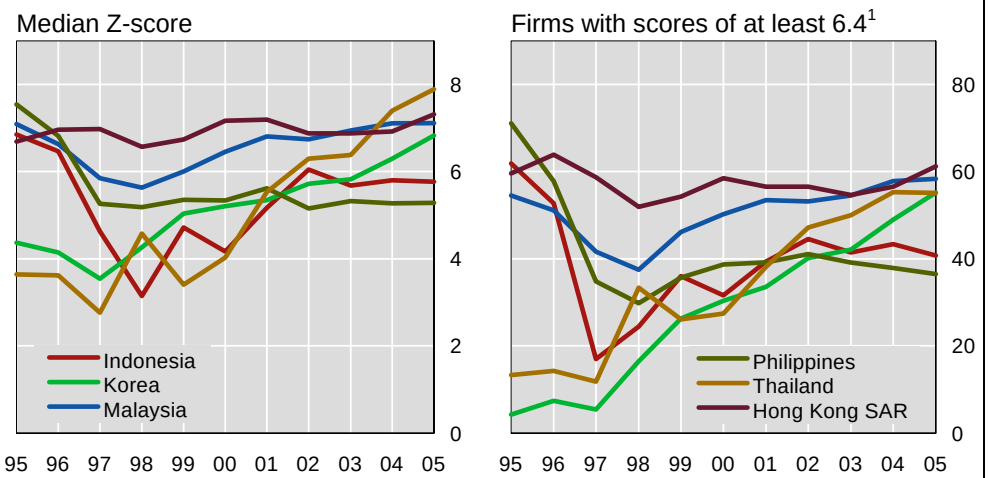
Corporate finances improved significantly after the crisis

The situation improved significantly after the crisis. Beginning in 1998, leverage began to fall significantly for Korea and Thailand, with book (market) leverage dropping to 77% (76%) in Korea and 99% (52%) in Thailand by 2005, well below pre-crisis levels. At the same time, interest coverage ratios improved markedly to above pre-crisis levels in all of the crisis countries except the Philippines (Graphs 1 and 2). By 2005, much smaller percentages of firms in East Asian countries had an interest coverage ratio below 1. Only in the Philippines was the percentage of firms unable to cover their debt service still relatively high, at 13.5%.

Additional evidence is provided by a composite corporate financial strength score for each firm in the sample. Traditional financial analysis is limited by the use of ratios measuring profitability, liquidity and solvency, without offering a comprehensive score or rating to assess overall financial strength. Altman (1968) extends ratio analysis using multiple discriminant analysis (MDA) to develop the Z-score model. Altman et al (1995) modify the Z-score model to assess firms in emerging markets, and calculate emerging market Z-scores (EMS; Box 2).

Graph 3 shows the results of applying the EMS to the corporate sector in East Asia over the sample period. By 2005, the median Z-score for Korean, Malaysian and Thai listed firms had all increased significantly to beyond pre-crisis levels, and were comparable to those of the Hong Kong SAR and developed country sample. The share of firms with Z-scores over 6.4 – which

Emerging market Z-score



Comparative developed country figures for 1996 (2005) are: in the left-hand panel, France, 5.9 (5.0); Germany, 5.9 (6.1); Japan, 5.6 (6.4); Netherlands, 6.7 (6.1); Sweden, 6.7 (6.7); United Kingdom, 6.4 (5.8); United States, 6.8 (6.9); in the right-hand panel, France, 36.4 (27.4); Germany, 37.5 (44.8); Japan, 37.6 (49.5); Netherlands, 66.7 (45.8); Sweden, 55.0 (56.6); United Kingdom, 49.1 (41.7); United States, 57.7 (55.3).

[1] In per cent; 6.4 corresponds to the score of A– rated US corporates using the model (Altman et al (1995)).

Source: Author's calculations using Worldscope data. Graph 3

corresponds to the score for US corporations rated A– by credit rating agencies – rose to well over one half in all three countries as well (in 1996, only 7.4% and 14.3% of the listed firms in Korea and Thailand, respectively, reached an equivalent score). It should be noted, however, that in Indonesia and the Philippines, median Z-scores and the proportion of firms with high scores remain below pre-crisis levels.

Local currency corporate bond markets in East Asia help to reduce vulnerabilities

Improvements in the liability structure of the corporate sector (not captured in the above-mentioned EMS) are probably also lending support to sounder corporate finances in a number of Asian countries. Historically, the structure of domestic private sector liabilities had been characterised by short maturities and exposure to foreign currency-denominated debt. The recent development of local currency corporate bond markets in East Asia has helped to reduce vulnerabilities in the corporate sector. Malaysia, Korea and Thailand (with 52%, 18% and 25% of total bonds outstanding, respectively) have made notable progress in developing the corporate bond markets, and the Korean corporate bond market has become less dependent on bank guarantees (CGFS (2007)).

The development of domestic corporate bond markets enhances financial stability through several channels. First, it reduces the risks of foreign exchange mismatch. Second, the disclosure requirements for bond issuance contribute to a general improvement in the quality of corporate reporting. Third, corporate bond markets introduce a transparent market-based process for assessing corporate credit risks. Finally, corporate bond markets disperse the concentration of risk away from the local banking system. A good example is the corporate bond market in Malaysia, which hardly existed in the late 1980s. Once regulatory impediments were relaxed and the approval process was

Box 2: The emerging market Z-score model

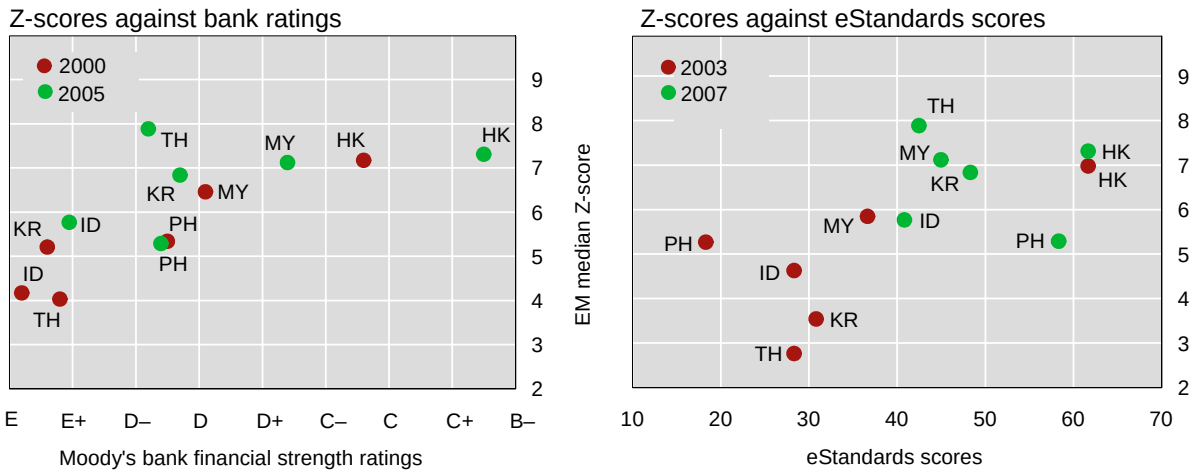
Traditional financial analysis employs ratios measuring profitability, liquidity and solvency to assess the likelihood of financial distress for corporate borrowers. Altman (1968) extends ratio analysis using multiple discriminant analysis (MDA), which classifies an observation into one of several a priori groupings dependent on the observation's individual characteristics. Altman uses MDA to predict bankruptcy in the US setting. It is rarely possible to build a similar country-specific model for corporations in emerging markets because of their lack of credit histories. To deal with this problem, Altman et al (1995) modify the original Altman Z-score model to create the emerging market (EM) model used in this analysis. The model uses the ratio of working capital to total assets, ratio of retained earnings to total assets, ratio of operating income to total assets, and ratio of book value equity to total liabilities.

The discriminant function is as follows:

$$\text{EM Z-score} = 6.56\,X1 + 3.26\,X2 + 6.72\,X3 + 1.05\,X4 + 3.25,$$

where X1 = working capital to total assets; X2 = retained earnings to total assets; X3 = operating income to total assets; and X4 = book value equity to total liabilities. Based on the credit ratings of major credit rating agencies for US corporates and the corresponding EM-Z-scores, Altman et al (1995) note that an EM Z-score of 5.65 corresponds to a rating of BBB– for US corporates, 6.4 to A–, 7.0 to AA–, etc. Nonetheless, the authors also remark that upward and downward adjustments based on special features of the bond industry, vulnerabilities due to foreign currency denomination of debt, and other factors would be necessary before assigning bond-rating equivalents.

Bank ratings, Z-scores and eStandards scores



HK = Hong Kong SAR; ID = Indonesia; KR = Korea; MY = Malaysia; PH = the Philippines; TH = Thailand.

Sources: eStandards Forum; Moody's Banking System Outlook; author's calculations using Worldscope data. Graph 4

streamlined, the corporate bond market grew from 21% of GDP in 1997 to 38% of GDP by 2005 (see the paper by Ibrahim and Wong in BIS (2006)) and private debt securities emerged as the largest source of private sector financing.

In summary, leverage measures, Z-score analysis and examination of the changes in liability structures offer clear evidence of sounder corporate financing practices in a significant number of the Asian crisis countries. Of the three countries with the highest leverage measures prior to the crisis, Thailand and Korea offer the clearest signs of improvement in corporate financial conditions. Malaysia, though not particularly highly leveraged prior to the crisis, has shown noticeable improvement in the composite measures of corporate financial health. The listed firms in the Philippines and Indonesia appear to have achieved a more modest improvement in corporate finances, if any.

Improvements in corporate finances are to some extent mirrored in the banking system

The improvements in corporate finances are to some extent mirrored in the banking system. Turner (2006) reports that the Asian crisis stimulated major structural changes in the banking systems in some countries, and there is good evidence of stronger performance. Yet he concludes that there are still several signs of inefficiency and poor risk management practices. Mohanty (2006) concludes as well that, over the past decade, Asian banks have made considerable progress in addressing their past vulnerabilities. A more diversified loan portfolio, reduced currency mismatches and improved financial health have all played a role in the recent revival of bank credit in Asia. The left-hand panel of Graph 4 depicts a concurrent improvement over 2000 in the median of Moody's bank financial strength ratings and the median Z-scores for Indonesia, Korea, Malaysia and Thailand.

Increased leverage reflecting both cyclical and structural trends

What explains the improvements in corporate finances?

While the reasons for high leverage before the crisis were multidimensional and reflected both cyclical and structural trends, we focus on the high levels of

international capital flows and the opaque framework of ties between the corporate, banking and government sectors.

International capital flows were particularly important. Capital accounts were liberalised in Korea, with the opening of the short-term capital account, and Thailand set up the Bangkok International Banking Facility scheme. The commitment of many governments to fixed or virtually-fixed exchange rates in the region encouraged foreign currency borrowing. New bank lending was especially strong. Net flows of private debt to developing countries rose sharply in the 1990s, reflecting an increase in gross financing through syndicated bank lending, which set records in 1996.

The implicit role of the government in support of industry probably contributed to the high levels of leverage in a number of countries. Wade (1990) argues that the predominant approach to economic policymaking in the 1950s and 1960s in East Asia stressed the links among corporations, banks and governments and assigned a substantial role to the state in "repairing" perceived market failures. Further, East Asian economies distrusted market-based intermediation and preferred to control the intermediation of savings from the public through banks. Although Korea transferred bank ownership to the private sector in 1981, the practice of government intervention, such as the appointment of bank CEOs by the Ministry of Finance and Economy, selective credit policies for heavy and chemical industries and indirect controls over the allocation of bank credit, continued throughout the 1980s and early 1990s (Hahm (2005)).

The lack of financial discipline was also attributable to the intricate webs of cross and pyramidal ownership structures of many Asian corporations. One of the biggest challenges in assessing the soundness of the corporate sector was the lack of accurate consolidated financial statements. For instance, Korean corporates did not consolidate their financial statements, and the reporting of standalone entities did not capture the extent of cross shareholdings and cross guarantees. The lack of transparency and disclosure on the composition of corporate liabilities and financial assets can curtail the ability of market participants to monitor risks (FSF (2000)).

Structural reforms

A decline in leverage is driven by demand and supply factors …

The lower levels of leverage that prevailed in many countries after the crisis were driven by fundamental demand and supply factors, but also by sounder corporate and banking financial practices. As for fundamentals, there has been a marked fall in the investment rate. The correlation between the ratio of investment to GDP and lagged GDP growth – a simple "accelerator" relationship – fell sharply following the crisis (Kramer (2006)). The decline was especially large in Indonesia, Malaysia and Thailand, and the average investment rate, at around 25% of GDP during 2000–04, remains significantly below the pre-crisis average of 34% of GDP (World Bank (2006)).

… as well as by sounder corporate and banking financial practices

Equally, changes in corporate financial practices contributed to the decline in leverage. Following the crisis in the late 1990s, corporates adopted sounder practices, divesting non-core business, reducing capital investment and using internally generated cash to reduce debt. Meanwhile, chastised domestic and

foreign banks showed less tolerance for risky lending, and reduced corporate exposures, while focusing on consumer lending.

Decisive reforms undertaken by East Asian governments supported the improvement in corporate financial practices. East Asian financial infrastructure suffered from systemic weaknesses: poor corporate governance, weak auditing and accounting standards, and inadequate bankruptcy laws. Therefore the response to the crisis was multifaceted, covering a range of remedies.

One particular focal point for improvement was the bankruptcy resolution process, which required an effective insolvency regime and out-of-court arrangements, and all the countries took measures to that end. Korea and Malaysia – countries with a strong culture of creditor rights and legal systems for insolvency – reached the most effective out-of-court resolutions using bankruptcy as a deterrent.

In Korea, a critical component of the entire corporate restructuring process has been the introduction of international accounting standards. Korean corporates were mandated to adopt international accounting standards by 2000, leading to improved disclosure and reporting requirements for public companies. Korea also adopted regulatory and tax incentives to put pressure on borrowers and banks alike and support the restructuring. The former chairman of a corporate restructuring committee during the crisis in Korea has opined that forcing supervised firms (and particularly banks) to be audited according to international accounting standards was the single most important policy initiative (World Bank (2005)).

Asia is making progress in adhering to international standards and codes

The above case is an example of a more general point: financial systems function better when they are supported by a strong financial infrastructure. There is broad agreement that adopting the standards of international best practice offers countries the best opportunity for stability. The standards and codes initiative was launched by the FSF in 1999 to promote greater financial stability, at both the domestic and international levels, through the development, dissemination, adoption and implementation of international standards and codes. Its objective was to assist countries in strengthening their economic institutions and informing market participants. Twelve Key Standards for Sound Financial Systems were designated as warranting priority implementation. These standards relate to policy transparency, financial sector regulation and supervision, and market integrity.

How much progress has East Asia made in adhering to international norms? Though many measures of progress in implementing standards developed in the policy community are not meant for public dissemination,[4] there are some relevant measures in the public domain. Since 2000, the eStandards Forum has been monitoring the progress of 83 countries in adopting and implementing the 12 international standards and codes identified by the FSF as warranting expeditious implementation. eStandards'

[4] Reports on the Observance of Standards and Codes (ROSCs) covering financial sector standards are usually prepared in the context of the IMF and World Bank Financial Sector Assessment Program. The assessments are highly qualitative and published only occasionally at the request of the member country. Therefore, the ROSCs do not allow an assessment of the extent of progress. As a result, this special feature relies on only public domain sources.

Compliance scores for East Asian economies, 2003–07		
	1 January 2003 starting score	31 January 2007 ending score
Hong Kong SAR	62	62
Singapore	31	56
Philippines	18	58
Korea	31	48
Malaysia	37	45
Thailand	28	43
Indonesia	28	42
China	11	24
Memo: Five developed countries		
United Kingdom	*68*	*78*
Australia	*74*	*73*
France	*56*	*73*
Netherlands	*40*	*73*
United States	*75*	*70*

Source: eStandards Forum. Table 1

assessments, which rely exclusively on publicly available information, examine the rules and regulations, enforcement and the political and regulatory environment, rank the progress towards full compliance and assign a score between 0 and 100.

To be sure, the ratings and assessments produced by eStandards need to be interpreted with caution. As mentioned, eStandards' assessments rely solely on publicly available information. Asian economies, as a group, have not been actively participating in the IMF/World Bank Financial Sector Assessment Program. Therefore, low ratings might simply reflect far less publicly available information. With this caveat in mind, it is important to focus more on the trends than the absolute scores.

The average scores across East Asian countries shows that they have made considerable progress since 2003, when the first scores become available (Table 1). With the exception of the highest-ranking country, which has maintained its score, all of the eight sampled East Asian countries have improved their scores. Within the individual score components, while considerable improvement is evident in the macro area – fiscal and monetary transparency and discipline – slower progress is noted in the implementation of skills-intensive areas such as accounting and auditing, insolvency and governance.

The widespread nature of the improvement suggests that the linkage with improvements in corporate finances is not clear-cut. The right-hand panel of Graph 4 documents a concurrent improvement since 2003 in the median of corporate Z-scores and eStandards scores for Korea, Malaysia and Thailand. On the other hand, there have also been marked improvements in the compliance scores for the Philippines and Indonesia, countries for which, as

mentioned above, an improvement in corporate financial conditions relative to the period before the crisis is not as evident.

Conclusions

Further efforts to improve financial practices and infrastructure are essential

There has been a marked transformation in financial practices in East Asia, leading to more robust corporate sector. While all the countries in the region appear to be in the process of restructuring in one dimension or another, Korea, Malaysia and Thailand have made the most progress, judging by their corporate financial indicators. Further efforts to improve corporate financial practices, banking systems and financial infrastructure are essential to ensure that future increases in leverage take place on a sounder footing.

In particular, there is a need for increased transparency and disclosure of risks to the market, because early detection of vulnerabilities can lead to earlier intervention and thus crisis prevention. Officials responsible for economic policy need to develop means of obtaining adequate information on the financial soundness of the corporate sector, as well as ensuring that good quality information is made available for market participants to monitor the risks. Policymakers might consider methods of boosting the analysis and reporting of those corporate risks, such as excessive external borrowing or currency mismatches, whose disclosure would be in the public interest.

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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) reported on three new workstreams and took a number of new initiatives. The Committee on the Global Financial System (CGFS) published a report on financial stability and local currency bond markets, the Committee on Payment and Settlement Systems (CPSS) issued a consultative report on reducing foreign exchange settlement risk, and the Financial Stability Forum (FSF) updated its report on highly leveraged institutions. Table 1 provides an overview of these and other developments.

Basel Committee on Banking Supervision

In its *newsletter* released on 7 May 2007, the BCBS reviewed progress and recent initiatives to achieve its strategic objectives:[1] implementation of Basel II, new workstreams, accounting and auditing work, and outreach.

BCBS reports progress on implementation of Basel II …

The BCBS noted that implementation of the Basel II framework continues to move forward around the globe. A significant number of countries and banks had already implemented the standardised and foundation approaches as of the beginning of this year. In many other jurisdictions, the necessary infrastructure (legislation, regulation, supervisory guidance, etc) to implement the framework is either in place or in process, which will allow a growing number of countries to proceed with implementation of Basel II's advanced approaches in 2008 and 2009. This progress is taking place in both Basel Committee member and non-member countries. The Committee's Accord Implementation Group (AIG) and its working groups on validation, operational risk and trading book issues continue to actively share supervisory experiences in Basel II implementation, thereby promoting consistency across jurisdictions.

[1] Last October, the Committee restructured its subcommittees (see under http://www.bis.org/bcbs/organigram.pdf) to better reflect its strategic objectives going forward. These objectives seek to: (i) promote a strong capital foundation at banks; (ii) strengthen supervision and risk management practices in the face of rapid financial innovation; (iii) promote understanding of the links between risk management, disclosure and accounting practices; and (iv) strengthen outreach to non-member countries, industry participants and other constituents.

Main initiatives by Basel-based committees and groups

Press releases and publications over the period under review

Body	Initiative	Thematic focus	Release date
BCBS	*Progress on Basel II implementation, new workstreams and outreach*	• Progress on Pillar 1, focus on other two pillars • New workstreams in the areas of liquidity risk, the definition of capital and economic capital • Outreach to non-member countries and the industry	May 2007
CGFS	*Financial stability and local currency bond markets*	• Benefits achieved by EMEs by developing local currency bond markets • Policy issues and challenges • Data issues	July 2007
CPSS	Red Books on payment systems in *Serbia* and *Turkey*	• Reference works on payment systems in these two countries	June 2007
	Progress in reducing foreign exchange settlement risk	• Assessment of progress made • Recommendations to reduce and control remaining large and long-lasting exposures and to consolidate progress	July 2007
FSF	*Update of FSF's 2000 report on highly leveraged institutions*	• Reassessment of the financial stability issues and systemic risks posed by hedge funds • Recommendations for financial authorities and market participants	May 2007

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

Supervisors have also made strong progress on coordinating home-host implementation issues at the level of individual banks, particularly for Pillar 1 (minimum capital requirements). The AIG is now focusing its attention on Pillar 2 (supervisory review process) and will also begin work on Pillar 3 (market discipline). Many of the home-host issues under review by the AIG are not new but have come to the fore as a result of the rapid globalisation of the banking sector. Basel II has served as a catalyst to encourage greater cooperation and communication between jurisdictions and the industry. The input, both formal and informal, from industry groups, individual firms and other constituents is particularly helpful in guiding this process.

… new workstreams in the areas of funding liquidity risk …

The BCBS reported on three new workstreams in the areas of liquidity risk, the definition of capital, and economic capital. First, the Committee recently initiated a review of jurisdictions' approaches to supervising and regulating funding liquidity risk. Its Working Group on Liquidity is currently conducting a survey of regulatory and supervisory practices. The survey will also assess how liquidity risk is managed under the assumption of stressed market conditions. Based on the results of the project, the BCBS will determine what further action, if any, is needed.

… the definition of regulatory capital …

Second, the BCBS has launched an initiative to review the definition of regulatory capital across jurisdictions, given the remarkable advances in banks' economic capital management frameworks as well as the development of the markets for various capital instruments, notably hybrid products. The Definition of Capital Subgroup is starting with a stocktaking exercise on the current definition of capital in member jurisdictions as well as fact-finding on how market participants, including rating agencies, perceive and value the equity-like characteristics of various capital instruments. This fact-finding work will focus on the fundamental aspects of capital, such as its capacity to absorb losses. The Subgroup will also look at the role of accounting in the calculation of regulatory capital and the relationships between regulatory definitions and firms' own definitions of capital in their internal economic capital models. Third, at its March meeting, the Basel Committee gave its Risk Management and Modelling Group the mandate to assess the range of practice in banks' approaches to economic capital measurement and management. This effort supports supervisors' objective to stay on top of evolving risk management techniques, and reinforces the AIG's work on Pillar 2. Areas of potential emphasis include: new measurement approaches for credit risk, the treatment of diversification effects, the assessment of complex counterparty credit risks, the treatment of interest rate risk, and firms' approaches to validation of internal capital assessments.

… and economic capital

Expanded cooperation with the broader supervisory community and the industry

The BCBS continues to expand its cooperation with the broader supervisory community and the industry as it has benefited significantly from their input on its various initiatives. It recently established the International Liaison Group (ILG) to provide a forum for deepening its engagement with supervisors around the world on a broad range of issues.[2] In addition, the Committee is in the process of identifying practical ways to increase the participation of non-member countries in the work of its other subcommittees. It will engage the industry on financial market, risk management, supervisory and regulatory developments that are forward-looking and of common interest to supervisors and the industry. Input from a range of constituents on these issues is an important contribution to shaping the Committee's future agenda.

Committee on the Global Financial System

On 9 July 2007, the CGFS released a report on *Financial stability and local currency bond markets*. It was prepared by a working group which drew on a series of regional workshops and a statistical survey.

CGFS notes reduction in exposure to currency depreciation

One major finding of the report is that exposure to currency depreciation risk has declined in most emerging market economies (EMEs). Net foreign currency exposures vis-à-vis non-residents (an important part of so-called currency mismatches) have fallen substantially. In addition, the proportion of

[2] New workstreams initiated by the ILG include: a project to assess the range of practice in approaches to risk-based supervision; an information exchange on jurisdictions' approaches to achieving sound provisioning and reserving practices; and an assessment of how the rapidly growing area of microfinance fits into existing supervisory frameworks.

financial contracts and instruments between residents that are denominated in foreign currency (notably domestic bonds and bank deposits or loans) has been reduced. This mainly reflects specific debt management policies designed to reduce risks, although exchange rate appreciation did help in recent years. A stress test conducted for the report shows that several countries previously hit by crises have become much less vulnerable to financial turbulence. There has therefore been a deliberate and substantial reduction in borrowers' exposures to the risk of currency depreciation.

Countries succeed in developing local currency yield curves ...

Many countries have succeeded in developing local currency yield curves across the maturity spectrum. The deepening of local currency bond markets across a range of maturities has encouraged increased participation by institutional investors such as insurance companies, pension funds and mutual funds (which in turn contributes to deeper markets). Furthermore, local currency bond markets help agents price and hedge maturity risks. They also foster market discipline, contributing to better policies and governance in the public and private sectors.

Notwithstanding these substantial benefits, the shift in the composition of debt from external foreign currency bonds to domestic local currency bonds raises two possible issues that policies may need to address.

... but potential risks stem from maturity mismatches ...

The first issue is that, because the maturity of domestic bonds is on average shorter than the maturity of external bonds, the exposures to interest rate and refinancing risks have increased. Yet the risks from such exposures are probably less serious than those from large currency mismatches.

... and debt servicing costs

A second issue is that higher interest rates on domestic bonds than on external bonds (allowing for exchange rate changes) mean that debt servicing costs are increased. Governments in several countries which had faced major financial crises in the past have been prepared in the initial stages to pay higher interest rates in order to lengthen the maturity of their debt issuance. More effective domestic macroeconomic policies (which have lowered inflation) and a very favourable international environment, however, have contributed to a substantial reduction in medium- and long-term interest rates across the EMEs. This narrowing of the gap between domestic and foreign interest rates has made local currency financing more attractive. Sustaining this virtuous circle requires continued fiscal discipline.

Three policy challenges

The report identifies three policy challenges posed by nascent local currency bond markets, which lack the features that help more mature markets work well even in volatile conditions. The first such challenge is liquidity: bond markets should be liquid enough for exposures to be managed and also to allow the rapid adjustment of portfolios without significant disruption to the market. The second is the fostering of local currency debt issuance by the private sector, and not just by government. The third relates to the risks that could arise if exposures are unduly concentrated.[3]

[3] The report identifies two main aspects of risk concentration. One concerns the concentration of credit and market risks in banking systems, which local currency bond markets make easier to hedge in EMEs. The other pertains to the holding of EME local currency bonds by non-residents, which can stabilise domestic markets but can also accentuate exchange rate and financial market responses to shocks, especially when financial markets in the early stages of

Finally, the report highlights some data issues,[4] together with the need for further analysis on risk exposures, in particular through derivatives markets.

Committee on Payment and Settlement Systems

In July, the CPSS issued a consultative report on reducing foreign exchange settlement risk. In June, it also published two reference documents on payment systems, one on Serbia and one on Turkey.

CPSS notes progress in reducing foreign exchange settlement risk …

The consultative report on *Progress in reducing foreign exchange settlement risk* analyses developments in this area, since the endorsement in 1996 of a comprehensive strategy by G10 central banks to reduce the systemic risks that arose from the arrangements then used to settle foreign exchange trades.[5] The consultative report concludes that the central bank strategy has achieved significant success, evidenced most visibly by the establishment and growth of CLS Bank, which currently settles on average more than $3 trillion each day in FX-related payment obligations. However, at the same time, a notable share of FX transactions is settled in ways that still generate significant potential risk across the global financial system, so further action is needed. The report therefore recommends specific actions by individual institutions, industry groups and central banks to reduce and control remaining large and long-lasting exposures and to guard against a risk of reversing the important progress already made. The recommendations pertain to the use of payment-versus-payment settlement services, bilateral netting and correspondent banking. The report is open for comments until 12 October 2007.

… but highlights remaining risks and makes recommendations

The CPSS periodically publishes reference works on payment systems in various countries, widely known as “Red Books”. These are published annually for CPSS member countries and occasionally for non-members. In June, the CPSS published its first Red Book for *Serbia* and its second Red Book for *Turkey*.

Financial Stability Forum

On 19 May 2007, the FSF issued an *update* of the Report of the Working Group on Highly Leveraged Institutions, published in 2000. The update was produced in response to a request by G7 Finance Ministers and central bank Governors.

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development are thin. Market intelligence suggests that holdings of EME local currency bonds by foreign investors are larger than what available data suggest, especially because of exposures through derivatives.

[4] The CGFS has established a sub-working group to assess and recommend changes in data collection.

[5] The strategy endorsed was motivated by the finding that banks’ foreign exchange settlement exposures to their counterparties were in many cases extremely large relative to their capital, lasted overnight or longer and were poorly understood and controlled. To support the assessment of progress made, in the second quarter of 2006 the CPSS, together with 27 central banks, organised a survey on the size, duration, concentration and control of FX settlement exposures at 109 institutions worldwide that are active in the FX market.

The report recognises the contribution hedge funds have made to financial innovation and market liquidity, and notes that their activity has expanded rapidly since the FSF's original report. The prime broking and dealing relationships between hedge funds and firms that are core intermediaries, in areas such as OTC derivatives dealing and securities financing, clearing and settlement, have become more central to the robustness of the financial system. While risk management techniques and capacity at hedge funds and core intermediaries have been improving, products and markets have become more complex, resulting in risk management, measurement and operational challenges. Dealer firms' direct current and potential credit exposures to hedge funds are reported to be modest in relation to their capital. However, indirect exposures, such as those via wider market liquidity erosion, are difficult to gauge. Moreover, the diversity of methodologies and measures of risk used by different counterparties, and exposure aggregation challenges, present problems for supervisors. There has been some erosion of counterparty discipline recently (eg declining initial margins), reflecting the strength of the competition for hedge fund business.

FSF reassesses financial stability risks posed by hedge funds

Public policy and private initiatives have encouraged sound practices among hedge fund managers in the areas of risk management and valuation systems, information provision and market conduct controls. These initiatives have also encouraged investors to evaluate the suitability of hedge fund investment in the light of investment objectives, risk tolerance and portfolio diversification. In some areas, market discipline can be buttressed by supervisors and regulators setting norms regarding strengthened counterparty risk management practices, and such work is under way. Rapidly changing products, rising trading volumes and closer market integration underscore the importance of continuing attention to infrastructure improvements, especially in the areas of documentation and settlement procedures for new products, capacity improvements to cope with volume expansions in stress conditions, and connectivity between post-trade derivatives services and other systems.

Strengthening counterparty risk management practices

In the light of the above, the report makes the following recommendations:

Five recommendations for financial authorities and market participants

- Supervisors should encourage core intermediaries to continue to strengthen their counterparty risk management practices.
- Supervisors should work with core intermediaries to further improve their robustness to the potential erosion of market liquidity.
- Supervisors should explore and evaluate the extent to which developing more systematic and consistent data on core intermediaries' consolidated counterparty exposures to hedge funds would be an effective complement to existing supervisory efforts.
- Counterparties and investors should act to strengthen the effectiveness of market discipline, including by obtaining accurate and timely portfolio valuations and risk information.
- The global hedge fund industry should review and enhance existing sound practice benchmarks for hedge fund managers in

the light of expectations for improved practices set out by the official and private sectors.

The report underlines the importance of ongoing cooperation among financial authorities, as well as of continuing dialogue with a range of market participants and actors. The FSF will monitor work on these recommendations and report to the G7 Finance Ministers and central bank Governors on progress made.