BANK FOR INTERNATIONAL SETTLEMENTS

BIS Quarterly Review

September 2005

International banking and financial market developments

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Special features

Recent initiatives by Basel-based committees and the Financial Stability Forum

Notations used in this Review

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

Differences in totals are due to rounding

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1. Overview: improving outlook lifts markets

An improving economic outlook underpinned a rebound in equity and credit markets between mid-May and mid-August. Equity markets rose on strong earnings reports, reaching their highest level in several years in Japan and Europe. Conditions in credit markets stabilised, helping corporate spreads to tighten from their May highs. Meanwhile, emerging market spreads approached the historical lows seen earlier in the year, despite strong issuance by emerging market borrowers in international debt markets.

A series of surprises did little to disrupt the momentum in markets. The terrorist attacks in London in July failed to dampen investor enthusiasm. Political uncertainty in Brazil and the Philippines had only a passing influence on emerging markets. The long anticipated revaluation of the Chinese renminbi was received calmly, with little lasting impact on prices in the major financial markets. Eventually, however, concerns about high oil prices helped to erase some of the gains in equity and credit markets.

Investors' appetite for riskier assets continued to be supported by the low level of nominal yields. Signs of robust growth and upward revisions to the expected path of policy rates did lead to increases in long-term yields between late June and mid-August, in the dollar and yen markets especially. However, yields failed to break out of the range in which they have been trading for the past year.

Equity markets surge on strong earnings

Stock markets recover ...

Equity markets recovered strongly starting in May, bouncing back from the sell-off in March and April (Graph 1.1). From its most recent low on 13 May to 26 August, the S&P 500 gained more than 4%. The DJ EURO STOXX and TOPIX rose by even more, to their highest levels in several years. Equity markets in Latin America and emerging Asia posted a still stronger performance over the period, rising by 19% and 9%, respectively.

... on surprisingly strong earnings ...

The key driver of equity markets was surprisingly strong corporate earnings. Investors had expected earnings growth to slow in 2005 from 2004's exceptionally fast pace. However, earnings have not slowed as much as expected. In Europe and the United States, corporate earnings increased by more than 10% year over year in the second quarter of 2005, down from a year ago but still several percentage points higher than anticipated earlier. In fact,

for the second quarter of 2005, the number of S&P 500 companies which announced higher than expected earnings exceeded those announcing lower than expected earnings by the widest margin since March 2004 (Graph 1.2). Earnings announcements in Europe show a similar pattern. Prominent retailers such as Amazon and Wal-Mart easily beat expectations, as did technology bellwethers such as Microsoft and eBay. Auto manufacturers' earnings tended to surprise on the upside as well, especially in Europe, where Fiat and Volkswagen reported profits well above analysts' forecasts. Better than expected profits from AIG, the large insurer which had revealed accounting irregularities earlier in the year, contributed to a rise of nearly 1% in the S&P 500 during the morning session of 10 August.

An improvement in the economic outlook reinforced the rally in equity markets, particularly in the United States and Japan. In the United States, a series of unexpectedly strong economic indicators, including ISM numbers in July and August and the non-farm payroll report in August, pointed towards a continuation of robust growth (Graph 1.3). In Japan, good macroeconomic news, such as a favourable *Tankan* survey in July and a very strong machinery orders report in August, led economists to raise their growth forecasts.

... and good economic news ...

Further increases in oil prices initially did little to dampen investors' enthusiasm. The price of Brent crude rose steadily from $47 per barrel in mid-May to a record high (in nominal terms) of $67 in mid-August. Rising energy prices were one of the factors often cited in warnings by companies about the outlook for profits. Yet in the first half of 2005 firms appear to have been able to offset rising raw material and energy costs with higher sales prices and further cost cutting, thereby maintaining or even increasing their profit margins. In late August, investors seemed to become more concerned about whether this would continue in the second half of 2005, and equity markets gave up some of their earlier gains.

... and were relatively unfazed by higher oil prices

Equity prices by region and industry

In local currency; 1 September 2004 = 100

Major indices

- MSCI World[1]
- S&P 500
- DJ EURO STOXX

Japan and emerging markets

- TOPIX
- MSCI Asia[1,2]
- Latin America[1]

MSCI World sectors[1]

- Autos
- IT
- Oil and gas

[1] Morgan Stanley Capital International equity index.   [2] Excluding Japan.

Sources: Bloomberg; Datastream.

Graph 1.1

Corporate earnings

Earnings growth[1]   Earnings surprises[2, 3]   Profit warnings[2, 4]

[1] Annual percentage change of weighted average operating earnings per share; for 2004, estimate; for 2005–06, forecast.
[2] Companies included in the S&P 500 Index.   [3] Number of companies which announced higher than expected quarterly earnings minus the number which announced lower than expected earnings; as a percentage of companies announcing quarterly earnings.
[4] Number of companies which announced positive revisions to their earnings outlook minus companies which announced negative revisions; as a percentage of companies announcing positive, neutral or negative revisions.

Sources: Bloomberg; I/B/E/S; BIS calculations.   Graph 1.2

Investors remained sensitive to changes in the anticipated pace of monetary tightening, in particular to signs of overheating in the United States which might precipitate a less "measured" pace of tightening. Upward revisions to the expected path of US policy rates in June and July did not derail the rally in equity markets because the revisions were accompanied by a strengthening of the outlook for growth (see below). By contrast, the greater than expected non-farm payroll number on 5 August heightened concerns that the Federal Reserve might have to accelerate the pace of monetary tightening to avoid a build-up of inflationary pressures, and so led to a marked decline in global equity markets that day. The largest daily increase in the S&P 500 during the rally, of 1.2%, occurred on 8 July when the employment report for June slightly undershot expectations, relieving concerns of overheating in the economy.

Markets prove resilient to the terrorist attacks in London ...

A sign of the underlying strength of the rally was equity markets' resilience to the terrorist attacks in London on 7 July. In contrast to the attacks in the United States in September 2001, those in London did not damage any of the infrastructure supporting the city's substantial financial market activity. As a result, trading continued as normal. The FTSE and DJ EURO STOXX did fall by around 1½% on the day of the attack. However, the fall was quickly reversed and both indices returned to their pre-attack levels within days. This also contrasted sharply with the terrorist attack in Madrid in March 2004, when the indices took more than one month to recover.

... and the revaluation of the Chinese renminbi

Equity markets also proved resilient to the revaluation of the Chinese renminbi on 21 July (see the box on page 7). Initially the shares of Japanese exporters were hard hit by the revaluation, because of expectations that a major appreciation of the Japanese currency might follow. The yen appreciated by 2% against the US dollar on the day of the revaluation and the Tokyo market fell by more than ½% when it opened the next day. However, as the

related yen appreciation proved short-lived, so did the impact on the market, which was back to pre-revaluation levels in less than a week. Other Asian markets tended to rise in the days following the announcement, and China's A-share market jumped by 2.5%. US and European markets were little changed.

In Japan, political uncertainty unsettled the Tokyo market in the first week of August. Prices fell sharply on 5 August amidst increasing expectations that the postal service privatisation bill would be rejected. But following the bill's defeat on 8 August and the announcement of national elections, Japanese shares rose.

In contrast to better than expected earnings, the turnaround in global equity markets does not appear to owe much to any surge in risk appetite (Graph 1.4). To be sure, measures derived from the prices of equity index options and their relationship to realised volatility had pointed to a sharp increase in risk appetite in the United States and Germany in the late spring and early summer. However, these indices subsequently fell back in August as implied volatilities rose. The principal component of risk appetite measures based on the DAX, FTSE and S&P 500 was in August close to the levels that had prevailed after the equity market sell-off in March and April and well below the highs estimated at the end of year 2004.

Risk appetite remains subdued ...

Comparatively subdued risk appetite perhaps explains why, despite the rally in equity markets, price/earnings multiples in the major markets remained in line with their historical averages when based on forward earnings. Based on earnings growth of 11% over the next year, in August the price/earnings ratio for the S&P 500 equalled about 15, compared to its 1990s average of 16. Historically, analysts have tended to overestimate earnings growth, and so current earnings forecasts may yet prove optimistic. However, for the past several quarters earnings have in fact exceeded analysts' forecasts.

... with P/E ratios in line with historical averages

Macroeconomic news

Announcement surprises[1]   Growth forecasts for 2005[5]   Inflation forecasts for 2005[5]

United States
Euro area
Japan

United States[2]
Germany[3]
Japan[4]

Jan 04   Jul 04   Jan 05   Jul 05   Jan 04   Jul 04   Jan 05   Jul 05   Jan 04   Jul 04   Jan 05   Jul 05

[1] Difference between actual data and consensus forecasts normalised by the standard deviation of past surprises; observations are positioned in the month in which the actual data were released.   [2] Weighted average of normalised surprises of the ISM survey, non-farm payrolls, retail sales and producer price and consumer price announcements.   [3] Survey of the business climate in Germany compiled by the Institut für Wirtschaftsforschung (Ifo).   [4] Based on the month-to-month industrial production survey.   [5] Forecasts as published monthly by Consensus Economics; observations are positioned in the month in which the forecast was made; percentage change over the previous year.

Sources: Bloomberg; © Consensus Economics; BIS calculations.   Graph 1.3

Volatility and risk appetite in equity markets

Implied volatilities[1]	Risk appetite indicators[2]	Principal component[3]

Legend (Implied volatilities): S&P 500, DAX 30, FTSE 100, Nikkei 225

[1] Price volatility implied by the price of at-the-money call option contracts on stock market indices; weekly averages. [2] Derived from the differences between two distributions of returns, one implied by option prices, the other based on actual returns estimated from historical data. [3] As the first principal component of the three risk appetite indicators.

Sources: Bloomberg; Chicago Mercantile Exchange; Eurex; London International Financial Futures and Options Exchange; BIS calculations.   Graph 1.4

Credit markets rebound

Credit spreads tighten steadily ...

The rebound in investors' confidence apparent in equity markets was equally evident in credit markets. After widening between mid-March and mid-May, corporate bond and credit default swap spreads tightened steadily over the subsequent three months. The spread between A-rated corporate bonds and US Treasuries, which had risen from 65 basis points on 16 March to 81 basis points on 18 May, fell to 73 basis points by 26 August (Graph 1.5). High-yield corporate spreads rallied even more strongly, tightening to 334 basis points by 26 August, only 63 basis points above their March low and 123 basis points below their May high.

... as spillover from spring dislocation in credit derivatives markets proves limited

The limited degree to which dislocation in credit derivatives markets in early May – triggered by the downgrade of General Motors and Ford – had spilled over to other segments of credit markets helped to bolster investor confidence in late May and June. Fears of financing difficulties at one or more large financial institutions and of the liquidation of hedge fund assets proved unfounded. Some hedge funds, especially those involved in convertible arbitrage trades, did experience large losses in the first half of 2005 and were wound up. However, hedge funds overall continued to enjoy net inflows of new money in the second quarter. Liquidity in the index tranche market was slow to return, and leveraged loans reportedly replaced synthetic instruments as the main source of collateral in new issues of collateralised debt obligations (CDOs). Yet CDO issuance rebounded strongly in June and July from depressed levels in May, suggesting that no lasting damage was done to the functioning of credit derivatives markets.

Nevertheless, the events of May 2005 left unanswered questions about how credit markets might perform if confronted with a widespread deterioration

Credit spreads

In basis points

A-rated[1]	Default swap spreads	High-yield

Graph legends:
- A-rated[1]: US dollar, Euro (axis 30, 45, 60, 75)
- Default swap spreads: General Motors, Ford (axis 0, 300, 600, 900)
- High-yield: EMBI Global[2] (axis 230, 300, 370, 440)

X-axis (all panels): Jan 04, Jul 04, Jan 05, Jul 05

[1] Option-adjusted spreads over government bond yields; Merrill Lynch corporate bond indices. [2] Sovereign stripped spread over government bond yields; JPMorgan Chase emerging market bond indices; adjusted for Argentina.

Sources: JPMorgan Chase; Mark-it; Merrill Lynch.   Graph 1.5

in credit quality. Credit derivatives have undoubtedly enhanced the liquidity of credit markets in general and facilitated the management and monitoring of credit risk exposures. At the same time, the complexity of some products and the associated risk management systems, the growing presence of leveraged players in credit markets and the possibility that investment strategies may be less diverse than anticipated make it difficult to predict how credit markets will function under more stressful conditions.

That being said, the near-term likelihood of a widespread deterioration in credit quality remains low. Strong economic and earnings growth in recent months has helped to restore credit investors' confidence in the outlook for credit quality after the sell-off. Admittedly, short-term borrowing has picked up in recent quarters, among US firms in particular, and the ratio of rating upgrades to downgrades appeared to peak in the early part of 2005. Furthermore, Standard & Poor's expects speculative grade default rates to rise gradually over the next year. However, default rates are forecast to remain well below their long-term average. Indeed, corporate balance sheets in the United States, Europe and Japan remain stronger than they have been for many years.

Strong fundamentals restore confidence

Just as auto manufacturers had led the sell-off in credit markets earlier in the year, they similarly led the most recent rally (Graph 1.5). Notwithstanding the relegation of General Motors and Ford by most of the major rating agencies to below investment grade, the companies' debt still comprises a significant share of many investors' portfolios. Furthermore, it is referenced in numerous structured products. Investors took heart from steps by General Motors to obtain a higher, possibly investment grade rating for its finance subsidiary, General Motors Acceptance Corporation (GMAC).

Auto sector leads rally

Managing the renminbi regime shift

Guonan Ma, Corrinne Ho, Robert McCauley and Eli Remolona

On Thursday 21 July 2005, the People's Bank of China (PBC) announced a change in the renminbi exchange rate regime, from a de facto peg against the US dollar to a managed float with reference to a basket of currencies. This move was accompanied by a 2% step appreciation against the dollar and the institution of a ±0.3% daily fluctuation band in the bilateral dollar exchange rate. In the days that followed, the PBC clarified its intentions regarding further moves in the exchange rate and named the currencies included in the basket. This box reviews post-announcement developments in financial markets, and discusses some of the possible reasons for the relatively limited fallout to date from the shift in regime.

Currency markets took this long-awaited policy event in their stride. Currencies in Asia first reacted in knee-jerk but orderly fashion, with five Asian currencies initially matching the step move of the renminbi spot rate: the Korean won, Japanese yen, Thai baht, Singapore dollar and New Taiwan dollar. The responses of other Asian currencies were relatively mild, while the reaction of the euro and Australian dollar was muted. The one-year Hong Kong dollar forward moved just 0.2%, while the Malaysian ringgit spot exchange rate gained less than 1% against the dollar.

Beyond the first day after the 21 July announcement, developments seemed to be dominated as before by movements in the major currencies, especially the yen against the dollar. In effective terms, three of the "major currencies" in the PBC basket, the yen, euro and won, appreciated in the following weeks while the dollar depreciated. The nominal effective exchange rate of the renminbi appreciated mildly relative to its pre-announcement level but by late August had depreciated by around 0.5% since the 2% step appreciation (Graph A).

Major bond markets worldwide were largely undisturbed by the policy shift, although there were temporary moves. During the first London and New York trading hours after the announcement, the benchmark 10-year US Treasury yield rose by 10 basis points. While this is a large response for news from currency markets, it was equivalent to the usual reaction to an average positive surprise in a US non-farm payroll announcement, in which the headline number is 80,000 above expectations. This initial reaction seemed to reflect expectations of reduced Chinese demand for US Treasury securities as a result of the new renminbi regime. As US bond yields continued their uptrend, however, the yields seemed to reflect strong data and prospective Fed tightening more than expectations of changes in Chinese demand.

One likely reason for the relatively subdued reaction in financial markets was that the announcement came 12 weeks after a brief episode that market participants considered to have been a "dry run". On 29 April, the renminbi rose beyond its narrow de facto trading band, staying outside the band for 20 minutes. Many market participants thought this was already the regime change and reacted accordingly. At that time, the Australian dollar, won and yen moved the most, appreciating by about 90% of the appreciation of the renminbi's one-year non-deliverable forward (NDF). The US Treasury market sold off briefly after the 29 April event as well.

Effective exchange rates and government bond yields[1]

Nominal effective exchange rates[2]
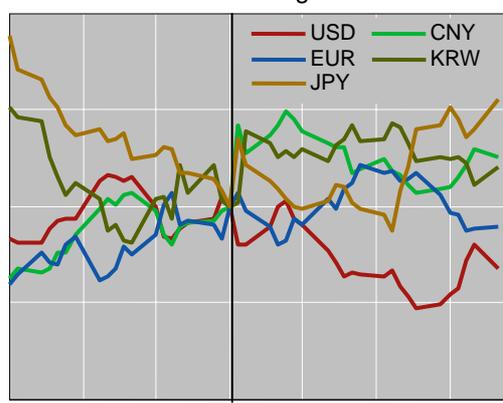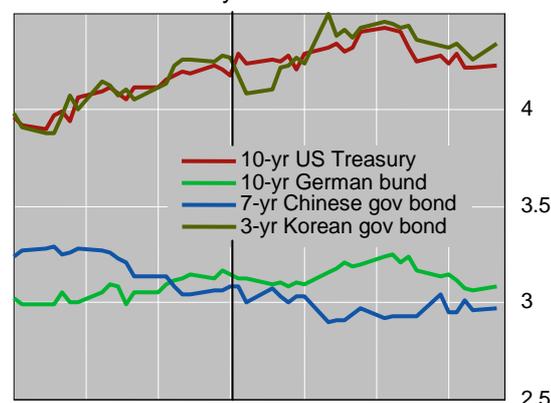
Government bond yields[3]

[1] The vertical lines indicate last closing prices before the announcement. [2] 20 July 2005 = 100. [3] In per cent.

Sources: Bloomberg; national data; BIS.   Graph A

The modest impact of the renminbi revaluation may well also reflect advance preparations by both the Chinese and other authorities. In retrospect, the Hong Kong Monetary Authority's timely operational refinements to the currency board last May focused expectations, albeit at the cost of some loss of local currency market activity to competing dollar markets. The response to the Chinese move within hours by Bank Negara Malaysia, in the form of its own announcement of a regime change, left market players no time to speculate on when the other shoe would drop. Even so, Malaysia's foreign reserves jumped nearly $3.5 billion in July as dollar purchases, most of them on 22 July, absorbed inflows into the local debt securities markets. China's reserve growth for July was boosted by the drawdown of residents' foreign currency deposits at banks in China by almost $5 billion, a reaction to fears of further appreciation, notwithstanding a 50 basis point hike in interest rates on dollar deposit accounts on 21 July. On 23 August, the PBC raised the same deposit rate by another 37.5 basis points.

The PBC has to date managed market expectations to avoid the kind of dollar selling that many might have predicted under the circumstances. Following the announcement, the response of the renminbi NDF to the spot rate's opening 2% stronger suggested that the surprise was mostly in the timing of the announcement. As shown in Graph B below, while the one-month NDF moved by about 2%, the 12-month NDF strengthened by only about 500 pips (or 0.7%) overnight, suggesting little impact on the expected level of the renminbi spot rate over the one-year horizon. In fact, while the one-year outright seemed to suggest a 7% appreciation relative to the prevailing dollar spot on the eve of the move, it pointed to only a 3% appreciation by late August. Given the slow pace of spot appreciation during this period, trading in shorter-term NDF contracts has also reflected a gradual easing of expectations of further appreciation in the near term.

Even though renminbi option markets are not the most liquid, they too convey an impression of well contained expectations. Implied volatilities of the renminbi NDF had spiked on several previous occasions of heightened sensitivity to the possibility of a regime change. A sharp rise in late November 2004 followed a Chinese policymaker's remarks highlighting US data showing small purchases of US Treasury securities by Chinese residents. Another spike followed the events of 29 April, discussed above. In the lead-up to 21 July, options changed hands at higher prices, suggesting a sense of greater volatility ahead of the move. However, the announcement itself led to a decline in ex ante volatility as reflected in at-the-money options on the renminbi NDF. Implied volatility fell from around 7% on the eve of the announcement to below 4% in mid-August. The announcement evidently resolved some of the uncertainty associated with the nature of the new regime and perhaps also pointed to less volatility than anticipated under the new regime. Lower implied volatility is also consistent with the steady one-year renminbi NDF in the wake of the move, indicating relatively stable long-term expectations.

The Chinese authorities so far seem to have managed the transition to a more flexible regime in a fashion that has had relatively limited effects on financial markets and near-term expectations.

Exchange rate, non-deliverable forwards and implied volatilities of the renminbi[1]

Spot rate and NDFs

Implied volatilities[3]
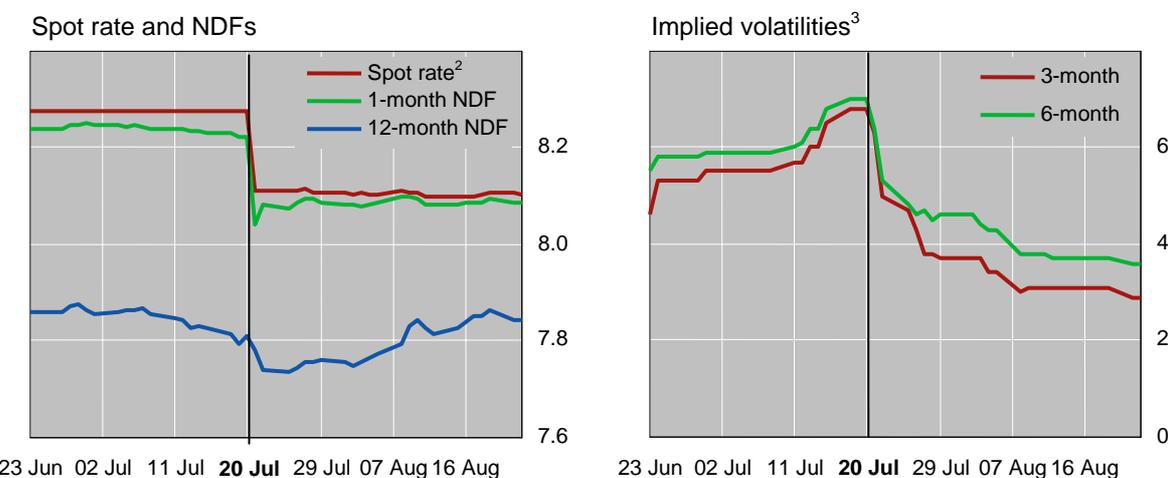
[1] The vertical lines indicate last closing prices before the announcement.   [2] Renminbi per US dollar.   [3] Annualised, in per cent.

Sources: Bloomberg; HSBC; national data.   Graph B

Mergers and acquisitions

In billions of US dollars
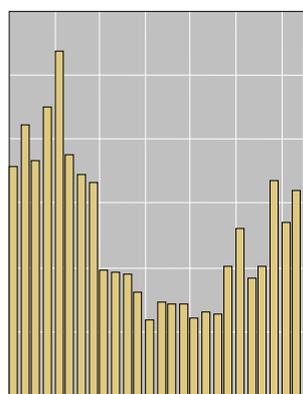
Announcements[1]	Financing[2]	Buyout funds[5]
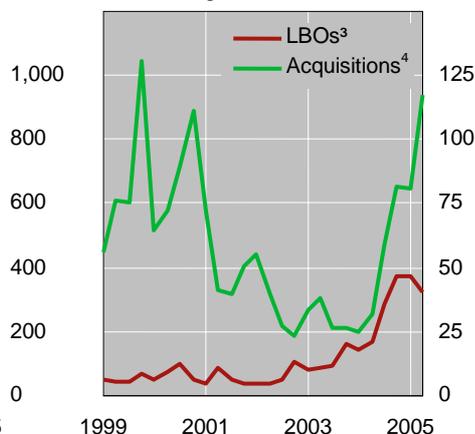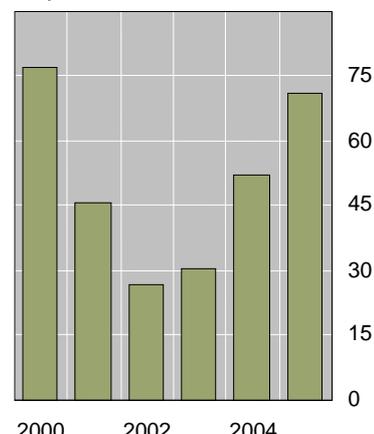
[1] Global announced M&A transactions.   [2] Signings of syndicated loans.   [3] Facilities for leveraged and management buyouts.
[4] Acquisition lines and facilities.   [5] Funds raised by private equity funds focused on LBOs, mezzanine or turnaround financing, or recapitalisations; for 2005, first half-year annualised.

Sources: Bloomberg; Dealogic Loanware; National Venture Capital Association; Thomson Venture Economics; BIS calculations.

Graph 1.6

Concerns over LBOs dissipate ...

Not even the continued strength of leveraged buyouts (LBOs) seemed to faze investors. In the first half of 2005 leveraged buyouts reached their highest level since the 1980s (Graph 1.6). Moreover, deals became larger in size. While LBOs had contributed to the sell-off in credit markets in the second quarter, concerns about them seemed to lessen in June and July. In May, investors announced a plan to buy a majority stake in Italian mobile phone company Wind for €12 billion. In July, private equity investors had little difficulty arranging financing in high-yield bond and leveraged loan markets for the leveraged buyout of SunGard Data Systems. At $11 billion, this was the largest LBO completed since the buyout of RJR Nabisco in 1989.

... as private equity investors exploit opportunities

It attests to the strength of corporate balance sheets that private equity investors now see opportunities to releverage companies. However, perhaps a more important driver of this activity is investors' search for higher returns and the consequent ready availability of financing. In addition to stepping up their investments in hedge funds in recent years, pension funds and other investors have allocated substantial amounts to private equity funds, especially funds specialising in LBOs. In the first half of 2005, buyout funds raised nearly $36 billion globally, 74% more than in the same period the previous year. At the same time, investors showed a willingness to buy the debt issued to support LBOs, which is often of very low credit quality. For example, over the past year several European companies have issued payment-in-kind bonds, ie securities which will be redeemed with other bonds because the company is not expected to have sufficient cash flow to service the debt. Such bonds allow private equity investors to recover their initial equity investment quickly.

M&A activity picks up globally

Mergers and acquisitions (M&As) by companies have increased even more rapidly than LBOs by private equity funds in recent months. After several years of lacklustre activity, announcements of M&As (including LBOs) in the

second quarter reached their second highest level since the fourth quarter of 2000 (Graph 1.6). The pick-up in activity was not limited to the United States but was in fact global, including Europe and Japan. Emerging market companies as well joined the search for acquisitions. For example, Chinese firms competed (in the end unsuccessfully) to buy several well known US companies. With earnings growth slowing (albeit from a very high rate), companies are coming under pressure from equity investors to use their cash flow to maintain the rapid earnings growth rates of recent years. Acquisitions appear to be an increasingly attractive strategy for doing so. To the extent that M&As produce the promised synergies and boost earnings growth, they are not detrimental to creditors' interests. However, the previous wave of M&As, in 1999-2000, tended to erase rather than add value. If the latest pick-up in M&As leads to a releveraging of corporate balance sheets, it could yet contribute to a deterioration in credit conditions.

Emerging markets find favour with investors

Emerging market spreads were not as adversely affected as corporate spreads by the turmoil in credit markets in May. As a result, they peaked earlier than corporate spreads – in mid-April – and returned more quickly to their previous lows – by early August. On 26 August the EMBI Global (excluding Argentina) closed at 272 basis points, approximately 55 basis points below its April high and not far above its March (and historical) low.

Emerging market spreads return quickly to historical lows ...

Political uncertainty weighed on the spreads of some countries. Spreads on the Philippine government's dollar-denominated bonds widened from approximately 440 basis points in mid-June to nearly 470 basis points in early July even as most other sovereigns' spreads tightened. Investor confidence in the Philippines was undermined by calls for the president's resignation as well as setbacks to the government's fiscal reform efforts. Concerns about the impact of continued political uncertainty on the government's (already weak) fiscal position led Standard & Poor's and Fitch to revise their rating outlooks for the Philippines to negative in mid-June.

... despite some political uncertainties

In Brazil, accusations of corruption led to the resignation of several senior officials in the governing party. Political uncertainty at times caused spreads on Brazilian debt to decouple from emerging market spreads, for example in late July and again in late August. However, in general investors did not seem too concerned about the government's difficulties. In fact, in late July investors were so receptive to Brazilian debt that the government was able to retire most of its outstanding Brady bonds. Brazil exchanged $4.4 billion in C-bonds – once the most actively traded emerging market bond – for eurobonds. This operation epitomised the improvement in fundamentals in Brazil since the debt restructurings of the 1980s and early 1990s. The issuance of Brady bonds had helped to define emerging market debt as a separate asset class in the early 1990s. The market has since matured: outstanding Brady debt declined from a peak of approximately $150 billion at the end of 1996 to less than $50 billion in mid-2005 and now accounts for less than 5% of all international bonds issued by emerging market borrowers.

Brazil retires Brady bonds ...

Emerging markets

Spreads[1] — EMBI Global[2], Philippines, Brazil, Russia

Cumulative issuance[3] — 2005, 2004, 1997

[1] Sovereign stripped spreads over government bond yields, in basis points; JPMorgan Chase emerging market bond indices. [2] Adjusted for Argentina. [3] Announced issuance of international bonds and notes plus signings of syndicated loans, in billions of US dollars.

Sources: Datastream; Dealogic Bondware; Dealogic Loanware; BIS calculations.   Graph 1.7

... while Russia repays Soviet-era debt

Another country which sought to affirm the turnaround in its credit standing through a debt exchange was Russia. In May, Russia agreed to an early repayment of $15 billion of Soviet-era debt owed to the Paris Club of official bilateral creditors. The retirement of this debt was facilitated by high oil prices, which have contributed to a sharp improvement in Russia's fiscal situation since the government defaulted in 1998.

Growing interest in local currency debt

Other countries took advantage of the favourable financing conditions to pre-fund their borrowing requirements. Emerging market borrowers raised a record amount in international bond and loan markets in the first seven months of 2005, 22% more than during the same period a year earlier (Graph 1.7). Foreign investors also showed a growing interest in local currency debt (see "The international debt securities market" on page 33). They were attracted by the high interest rates on offer in some local markets and, in some cases, by expectations of an appreciation of the local currency against the US dollar. Mexico, once one of the largest borrowers in international markets, now meets most of its borrowing requirements through local currency debt issues.

Policy rate expectations move up

Long-term interest rates remain range-bound at low levels ...

Investors' appetite for equities and credit instruments continued to be supported by the low level of nominal yields. Long-term interest rates in the major markets did increase between June and August (Graph 1.8). However, they failed to break out of the range in which they have been trading for the past year (Graph 1.9). In fact, in early June and again late in the month, 10-year US Treasury yields fell as low as 3.9%, their lowest level in over a year. Treasury yields subsequently rose, peaking at 4.4% on 8 August, before retreating again. Long-term yields in the euro and yen markets also remained well below levels of a year ago, notwithstanding an increase in yields between June and August.

Swap yield curves

In per cent

United States

Euro area

Japan

- 26 August 2005
- 3 June 2005
- 22 March 2005

Note: For three-month US dollar and yen maturities, Libor; for three-month euro maturities, euro deposit rates; for all other maturities, annual swap yields at the close of trading in London.

Sources: Bloomberg; ICAP; BIS calculations.   Graph 1.8
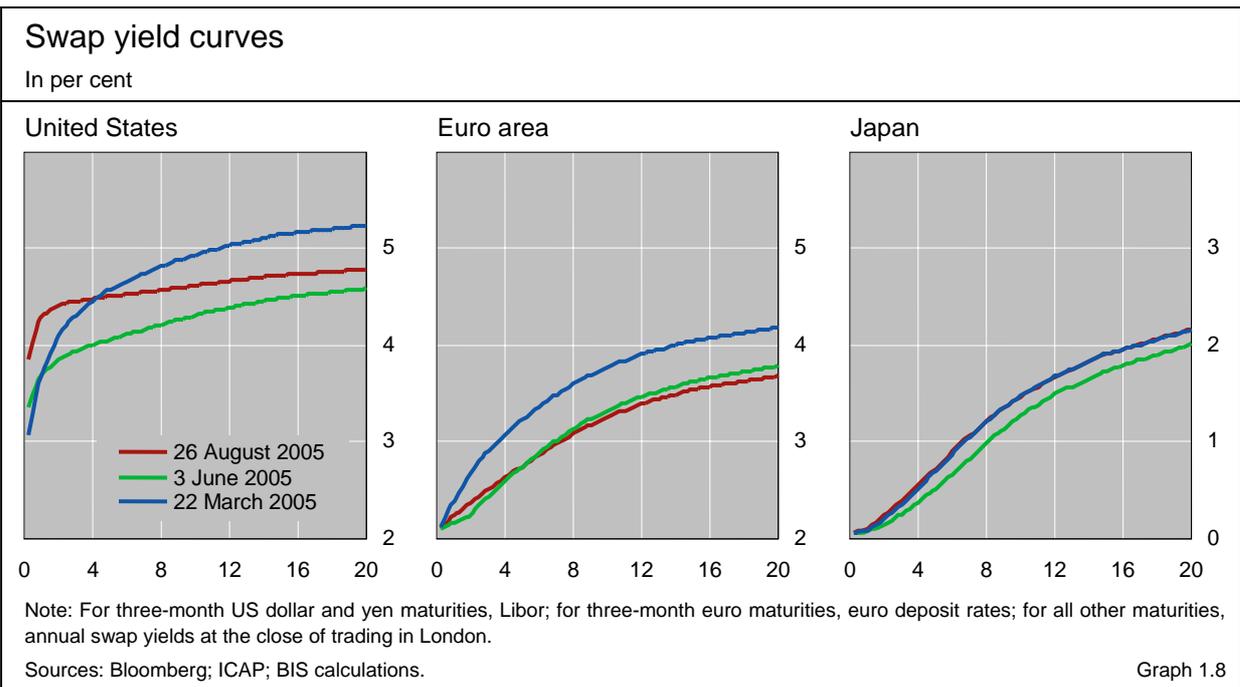
Upward revisions to the expected path of policy rates contributed to the increase in long-term rates in most of the major markets (Graph 1.10). In particular, the Fed funds futures contracts expiring in early 2006 were nearly 50 basis points higher in late August than they were in early June, when markets anticipated a significant pause in the rate hike cycle before the end of the year. Even in the euro area, the changing tone of some statements by ECB board members led to a change in the expected direction of the next policy move, from a rate cut by the beginning of next year to a rate hike. In Japan, bond investors took note of comments on 27 July by Bank of Japan Governor Fukui that there was a high probability that the year-on-year change in core CPI

... in the face of upward revisions to expected policy rates ...

Bond yields

In per cent

Ten-year yields[1]

- United States
- Germany
- Japan

Ten-year minus three-month[1]

Inflation compensation[2]

- United States
- France

[1] Nominal government yields.   [2] Nominal minus real 10-year bond yields.

Sources: Bloomberg; national data.   Graph 1.9

Futures curves

Fed fund futures curve

- 26 Aug 2005
- 01 Jul 2005
- 03 Jun 2005

EONIA forward rates curve

Sources: Bloomberg; BIS calculations.   Graph 1.10

might turn positive around the end of the year. His comments accompanied the central bank's upward revision to its economic assessment. While few analysts anticipated an end to the zero interest rate policy in early 2006, the yields on euroyen futures contracts expiring in March 2006 moved up by 5 basis points between June and mid-August.

... and robust US macro data

Robust US macroeconomic data releases typically had a big impact on bond markets during the period. For instance, the well above consensus ISM number, in combination with signs of improving consumer confidence, contributed to an outsize 14 basis point rise in 10-year yields on 1 July; the positive surprise for July payrolls announced on 5 August led to a 7 point rise. Worries about inflationary pressures appeared to play a more marginal role. To be sure, forecasts for near-term inflation increased as oil prices rose (see Graph 1.3, right-hand panel), but monthly announcements on core inflation remained subdued, as did consensus forecasts of inflation at longer horizons. Moreover, the stability in the difference between nominal and indexed yields suggests that the increase in yields in the United States in July and August reflected almost entirely higher real rates (Graph 1.9, right-hand panel).

Economic releases fail to rouse yields in Japan or the euro area

In Japan, yields were much less volatile. Even though economic releases tended to surprise on the upside, individual announcements did not have a significant impact on long-term yen yields. For example, the reaction of bond investors to the announcement of a much better than expected machinery orders report on 9 August was muted by the conservative outlook for orders.

In the euro area, economic data provided little support for higher yields. Economic forecasts for growth continued to be revised downwards and the data flow was mixed. Even strong indicators, such as the positive Ifo surprise on 26 July, did little to rouse bund yields. In fact, one of the largest single increases in bund yields over the period was on 5 August, in reaction to the above consensus US payroll report.

Despite the different cyclical positions of the US, euro area and Japanese economies, the slope of the yield curve was remarkably similar in the three markets. In late August, 10-year government bond yields were between 65 and

140 basis points higher than three-month rates in the dollar, euro and yen markets (Graph 1.9). Moreover, the term structure of euro, yen and especially dollar interest rates has flattened noticeably over the past year. The slope of the euro and yen yield curves steepened slightly in July and August but was still much flatter than it had been in the first half of 2005. A flattening of the yield curve has historically foreshadowed a weakening of economic activity and lower inflation. However, the similarity of the slope of the yield curve in the major markets raises questions about whether the information content of the term structure has changed in recent years.

Even more than in the case of equity markets, the London terrorist attack on 7 July appeared to have only ephemeral effects on bond markets. Although there was outsize intraday volatility in the United States and euro area, with declines in yields initially observed on a flight to safety, the final observed daily declines in yields were rather modest (1 and 4 basis points in the 10-year Treasury and bund markets, respectively). The second attack in London two weeks later had scarcely any market impact.

Reactions were more marked following the renminbi revaluation announced on 21 July. Then, on speculation that the revaluation might imply significantly lower demand for US Treasuries, the 10-year yield rose by nearly 10 basis points within a few hours. By contrast, the bund yield briefly fell by nearly 3 basis points in anticipation of a spillover in demand. However, the effect of the renminbi revaluation was short-lived as the future path of the renminbi implied by the regime shift, and the degree to which it signified a diminished demand for dollar assets, remained unclear (see the box on page 7).

<div style="float:right">Flat yield curves globally raise questions about their information content</div>

<div style="float:right">The renminbi revaluation has only a passing effect</div>

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2. The international banking market

Claims surged in the first quarter of 2005. Interbank lending in the euro segment of the market, as well as credit to non-banks in the United States, rose noticeably. In addition, BIS reporting banks continued to channel funds to non-banks in the United Kingdom and offshore centres, areas with considerable non-bank financial activity. Lending to these non-bank borrowers has contributed significantly to overall claim flows in recent quarters, accounting for 40% of the overall rise in loans to the non-bank sector worldwide since end-2002. While banks' aggregate positions vis-à-vis offshore centres capture numerous types of financial activity – which are difficult to disentangle – there is some evidence that hedge funds may have contributed to the rise in loans to non-banks in some areas.

Emerging markets experienced a relatively large net inflow of funds, the result of increased cross-border credit to banks in Asia-Pacific. Large quarterly net inflows to the region have occurred with some regularity since 2001, despite the growing current account surpluses in many countries. In Latin America, placements of deposits abroad outpaced a rise in claims and led to a net outflow. Elsewhere, banks in Russia drove a net outflow from emerging Europe, despite strong growth in claims on borrowers in the new EU member countries. Since 2002, the stock of BIS reporting banks' net claims on Latin America and emerging Europe has tracked the current account balances of countries in these regions.

Foreign-headquartered banks have an expanding presence in many emerging markets. Measures of foreign bank participation in domestic banking markets indicate that the share of total bank credit accounted for by foreign-headquartered banks has risen since 1995 in Latin America and emerging Europe. In comparison, that share has remained low in Asia-Pacific.

Interbank activity drives claim growth in the first quarter

Cross-border claims surged in the first quarter of 2005, largely the result of greater interbank activity in the euro segment of the market, and of increased claims on non-bank borrowers in the United States and offshore centres. Total claims rose by $1.0 trillion to $19.8 trillion in the first quarter of 2005 (Table 2.1), the second largest quarterly increase since the BIS statistics have been collected. The largest quarterly expansion had occurred in 2004, and thus

| | 2003 | 2004 | 2004 | | | | 2005 | Stocks at end-Mar 2005 |
	Year	Year	Q1	Q2	Q3	Q4	Q1	
Total cross-border claims	1,076.7	2,262.0	1,228.8	240.0	227.2	565.9	1,040.1	19,792.6
on banks	530.6	1,344.7	819.8	191.3	−5.4	339.1	602.1	12,552.8
on non-banks	546.1	917.3	409.0	48.8	232.6	226.8	438.0	7,239.8
of which Loans: banks	453.4	911.0	607.5	130.1	−105.4	278.8	372.1	10,605.1
non-banks	277.9	439.3	271.9	−25.8	57.5	135.7	261.8	3,740.7
of which Securities: banks	75.6	265.6	190.8	51.0	−11.1	35.0	112.8	1,378.5
non-banks	208.5	362.1	118.5	33.5	162.8	47.3	113.0	3,004.5
Total claims by currency								
US dollar	580.7	1,113.1	618.8	61.5	9.6	423.1	267.0	8,315.5
Euro	502.7	808.4	400.1	81.0	202.4	125.0	584.6	7,884.8
Yen	−127.2	96.3	−21.5	50.7	36.8	30.2	−29.8	1,059.3
Other currencies[2]	120.5	244.2	231.4	46.8	−21.6	−12.4	218.2	2,533.1
By residency of non-bank borrower								
Advanced economies	452.3	673.8	362.0	29.6	131.1	151.1	371.0	5,628.4
Euro area	157.6	239.3	151.1	33.2	11.0	44.1	110.8	2,476.3
Japan	38.4	73.3	0.1	21.4	15.6	36.3	−32.8	230.3
United States	172.5	164.6	105.1	−25.1	38.9	45.7	207.0	1,871.5
Offshore centres	100.0	238.8	41.6	33.8	106.0	57.4	55.8	936.9
Emerging economies	6.1	50.4	24.5	2.3	1.2	22.4	17.8	625.9
Unallocated[3]	−13.5	−40.7	−15.8	−14.3	−6.2	−4.3	−6.9	20.2
Memo: Local claims[4]	*415.1*	*221.0*	*188.6*	*34.2*	*3.2*	*−5.0*	*231.2*	*2,919.0*

Cross-border claims of BIS reporting banks

Exchange rate adjusted changes in amounts outstanding, in billions of US dollars[1]

[1] Not adjusted for seasonal effects. [2] Including unallocated currencies. [3] Including claims on international organisations. [4] Foreign currency claims on residents of the country in which the reporting bank is domiciled.   Table 2.1

the year-on-year growth in claims actually fell to 12% in the first quarter of 2005 from 14% in the previous one.

Interbank activity accounted for over half of this quarterly rise in total claims. Worldwide, claims on banks increased by $602 billion, with particularly strong growth in the euro segment of the market (Graph 2.1). Euro-denominated claims rose by $467 billion, the result of greater lending to banks in the euro area and the United Kingdom. Inter-office activity accounted for a portion of this; German, Dutch and French banks all transferred funds from their offices in the United Kingdom to offices elsewhere.

Euro-denominated interbank activity swells

Hedge fund activity in the Caribbean and the United States

Claims on non-banks surged, reflecting greater credit to these borrowers in the United States, the United Kingdom and offshore centres. In particular, the $185 billion rise in loans to non-banks in the United States in the most recent quarter was the largest quarterly increase for these borrowers since the BIS statistics have been collected. Most of these loans were extended by banks in the United Kingdom and Caribbean offshore centres, possibly reflecting the channelling of funds to non-bank financial institutions (eg securities firms and

A rise in loans to non-banks in offshore centres ...

Cross-border claims by sector and currency

US dollar	Euro	Yen

Legend:
- Claims on banks (lhs)[1]
- Claims on non-banks (lhs)[1]
- Aggregate growth (rhs)[2]

[1] Exchange rate adjusted quarterly changes in amounts outstanding, in billions of US dollars.   [2] Annual changes, in per cent, calculated as the sum of exchange rate adjusted changes in amounts outstanding between periods *t*–3 and *t*, divided by the amount outstanding in period *t*–4.

Graph 2.1

hedge funds). Claims on non-banks *located in* the United Kingdom and Caribbean offshore centres – areas with considerable non-bank financial activity – were up as well, accounting for nearly one third of the total rise in claims on non-banks in the first quarter.

... is consistent with longer-term trends ...

Over the longer term, the stock of outstanding loans to non-bank borrowers in these three areas has grown substantially, dominating the quarterly movements in total claims in recent years. For example, BIS reporting banks' loan claims on non-banks in offshore centres and the United Kingdom have risen by 169% since end-1999, to $1 trillion in the most recent quarter.[1] Likewise, cross-border loans to non-banks in the United States have increased every quarter save three since end-1999, for a total increase of over $560 billion (or 110%). This stands in sharp contrast to the relatively small overall rise in domestic corporate lending in the United States over this same period.[2]

Overall, cross-border claims on non-banks in the Cayman Islands and the United States reflect many types of economic activity, making it virtually impossible to identify with certainty the drivers of quarterly flows. For example, the Cayman Islands hosts a variety of businesses, including fund management, hedge funds, structured finance and insurance,[3] all of which are classified as

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[1]   The outstanding stock of loans to non-banks in the United Kingdom and offshore centres accounted for 27% of total loans to non-banks worldwide in the first quarter of 2005, up from 18% in 1999.

[2]   The outstanding stock of commercial and industrial (C&I) loans booked by banks resident in the United States stood at $964 billion in the first quarter of 2005, up $36 billion from its end-1999 level. These C&I loans fell between early 2001 and mid-2004, but have been on the rise since. In the first quarter of 2005, C&I loans rose by $32 billion. These data can understate total C&I lending in the United States because they exclude loans booked offshore. See R McCauley and R Seth, "Foreign bank credit to U.S. corporations: the implications of offshore loans", *FRBNY Quarterly Review*, Spring, 1992.

[3]   See E Dixon, "Financial flows via offshore financial centres", Bank of England, *Financial Stability Review*, June 2001.

non-banks in the BIS statistics. In a similar vein, cross-border loans to non-bank borrowers in the United States include corporate and household lending, as well as loans to securities firms and hedge funds.

However, in both areas, hedge fund activity has expanded greatly since end-1999. Data from Hedge Fund Research (HFR), which track the monthly returns and assets under management (AUM) for a large sample of hedge funds,[4] indicate that total AUM in hedge funds legally domiciled in the Cayman Islands have increased almost fourfold since end-1999. Similarly, AUM in hedge funds in the United States have almost doubled over this period (Graphs 2.2 and 2.3, left-hand panels).

Over shorter horizons, there is also some indirect evidence that hedge funds' use of leverage, on top of the growth in AUM, may have contributed to the rise in loans to non-banks in these areas. As shown in the right-hand panel of Graph 2.2, the growth in loans to non-banks in the Cayman Islands accelerated, in stages, after 2003. Concurrently, estimates of the degree of leverage employed by hedge funds there – proxied by an indicator of the

... and may partially reflect increased leverage in hedge funds

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Hedge fund activity in the Cayman Islands
In billions of US dollars

AUM in and inflows to hedge funds

Loans to non-banks and leveraged AUM

[1] Total assets under management (AUM) of 1,175 hedge funds legally domiciled in the Cayman Islands, as listed in the Hedge Fund Research (HFR) database.   [2] Estimated net inflows into hedge funds legally domiciled in the Cayman Islands. Funds that disappear from the HFR database are assumed to have stopped reporting, and thus are not included in the calculation of net inflows in the month in which they disappear.   [3] The estimate of leveraged AUM is based on the procedure detailed in P McGuire, E Remolona and K Tsatsaronis, "Time-varying exposures and leverage in hedge funds", *BIS Quarterly Review*, March 2005. Leverage is estimated separately for different families of hedge funds by regressing hedge fund returns on a variety of market-based risk factors using a 24-month rolling regression window. This measure is a rough indicator of *both* on-balance sheet leverage (through debt) *and* instrument leverage (such as through derivatives), and cannot differentiate between the two. Leveraged AUM for a particular family is the product of total AUM (average over the 24-month window) and the estimate of leverage. Total leveraged AUM is the sum across families.   [4] Cross-border loans of BIS reporting banks (excluding banks in Japan) in all currencies to non-banks in the Cayman Islands.   [5] Cross-border US dollar-denominated loans of BIS reporting banks (excluding banks in Japan) to non-banks in the Cayman Islands.

Sources: HFR; BIS calculations.   Graph 2.2

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[4]   The HFR dataset does not include all hedge funds, and thus will underestimate total AUM and inflows.

Hedge fund activity in the United States

In billions of US dollars

AUM in and inflows to hedge funds

- AUM (rhs)[1]
- Inflows (lhs)[2]

Loans to non-banks and leveraged AUM

- Leveraged AUM[3]
- Banks in the United Kingdom[4]
- Banks in offshore centres[5]
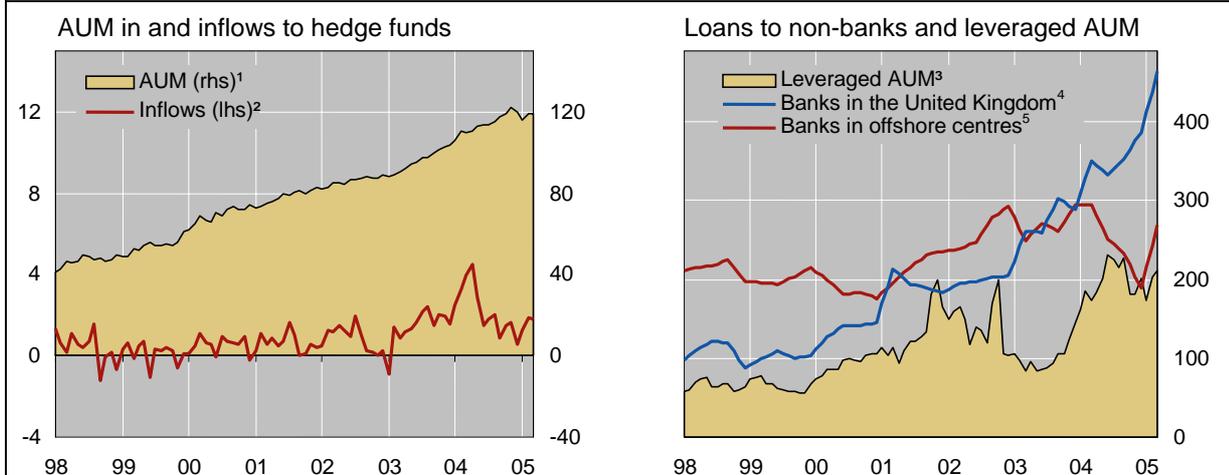
[1] Total assets under management (AUM) of 1,515 hedge funds legally domiciled in the United States, as listed in the Hedge Fund Research (HFR) database.   [2] Estimated net inflows into hedge funds legally domiciled in the United States. Funds that disappear from the HFR database are assumed to have stopped reporting, and thus are not included in the calculation of net inflows in the month in which they disappear.   [3] The estimate of leveraged AUM is based on the procedure detailed in P McGuire, E Remolona and K Tsatsaronis, "Time-varying exposures and leverage in hedge funds", *BIS Quarterly Review*, March 2005. Leverage is estimated separately for different families of hedge funds by regressing hedge fund returns on a variety of market-based risk factors using a 24-month rolling regression window. This measure is a rough indicator of *both* on-balance sheet leverage (through debt) *and* instrument leverage (such as through derivatives), and cannot differentiate between the two. Leveraged AUM for a particular family is the product of total AUM (average over the 24-month window) and the estimate of leverage. Total leveraged AUM is the sum across families.   [4] Cross-border loans to non-banks in the United States from banks located in the United Kingdom.   [5] Cross-border loans to non-banks in the United States from banks located in offshore centres.

Sources: HFR; BIS calculations.   Graph 2.3

sensitivity of their returns to a variety of risk factors[5] – edged upwards starting in late 2003. This has yielded a rise in the *estimated* total amount of *leveraged AUM* in the Cayman Islands, broadly consistent with the uptick in BIS reporting banks' loan claims. A similar, albeit less clear, trend is evident in the United States. The fluctuation in leveraged AUM in hedge funds legally domiciled there since 2003 is roughly in line with the pickup in loans from banks in the United Kingdom, and the subsequent drop-off in loans channelled by banks in offshore centres (Graph 2.3, right-hand panel).

Inflow to Asia-Pacific overshadows outflows from other regions

In the first quarter of 2005, emerging markets experienced a relatively large net inflow, the result of a sizeable increase in BIS reporting banks' cross-border claims on banks in Asia-Pacific. In contrast, substantial placements of deposits

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[5]   The style analysis regression which generates the estimate of leverage is detailed in P McGuire, E Remolona and K Tsatsaronis, "Time-varying exposures and leverage in hedge funds", *BIS Quarterly Review*, March 2005. This measure is a rough indicator of *both* on-balance sheet leverage (through debt) *and* instrument leverage (such as through derivatives), and cannot differentiate between the two. Since that publication, the statistical procedure has been refined; it now incorporates additional risk factors and relies on a fixed effects empirical specification.

	Banks' positions[1]	2003 Year	2004 Year	2004 Q1	2004 Q2	2004 Q3	2004 Q4	2005 Q1	Stocks at end-Mar 2005

Cross-border bank flows to emerging economies

Exchange rate adjusted changes in amounts outstanding, in billions of US dollars

	Banks' positions[1]	2003 Year	2004 Year	2004 Q1	2004 Q2	2004 Q3	2004 Q4	2005 Q1	Stocks at end-Mar 2005
Total[2]	Claims	64.9	131.6	67.9	26.0	1.6	36.2	76.1	1,256.9
	Liabilities	72.3	201.1	107.2	20.8	49.7	23.3	63.2	1,510.5
Argentina	Claims	−8.5	−5.3	−2.6	−1.1	−0.8	−0.7	−0.8	17.9
	Liabilities	−0.8	−0.3	0.3	0.1	−0.3	−0.5	−0.3	24.3
Brazil	Claims	−7.2	−7.4	1.8	−4.0	−2.1	−3.1	4.5	81.6
	Liabilities	14.4	−4.8	5.0	−3.6	−7.0	0.9	13.6	66.1
China	Claims	13.5	24.0	13.9	9.9	−3.1	3.2	10.0	101.5
	Liabilities	−6.4	25.8	21.6	20.3	−2.6	−13.5	−3.4	114.6
Czech Rep	Claims	3.7	2.7	−1.7	0.8	0.4	3.1	0.7	24.0
	Liabilities	−2.4	0.8	−2.6	2.5	−0.6	1.5	−0.8	10.3
Indonesia	Claims	−4.6	0.4	0.3	−0.9	0.2	0.7	−0.7	30.2
	Liabilities	0.2	−2.3	−0.2	−1.3	−0.1	−0.6	0.1	10.5
Korea	Claims	−1.0	12.6	14.3	−8.6	0.8	6.1	8.8	98.9
	Liabilities	7.3	13.8	21.7	−4.9	2.9	−5.9	−4.6	49.5
Mexico	Claims	−0.7	−0.8	7.5	−0.6	−6.7	−1.0	4.4	69.9
	Liabilities	6.2	−4.7	4.0	−0.7	−6.4	−1.6	2.0	59.7
Poland	Claims	3.3	5.9	2.4	2.0	1.5	−0.1	5.5	46.6
	Liabilities	−0.1	11.3	3.0	3.9	−0.2	4.6	1.6	32.3
Russia	Claims	12.1	8.9	3.4	−0.3	−1.8	7.6	3.3	65.4
	Liabilities	16.2	23.9	5.0	7.8	5.5	5.6	28.1	110.7
South Africa	Claims	−1.2	0.4	−0.1	0.5	−0.3	0.3	−0.2	19.3
	Liabilities	9.5	6.8	4.1	1.9	0.7	0.1	0.5	40.0
Thailand	Claims	−1.6	0.2	−1.0	−0.4	1.7	−0.1	0.5	20.0
	Liabilities	5.7	2.4	−1.5	1.2	1.7	1.0	2.6	23.1
Turkey	Claims	5.3	9.1	4.2	3.4	0.0	1.5	2.9	57.5
	Liabilities	−0.4	6.9	2.9	0.9	1.1	2.0	−1.5	26.2
Memo:									
New EU countries[3]	*Claims*	*20.9*	*30.3*	*3.9*	*6.6*	*8.4*	*11.5*	*15.1*	*175.5*
	Liabilities	*−0.4*	*17.4*	*3.2*	*4.8*	*0.0*	*9.4*	*0.7*	*84.3*
OPEC members	*Claims*	*−6.5*	*21.4*	*9.2*	*1.7*	*4.9*	*5.6*	*5.3*	*161.7*
	Liabilities	*−14.9*	*34.5*	*16.4*	*−1.7*	*24.1*	*−4.2*	*8.6*	*298.2*

[1] External on-balance sheet positions of banks in the BIS reporting area. Liabilities mainly comprise deposits. An increase in claims represents an inflow to emerging economies; an increase in liabilities represents an outflow from emerging economies. [2] All emerging economies. For details on additional countries, see Tables 6 and 7 in the Statistical Annex. [3] Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia. Table 2.2

abroad by banks in Latin America and emerging Europe led to net outflows from these regions. The longer-term relationship between net claims on and the current account balances of emerging economies sheds light on the extent to which changes in external positions are channelled through BIS reporting banks.

The borrowing of US dollars by banks in Asia-Pacific, a trend evident since mid-2002, continued in the most recent quarter. Total claims on the region rose by $34 billion to $442 billion in the first quarter of 2005. In particular, claims on banks in China increased by $9 billion to reach $77 billion, from a post-Asian crisis low of $31 billion in the second quarter of 2002. Similarly, new credit to banks over this period drove a rise in total claims on Korea and Taiwan (China)[6]. This rapid growth in claims on banks has been in US dollars, while claims on non-banks,[7] as well as non-US dollar claims on banks, have remained comparatively stable since 2002. Deposit liabilities vis-à-vis Asia-Pacific changed little in the most recent quarter. The banking sector in the region, including central banks, repatriated $8 billion in funds, even though the stock of foreign exchange reserves placed in banks abroad remained stable for many countries (eg India, Korea, Malaysia and Thailand). Banks in Korea and Taiwan together reduced their cross-border deposits – primarily US dollar-denominated – by $9 billion, while banks in Malaysia and Thailand increased the funds they placed in banks abroad.

In contrast to Asia-Pacific, net funds flowed out of other emerging market regions. In Latin America, banks in Brazil and Venezuela increased the funds placed with BIS reporting banks, more than offsetting a rise in claims on banks in Brazil and non-banks in Mexico. This resulted in an $8 billion net outflow from the region. In emerging Europe, a substantial placement of deposits with BIS reporting banks by banks in Russia ($28 billion) overshadowed new lending to borrowers elsewhere in the region, and led to a $6 billion net outflow.[8] Russia's growing current account surplus sets it apart from other emerging European countries, which have been recording deficits. The Russian banking sector has accumulated significant deposits abroad since the sovereign default in 1998; deposit liabilities of BIS reporting banks have risen by a factor of 15 since the third quarter of 1998 to reach $101.6 billion in the last quarter. Only a portion of this rise reflects placements by the Russian central bank.[9]

The stock of BIS reporting banks' net claims can be affected by changes in the external positions of borrowing countries. In general, movements in net claims on a particular country reflect the recycling of current account balances

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[6] Hereinafter Taiwan.

[7] US dollar claims account for 88% of the increase in claims on Asia-Pacific banks since the third quarter of 2001. The share increases to 96% if claims on banks in Hong Kong SAR and Singapore, countries classified as offshore centres in the BIS statistics, are also considered.

[8] New credit to borrowers in new EU member states contributed to a relatively large $23 billion rise in claims on emerging Europe.

[9] Deposits by the Russian central bank currently account for 53% of the stock of BIS reporting banks' deposit liabilities vis-à-vis banks in Russia. Placements abroad by the Russian central bank accounted for roughly one third ($9.3 billion) of the increase in these liabilities in the first quarter of 2005. At the same time, securities holdings by the Russian central bank decreased by $4.4 billion. See also Graph 2 in R McCauley, "Distinguishing global dollar reserves from official holdings in the United States", in this *Quarterly Review*.

Net claims and external positions vis-à-vis emerging markets
In billions of US dollars

Latin America[1]   New EU members[4]   Asia-Pacific[5]

Current account[2]
Net claims[3]
FX reserves

[1] Argentina, Brazil, Chile, Colombia, Mexico and Venezuela.   [2] Cumulative current account balance as of 1995 Q4.   [3] Total stock of net claims of BIS reporting banks.   [4] The Czech Republic, Hungary and Poland.   [5] China (reports on an annual basis; the conversion to quarterly frequency assumes that flows are evenly distributed throughout each year), India, Indonesia, Korea, Malaysia (from 1997 Q1 onwards), the Philippines, Taiwan (China) and Thailand.

Sources: IMF; BIS.   Graph 2.4

and changes in the stock of official reserves held as deposits in banks abroad. This link has been particularly evident in Latin America and emerging Europe in recent years. The sustained fall in net claims on Latin America started in the aftermath of the Argentine default, coinciding with a switch to current account surpluses (Graph 2.4, left-hand panel).[10] This contrasts with the period between end-1998 and 2001, during which foreign banks' reduced exposure to the region was associated with the financing of sustained current account deficits by other financial intermediaries. In emerging Europe, the stock of net claims on new EU member states continued to rise in the first quarter of 2005, a trend evident since the third quarter of 2002 when clear signals emerged that these countries were set to join the Union (Graph 2.4, centre panel).[11] Since then, reporting banks' exposures have tracked the current account deficits in the region, which had previously been financed primarily by FDI inflows.

In contrast to Latin America and emerging Europe, the co-movement between net claims and external balances in Asia-Pacific, evident between 1996 and 2001, has been weaker in recent years. The rise in US dollar-denominated claims on the region's banking sector (discussed above) halted and even reversed the fall in the stock of net claims vis-à-vis the region (Graph 2.4, right-hand panel). Such inflows, which occurred against the backdrop of sustained current account surpluses and official intervention in the

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[10] The FX reserves of Latin American countries started to rise in 2002 mainly as a result of investment in securities.

[11] The Irish referendum, which de facto indicated that the accession process was irreversible, took place in November 2002. Since then, the flow of claims into central Europe has been facilitated by the increasing western European ownership of banks in EU accession countries.

FX market, contributed to a pickup in the growth of FX reserves in Asia-Pacific countries.

Foreign bank participation in key emerging markets

Deregulation, the opening of capital accounts since the late 1980s, and the development of domestic bond markets have led to significant shifts in corporate and government financing patterns in many emerging markets. These shifts have, in some countries, reduced the overall importance of *loan financing* relative to *bond financing*. However, in all emerging market regions, banks remain the key source of *debt* financing for non-banks. While the growth in domestic and international bond issuance has allowed non-bank borrowers to tap a wider range of investors, banks continue to provide the bulk of credit, by extending loans or by purchasing bonds directly (Graph 2.5).

Credit to non-bank borrowers, by region[1]

Outstanding bonds

Asia-Pacific[2]   Emerging Europe[5]   Latin America[6]

Corporate (lhs)[3]
Government (lhs)[3]
Total (rhs)[4]

Credit from banks

Asia-Pacific[2]   Emerging Europe[5]   Latin America[6]

Cross-border (lhs)[3]
Domestic (lhs)[3]
Total (rhs)[4]

[1] Data up to the fourth quarter of 2004.   [2] China, India, Indonesia, Korea, Malaysia, the Philippines, Thailand and Taiwan (China). [3] In billions of US dollars.   [4] As percentage of GDP.   [5] The Czech Republic, Hungary, Poland, Russia and Turkey.   [6] Brazil, Chile, Mexico and Venezuela.

Sources: IMF; BIS calculations.   Graph 2.5

Below we construct two measures of the degree to which foreign (ie foreign-headquartered) banks have made inroads into domestic (bank) credit markets. These measures can shed light on longer-term trends, in particular the integration of domestic banking systems and the growth in local lending by foreign banks. These issues are also discussed in the context of the syndicated loan data in the box on page 30.

Overall, these measures indicate that the foreign bank share of all bank credit to *non-banks* increased dramatically after 1995 in emerging European and Latin American economies, but has not risen further in either region in recent years. In Asia-Pacific, where domestic financial systems are significantly larger and more developed (Graph 2.5), foreign banks account for a relatively small share of total bank credit to non-banks, although there are significant differences across countries.

Measures of foreign bank participation[12]

The two measures serve as indicators of the extent and form of foreign bank financing of non-bank residents in a particular country. The first measure captures the importance of direct cross-border, or offshore, banking for a national lending market. This form of financing, conducted by or at least booked at foreign banks' offices located outside the borrower's country, is typically missed by domestic banking statistics. Specifically, the measure is calculated as the ratio of cross-border (XB) to total bank credit to non-banks, or $XB/(XB+DC)$. The denominator of this ratio is the sum of cross-border (XB) and domestic bank credit (DC) to non-banks, and includes both loan and security claims.[13] As shown in the June 2005 *Quarterly Review*, cross-border banking has become more important in developed countries over the last two decades.

The second measure arguably captures foreign bank participation more fully, by incorporating foreign banks' local lending, ie the lending done by offices located in the borrowing country. The measure is calculated as the ratio of BIS reporting banks' cross-border *and* locally extended claims on non-banks to total bank credit to non-banks, or $(INT+LL)/(XB+DC)$.[14] In the numerator, international claims (INT) include cross-border and local claims in foreign

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[12] These measures, discussed in detail in the June 2005 *BIS Quarterly Review*, capture the participation of BIS reporting banks only. This can lead to an underestimation of the degree of total foreign bank participation in a particular country if, for example, banks from non-reporting countries have a significant presence. In addition, these measures tend to underestimate overall *foreign* participation if, for example, domestic banks are owned by foreign non-bank entities (eg private equity firms).

[13] This measure may underestimate the role of foreign institutions because it ignores local lending by foreign bank offices located in the country. At the same time, it may overestimate the role of foreign institutions if domestic banks' offices located abroad account for a significant share of the cross-border credit received by domestic non-bank borrowers (this would be an instance of the so-called "round-tripping" of credit).

[14] The individual components used in constructing the two measures are converted to US dollars at current exchange rates rather than constant dollar exchange rates. From the borrowers' perspective, these measures represent the value of liabilities to foreign banks as a share in the value of total liabilities to all banks.

currencies on non-banks. Local claims in local currencies, *LL*, are not broken down by sector, and thus also include lending to other banks. Hence, the measure is presented as a range – with *LL* included and excluded from the numerator – in the graphs below.[15] A best-guess point estimate within this range is calculated by applying to *LL* the sectoral breakdown available for international claims (*INT*). While this may provide a more reasonable estimate for some countries, it can be misleading for countries where the sectoral distributions of international and local currency claims differ.

Applying these measures to the data

The evidence based on these measures suggests that foreign banks supply a significant share of total bank credit in Latin America and emerging Europe, while their share is considerably smaller in Asia-Pacific (Graph 2.6). Cross-border banking, captured by the first measure, has remained mostly flat in all three regions, at near 20% of total bank credit in Latin America and Europe, but below 10% in Asia-Pacific. The total participation of foreign banks, however, seems to have risen significantly in some regions, primarily due to the growth in locally extended claims. Foreign bank participation increased steadily in emerging Europe and Latin America until 2002, only to stall in the former region and reverse its course in the latter thereafter. In contrast, foreign banks account for a relatively low share of total bank credit to non-banks in Asia-Pacific.

Foreign bank participation in emerging markets, by region[1]

[1] Data up to the fourth quarter of 2004.   [2] China, India, Indonesia, Korea, Malaysia, the Philippines, Thailand and Taiwan (China).   [3] The lower bound is the ratio of international claims on non-banks (which include local claims in foreign currency) to total credit to non-banks (domestic credit plus cross-border claims). The inclusion of local claims in local currency (on all sectors) in the numerator yields the upper bound.   [4] Implied foreign bank share from applying the sectoral breakdown available for international claims to local currency claims.   [5] Ratio of BIS reporting banks' cross-border claims on non-banks to total credit to non-banks.   [6] Brazil, Chile, Mexico and Venezuela.   [7] The Czech Republic, Hungary, Poland, Russia and Turkey.

Sources: IMF; BIS calculations. Graph 2.6

[15] The upper bound is equivalent to assuming that all local claims in local currency are vis-à-vis non-banks, while the lower bound, which excludes *LL* from the numerator, is equivalent to assuming that these claims are vis-à-vis banks.

In Latin America, the rise in the estimated rate of foreign bank participation is mostly the result of larger local positions, primarily in Mexico (Graph 2.7). The stock of locally extended credit in Mexico expanded after 2000 following the acquisition of several domestic banks by foreign (Spanish and US) banks.[16] As a result, the upper bound on the estimated range of foreign banks' share of total bank credit in Mexico has risen above 80%, from less than 35% at end-1999. Elsewhere, foreign banks accounted for an estimated 60% of total bank credit to non-bank borrowers in Argentina in the fourth quarter of 2000, up from less than 40% in 1995. However, following the government bond default, a reduction in cross-border lending by BIS reporting banks drove down the estimated foreign bank share to less than 40% in the fourth quarter of 2004.

As in Latin America, foreign banks account for a relatively high share of total bank credit in emerging Europe. The lower bound on the measure of foreign bank participation has remained roughly constant since 1996, while the upper bound has risen significantly, reflecting greater local currency lending in the region (Graph 2.6). Graph 2.8 provides some evidence that foreign bank participation has been on the rise in the new EU member countries, as both the upper and lower bounds have trended upwards. For individual countries, foreign banks accounted for 40–60% of total bank credit in Hungary, and 35–80% in Poland, in the fourth quarter of 2004. While these estimated ranges are quite wide, their lower bound has indeed risen in each case since 1995. In contrast, foreign bank participation rates remain low, and local currency positions small, in Russia and Turkey.

... has risen in Latin America ...

... and in emerging Europe ...

Foreign bank participation in selected Latin American countries[1]

1 Data up to the fourth quarter of 2004.   2 The lower bound is the ratio of international claims on non-banks (which include local claims in foreign currency) to total credit to non-banks (domestic credit plus cross-border claims). The inclusion of local claims in local currency (on all sectors) in the numerator yields the upper bound.   3 Implied foreign bank share from applying the sectoral breakdown available for international claims to local currency claims.   4 Ratio of BIS reporting banks' cross-border claims on non-banks to total credit to non-banks.

Sources: IMF; BIS calculations.   Graph 2.7

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16   Claims of banks in the United States account for a significant share of claims vis-à-vis Mexico.

Foreign bank participation in selected emerging European countries[1]

New EU member countries[2]

Foreign bank range[3]
Estimated share[4]
Cross-border share[5]

Russia

Turkey

1995 1997 1999 2001 2003

1995 1997 1999 2001 2003

1995 1997 1999 2001 2003

[1] Data up to the fourth quarter of 2004.   [2] The Czech Republic, Hungary and Poland.   [3] The lower bound is the ratio of international claims on non-banks (which include local claims in foreign currency) to total credit to non-banks (domestic credit plus cross-border claims). The inclusion of local claims in local currency (on all sectors) in the numerator yields the upper bound.   [4] Implied foreign bank share from applying the sectoral breakdown available for international claims to local currency claims.   [5] Ratio of BIS reporting banks' cross-border claims on non-banks to total credit to non-banks.

Sources: IMF; BIS calculations.   Graph 2.8

... but not in Asia-Pacific

In general, BIS reporting banks account for a smaller share of total bank credit to non-banks in Asia-Pacific, although differences across countries are substantial (Graph 2.9).[17] While this overall share has risen slightly in recent quarters, Asia-Pacific differs from Latin America and emerging Europe in at least two respects. First, the overall level of foreign bank participation remains below that in other regions. Second, BIS reporting banks' local currency positions have not expanded as they have elsewhere. While this is partially due to China and India, which have relatively closed banking systems and large domestic bank credit markets, Korea and Taiwan also have relatively low levels of foreign bank participation.[18] In contrast, other countries, namely Malaysia and the Philippines, have foreign bank participation rates approaching those in other emerging market regions.

The funding of local currency positions

The dramatic rise in BIS reporting banks' local lending in local currencies, implied by the widening range of foreign bank participation shown in the previous graphs, has gone hand in hand with a roughly equal rise in local currency liabilities. This has helped to largely insulate foreign banks from

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The United States reports local and cross-border claims, rather than international and local claims in local currencies. This depresses the lower bound of the estimated range for the share of foreign banks in national lending markets, while raising the upper bound.

[17] In absolute terms, BIS reporting banks' claims on Asia-Pacific are relatively large. The outstanding stock of foreign claims (ultimate risk basis) vis-à-vis all sectors in Asia-Pacific stood at $600 billion in the first quarter of 2005, compared with $495 billion vis-à-vis emerging Europe and $515 billion vis-à-vis Latin America. International claims on non-banks in Asia-Pacific stood at $241 billion, compared with $252 billion vis-à-vis emerging Europe and $180 billion vis-à-vis Latin America.

[18] These measures do not capture the ownership of local banks by foreign investment funds.

Foreign bank participation in selected Asia-Pacific countries[1]

China

Korea

Taiwan, China

- Foreign bank range[2]
- Estimated share[3]
- Cross-border share[4]

[1] Data up to the fourth quarter of 2004. [2] The lower bound is the ratio of international claims on non-banks (which include local claims in foreign currency) to total credit to non-banks (domestic credit plus cross-border claims). The inclusion of local claims in local currency (on all sectors) in the numerator yields the upper bound. [3] Implied foreign bank share from applying the sectoral breakdown available for international claims to local currency claims. [4] Ratio of BIS reporting banks' cross-border claims on non-banks to total credit to non-banks.

Sources: IMF; BIS calculations.   Graph 2.9

exchange rate risk. Still, as shown in Graph 2.10, the ratio of reporting banks' local currency claims to local currency liabilities is typically higher than unity. This possibly reflects foreign banks' advantage in local lending (over local deposit taking), and their ability to fund these local claims by borrowing foreign currency offshore and swapping it into local currency. In addition, local claims may also reflect purchases of domestic bonds indexed to currency movements, which can be financed in foreign currency without incurring exchange rate risk.

The variability in the ratio of local currency claims to liabilities over time, as well as its overall level, differs across countries. In Latin America, this ratio has been stable and close to unity since 1999, but has recently trended

Local currency claims on emerging markets[1]

Latin America

Emerging Europe

Asia-Pacific

- Local claims (lhs)[2]
- Entire region (rhs)
- Argentina (rhs)
- Brazil (rhs)
- Mexico (rhs)

- New EU members (rhs)
- Non-EU countries (rhs)

- Korea (rhs)
- Taiwan, China (rhs)

Note: Lines depict the ratio of BIS reporting banks' local currency claims to local currency liabilities, in percentage points.

[1] The United States reports local claims in all currencies. [2] Outstanding stock of local claims in local currency; in billions of US dollars.   Graph 2.10

downwards, most noticeably in Argentina and Brazil after the Argentine default in 2002.[19] In contrast, this ratio has, on average, risen in emerging Europe as the integration of the new EU member states in euro area financial markets has progressed. In Asia-Pacific, this ratio has been volatile since the Asian crisis. Local currency claims on the region have increased since the second quarter of 2001, relative to local currency liabilities, mainly as a result of developments in Korea and Taiwan.

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[19] In Brazil, this may be linked to the slowdown in the issuance of sovereign indexed bonds, which would appear as local currency claims in the BIS statistics.

Developments on the syndicated loan market

Blaise Gadanecz

Strong activity in the second quarter of 2005

Activity on the international syndicated loan market was strong in the second quarter of 2005. Signings rose by about $270 billion from the previous quarter to $703 billion, up $180 billion from one year previously.[①] Given that activity in the second quarter of each year is traditionally robust, and that the market had been buoyant in recent quarters, on a seasonally adjusted basis total volumes dropped slightly from those registered in the first quarter.

As in previous quarters, the M&A segment and refinancings drove the market in industrialised countries. Merger-related activity continued to be strong in the United States. Western European borrowers took advantage of favourable market conditions to lock in low spreads and rolled over an unprecedented $200 billion, or almost twice the volume of refinancing in the first quarter. Indeed, financing terms continued to be favourable for borrowers from industrialised countries. This was reflected in persistently low average Libor and Euribor pricing, particularly in the investment grade segment, although average maturities dropped slightly. Even though bond issuance spreads stayed relatively high after the downgrades of General Motors and Ford, primary loan spreads reportedly remained below those observed for comparable risks on CDS or bond markets. The wish to foster bank-client relationships may have accounted for such pricing differences.

Lending to emerging market borrowers peaked at $45 billion, a level not seen since the end of 1997. All emerging regions except Asia-Pacific enjoyed lower spreads compared to the previous quarter. In several new EU member countries such as Hungary and Slovenia, large financial and non-financial borrowers have been able to secure deals at spreads close to levels paid by their western European counterparts. In Latin America, the oil and cement sectors secured exceptionally cheap loans.

Signings of international syndicated credit facilities

In billions of US dollars

Total signings
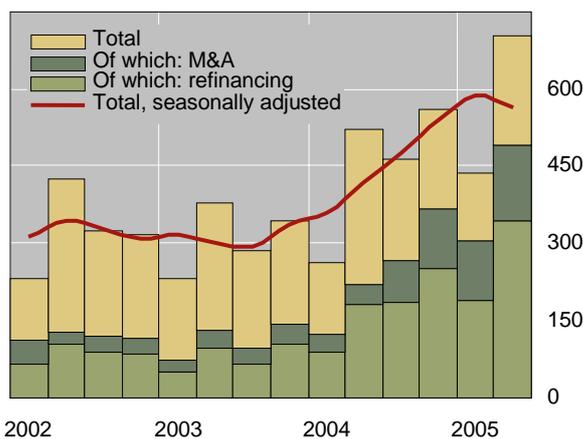
Weighted[1] average maturities (years, lhs) and pricing[2] (bp, rhs), United States and western Europe
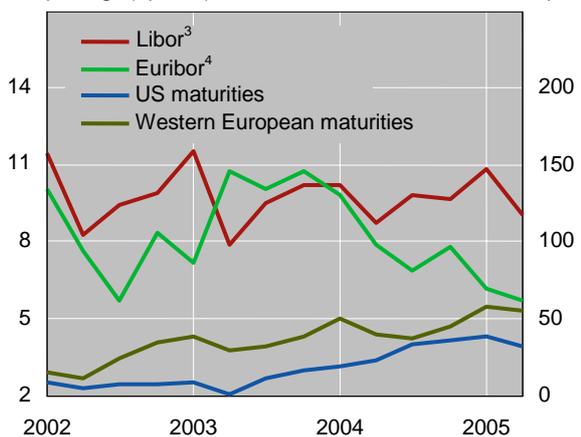
[1] By facility sizes.   [2] Spreads + fees.   [3] US dollar-denominated facilities with Libor pricing granted to US borrowers.   [4] Euro-denominated facilities with Euribor pricing granted to western European borrowers.

Sources: Dealogic Loanware; BIS.

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[①] Activity in the second quarter of 2005 was also stronger than in the fourth quarter of 2004, when signings had peaked at $559 billion.

*Regional integration of the syndicated loan market in emerging market countries*

The analysis of syndicate structures makes it possible to assess the origin of lending flows to emerging market countries and, by extension, the geographical integration of these syndicated loan markets. This exercise shows that it is mainly Japanese, US and western European banks which have been providing syndicated loans to emerging market countries, and that, for the remaining part, this type of lending has been primarily a domestic phenomenon, not a regional one.

Over the past decade, borrowers from Asia and the Pacific have obtained the highest share of the total funds they have received from banks headquartered in their own region. This share has averaged 40% over the past decade (see graph below) and has risen since the Asian crisis, to the detriment of Japanese banks. Conversely, in eastern Europe and Latin America, banks from outside these regions have had a much more significant presence, and the share of home region banks in total commitments has not exceeded 10%. In Latin America, western European – among them, Spanish – banks have had a strong and growing presence: together with US lenders, they have provided more than 70% of funds over the past 10 years.

A closer examination of individual lender nationalities can be used to further investigate the composition of syndicated lending in Asia, the market where home region banks have been most prominent in the provision of syndicated loans. Such a country breakdown (not shown) indicates that most intraregional Asian lending has in fact been domestic, consistent with the low measures of cross-border intra-Asian bank lending flows apparent in the BIS international banking statistics. The majority of this domestic business has taken place in China, Korea and Taiwan, with the borrowers (and banks) of other Asian countries participating significantly less on the syndicated loan market.

Geography of syndicated lending[1] to emerging market countries

Fund provider group nationalities, in % of loan amounts provided, average for 1993–2005

Asia-Pacific[2]

Legend: Own region / United States / Japan / Western Europe / Other

Eastern Europe

Latin America & Caribbean

[1] Includes domestic facilities. [2] Includes Hong Kong SAR and Singapore.

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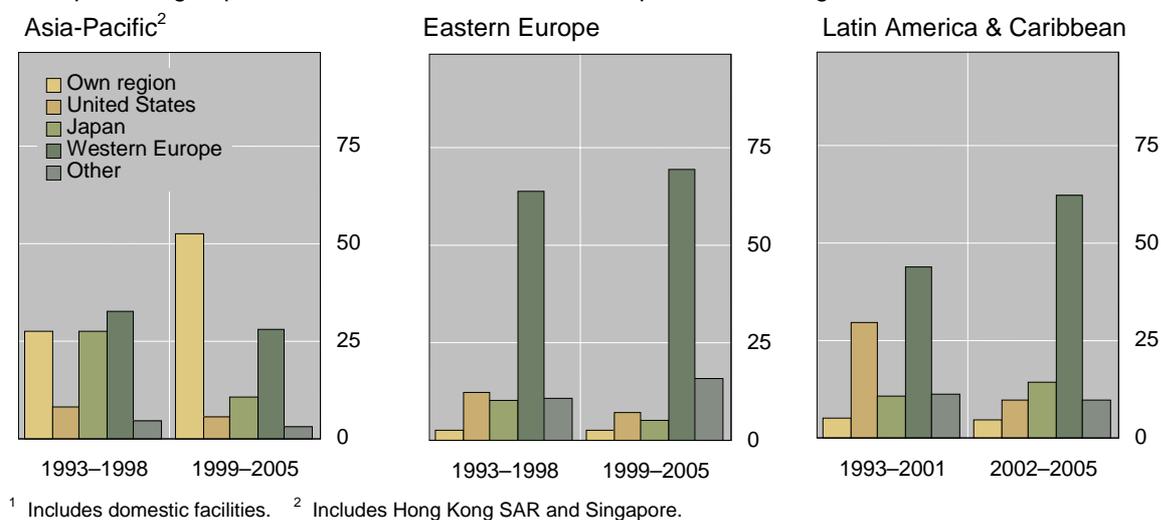
3. The international debt securities market

The appetite for international debt securities remained relatively robust in the second quarter of 2005 despite turmoil in global credit markets sparked by events surrounding US auto makers. Although the pace of overall gross issuance of international bonds and notes fell slightly, the decline was roughly in line with past seasonal patterns and, in fact, issuance was 27% higher on a year-over-year basis (Table 3.1). Gross issuance by Japanese entities increased and that by nationals from the euro area remained at elevated levels. Global net issuance of bonds and notes declined by 4% during the period, even though it was also higher in most cases than in the second quarter of 2004 (Table 3.2).

After several strong quarters, borrowing by high-yield entities in developed economies fell sharply during April and May, reflecting the heightened uncertainty in high-yield markets following the ratings downgrades of General Motors and Ford, but rebounded strongly in June. By contrast, most emerging market borrowers were relatively unaffected by the turmoil this spring, with gross issuance increasing once again, sustaining the record-breaking trend of borrowing begun in 2003.

Euro area issuance stays strong

In the euro area, both gross issuance ...

Gross issuance of bonds and notes in euros in the international market by euro area entities increased by 1.2% to €418 billion. In fact, quarterly issuance grew by a much larger rate than predicted by historical seasonal patterns – euro area gross issuance is estimated to be, on average, about 16% lower in the second quarter compared to the first quarter (see the box on page 36). When expressed in US dollars, however, gross issuance declined by 4.8% due to the depreciation of the euro vis-à-vis the dollar.

... and net issuance rise, driven largely by German entities

Net issuance of bonds and notes in the euro area actually rose in the second quarter by 2.6%. At $289 billion, it accounted for 61% of total net issuance in the international market during the period. For the second consecutive quarter, net borrowing rose in Germany, reflecting positive economic news about the economy. Net issuance also picked up in Spain, whereas it fell in France and the Netherlands. The decline in net issuance by French entities can be traced to both financial firms and the government; corporates increased net borrowing from –$2.6 billion in the first quarter to $4.7 billion in the second.

Gross issuance in the international bond and note markets
In billions of US dollars

	2003	2004	2004			2005	
	Year	Year	Q2	Q3	Q4	Q1	Q2
Total announced issues	2,885.2	3,300.7	768.7	726.1	822.8	1,074.9	975.7
Bonds	1,610.8	1,786.5	402.5	378.2	435.4	593.9	532.1
Notes	1,274.4	1,514.3	366.3	347.9	387.4	480.9	443.6
Floating rate	962.6	1,257.3	306.4	285.2	328.2	336.9	410.8
Straight fixed rate	1,834.5	1,986.1	444.0	430.3	483.3	723.5	558.2
Equity-related[1]	88.1	57.4	18.3	10.5	11.2	14.5	6.6
US dollar	1,171.8	1,154.4	257.3	255.5	284.4	313.6	299.1
Euro	1,287.8	1,597.8	379.0	350.2	389.8	570.1	530.4
Yen	102.7	111.4	33.8	22.4	25.9	30.5	27.0
Other currencies	322.9	437.1	98.7	98.0	122.6	160.8	119.2
Developed countries	2,620.5	3,010.3	694.7	655.8	752.6	952.0	883.9
United States	739.9	771.9	167.8	169.7	184.7	215.2	176.5
Euro area	1,302.5	1,469.8	358.2	306.1	363.1	531.2	505.6
Japan	48.3	62.0	19.8	12.1	9.9	13.9	14.9
Offshore centres	32.0	41.3	7.0	13.9	13.5	11.7	12.7
Emerging markets	140.2	152.0	36.7	35.0	34.9	82.9	50.2
Financial institutions	2,282.0	2,687.2	603.4	606.5	688.8	840.0	810.5
Private	1,913.3	2,276.5	515.4	500.4	592.8	696.7	674.1
Public	368.7	410.7	88.0	106.1	96.0	143.3	136.4
Corporate issuers	268.2	271.3	72.1	62.3	75.0	58.3	55.5
Private	217.8	231.4	60.6	57.0	60.9	54.9	42.0
Public	50.4	39.9	11.5	5.3	14.0	3.4	13.5
Governments	242.6	245.2	62.9	35.9	37.3	148.3	80.7
International organisations	92.5	97.1	30.3	21.3	21.8	28.3	28.9
Completed issues	2,866.3	3,304.3	796.4	708.9	864.7	1,014.3	998.0
Memo: Repayments	*1,502.6*	*1,752.1*	*456.8*	*405.0*	*439.8*	*521.7*	*524.5*

[1] Convertible bonds and bonds with equity warrants.

Sources: Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS.   Table 3.1

Perhaps the most notable transaction during the period was the completion of a dollar-denominated bond by the Federal Republic of Germany on 1 June. With a face value of $5 billion, it is one of the largest dollar bonds ever issued by a sovereign or supranational in the international market. The five-year issue was priced at a spread of 12 basis points over the May 2010 Treasury which, when taking into account the relevant swap rates, probably reduced the issuer's funding costs relative to bringing a euro-denominated bond to the market.

Unprecedented dollar bond issue by the German government

The largest issues during the period were by euro area sovereigns, Greece and Finland, both of whom issued bonds in the amount of €5 billion. The Hellenic Republic completed its five-year bond, which was targeted mainly at non-residents, on 20 April at a spread of 13 basis points over the April 2010 bobl (German federal note). Even though the issue was priced at a lower spread than where Greek bonds had been trading earlier in the year, its reception in the market seemed to be less

Several other euro area sovereigns are active, including Greece

Main features of net issuance in the international bond and note markets

In billions of US dollars

	2003	2004	2004			2005		Stocks at end-Jun 2005
	Year	Year	Q2	Q3	Q4	Q1	Q2	
Total net issues	1,363.7	1,552.2	339.6	303.9	424.9	492.5	473.5	13,392.2
Floating rate	384.2	637.3	161.3	129.7	193.9	99.9	236.8	3,714.5
Straight fixed rate	958.6	921.1	170.6	176.8	235.4	397.1	242.1	9,338.8
Equity-related	20.9	–6.2	7.7	–2.7	–4.4	–4.5	–5.4	338.9
Developed countries	1,282.5	1,432.6	311.3	276.6	397.1	459.3	444.8	11,889.2
United States	258.9	218.5	4.2	34.8	64.1	64.4	45.7	3,306.9
Euro area	733.4	780.8	205.1	139.8	220.4	282.1	289.4	5,878.1
Japan	–1.6	17.4	10.0	1.9	0.4	4.9	–0.6	270.0
Offshore centres	16.5	21.4	4.4	8.5	8.9	2.6	8.0	161.2
Emerging markets	42.3	75.3	15.1	13.0	21.6	28.7	15.2	816.8
Financial institutions	1,105.1	1,302.5	275.0	277.0	365.5	392.2	419.7	9,930.3
Private	907.4	1,087.2	234.7	220.3	316.8	317.4	349.5	8,379.6
Public	197.7	215.2	40.3	56.7	48.7	74.8	70.2	1,550.7
Corporate issuers	108.5	75.7	11.5	12.3	42.9	13.9	10.8	1,504.2
Private	90.1	55.9	5.9	12.6	34.8	21.9	3.4	1,271.1
Public	18.4	19.8	5.7	–0.3	8.1	–8.1	7.4	233.1
Governments	127.6	151.2	44.3	8.8	19.2	84.5	37.4	1,432.7
International organisations	22.5	22.9	8.8	5.8	–2.7	2.0	5.5	524.9

Sources: Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; national authorities; BIS. Table 3.2

than enthusiastic. This may have been due to several factors, including the large amount of issuance by the government already this year, the relative difficulty in placing bonds with mid-range maturities and the increased uncertainty in euro area financial markets following the French and Dutch rejections of the European constitution in springtime referendums. On the upside, the bond issue looked to complete Greece's benchmark funding programme in 2005.

Other large euro-denominated public issues included a €4.5 billion bond by the Republic of Austria and €4 billion bonds by each of the Caisse D'amortissement de la Dette Sociale and Kreditanstalt für Wiederaufbau. The largest non-public issue was completed by German Postal Pensions Securitisations Plc. This SPV issued an asset-backed security in the amount of €3.5 billion collateralised with a portfolio of pension claims.

Net US issuance continues to falter

US financials announce several bonds ...

Borrowing by US entities in the international bond and note market declined by 18% in the second quarter of 2005. On a seasonally adjusted basis, gross issuance by US nationals increased by 8.4%. Financial firms continued to account for the bulk of US activity in the market, with 95% of the share of gross issuance of bonds and notes attributable to this sector. Fannie Mae completed several large issues (see below), as did Federal Home Loan Banks, Global Mtg Sec 2005-A and Wells Fargo.

Seasonality in international bond and note issuance

Jeffery D Amato and Jhuvesh Sobrun

Data on international debt securities reported in the BIS statistics are not adjusted for seasonal effects. For some purposes, however, it may be of interest to know whether there is a large seasonal component in order to improve our inferences about trends and cycles. For instance, in analysing changes in gross issuance on a quarterly basis, it is useful to know what portion may be due to funding activity tied to a particular time of the year and what portion may be attributed to other factors. Seasonality in issuance may arise out of a need to smooth out cash flows due to systematic revenue-expenditure imbalances over the calendar year, while macroeconomic conditions may produce a cyclical pattern in financing activities.

This box provides the first evidence on the degree of seasonality in BIS data on international bond and note issuance. We obtain four main results: in general, there is a high degree of seasonality in gross issuance; issuance tends to be highest in the first quarter and then decline as the year progresses; in some cases, seasonal patterns have shifted over time; and there is weaker evidence of seasonality in net issuance, which points to a seasonal rollover effect in gross issuance.

Methodology and results

We analyse a wide range of BIS quarterly data on gross and net issuance: total; by economic region; by sector; by currency; and for a selected group of the largest sovereign and non-governmental issuers. The BIS database contains data that have been collected according to a unified methodology dating back to the fourth quarter of 1993 (some series exist for a longer time period). To maintain consistency and comparability, this is the starting date used in our analysis. Graph A plots some of the time series on gross issuance. For series exhibiting exponential growth, the data are plotted on a logarithmic scale. Calendar regularities are evident across most of the sample period in the series shown. For instance, euro area issuance has generally been higher in the first half of the calendar year, particularly in the first quarter. In our analysis below, we provide estimates on the quantitative significance of this pattern.

A common method for seasonally adjusting data is the US Census Bureau's X-12-ARIMA procedure. It is employed in the adjustment of many official government statistics, both in the United States and elsewhere. In essence, the X-12 method uses moving averages to estimate the seasonal factors in a data series.[1] Alternatives to the X-12 procedure exist, but they tend to yield similar results.[2]

Gross issuance in the international bond and note markets[1]

Legend:
- Total (rhs)
- Euro area (rhs)
- Emerging markets (rhs)
- Fannie Mae (lhs)
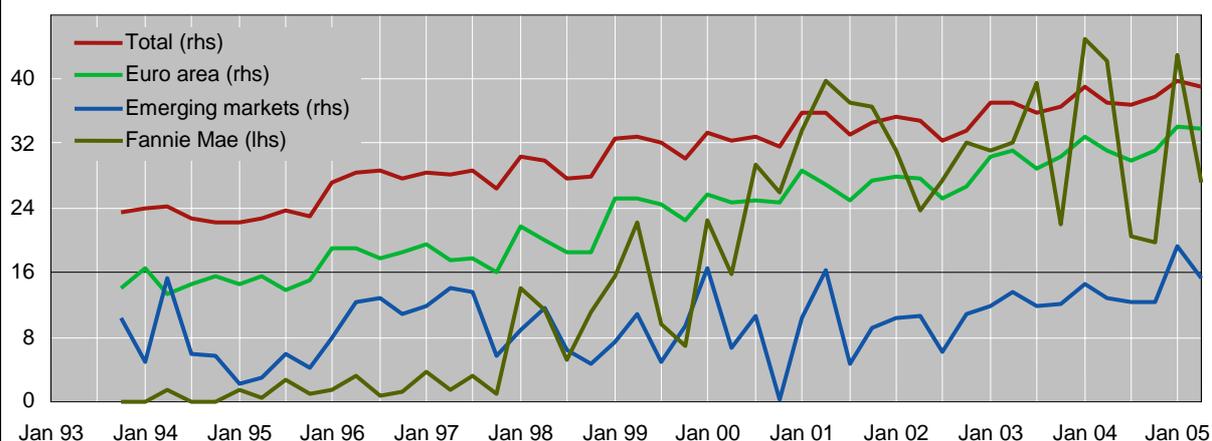
[1] Each series (originally in billions of US dollars) is expressed in natural logarithms, except Fannie Mae.

Sources: Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS.   Graph A

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[1] See US Census Bureau, *X-12-ARIMA Reference Manual, Final Version 0.2*, Washington, DC, US Census Bureau, 2002, for further details on the X-12 method.   [2] See B Fischer, *Decomposition of time series – comparing different methods in theory and practice*, Eurostat working group document, 1995, for a description of other seasonal adjustment procedures and their relative merits.

Seasonal factors in gross and net issuance of international bonds and notes[1]										
	Average seasonal factors								F-test for the presence of seasonality[2]	
	Gross				Net					
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Gross	Net
Total	1.139	1.072	0.949	0.840	34.735	24.719	−23.557	−35.393	32.252*	10.717*
By region										
Emerging markets	1.060	1.298	0.860	0.772	1.762	3.240	−0.203	−5.022	7.087*	2.171
Euro area	1.214	1.050	0.866	0.874	19.795	13.594	−18.400	−13.588	39.071*	14.373*
United States	1.128	1.037	0.990	0.842	8.243	−4.203	2.966	−7.680	17.676*	2.352
By sector										
Corporates	1.006	1.159	0.954	0.879	−2.483	5.739	−3.868	0.330	6.983*	4.449
Financials	1.151	1.029	0.963	0.857	21.697	10.410	−18.854	−13.421	29.076*	7.322*
Governments	1.328	1.241	0.798	0.636	14.793	3.141	−3.909	−13.336	13.100*	9.656*
By issuer[3]										
France	0.986	0.988	1.006	1.021	−0.019	−0.018	−0.018	0.052	35.997*	2.505
Germany	1.691	1.270	0.766	0.648	1.426	0.284	−0.532	−1.025	8.402*	8.143*

[1] Multiplicative for gross issuance and additive (in billions of US dollars) for net issuance, unless otherwise specified. Sample period is 1993 Q4–2005 Q2.   [2] * indicates statistical significance at 0.1% level.   [3] Additive seasonal factor estimated for gross issuance, expressed as the exponential of the ratio of seasonal to average gross issuance over the sample period. This helps facilitate comparison with multiplicative factors in other series.

Selected estimates of the average seasonal factor (across the sample) for each quarter are reported in the table.[3] Also shown are statistics testing for the presence of seasonality. The null hypothesis of "no seasonality" is rejected at conventional significance levels in most gross issuance series, leading us to conclude that most international debt issuance exhibits strong seasonality.[4] Total issuance shows a clear pattern of declining seasonal effects moving from the first to the last quarter of a year. For example, our estimates suggest that first quarter gross issuance tends to be about 14% higher than average in the first quarter, but 16% below average in the fourth quarter. The seasonality found in total issuance is reflected in many of the sub-aggregates as well, notably in the euro area and United States. Similarly, as financial firms are the largest issuers from these regions, we also find first quarter issuance to have been relatively strong in this sector. The strongest first quarter seasonal effect is evident in gross issuance by sovereign issuers from developed and emerging economies. Together this group exhibits 33% above average issuance in the first three months of the year, which then declines sharply as the year progresses. By contrast, emerging market nationals as a whole have tended to issue more international debt in the second quarter.[5]

The nature of seasonality has also evolved over time. Graph B shows time series estimates of the seasonal factors in gross issuance in three cases. While the seasonal pattern in gross issuance by euro area nationals as a whole has been fairly stable since 1993, the government of Italy, one of the largest issuers in the region, increased first quarter issuance markedly around 1999. One possible explanation for this behaviour is a change in Italy's funding strategy arising from the advent of European monetary union. In particular, since the start of the euro, there have been concerted efforts to achieve greater coordination in public debt issuance by euro area governments. In contrast to the euro area, seasonal issuance patterns have changed considerably across emerging market countries. It is notable that issuers in these countries have been increasingly front-loading issuance in the early part of the year, in line with the patterns found in the euro area and United States.

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[3] Results for many other series are available upon request. For gross issuance, multiplicative seasonal factors (ie their product equals one) are estimated in most cases, whereas additive factors (ie they sum to zero) are estimated for all net issuance series because they can be negative.   [4] The only exceptions are relatively small sub-categories of issuers.   [5] We also find evidence of seasonality in issuance broken down by currency, which roughly matches the seasonality found in the economic region of the currency.

Time-varying seasonal factors in gross issuance

Euro area

Italy[1]

- 1st quarter
- 2nd quarter
- 3rd quarter
- 4th quarter

Emerging markets
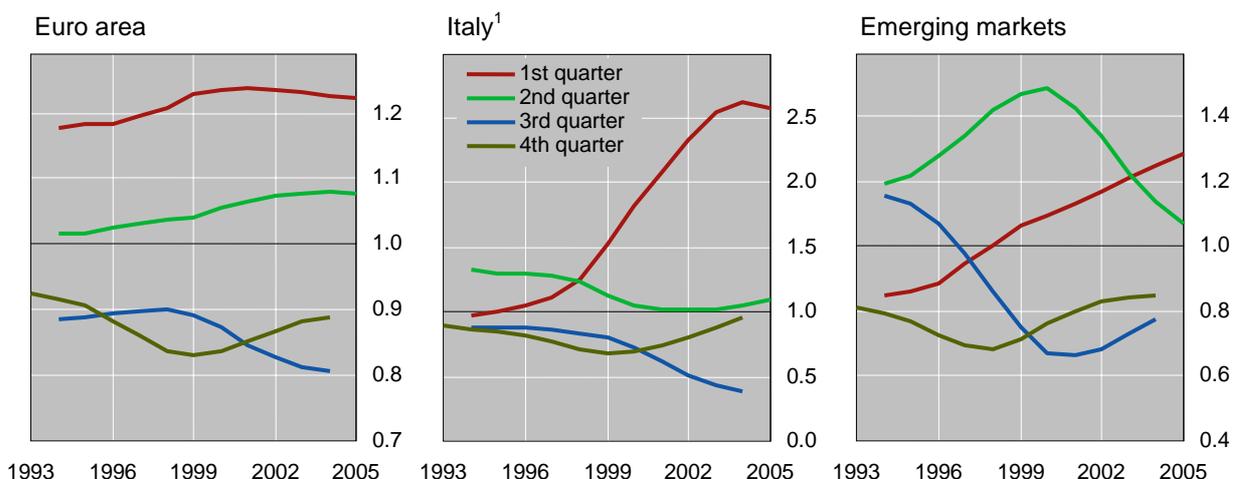
[1] Additive factors are expressed as the exponential of the ratio of seasonal to average gross issuance over the sample period.

Graph B

The impact of seasonal adjustment on gross issuance data is shown in Graph C, which plots quarterly percentage changes in raw and seasonally adjusted data. There is a close association between the two series, yet it is also clear that seasonal adjustment has smoothed out many of the sharp movements in the non-adjusted data.

Lastly, the table also reports average estimates of quarterly seasonal factors in net issuance. Overall, there is less evidence of seasonality in net issuance compared to gross issuance. For example, on the one hand, a strong seasonal pattern is evident in the euro area, resembling that found in gross issuance, and which is also reflected in the estimates for the German government. On the other hand, net borrowing by US and emerging market entities does not exhibit seasonality.

Discussion and conclusions

What explains the estimated seasonal patterns in gross and net issuance? First, holiday conventions are likely to have an impact on market activity. Typically, August and December are quiet months in primary markets since many market participants take holidays at these times; many issuers will not even attempt to place bonds in the markets during these periods.

Second, funding schedules may have to be moulded around a given cash flow pattern of revenue inflows and expenditure outflows. For some issuers, revenues can greatly exceed expenditures in certain periods on a systematic basis, yet fall short at other times. For

Seasonally adjusted gross issuance

Quarterly changes, in per cent

Euro area

- Original
- Seasonally adjusted
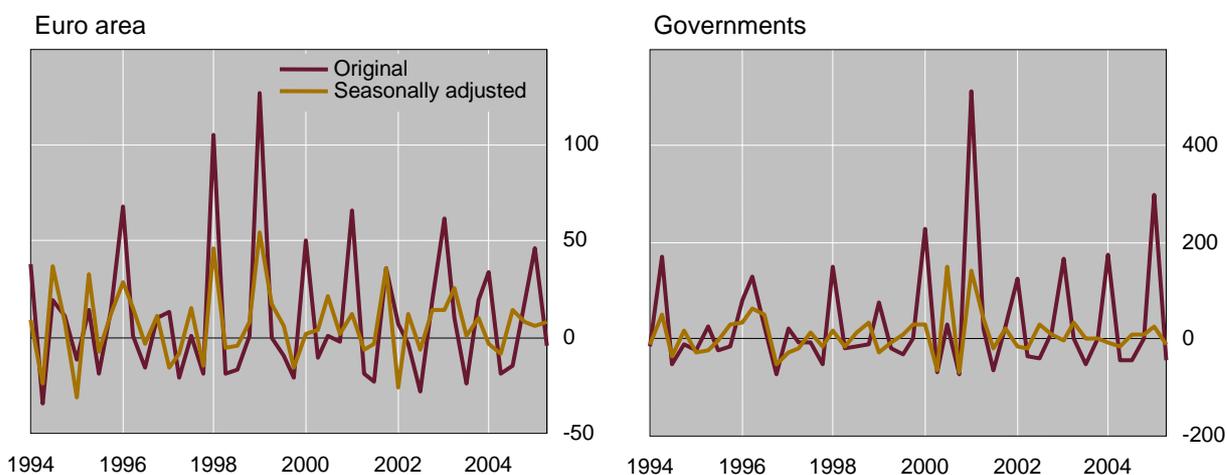
Governments

Graph C

Government deficits and funding

In billions of US dollars; by quarter[1]

France

Germany

Legend: Deficit[2], Net issues[3]

Axis labels: 1st quarter, 2nd quarter, 3rd quarter, 4th quarter (for both France and Germany panels); y-axis values 16, 8, 0, -8
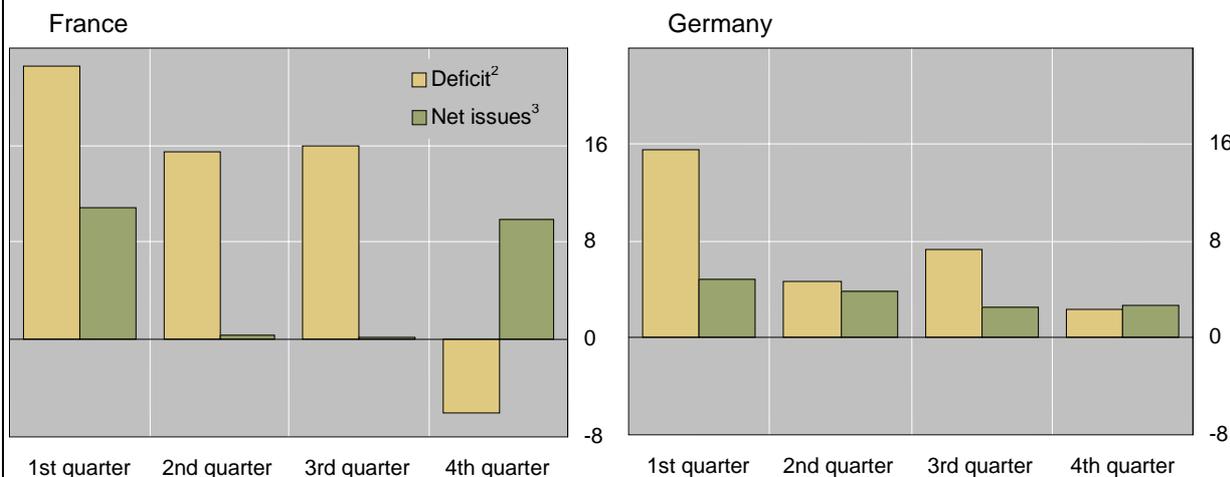
[1] Average over 1993 Q4-2005 Q2. [2] Central government expenditures minus revenues. [3] Issuance of international bonds and notes; for France, the values have been multiplied by 10 to facilitate comparison with deficit figures.

Sources: IMF/IFS; BIS calculations.   Graph D

instance, in some countries, tax laws cause revenues to be much higher during certain months of the year. Graph D shows that average quarterly central government deficits in France and Germany have been largest in the first quarter and smallest in the fourth quarter. To the extent that these governments use the international market to fund deficits, we would expect net issuance to be typically higher in the first quarter and lowest in the last quarter. Indeed, the results for Germany support this conjecture, whereas the estimates for France, if anything, indicate that net issuance has been relatively high in the fourth quarter. In fact, the total amount of net issuance in the international market by the French government has been a small fraction of the average annual deficit, which suggests that the Agence France Trésor looks to domestic markets for most new net borrowing. This highlights one obstacle in trying to explain seasonal patterns in international debt securities issuance, namely, that this market is only one of a number of possible sources of financing for many issuers.[⑥]

Third, regardless of the type of issuer, risk-averse debt managers may desire to front-load issuance in the budget year. Many issuers typically set annual targets for issuance of longer-term marketable debt in advance. To reduce the risk of being left short at year-end, debt managers will try to fulfil a relatively large proportion of their annual target early on in the year even if the actual timing of their funding needs is evenly spaced throughout the calendar. In particular, this may provide one explanation of the large positive first quarter seasonal factor estimated for many sovereign issuers, as the fiscal year of most governments coincides with the calendar year.

Finally, the stronger evidence of seasonality in gross versus net issuance suggests that there is a seasonal rollover effect in gross issuance, eg debt tends to mature at certain times of the year. For instance, some issuers have created a pattern of having debt come due only in January and July.

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[⑥] In addition, we have focused our attention on longer-term securities (bonds and notes), whereas there may also be strong seasonal effects in the issuance of international money market instruments.

... but US net issuance declines

Net issuance of bonds and notes by US entities declined by 29% to $45.7 billion during the quarter; however, this was well above the $4.2 billion in net issuance in the second quarter of the previous year. Net issuance of all debt securities (bonds and notes plus money market securities) fell by a wider margin, from $72.2 billion to $49 billion (see Table 12A in the Annex). The presence of US non-financial corporations in the international debt market has

continued to shrink, with negative net issuance on all debt securities in the amount of –$3.9 billion from this sector in the last quarter.

From a longer perspective, the US presence in the international debt securities market has not been as strong over the past couple of years as in the past. Coming out of the last recession, many US firms concentrated on reducing leverage and improving their balance sheets. The reduction in net issuance in the much larger domestic market was also mirrored in the international market. It is also apparent, however, that issuance by US corporates on the international market has yet to rebound, even if the credit cycle may have already turned as gauged by domestic activity (see the Overview).

The picture is inevitably more diverse at the individual issuer level. For instance, the funding activities of the two largest US issuers in the international market, Fannie Mae and Freddie Mac, have diverged recently. On the one hand, Fannie Mae brought several large bonds to the market in the second quarter, with gross issuance of $27.1 billion and net issuance of $17.8 billion (Graph 3.1); by contrast, net issuance by Freddie Mac was negative (–$6.1 billion). Financial restructuring has been taking place at both of these

International debt securities issuance by selected US issuers
In billions of US dollars

Sources: Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS.   Graph 3.1

government-sponsored enterprises in response to the revelation of accounting irregularities at the two firms. Even so, Fannie Mae regularly continues to tap international capital markets.

Two of the other large US issuers in the international market, General Motors (GMAC) and Ford, have also been experiencing financial difficulties, albeit of a different nature. Beset by negative earnings surprises and ratings downgrades by the major agencies, neither of these issuers was active in the international debt securities market in the second quarter. In fact, the presence of these firms in this market has been diminishing since 2002, with net issuance often coming in negative, especially in the case of Ford (Graph 3.1).

Mixed picture in Japan

Gross issuance of bonds and notes by Japan increased in the second quarter, from $13.9 billion to $14.9 billion. Issuance figures expressed in terms of yen are even higher, owing to the negative impact of valuation effects arising from a 3.2% depreciation of the yen vis-à-vis the US dollar from 1 April to 30 June. Some of the largest Japanese issues were completed by entities with operations outside the country. For example, CIT Group Canada issued five-year and 10-year dollar-denominated bonds with face values of $1 billion and $0.7 billion, respectively. Several public finance vehicles also announced large issues, including Japan Finance Corporation for Municipal Enterprises, Japan Bank for International Cooperation, and Development Bank of Japan. All of these offerings have public guarantees.

Even so, despite the increase in gross issuance, net issuance of bonds and notes by Japanese nationals actually became negative during the period (−$0.6 billion). Most of the new net borrowing by Japanese nationals was done by corporations, but this was more than offset by a large decline in net issuance by financial institutions.

High-yield issuance hit by auto sector turmoil

Borrowing by high-yield entities in developed economies fell by 44% during the quarter, albeit from what had been an unusually high level sustained in the past two years (Graph 3.2). Conditions deteriorated in the wake of turmoil in credit markets in April and May. Secondary market spreads on US high-yield bonds rose precipitously, from 355 basis points on 1 April to 457 basis points on 17 May, and the spread on European high-yield bonds widened by even more. With a large jump in the stock of outstanding high-yield debt following the downgrades of General Motors and Ford to junk status, there was considerable uncertainty about how much new speculative grade issuance could be absorbed, as an anxious and hesitant mood beset the markets (see the Overview in the *BIS Quarterly Review*, June 2005). However, conditions improved markedly in June: spreads narrowed to 385 basis points by month-end and several new issues were brought to the market late in the quarter.

Announced issuance of non-investment grade[1] international bonds by developed country entities

In billions of US dollars, by nationality of issuer

[1] Issuers rated BB or lower.

Sources: Dealogic; BIS.   Graph 3.2
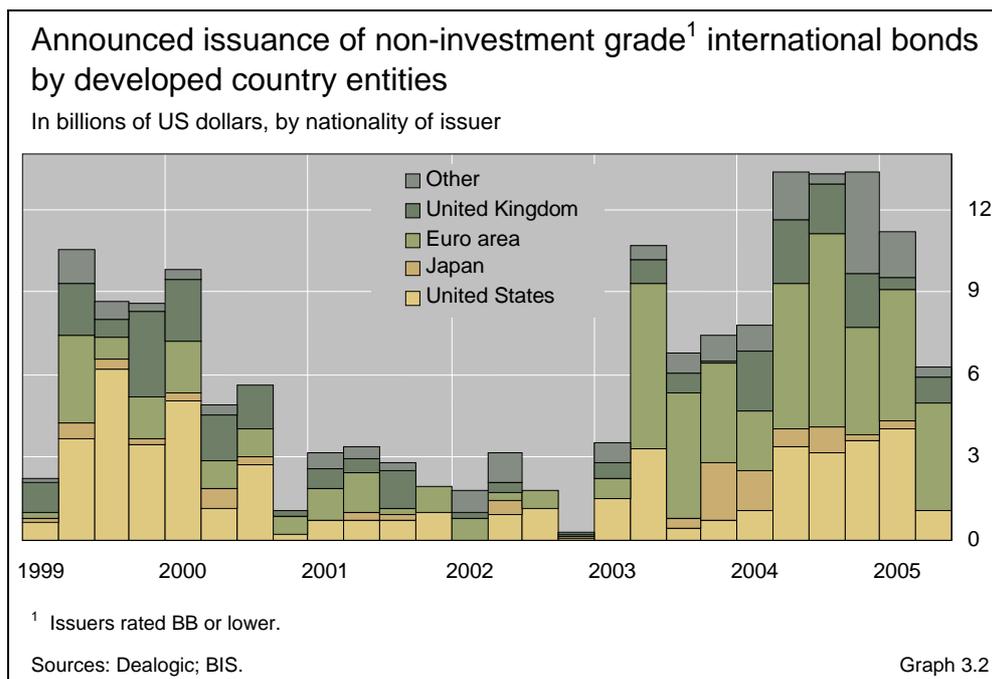
The largest completions in the second quarter were made mainly by entities from the euro area and United Kingdom. These included French issues by Cap Gemini SA and FG4 SA in the amounts of €437 million and €265 million, respectively. The former was launched with a rating of BB+ by Standard & Poor's, while the latter was rated B1 by Moody's. The largest placements by US nationals were, in fact, for operations resident outside the United States. For example, TFM SA de CV, a rail transportation firm operating in Mexico, released a bond with a face value of $460 million. It was announced and completed in the market in mid-April before US high-yield spreads spiked.

European firms are the largest high-yield borrowers in the international market

One of the largest non-investment grade issues (excluding emerging markets) announced in the second quarter points to the growing significance of the market for credit default swap (CDS) indices.[1] It was a fixed rate bond for €500 million by SPV iTraxx, secured on a portfolio of 35 European non-financial bonds whose composition is designed to track the Dow Jones iTraxx Crossover index. The bond, which was rated B+ by Standard & Poor's at launch, will pay a semiannual coupon of 6.25% and is timed to mature at the rollover in the index on 20 June 2010.

Emerging market borrowing maintains rapid pace

Gross issuance of bonds and notes in the international market by emerging market countries surged ahead once again in the second quarter, up by 6% from the first quarter of 2005 and up by 37% over the previous year.[2] The most recent figures are impressive for several reasons. First, and most obviously,

Emerging market borrowing surges ahead

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[1] Further discussion of structural developments in the CDS market can be found in the *BIS 75th Annual Report*, Chapter VI.

[2] Excluding the Republic of Argentina's newly exchanged issues totalling $35.6 billion from the first quarter of 2005. See below for further discussion.

the second quarter results extend the record-breaking trend in borrowing on the international securities market by emerging market countries that began early last year (Graph 3.3). Second, the increase compared to the first quarter of 2005 came despite apparent changes in seasonal factors that show a growing amount of emerging market issuance being done in the first quarter of the year, whereas second quarter issuance has persistently declined since 2000 (see the box). Third, although the macroeconomic outlook continues to be strong in many emerging market countries, and would therefore be supportive of further credit expansion, past experience suggests that emerging market borrowers were at risk of being exposed to a potentially large negative swing in investor sentiment emanating from the turmoil in US credit markets. As it turned out, the market reaction was much more muted than in US and European high-yield markets, with spreads on JPMorgan Chase's EMBI+ index widening from 392 basis points on 1 April to 414 basis points on 15 April. By the end of the quarter, spreads had narrowed to what was then a historical low of 304 basis points. Ultimately, with net issuance also increasing in the second

International debt securities issuance by emerging market entities[1]

In billions of US dollars

Gross issuance, by nationality of issuer

- Middle East & Africa
- Emerging Europe
- Latin America & Caribbean
- Asia-Pacific

Net issuance, by nationality of issuer

- Middle East & Africa
- Emerging Europe
- Latin America & Caribbean
- Asia-Pacific

Gross issuance, by sector of issuer

- Corporate issuers
- Financial institutions
- Governments

Net issuance, by sector of issuer

- Corporate issuers
- Financial institutions
- Governments

[1] Excluding issuance by the Republic of Argentina in the first and second quarters of 2005.

Sources: Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS.   Graph 3.3

quarter,[3] financing conditions were clearly favourable during the period as a whole, as global investor demand for emerging market debt remained robust.

In general, sovereigns were the biggest issuers in all markets except the Middle East and Africa. Emerging Europe led the way, with gross issuance of debt securities from the region totalling $21.1 billion, 53.6% of it from sovereigns. Following up on a record €3 billion issue in the first quarter, the Republic of Poland has been particularly active in recent months in issuing several types of bonds. In early April, the Polish government completed a euro-denominated medium-term note with a face value of €1.5 billion ($1.89 billion). The new instrument has a maturity of 15 years and was launched at a spread of 37.8 basis points over the 4.25% OAT maturing in April 2019. Then, in early June, Poland issued a samurai bond with a record (for the region's issuers) face value of ¥75 billion ($697 million). Later in the month, the Republic of Hungary also issued two samurai bonds totalling the same amount. Finally, tapping into the new-found demand for long-dated paper, primarily on the part of euro area pension funds, the Republic of Poland issued a 50-year bond in early July (for further discussion on the increased demand for long-duration bonds, see this chapter in the *BIS Quarterly Review*, June 2005).

A total of 175 issues in the amount of $16.3 billion were announced by entities from Asia-Pacific in the second quarter. The Asian sovereigns that brought the largest issues to the international market were the Republic of Indonesia and the Republic of the Philippines. The former issued a 10-year dollar-denominated bond with a face value of $1 billion. More striking was the ability of the Republic of the Philippines to complete a large issue during the quarter in the face of ongoing political difficulties and a deterioration in the country's fiscal situation. To some extent, the country's difficulties were reflected in the secondary market. For instance, after narrowing to a low of 385 basis points in early March, spreads on Philippines government debt widened in late March–early April and were also more volatile over the subsequent period (see the Overview). The government bond issued on 16 May had a maturity of 24.75 years and was priced at a spread of 510.5 basis points over the 5.375% US Treasury bond due to mature in February 2031.

Both gross and net issuance from the Middle East and Africa grew in the second quarter, though this region continues to account for a much smaller segment of the international debt securities market than the other three emerging market regions. Amongst the largest borrowers during the period were banking and financial firms from the United Arab Emirates and Kuwait.

In contrast to the regions of emerging Europe and Asia-Pacific, gross issuance by entities from Latin America fell during the second quarter, by 6.9% to $12.1 billion. Still, the governments of Venezuela, Brazil and Mexico each completed large bond issues, in the amounts of $1.6 billion, $1.1 billion and $0.9 billion, respectively.

The second quarter may prove to have been a pivotal period for Latin America in the international debt securities market for at least two reasons.

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[3] Excluding repayments in the amount of $48.6 billion in the second quarter of 2005 resulting from the completion of the Republic of Argentina's debt exchange offer.

First, as discussed further below, Latin American entities continued to issue international bonds in local currency. Second, the Republic of Argentina's debt exchange offer to eligible creditors (holding approximately 76% of claims) was finally settled in June, following the original announcement in February of this year. A significant portion of the debt to be restructured had been placed in the international market, and under the terms of the offer all $35.6 billion of the new issues have been registered in the global market. Of particular significance is the fact that 44% of the newly issued debt was denominated in pesos.

Appetite for local currency issuance grows

The trend towards greater issuance of international debt securities in local currencies by emerging market entities continued in the second quarter, with the amount of gross issuance in local currency increasing by roughly 30% expressed in US dollars (Graph 3.4). Notably, local currency issuance continued to rise against a backdrop of what would seem to have been unfavourable global conditions, as the second quarter witnessed a general increase in investors' risk aversion arising from the events in the US auto sector. Moreover, this increased willingness of investors to assume local currency risk in emerging market debt has coincided with a significant narrowing of emerging market spreads, similar to the scenario observed in 1996–97, when local currency issuance was also elevated for several quarters (Graph 3.4).

Latin America continues to take a leading role in the growth of the local currency segment in the international bond markets. Sovereigns (Uruguay, Colombia and Argentina) and corporates (notably Brazilian banks) alike have been active in this area over the past couple of years. In the second quarter, Brazilian firms came to the international market with several local currency

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International debt securities issuance in local currency by emerging market entities

Announced issuance by nationality of issuer, in millions of US dollars

[1] Excluding issuance by the Republic of Argentina in the first quarter of 2005.

Sources: Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS.   Graph 3.4
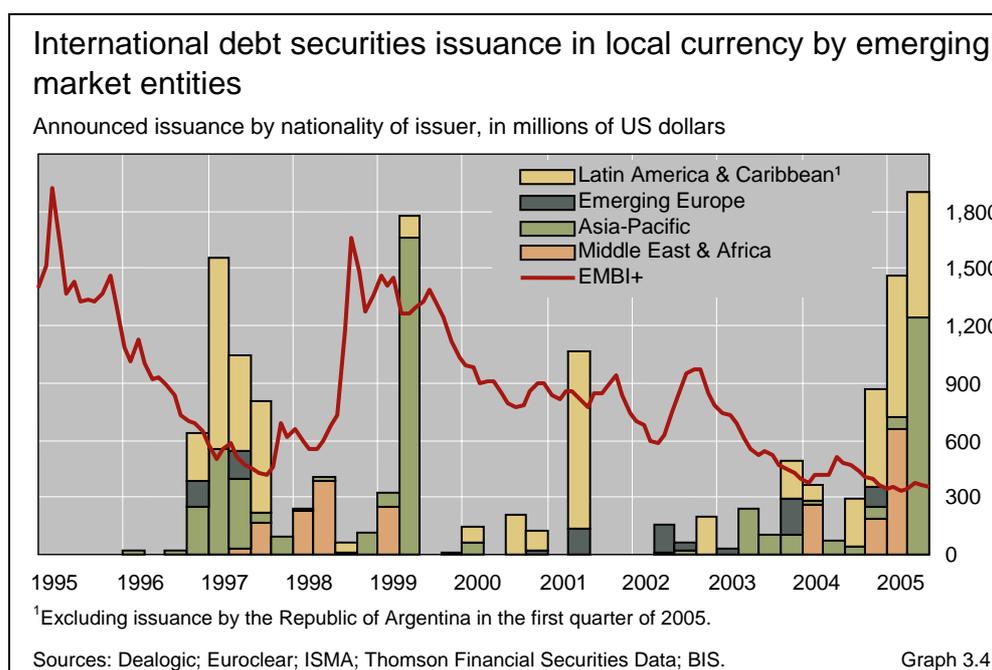
Net issuance of international bonds and notes by region and currency[1] In billions of US dollars		2003	2004	2004			2005	
		Year	Year	Q2	Q3	Q4	Q1	Q2
United States	US dollar	203.5	131.2	−27.0	5.0	51.1	42.2	47.7
	Euro	41.4	48.4	20.2	14.7	7.4	13.7	−3.2
	Pound sterling	11.8	22.5	5.4	10.6	4.7	5.1	1.6
	Yen	1.2	4.8	1.7	1.5	0.3	−1.1	−0.3
	Other	1.0	11.7	3.9	3.0	0.5	4.5	−0.1
Euro area	US dollar	75.9	57.6	25.5	9.8	15.9	15.4	12.7
	Euro	627.6	655.6	157.0	115.4	195.3	236.3	262.1
	Pound sterling	13.9	32.6	12.6	8.2	5.3	12.0	6.9
	Yen	−9.5	3.1	3.8	0.6	−3.0	5.0	0.2
	Other	25.6	31.8	6.1	5.8	6.9	13.3	7.6
Others	US dollar	140.1	183.5	50.4	39.2	46.3	37.4	30.2
	Euro	114.8	219.2	43.4	62.6	47.8	61.1	52.8
	Pound sterling	59.5	79.2	19.1	8.2	29.0	31.5	25.1
	Yen	12.0	19.2	9.5	5.2	0.9	0.1	−6.4
	Other	45.0	51.8	7.8	14.1	16.5	15.9	36.7
Total	US dollar	419.4	372.3	48.9	53.9	113.3	95.1	90.5
	Euro	783.7	923.2	220.7	192.8	250.5	311.1	311.7
	Pound sterling	85.2	134.2	37.1	27.0	39.0	48.6	33.7
	Yen	3.7	27.2	15.0	7.3	−1.8	4.0	−6.5
	Other	71.7	95.3	17.9	22.9	23.9	33.7	44.2

[1] Based on the nationality of the borrower.

Sources: Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS. Table 3.3

bonds totalling $660 million, including medium-term notes by three banks (Banco Bradesco SA, Banco Itau Europa SA and Unibanco-Uniao de Bancos Brasileiros SA) and a straight five-year fixed rate bond by Eletricidade de São Paulo SA with a face value of 474.1 million reais ($198.7 million). In addition, as mentioned above, a portion of the Republic of Argentina's debt repackage included local currency global bonds in the amount of $15.6 billion.[4] This more than accounted for the large increase in global issuance in non-G3 currencies in the second quarter (Table 3.3).

Despite several local currency issues by Latin American entities, the largest amount of local currency international debt during the period came from the Asia-Pacific region. Even so, the total amount of $1,238 million in local currency issuance from this region consisted of only two issues, of which by far the larger one was a foreign private placement of a 10 billion renminbi ($1,208 million) floating rate note issued by the Agricultural Development Bank of China. The other bond, denominated in Korean won, was from SKC Inc, a US-based engineering firm that is part of the Korean entity SK Corp.

... and a large renminbi-denominated issue

[4] The peso-denominated portion of the Republic of Argentina's global bond exchange is omitted from Graph 3.3 because it dwarfs in size all other local currency issues dating back to 1995. As the graph reports announced (as opposed to completed) issues, the Argentine issues would have been included in the total for the first quarter of 2005.

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4. Derivatives markets

Trading on the international derivatives exchanges continued to be buoyant during the second quarter of 2005. Combined turnover in fixed income, equity index and currency contracts increased by 11% to $372 trillion, after a 20% rise in the previous quarter.

The growth in activity was mainly due to market participants' changing perceptions about the future path of policy rates. Consequently, the increase in turnover was greatest in derivatives on short-term interest rates, both futures and options, whereas activity in long-term bond contracts declined slightly (Graph 4.1). The trading volume of equity index contracts rose for the third quarter in a row, albeit at a reduced pace. Turnover in exchange-traded currency derivatives increased by 15% in the second quarter, but at $3 trillion remains modest compared to interest rate and equity index contracts.[1]

Turnover of exchange-traded futures and options
Quarterly data, in trillions of US dollars

By contract type — Long-term interest rate, Short-term interest rate, Stock market index

By region — Asia-Pacific, Europe, North America

Sources: FOW TRADEdata; Futures Industry Association; BIS calculations.   Graph 4.1

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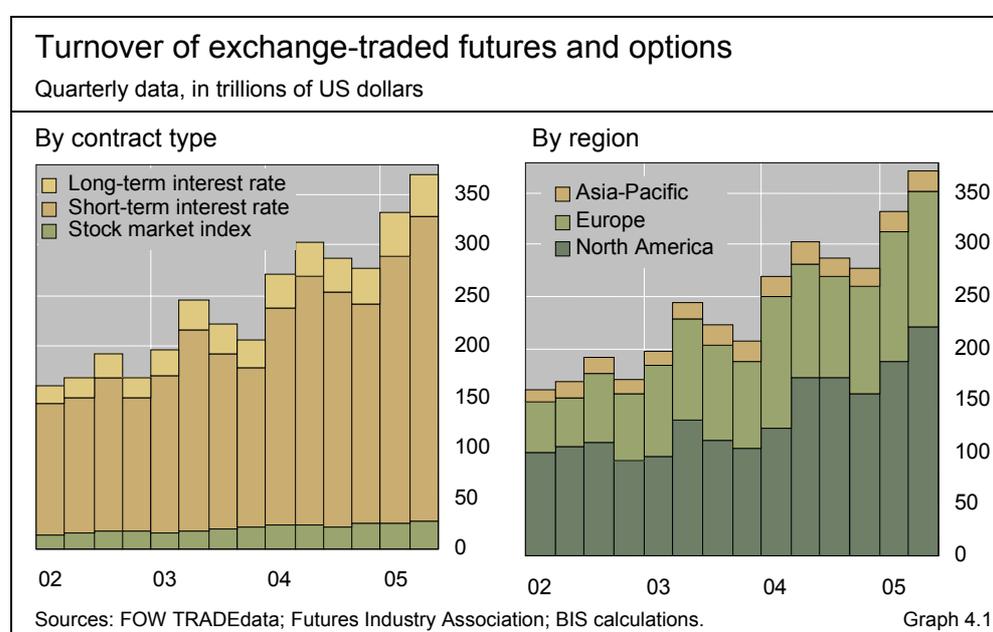
[1] This section focuses exclusively on exchange-traded derivatives. Semiannual data on the OTC market are published in the June and December issues of the *BIS Quarterly Review*. In December 2004, the BIS started to collect data on credit default swaps (CDSs) as well as concentration measures for the OTC market. They were published in May 2005 in Tables 4 and 5 of *OTC derivatives market activity in the second half of 2004* (available on the BIS website).

Strong growth in short-term interest rate contracts

Although volatility in money market rates was low during most of the second quarter (Graph 4.2), there were some shifts in investors' expectations about future central bank policy actions that have spurred trading in derivatives markets. In the United States, adverse news on economic activity in April led to a flattening of the short end of the yield curve, as market participants expected the Federal Reserve to slow the pace of its rate increases. This contributed to a surge in trading volume in derivatives on short-term dollar interest rates to $71 trillion in April, the highest monthly value on record in that segment. In the following months, the economy rebounded and it became clear that the Fed would continue its policy of measured rate increases. Turnover in short-term interest rate contracts declined, averaging $59 trillion per month over the remainder of the quarter, although open interest continued to rise in May. For

Changing rate
expectations in the
United States ...

Volatility of major fixed income rates

Five-day moving averages

Money markets

Eurodollar — GARCH[1] / Implied[2]

Euribor

Euroyen

Government bond markets

Ten-year US Treasury note

Ten-year German government bond

Ten-year Japanese government bond

[1] Annualised conditional volatility of daily changes in eurocurrency yields and bond prices from a GARCH(1,1) model. [2] Volatility implied by the prices of at-the-money call options.

Sources: Bloomberg; national data; BIS calculations.   Graph 4.2

Turnover of short-term interest rate contracts

Quarterly contract turnover, in trillions of US dollars

North America — Europe — Asia-Pacific
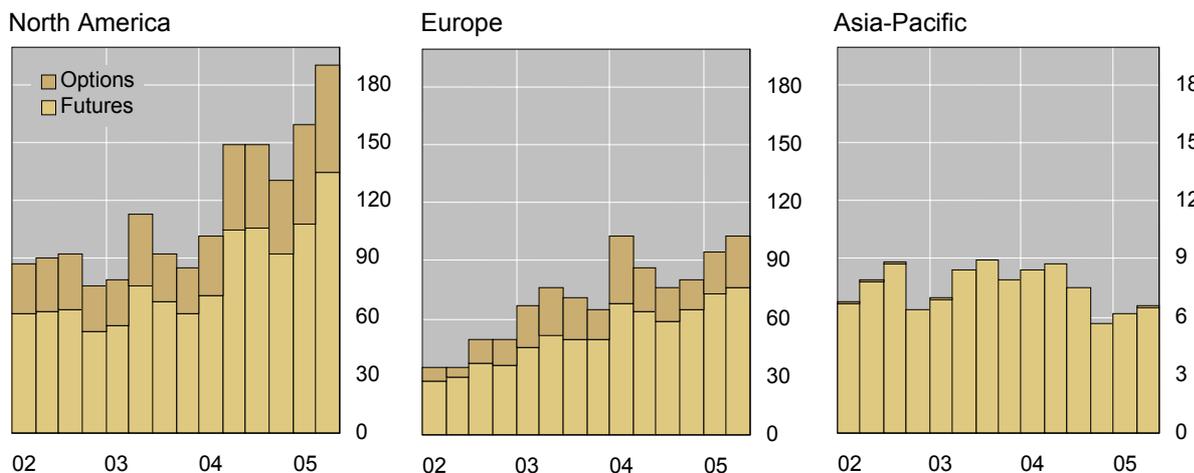
Options
Futures

Sources: FOW TRADEdata; Futures Industry Association; BIS calculations.   Graph 4.3

the second quarter as a whole, turnover in short-term interest rate derivatives denominated in US dollars reached $190 trillion, with options accounting for $56 trillion (Graph 4.3).

In Europe, signs of slowing economic activity as well as remarks by ECB officials towards the end of the quarter led markets to revise their expectations concerning future monetary policy. Rather than pricing in rate increases (as in April and May), market participants began to assign a small probability to a rate cut. Implied volatility from options on three-month Euribor soared in June. Owing to the increasingly uncertain outlook for policy rates, trading in short-term interest rate options denominated in euros more than doubled to $9 trillion in June, and activity in the underlying futures rose to $23 trillion from $15 trillion in May. During the entire second quarter, trading in short-term interest rate derivatives in euros amounted to $74 trillion, 6% higher than in the previous quarter. A pickup in trading activity was also observed in short-term sterling contracts. For the second quarter in a row, turnover increased at a rate of around 20%, as investors became more convinced that a rate cut was in the offing.

Business in exchange-traded long-term interest rate derivatives remained more contained than activity at the short end, with global turnover decreasing by 3% to $41 trillion in the second quarter. The decline was led by a 9% drop in euro-denominated contracts (Graph 4.4). However, at $22 trillion, activity in long-term euro fixed income derivatives remained greater than that in all other currencies taken together. The fall in turnover during the second quarter reflected weak activity in April and May, which was followed by heavier trading in June.

Turnover in the dollar market, by contrast, rose slightly to $15 trillion in the second quarter. While trading was muted in April, a record level of open interest shows that market participants increased their positions in long-term interest rate risk beyond the already high level observed at the end of March. Trading in futures on US government bonds picked up in May as yields

Turnover of government bond contracts
Quarterly contract turnover, in trillions of US dollars

North America

Europe

Asia-Pacific

□ Options
□ Futures

Graph 4.4
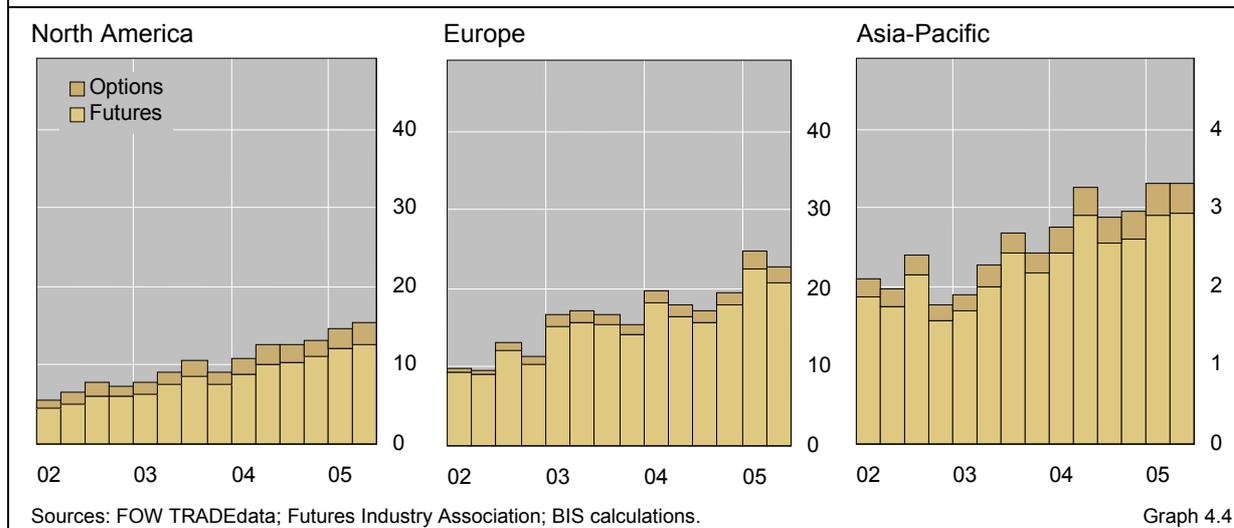
continued to decline, although open interest fell back to a level similar to the one that had prevailed during the first two months of the year. Interestingly enough, neither the short-lived rise in yields nor the surge in mortgage prepayments in June produced any noticeable rise in derivatives trading. In fact, turnover in futures went down, although trading in options did rise somewhat. The reduced levels in volume and open interest in June point to only subdued hedging activity preceding the decrease in bond prices the following month.

The decline in activity in June is unlikely to have been related to fears of a shortage of deliverable bonds for the June 10-year Treasury future, as contracts on bonds with other maturities showed a similar time pattern. The announcement by the Chicago Board of Trade on 29 June of a rule capping deliveries of underlying bonds depressed futures prices, but came too late to have any visible effect on volume in the same month.

Fear of a shortage of deliverable Treasuries leaves volumes unaffected

Trading in interest rate derivatives in the Asia-Pacific region rose by 4% to $10 trillion. The increase was driven mainly by higher turnover in contracts denominated in Australian dollars, which was up by 11% to $5 trillion. As in most other regions, trading concentrated on the short end of the yield curve, as market participants revised downwards their expectations of future interest rates. Trading volume in options on short-term Australian interest rates climbed by a remarkable 58%, with heavy activity in April and May. However, at $104 million, turnover in options remains minuscule relative to trading in futures ($4.7 trillion). In contrast to most other large markets, activity in interest rate contracts denominated in yen remained virtually unchanged at $4.7 trillion, which is in line with low and stable volatility at both the short and the long ends of the curve.

Turnover growth in Asia-Pacific currencies

Slowing growth in equity derivatives

Business in stock index derivatives went up by 4% to $28 trillion between April and June, after an increase of 9% in the previous quarter. Growth slowed in spite of a rise in implied volatility in major equity markets in the first half of the quarter. The hedging needs associated with this increase in uncertainty may have been offset by a reduced inclination on the part of traders to take positions in equity risk, which would be consistent with the decline in risk appetite indicators over the period (see the Overview in the June 2005 *BIS Quarterly Review*). Open interest in stock index contracts rose by 2%, half the rate of growth in turnover. In the first quarter, open interest had soared by 22%. The slowing growth in open positions is in line with the increase in implied volatility already mentioned, which was only partly offset by the effect of heightened disagreement on future profit growth among equity analysts. In the past, open interest in stock index contracts has been positively related to analyst disagreement and negatively related to implied volatility (see the box on page 52).

The growth in turnover was more or less evenly spread across the major derivatives markets, in line with similar patterns in equity prices and volatility. The major exceptions to this general picture were contracts on Korean and UK stock indices, where trading volume fell by 5% to $7 trillion and by 3% to $0.8 trillion, respectively. Among the smaller markets, activity strongly increased in the Scandinavian countries, going up by 34% in Denmark, 27% in Norway, and 14% in Sweden. Stock prices in these countries rose at a considerably higher rate during the second quarter than those in the major European markets. In the Asia-Pacific region, turnover picked up in Taiwan (China) (+26%) and Australia (+15%). In Latin America, trading went up by 15% in Brazil, but dropped by 6% in Mexico. Finally, activity in the South African market also declined by 6%.

Turnover in contracts on individual stocks (data on which are available only in terms of the number of traded contracts) increased by more than 2% in the second quarter. This is similar to the rate of growth in the number of equity index contracts (in contrast to the 4% rise in notional values described above). However, the similarity in the rates of growth is an artefact that arises due to the different regional composition of trading in single stock contracts and index products. In the US and euro area markets, where both types of contracts are traded in parallel, the growth in index derivatives far outpaced that in single stock products. It has been argued that investors tend to use single stock contracts to trade on individual company news and index products to trade on news affecting the aggregate market. If this is true, then the two turning points in equity prices during the second quarter would have been mainly attributable to changing perceptions about aggregate economic activity and systemic risk, rather than being the result of isolated events at major firms.

Differences in opinion and derivatives activity

In principle, trading is not necessary for new information to be reflected in financial market prices; in practice, though, trading does occur. One reason for this is the existence of private information. However, while asymmetric information may explain trading in individual stocks, it is not clear whether it suffices to explain activity in stock index contracts, whose returns tend to be driven more by macroeconomic information.[1] Most of this information is public, but investors may still disagree about how it relates to stock returns. In contrast to private information, which tends to get incorporated into prices very quickly, such differences in opinion may persist over prolonged periods of time and may therefore be associated with high trading volume even at lower frequencies.[2]

In this box, we present some tentative evidence on the relationship between differences in opinion and monthly trading activity, as measured by the BIS derivatives statistics. We find that analyst disagreement is positively related to open interest in stock index derivatives, reflecting increased trading opportunities, whereas high uncertainty is associated with smaller open positions, perhaps due to their increased riskiness. Turnover in index products, by contrast, rises in times of uncertainty, but is not affected by differences in opinion.

We use the disagreement on future profits of stock analysts as a proxy for differences in opinion. Forecasts of the profits per share of the individual firms included in the S&P 500 stock index are collected and aggregated by I/B/E/S on a monthly basis. We relate the standard deviations in each month of these forecasts (stdprofits) to measures for activity (y) such as monthly turnover in S&P 500 stock index futures and options as well as to the open interest in these contracts, giving a total of four regressions.

In addition, we include a measure for price uncertainty in our set of explanatory variables. We proxy the uncertainty on future equity returns by the implied volatility from options on the S&P 500 future (iv). Implied volatility provides a useful measure of the degree of uncertainty in a market, even if one relaxes the fairly restrictive assumptions of the option pricing model under which it is derived. While intuitively one would expect differences in opinion to be more pronounced in periods with a high degree of uncertainty, these two concepts are not the same.[3] This is underscored by the low correlation of 0.22 between implied volatility on the one hand, and our measure for differences in opinion on the other.

Estimations are based on monthly data ranging from June 1994 to June 2005. All variables are integrated of order 1, but standard cointegration tests fail to uncover any long-term relationship. The models are estimated in first differences by OLS, the lag length being determined by the Akaike and Schwartz information criteria. The results are given in the table below. The regressions also include a constant and a full set of monthly dummy variables in order to control for expiration and other seasonal effects, but the respective coefficients are not reported for reasons of space.

The estimation results do not give support to the notion that differences in opinion are associated with higher turnover in stock index futures. For options, there is in fact weak evidence (at the 10% confidence level) that analyst disagreement is associated with lower, rather than higher, turnover in the following month. The coefficient of contemporaneous implied volatility, by contrast, is statistically significant and positive in both equations. This is in line with the literature based on daily frequencies, but differs from the results obtained by Jeanneau and Micu (2003) with monthly data.[4] A possible explanation for this contradiction is that they controlled for reverse causation by using two-stage least squares, while the present OLS estimates merely highlight correlations, not causation.

The results concerning open interest differ substantially from those on turnover. A rise in disagreement among analysts is initially associated with larger positions in both futures and

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[1] The unattractiveness of index contracts for traders with private information reduces the adverse selection cost of trading in that market, making it particularly attractive to uninformed investors. See A Subrahmanyam, "A theory of trading in stock index futures", *Review of Financial Studies*, 4(1), 1991, pp 17–51.   [2] On a more abstract level, C T Shalen, "Volume, volatility, and the dispersion of beliefs", *Review of Financial Studies*, 6(2), 1993, pp 405–34, and M Harris and A Raviv, "Differences in opinion make a horse race", *Review of Financial Studies*, 6(3), 1993, pp 473–506, find that a dispersion in traders' beliefs may exert a positive influence on trading volume over an extended period of time.   [3] If analyst disagreement merely reflected risk, it should be positively related to future stock returns, reflecting a risk premium. Instead, the relationship between disagreement and returns appears to be negative. See K B Diether, C J Malloy and A Scherbina, "Differences of opinion and the cross section of stock returns", *Journal of Finance*, 57(5), 2002, pp 2113–41.   [4] S Jeanneau and M Micu, "Volatility and derivatives turnover: a tenuous relationship", *BIS Quarterly Review*, March 2003, pp 57–65.

Differences in opinion and activity in S&P 500 stock index derivatives				
	Turnover		Open interest	
	Futures	Options	Futures	Options
Δy_{t-1}	−0.748*** (0.0734)	−0.403*** (0.0844)	−0.295** (0.116)[1]	−0.045 (0.084)[1]
Δy_{t-2}	−0.648*** (0.0741)	–	−0.180* (0.096)[1]	−0.095 (0.103)[1]
Δy_{t-3}	–	–	–	0.362*** (0.092)[1]
$\Delta stdprofits_t$	−50,770 (73,405)	40,697 (39,124)	17,106** (8,282)[1]	61,850*** (21,021)[1]
$\Delta stdprofits_{t-1}$	−32,611 (73,576)	−72,475* (37,325)	3,771 (6,705)[1]	−25,926 (22,578)[1]
$\Delta stdprofits_{t-2}$	−87,430 (72,027)	–	−15,633** (6,113)[1]	−52,760** (22,955)[1]
$\Delta stdprofits_{t-2}$	–	–	–	7,349 (24,386)
Δiv_t	11,506*** (3,415)	3,709** (1840)	−817*** (277)[1]	−2,833*** (980)[1]
Δiv_{t-1}	3,602 (3,470)	−1,548 (1,917)	−81 (327)[1]	−1,157 (954)[1]
Δiv_{t-2}	−270 (3,586)	–	−541 (375)[1]	−1,853* (953)[1]
Δiv_{t-3}	–	–	–	1,323 (985)[1]
Adjusted R^2	0.84	0.41	0.61	0.82
Durbin-Watson	1.88	2.19	1.88	1.93

Note: Standard errors in brackets. ***, ** and * stand for significance at the 1%, 5% and 10% level, respectively.

[1] White heteroscedasticity-consistent standard error.

options, but the effect reverses after two months. Incidentally, two months is roughly equivalent to the average time to maturity of the most heavily traded contract. Since at maturity positions have to be either closed or rolled over to the next contract, it is not surprising to find a reversal in open interest.

The coefficient on contemporaneous implied volatility is positive and highly significant. This relationship, which is robust to changes in sample length or the selection of variables, is at odds with a large literature that explores the relationship between trading activity and volatility at a daily level, although it supports the work of Jeanneau and Micu using monthly data. It appears that an increase in uncertainty boosts trading in the short term but reduces investors' willingness to hold open positions once the immediate adjustment is completed.

Our findings provide a useful background for the interpretation of monthly movements in turnover and open interest in the present and future issues of the *BIS Quarterly Review*, but for two reasons should not be mistaken for a test of a formal theory. First of all, the opinions of stock analysts may differ from those held by traders. While the two are often employed by the same firm, they perform very different roles and are subject to different incentives. This holds even more so after the recent changes mainly, but not exclusively, in the United States, aimed at increasing the independence of analysts and strengthening the integrity of their forecasts. Moreover, traders and analysts may have different time horizons, which provides yet another reason for why their views may differ. The second caveat concerns the frequency of the data used. A more thorough examination would have to look at the pattern over time by which differences in opinion and uncertainty affect derivatives activity.

Surge in currency contracts

The strength of the US dollar during the second quarter set the scene for yet another surge in activity in exchange-traded currency derivatives. The dollar gained 7% against the euro and 6% against the yen between its low in late April and the end of June (Graph 4.5). Against this backdrop, turnover in exchange-traded currency derivatives rose by 15% to $3 trillion. While activity in April and May remained close to the monthly average in the preceding quarter, it soared to a new high in June. The fact that this pattern holds for euro, yen and pound sterling contracts suggests that investors were trading dollar risk rather than the risk specific to another currency. In particular, the data do not offer any indication that traders used the derivatives market to speculate on a revaluation of the Chinese renminbi, which eventually materialised on 21 July (see the Overview). Although direct trading in renminbi derivatives has been heavily restricted by Chinese regulations, traders may have used the yen/dollar market as a vehicle for speculation on the likelihood of a renminbi adjustment, since the yen was widely expected to appreciate against the dollar were the renminbi to revalue. But while turnover in that

Dollar appreciation the main driver of derivatives turnover

Dollar appreciation the main driver of derivatives turnover

Exchange rates, implied volatilities and risk reversals

Dollar/euro

Yen/dollar

Yen/euro

Exchange rate

Implied volatility (rhs)[1]
Risk reversal (lhs)[2]

[1] One-month horizon, in per cent.   [2] A positive value indicates a bias towards dollar strength in the left-hand and centre panels, and towards euro strength in the right-hand panel.

Sources: DrKW Research; Reuters; BIS calculations.   Graph 4.5

54   BIS Quarterly Review, September 2005

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Sources: DrKW Research; Reuters; BIS calculations.   Graph 4.5

54   BIS Quarterly Review, September 2005

currency pair was strong (+18% in the second quarter), its growth was very much in line with that in the euro/dollar (+16%) or in the sterling/dollar (+20%) markets.

It appears that the rise in volume in June mainly reflected trading on short-term price movements rather than more long-term position-taking. This is suggested by the development of open interest in euro, yen and sterling contracts. Correcting for exchange rate movements, open interest in these currencies moved broadly in line with turnover during the first two months of the quarter, but then fell in June. Data from the Commodity Futures Trading Commission (CFTC) for the heavily traded euro FX contract of the Chicago Mercantile Exchange show that commercial traders, who use derivatives primarily for hedging purposes, sharply increased both their long and their short positions until the beginning of June and reduced them afterwards. The decline towards the end of the quarter was only partly offset by non-commercial users, who doubled their short positions in the euro between April and June, while holding their long positions constant. This is consistent with evidence from risk reversals, which involve purchasing an out-of-the-money call option and selling an out-of-the-money put option. The price paid on such a strategy reflects, among other factors, the risk of large upward price movements relative to large downward movements. During the second quarter, the risk reversal indicator for the dollar/euro and the yen/dollar currency pairs steadily moved upwards (Graph 4.5), suggesting that investors viewed the upward potential of long positions in the dollar to be larger than the downward risk of such positions.

Similar data on commercial and non-commercial users are not available for contracts traded outside the United States. There is some reason to believe, however, that hedging was an important motivation behind the 35% increase in the open interest in contracts on the US dollar/Brazilian real currency pair, which far outpaced growth in turnover (+14%). At $44 billion at the end of the second quarter, open interest in the real exceeded open positions in all other currencies bar the euro ($49 billion). A development similar to that in Brazil could be observed in Mexico, where turnover declined by 15% in the second quarter, whereas open interest rose by 76%. Domestic bond markets have grown considerably in recent years in both countries, as has the participation of foreign investors in these markets, which could account for the increased hedging needs. The tightness of the spreads paid on Brazilian debt, by contrast, suggests that political turmoil in that country is unlikely to have played a major role in this regard (see page 10 of the Overview).

Growth in commodities picks up as economy grows

The favourable outlook for economic activity during most of the second quarter was reflected in solid growth in the market for commodity derivatives. Although the total number of contracts (data on notional value are not available) rose by only 5%, this was in part due to a 12% drop in derivatives on precious metals. These contracts are often preferred as a hedge in times of economic weakness

or turbulence, so a decline in trading volume may be associated with positive news on economic activity.

Sharp price movements in the market for crude oil during the second quarter led to a surge in trading in energy products (+11%) that outstripped turnover growth in non-precious metals (+6%) and in agricultural commodities[2] (4%). The increase in turnover of energy derivatives reflected heavy trading on short-term news rather than long-term position-taking, as open interest declined by 9% in the second quarter. Among the major markets, open interest only increased in the United States, but even there its rate of growth (4%) fell behind that of turnover (11%). CFTC data indicate that the slowing in the growth of open interest followed a reduction in the long positions of non-commercial users, which between the beginning of April and the end of June fell by one quarter. Although non-commercial users, often termed "speculators", only account for a minor fraction of total open interest, their positions are much more variable than those of the commercial users, or "hedgers".

<div style="float:right">… boosted by price volatility in the oil market</div>

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[2] A number of new agricultural contracts have been added to the BIS database since the start of this year. For this reason, the number of contracts traded in the first quarter has been revised upwards from the last *BIS Quarterly Review*. It cannot therefore be compared to the number of contracts traded in previous years.

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Distinguishing global dollar reserves from official holdings in the United States[1]

Official holdings of US dollar reserves are partly invested outside the United States. These offshore investments do not strictly speaking finance the US current account, but do support the US dollar. Offshore holdings grow fast when intervention is large.

JEL classification: E580, F210, F310, F320, F330, F340, G150, N200.

The extent to which global official dollar reserves exceed official holdings of assets in the United States has come under increasing scrutiny in recent years.[2] To be sure, official holders of dollars have invested a portion outside the United States for generations. But, as official intervention in the foreign exchange markets has reached unprecedented levels, so too has the sum of dollars placed offshore. What accounts for these holdings, and in what sense do they either finance US external deficits or support the dollar's exchange rate?

Drawing on national and BIS data, this special feature begins by presenting estimates of official dollars held offshore. After reviewing the debate over their role in financing US current account deficits, it then outlines the political and economic reasons for such holdings. Once crucial, yield differences have lost importance, while country risk and investment lags after heavy intervention have not.

Finally, the feature argues that, while offshore placements do not strictly speaking finance the US current account deficit, they do support the dollar. The importance of such official support can be gauged by the US net *dollar* external financing requirement, including the purchase of foreign currency assets.

Questions regarding the reasons for and consequences of central banks' dollar holdings outside the United States are just special cases of the broader and long-standing questions of why offshore markets exist and what difference they make. To some extent, then, this feature reviews and updates almost 50 years of analysis with which the BIS has been closely associated.

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[1] I thank Swapan-Kumar Pradhan and Michela Scatigna for research assistance. The views herein expressed are those of the author and do not necessarily reflect those of the BIS.

[2] See BIS (2004), Higgins and Klitgaard (2004) and Truman (2005). Summers (2004) states: "There are significant discrepancies that some … probably understand, but I do not, between BIS figures on central bank accumulation of reserves and US Bureau of Economic Analysis figures on official financing of the current account deficit."

Global official dollar reserves and official holdings of US assets

The change in global official dollar reserves as reported by the IMF and BIS differs from the change in official holdings of US assets reported by the Bureau of Economic Analysis (BEA). This divergence has two regularities.

First, the fraction of dollar reserves that seems to be held outside the United States is substantial (Graph 1). It was about a quarter in mid-2004, if unidentified dollar reserves are considered as being invested in eurodollar bonds.[3] At a minimum the proportion was 20%, based on identified dollar holdings ($438 billion out of the identified total of $2,242 billion in Table 1). Consistent with this observation, the rise in global dollar reserves in any year is usually larger than the BEA-reported increase in official holdings of US assets.

Substantial offshore dollar holdings ...

Global official dollar holdings and official holdings of US assets
In billions of US dollars

[1] BIS figures are estimated.

Sources: BEA; BIS.   Graph 1

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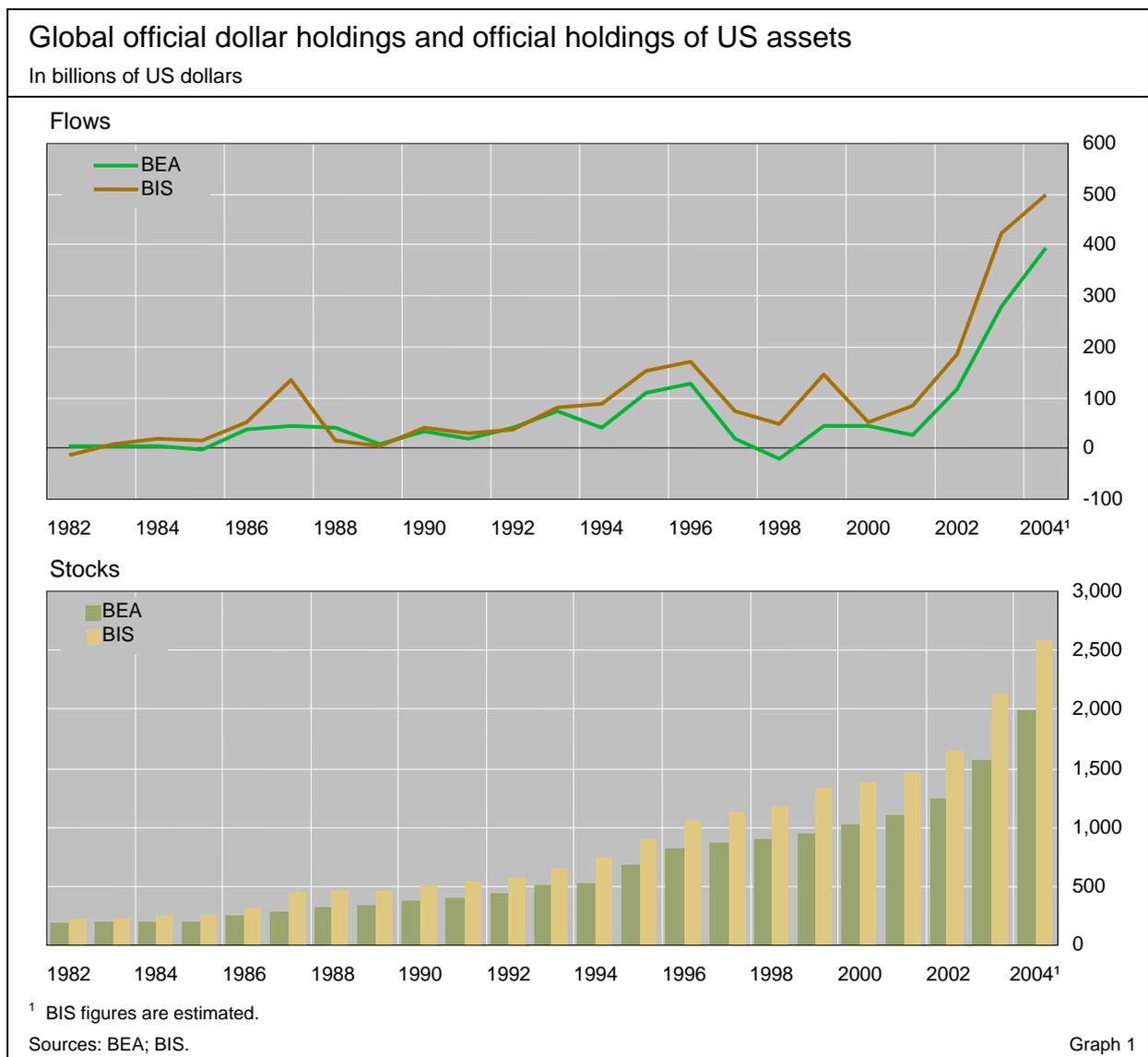
[3] If offshore holdings account for the difference between the total estimated dollar holdings ($2,334 billion) and identified holdings ($2,241 billion), then offshore holdings would total $531 billion out of $2,241 billion, or almost a quarter. Compare to McCauley and Fung (2003).

Instrument composition of US dollar reserves at end-June 2004			
In billions of US dollars			
	Short-term	Long-term	Total
Treasury securities	249	923	1,172
Other assets	635	434	1,069
Repos and deposits in the United States	141		
Commercial paper and certificates of deposit in the United States	93		
Offshore deposits	401	37	
Agency securities		216	
Corporate bonds		47	
Equities		134	
Total	884 (39.4%)	1,357 (60.6%)	2,241 (100%)
Memo:			
Share of Treasury securities in assets of the given maturity	*28.2%*	*68.0%*	*52.3%*
Total estimated US dollar reserves at end-June 2004			*2,334*

Note: Figures for US Treasury and agency bonds, corporate bonds and equities are from US Treasury et al (2005). Figures for deposits and money market paper in the United States are from BEA, International Transactions Table 4. Figures for offshore US dollar deposits are from the *BIS Quarterly Review*, Table 5C, BIS (2005, pp 174–5) and the Japanese SDDS for June 2004. Long-term is defined by original maturity; by remaining maturity the long-term share is 51.7%.   Table 1

... especially when intervention heavy

Second, there is a tendency for years of sharp increases in dollar reserves to see a larger fraction of offshore holdings. Thus, in 1987, then the year of the largest rise ever in dollar reserves, the increase in official assets reported by the BEA fell far short of that in dollar reserves. Consistent with this observation, the marked rise in global dollar holdings by central banks in recent years has been accompanied by a substantial increase in offshore assets. This partly reflects the stock adjustment process described below.

Offshore choice: insignificant ...

It is argued below that today it makes little difference to global asset prices whether a central bank places a dollar deposit in Tokyo, Hong Kong SAR, Singapore, Bahrain, London or the Caribbean, on the one hand, or New York, on the other. It matters only a little more whether a central bank buys a US Treasury note held in custody in the United States or a dollar note issued by the German government-guaranteed agency KfW held in Europe. At most, such choices affect spreads in yields between centres (unlikely) or issuers.

... or significant?

However, the onshore-offshore choice by reserve managers makes a big difference to the US balance of payments. This was strikingly demonstrated in 1987, when heavy intervention by Asian and European central banks raised global official dollar reserves by $134 billion, compared to a US current account deficit of $160 billion. The BEA, in contrast, reported official purchases of US assets of only $45 billion. At the time, central banks had a regulatory incentive, described below, to hold dollar bank deposits offshore, and interbank inflows were providing a significant share of the financing of the US current account deficit. Funds placed by official reserve managers in Tokyo, Hong Kong or London could be seen as one interbank (or intrabank) transaction away from the private inflow captured by the BEA. Under these circumstances, it was

possible to argue that the official share of the financing of the US current account deficit was in effect over four fifths. Higgins and Klitgaard (2004) adopt this line of reasoning as still appropriate today and term the difference between the BEA and BIS measures a discrepancy.

Truman (2005) argues, however, that it is mistaken to treat identified official dollar claims on non-residents in the same fashion as those on US residents. After all, the US economy needs only to service US entities' liabilities. Moreover, a variety of countries can finance their current account deficits with US dollar borrowing, and borrowers in countries without such deficits issue dollar-denominated debt. While countries running substantial deficits, like Australia, are not ultimately competing with the United States for US dollar financing, issuers outside the United States sold a record net $257 billion in dollar-denominated debt securities in 2004, according to BIS data.[4]

It is useful to distinguish the issue of financing the US current account flow (or net international investment liability stock), on the one hand, from the portfolio balance issue of the holding of the new flow (or stock) of dollar assets, on the other (Tille (2004), BIS (2005, Chapter V)). Foreign central bank acquisition or holding of dollars provides support to the dollar even if it does not finance US deficit or debt. This special feature's last section suggests that the appropriate comparison to be drawn is between the global official dollar reserve change and US net issuance of *dollar* liabilities.

Politics and economics of offshore dollar holdings

Central banks have a variety of reasons for placing dollar reserves outside the United States. The economic reasons are common to those of private investors but some of the political reasons are specific to foreign officials.

Country risk: high politics, litigation risk and infrastructure risk

For an investor, country risk refers to factors that might prevent the use of funds placed in a given jurisdiction. The term can be used in a narrow sense of high politics or a broader sense including the actions of courts and breakdowns of market functioning (Borio and Packer (2004)). Here we opt for a broad usage.

High politics. Histories of the eurodollar market, the market for short-term dollar placements outside the United States, refer to the Soviet Union as an early holder of dollars in London (Einzig (1970, p 30), Kindleberger (1973, p 289)). Such placements could have been intended to hide dollar payments from the US authorities and permit dollars to be mobilised in the event of cold war tensions. The validity of efforts to avoid the US authorities' reach became evident in 1979, when they froze Iranian assets.[5]

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[4] Dollar bonds sold by high-quality names outside the United States compete with US agency bonds in the portfolios of central banks (see below). Dollar bonds sold by Brazilian, Korean or Russian agencies, banks and firms, if converted into domestic currency, can lead to intervention and higher official reserve holdings.

[5] See Hufbauer et al (1990a, p 38). Not all offshore jurisdictions may prove equally safe: the United Kingdom froze Argentina's assets during the Falklands war (Hufbauer et al (1990b, p 537)). The US freeze on Iranian assets was extended to those held at US bank branches

In the late 1970s and early 1980s, around the time of the Soviet invasion of Afghanistan, Soviet deposits in the United States amounted to only tens of millions of dollars, while Soviet official reserves amounted to tens of billions of dollars (Graph 2, left-hand panel). Once the Soviet Union was dissolved and relations with the United States improved, Russian banks, including the central bank, took to placing their dollars in the United States. Nowadays, Russian deposits in the United States are measured in the tens of billions, just like Russian reserves.

... courts ...

Litigation risk. Another type of country risk that can lead to holding dollars offshore is litigation risk. In the absence of collective action clauses in sovereign bond documentation, there is a hold-out problem when a sovereign restructures its debt. Some US investors seem to specialise in buying distressed sovereign debt and holding out from participating in offered settlements. They then seek to be bought out at better prices by threatening to initiate, or actually initiating, litigation. In some cases, this can include attempts to seize assets of the defaulting sovereign. In response, putting sovereign assets beyond the reach of US or other creditors' courts may be a logical counter-strategy.

It is hard to quantify the extent to which litigation risk has led to holding dollars outside the United States. However, at any given time, only a handful of countries might seek to reduce such risk by choosing an offshore jurisdiction for dollar deposits. At present, Argentina faces ongoing litigation in the United States and its post-default holdings of bank deposits there are relatively low, especially compared to the period in the 1990s when dollars were held in New

Banks' holdings[1] of bank deposits inside and outside the United States

In billions of US dollars[2]

Soviet Union/Russia

- Liabilities of BIS reporting banks
- Dollars held at banks in the US
- Foreign exchange reserves[3]

Argentina

[1] Including central bank holdings. [2] Logarithmic scale, four-quarter moving averages. [3] "At the end of 1990, deposits in Western banks accounted for virtually all of Soviet hard currency assets" (Neu (1991, p 16)).

Sources: Treasury International Capital System; national data; BIS.   Graph 2

abroad, originally without regard to currency, but later only to dollar accounts (Kirton (1987, p 274)). The UK freeze on Argentine assets was not extended to those held at UK bank branches outside the United Kingdom. Asset freezes can be used, however, to defend against plundering, as for example the US and allies' freeze of Kuwaiti assets after the invasion by Iraq in 1990.

Location of official dollar deposits and nationality of banks, December 2004			
In billions of US dollars			
Nationality of bank	Location of deposits		Total
	United States	Offshore	
United States	73.6	7.8	81.4
Others	73.0	264.9[1]	337.9
Total	146.6	272.7	419.3

Note: The X^2 test statistic for the independence of location and nationality is 137, while the critical value for the 1% level of significance is 6.6.

[1] Includes $5 billion from domestic official monetary authorities.

Source: BIS locational banking statistics by nationality.   Table 2

York banks to help make the commitment to convertibility more credible (Graph 2, right-hand panel).

Infrastructure risk. As central banks have lengthened their investment portfolios, their overall access to liquidity has become more dependent on the proper functioning of securities markets, including repurchase markets. Thus, the interruption of trading of US Treasury securities in September 2001 owing to terrorist attacks reminded officials of the potential benefits of having diverse trading and custodial locations. While normal operations with Treasury securities were interrupted, central banks with dollar securities held in European depositories were still able to carry out normal operations with them, since the US payment system continued to operate and thus banks could make dollar payments.

... and operations ...

Nationality of bank. The choice of whether to place dollars in the United States or offshore should not be confused with the choice of whether to place dollars in US banks or in other banks. True, US banks receive few of the officially held dollars deposited offshore.[6] But half of the official dollar deposits placed in the United States are placed with banks (or securities firms) not headquartered there (Table 2). A central bank that has decided to place a deposit with a bank headquartered outside the United States still has the choice of whether to place the deposit inside or outside the United States.

Yield

Yield has proved more important to the growth of the euromarket over the last two generations than country risk. For most of the life of the eurodollar market, a substantial yield pickup was available to those willing to buy a deposit in a bank in London or another centre outside the United States (Graph 3, upper panel). This resulted originally both from a lack of integration between the London and New York dollar money markets and from US reserve requirements, but from the mid-1970s just from the latter.

... but yield was more important ...

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[6]   As a result, US banks have a global share of only about a fifth of official dollar deposits reported to the BIS. It might be noted in passing that this observation raises a question regarding the oft-assumed advantage of the reserve role of the dollar to the US financial services industry and, through its employment and profits, to the US economy as a whole.

Yields and official placements in US and eurodollar deposits

Spread between Libid and US certificate of deposit, three-month rates, in basis points
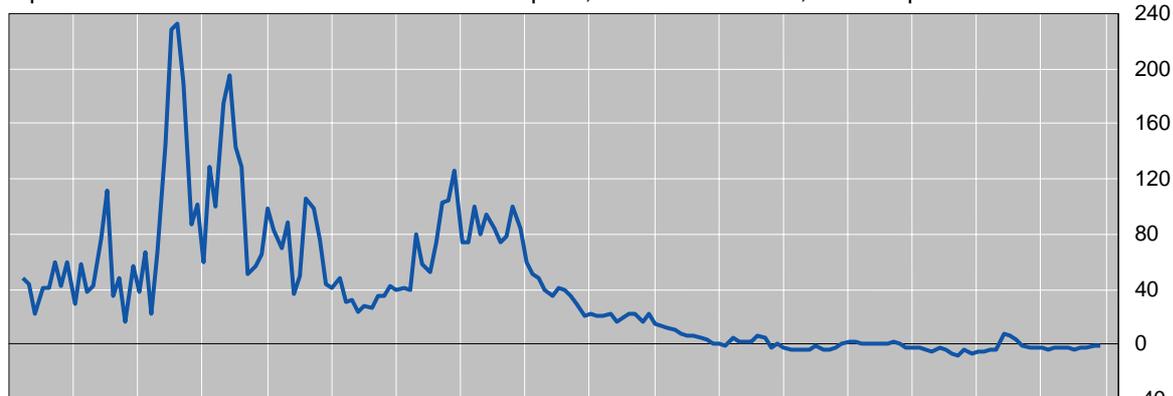
US and eurodollar placements, in billions of US dollars
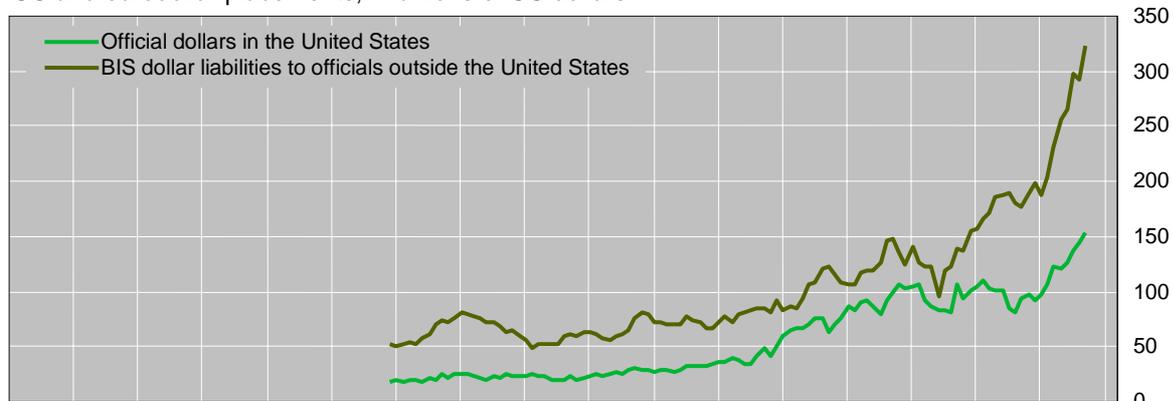
- Official dollars in the United States
- BIS dollar liabilities to officials outside the United States

Sources: National data; BIS statistics.   Graph 3

Before global dollar money markets became generally integrated 30 years ago, yields in London often exceeded those in New York by more than the cost of US reserve requirements.[7] Owing to the US "voluntary credit restraint program" introduced in 1965, banks could not place enough US-raised funds in London to ensure the equality of funding costs in the two markets.[8] In particular, these capital controls succeeded in restraining banks in the United States from closing a 100–300 basis point incentive for outward arbitrage in 1971 (Kreicher (1982)). Given these constraints, central banks faced strong incentives to shift onshore deposits offshore. If reserve managers were expected to earn Treasury bill or US certificate of deposit yields, they could earn still higher ones by holding eurodollars.[9]

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[7]   The classic references are Johnston (1979), Aliber (1980, 2002) and Kreicher (1982).

[8]   The BIS (1965, p 143) noted delicately that "the amount of new money that US banks may lend to foreigners is, since February 1965, supervised by the American monetary authorities".

[9]   The BIS (1964, p 132) reported that the Italian and Japanese authorities placed dollars with their own banks and that the BIS itself placed dollars offshore, "presumably to obtain higher earnings on these funds". The Deutsche Bundesbank, by contrast, at times even required

<div style="border:1px solid black; padding:1em;">

Policy initiatives to limit official offshore dollar holdings

Before the offshore and onshore US dollar money markets were well integrated, central banks meeting at the BIS expressed concern about money and credit creation in the eurodollar market. Given the absence of any reserve requirements, it was hypothesised that the money and credit multipliers might be very large and money and credit out of official control. There was also a concern that eurodollar deposits would be lent to European companies and the proceeds used to buy European currencies, increasing the need for dollar purchases by central banks. Mayer (1970) likened the placement of dollars offshore by central banks to newly mined gold, in that it permitted an increase in reserve holdings by one country without another country running an official settlements deficit.[1]

Two policy proposals were made, one of which was subsequently implemented and the other not. In 1971, the G10 central banks agreed not to place more funds offshore.[2] However, another, more fundamental, proposal was "an agreement among the major international banking countries (the Group of Ten and Switzerland) to impose reserve requirements on the eurodeposits of the banking systems worldwide. This was proposed by the United States at the BIS in 1980 but was not adopted" (Frydl (1982, p 18)).

The line of reasoning that led central banks to forswear eurodollar deposits made sense at a time when capital controls segmented the onshore and offshore dollar money markets. By the mid-1970s, however, this reasoning had lost its validity. The choice by a central bank, or any other depositor, to place funds in the Caribbean or London instead of New York would just lead to a slightly larger net interbank flow into the United States or a slightly smaller net interbank outflow. For banks arbitraging the two markets, an onshore and an offshore deposit at the same all-in cost were perfect substitutes.

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[1] See Machlup (1972) and Dufey and Giddy (1978) for discussion. [2] Zijlstra (1971): "[I]t is becoming increasingly clear that the Euro-currency market needs guidance and supervision. The group of Governors meeting regularly in Basel decided to set up a study group under my chairmanship to analyse the problem and to work out terms of reference for a standing group which might suggest policies to be adopted by the Governors. I am confident that the Governors will be able to bring the Euro-currency market into better harmony with the proper functioning of the international monetary system ... [W]e have already decided for the time being not to place additional official funds in the market and even to withdraw funds when such action is prudent in the light of market conditions." This policy can be seen as a loose version of Governor Norman's principle of exclusiveness: central banks should do all their business in a given currency through the central bank of issue of that currency, a "doctrine without much practical effect" (Sayers (1976, vol 1, p 158 and vol 3, pp 74–5)).

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In January 1974 the US capital controls were abolished. Subsequently, arbitrage tended to hold eurodollar rates within a range against the all-in costs of US money market rates. Yields on deposits located onshore and offshore did not become identical, however. US reserve requirements interacted with the level of interest rates to raise the all-in costs of fund-raising by banks in the United States. At an interest rate of 10%, a 6% reserve on a US certificate of deposit imposed a cost of nearly 60 basis points. Banks would thus be willing to pay that much more for funds in London to finance lending there. So for 15 years after the integration of the on- and offshore dollar money markets, offshore deposits still offered a yield advantage.[10]

German banks that were counterparties to short-term foreign exchange swaps to place the dollars temporarily acquired in US Treasury bills.

[10] In effect, London and other offshore centres allowed central banks to avoid paying the small amount of seigniorage earned by the US public sector on reservable dollar deposits. Most of the seigniorage earnings from non-residents then (and all of them now), however, arose from foreign holdings of US banknotes, which were almost entirely in private hands.

Offshore share of US dollar bank deposits of official monetary institutions and the yield premium on offshore deposits				
	Coefficient	Standard error	t-statistic	Significance
Constant	0.2611	0.086	3.047	0.004
Offshore share[1]	0.6237	0.122	5.093	0.000
Spread	0.0002	0.000	2.117	0.040
Sample 1978 Q1–1990 Q3 Adjusted R-squared 0.616 DW statistic 2.360				
Constant	0.0811	0.049	1.641	0.107
Offshore share[1]	0.8682	0.078	11.066	0.000
Spread	–0.0007	0.001	–0.618	0.539
Sample 1990 Q4–2004 Q4 Adjusted R-squared 0.707 DW statistic 2.020				
Note: The dependent variable is the offshore share of dollar deposits, calculated as the ratio between the BIS-reported dollar liabilities to official monetary institutions in banks outside the United States and the sum of such liabilities and the dollar liabilities to official monetary institutions in the United States. The spread is the difference between Libid and the US certificate of deposit rate at the three-month maturity. The US reserve requirement on large deposits and on net eurodollar borrowings was reduced to zero in December 1990 (McCauley and Seth (1992)).				
[1] Lagged one quarter.				
Sources: National data; BIS statistics; BIS estimates. Table 3				

Since 1990, eurodollar deposits have had scant, if any, yield advantages over US money market investments like certificates of deposit. Late that year, the Federal Reserve lowered the reserve requirements on large certificates of deposit to zero. Admittedly, Federal Deposit Insurance Corporation insurance premiums on most, but not all, large bank deposits in the United States still provided an incentive for central banks to place offshore during most of the 1990s. Since 1997, however, the best-rated banks have not had to pay any deposit insurance premiums either.[11]

... as demonstrated by central bank behaviour

Central banks responded as yield-sensitive investors to offshore-onshore rate differentials, although at one point they agreed to refrain from seeking higher yields in the offshore market in the interest of monetary and financial stability (see the box on the previous page).[12] For instance, when high US dollar interest rates widened the yield advantage of offshore deposits around 1980, central banks placed a higher proportion of their deposits offshore (Graph 3, lower panel). Table 3 reports a regression of the offshore share of dollar bank deposits of official monetary institutions on the difference in yields between the London interbank bid (Libid) rate and the US certificate of deposit

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[11] "Currently, 93 percent of FDIC-insured institutions, which hold 98 percent of insured deposits, pay nothing for deposit insurance" (Congressional Budget Office (2005)).

[12] Risk-adjusted returns matter to central banks, but it is hard to think of a good proxy for the risk of eurodollar deposits. Frydl (1982) argued that the risk imputed by depositors to eurodollar deposits had subsided after the 1974 failure of Bankhaus Herstatt. Frydl also argued that the agreement on the Concordat regarding the division of supervisory responsibilities between home and host authorities had given comfort to depositors in the eurodollar market. In the event, the Latin American debt and Continental Illinois crises of 1982 and 1984, respectively, led to a substantial, if temporary, risk premium of eurodollar rates over US money market rates.

rate. Before the reduction of the US reserve requirements on large certificates of deposit in the fourth quarter of 1990, a 10 basis point widening in the spread was associated with a 0.2 percentage point rise in the share of official deposits offshore in the same quarter and a 0.6 percentage point rise with a lag.[13]

Since 1990, the onshore-offshore choice has been dominated by the interaction of the composition of reserve gainers (and losers) and differences across central banks in their habitual choice of deposit centre. These habits may be rooted, for instance, in time zone convenience: Latin American central banks may find it more convenient to place dollars in banks in the United States than Asian central banks.

Securities market regulation

The empirical analysis has focused thus far on bank deposits, but these represent less than a third of official dollar holdings. Over time, central banks have extended the maturity of their portfolios by buying long-term securities. Here, too, they choose between investing in dollar securities in the United States and offshore; unfortunately, there is no direct measure of the latter.

Avoiding securities market regulation not an obvious factor ...

The historical relationship between onshore and offshore bond markets stands as a mirror image of that between the onshore and offshore deposit markets. In both cases, a US tax affected relative yields in the two markets until it was eliminated. This "tax" was the reserve requirement on large deposits in the United States (paid by the bank), on the one hand, and a withholding tax on interest paid on US bonds held by non-residents (paid by the holder), on the other. Banks in London could afford to pay higher yields on dollar deposits at the same all-in costs, while dollar bond issuers in Europe could pay lower yields to non-residents because interest payments were paid gross.[14]

Central banks were not subject to the withholding tax and so had little incentive to buy relatively low-yielding eurodollar bonds. Into the 1980s, Indirect evidence suggests that there was little central bank holding of eurodollar bonds.[15] With the repeal of the US withholding tax in July 1984, however, the US and eurodollar bond markets quickly became integrated in their pricing. Possible savings by issuing eurodollar bonds instead of US bonds

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[13] Why did US pension funds, insurance companies, mutual funds and state and local governments buy large US certificates of deposit before 1990 when they could get higher yields on deposits with the same banks' Caribbean or London branches? This question has never received a satisfactory answer. Some, no doubt, were constrained by investment guidelines that limited foreign holdings, but then the question is why these were not altered. It is clear that the growth of the money market mutual fund industry increased US portfolios capable of investing in the eurodollar market. One could label the unwillingness of US investors to buy eurodollars a response to country risk or an expression of home bias.

[14] Competition forced banks in London generally to pass through to depositors the saving from the absence of a reserve requirement. In contrast, each high-quality bond issuer was in its own spectrum of credit risk a discriminating monopolist, facing two different demand curves in the US and euromarket, the former more elastic. Consequently, the issuer did not push eurodollar issuance to the point of equal cost vis-à-vis US issues and offshore investors were inhibited by the withholding tax from buying higher-yielding onshore bonds. In effect, the eurodollar bond issuer shared with the the bond buyer the benefit of the absence of the tax.

[15] Fung and McCauley (2000) found that the sum of official assets in the United States and BIS-reported offshore deposits came very near to estimated dollar reserves in 1980.

came to be measured in basis points, rather than tens of basis points or even percentage points (Papke (2000)).

Since 1984, central banks might actually have had an incentive to buy eurodollar bonds, if the cost of Securities and Exchange Commission (SEC) registration outweighs the liquidity benefits of full access to the US bond investor base. Savings from avoiding this cost can presumably be shared between the buyer (including central banks) and the issuer. Against this cost, however, might be the benefit of additional liquidity that secondary trading of a bond could derive from a wider range of US investors. Many top-quality bonds marketed through eurobond channels nowadays are global bonds that are also issued in the United States and registered with the SEC. Others can be sold in the United States to institutional investors under the SEC's Rule 144A.

The breakdown of selected international dollar bond issues by SEC status over the last five years suggests that central banks do not buy bonds of non-US issuers to avoid the costs of SEC regulation (Table 4). The selected obligors are known to attract wide holdings by central banks. While the French agency CADES has eschewed SEC registration in this period, others, like the German government financing agency KfW, have registered most of their dollar paper. The Republic of Italy has registered over 90% of its dollar issues since 2000. The bulk of these obligors' issues, over two thirds by value, have been SEC-registered. It seems that central banks are seen by issuers as willing to bear the costs of SEC registration to enjoy better secondary market liquidity.[16]

US SEC registration of selected international bond issues denominated in US dollars				
In billions of US dollars, 2000–May 2005				
	SEC-registered	Rule 144A eligible	Neither	Total
CADES (French agency)	–	–	6.75	6.75
Hydro Quebec	0.75	–	–	0.75
KfW (German agency)	23.00	–	21.36	44.36
Quebec	4.75	–	0.02	4.77
Republic of Italy	48.00	–	4.15	52.15
Swedish Export Credit	3.10	0.25	2.99	6.34
Japan Bank for International Cooperation	1.00		2.25	3.25
Total	80.60	0.25	37.52	118.37

Note: Bonds issued by such non-residents of the United States and bought by foreign central banks, even if marketed in the United States, would not be included in the BEA flow or stock.

Sources: Dealogic; BIS.   Table 4

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[16] If regulation does not seem a strong reason for central banks to buy dollar bonds of non-US residents, then perhaps considerations of yield, portfolio diversification and perhaps the diversification of infrastructure risk are more important.

Japanese foreign exchange reserves, securities holdings and offshore bank deposits

In billions of US dollars

- Total FX reserves
- Offshore bank deposits
- Securities

Graph 4
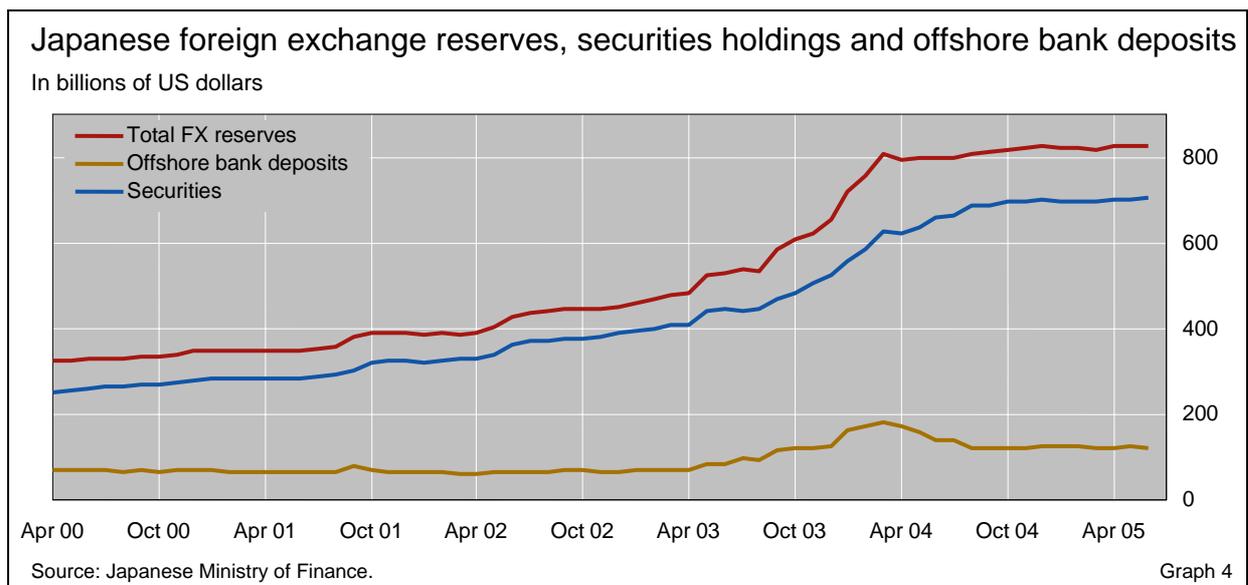
Stock adjustment in the investment process

Large acquisitions of dollars within a short period of time seem to lead to temporary increases in offshore holdings. This could reflect reserve managers' parking funds in bank deposits in preparation for investment in securities. As we have seen, such deposits are largely held outside the United States, formerly for yield and now out of convenience or habit, while securities are mostly held in the United States. Lags in the investment process can push up the offshore share when reserves grow rapidly.[17] The reason for the lag is that, in common with other stock adjustment processes, the process of switching funds from bank deposits into securities may entail costs that are larger the greater the stock of funds to be switched (or, for a given size, the faster). In some cases, reserve managers prefer to buy newly issued securities, and this takes time; in other cases, reserve managers may find that intervention does not coincide with perceived opportunities to buy securities.

... but lags in investment do seem to play a role

The flow of investment during the large Japanese intervention of 2003–04 is a case in point (Graph 4). Funds initially flowed into bank accounts in Japan, and only gradually were they invested in securities. As a result, the heavy purchases drove up the share of offshore deposits in the overall portfolio, which was then gradually worked down as securities were purchased.

Implications and conclusion

In conclusion, three statements of ascending breadth can be made about the importance of official financing of US external deficits in 2004. Strictly speaking, the official sector, in purchasing US liabilities onshore, financed 59% of the US current account deficit in 2004 ($395 billion out of $668 billion; Table 5). Including offshore holdings, however, foreign officials bought enough

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[17] The acquisition of an offshore dollar account is not an immediate settlement result of intervention, since a purchase of dollars would be normally settled in the United States.

Official holdings of US dollars and US external financing					
In billions of US dollars					
	Flow			Stock	
	2002	2003	2004	2003	2004
BEA foreign official assets in the United States	116	278	395	1,567	1,982
Official dollar purchases/holdings[1]	187	423	498	2,077	2,575
US current account deficit/net international investment position	475	520	668	2,157	2,484
US fixed income external financing/debt[2]	510	672	836	3,012	3,734
US dollar net external financing/ liabilities (excluding US equity from dollar-denominated)[3]	515	697	791	3,288	3,901
US dollar net external financing/liabilities[4]	652	799	958	7,446	8,516

[1] Estimated using foreign official assets in the United States from BEA, offshore US dollar deposits from the BIS international banking statistics, Table 5C, and the Japanese SDDS data on deposit reserves. [2] Calculated by adding flows/stock of net direct investment and net portfolio equity investment to the absolute value of the current account deficit/net international liability position . [3] Calculated by adding US official reserve flows/assets, the net increase/holding of foreign currency bonds and the net increase/stock of US bank and non-bank claims denominated in foreign currency to fixed income external financing/debt. [4] Estimated by summing the absolute value of the current account deficit/net international investment position, flows/stocks of direct and portfolio equity investment abroad, the net increase/stock of foreign currency denominated bonds, the net increase/stock of US bank and non-bank claims denominated in foreign currency and the flow/stock of US official reserve assets.

Sources: BEA; Nguyen (2005); Sauers and Pierce (2005); US Treasury et al (2005); BIS estimates.

Table 5

dollars to have financed three quarters of that deficit ($498 billion).[18] Note that the gap between these shares was narrower in 2004 than in 2003, when 53% contrasted with 81%. This narrowing reflects both the deceleration of reserve growth in 2004 compared to 2003 and the working-out of the stock adjustment process evident in Graph 4. Recall, however, that these offshore holdings do not immediately finance US deficits, since they involve the liabilities of residents of other countries. But certainly the official increase in global official dollar reserves, whether placed on shore or offshore, supports the dollar.

The extent of that support might be most appropriately compared with the US economy's overall dollar financing requirements, ie the US net issuance of *dollar* liabilities, rather than the size of the current account deficit.[19] This net

[18] Note, however, that questions can arise when comparing the growth of global dollar reserves to the US current account deficit. It is entirely possible that the increase in official dollar reserves exceeds the current account deficit, in which case reserve accumulation is necessarily financing more than the deficit. Indeed, in the late 1960s, when the difference was first noticed, the US current account was in surplus. At that time, there was concern that European central banks' accumulation of Treasury bills or eurodollars was financing US firms' purchases of corporate assets in Europe (Kindleberger (1965)).

[19] One can also compare the change in global dollar reserves to the fixed income borrowing by the United States. On this view, US borrowing is needed to cover the current account and the excess of US direct investment and portfolio equity outflows over such inflows into the United States. A problem with this measure as compared to that in the text is that it would not make sense were central banks to switch from buying bonds to buying equities.

issuance by the United States exceeds the (absolute size of the) current account deficit by the US acquisition of foreign currency assets in any year. In effect, the US economy is going short the dollar, once to finance an excess of imports of goods and services over exports, and twice to finance the acquisition of foreign equities, corporate assets and foreign currency denominated bonds. On this showing, increases in global official dollar reserves did less of the work, serving as counterpart to 51% of the increase in the US short dollar position in 2004 (comparing the second and last rows of Table 5). A still broader view, taking in offshore dollar borrowing and lending, remains to be reached through further investigation.

Thus, it is both easy to understate and possible to overstate the role of foreign official support for the dollar. While global reserve managers have lost their strongest reason to place dollars outside the United States, they continue to place large sums offshore. The dollar is supported wherever officials place their dollars. The increase in global official dollar reserves is most sensibly compared not to the US current account deficit, but to a wider notion of the US financing requirement in dollars.

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The BIS consolidated banking statistics: structure, uses and recent enhancements[1]

The BIS consolidated banking statistics have been expanded to better capture banks' country risk exposures. The expanded statistics provide for the first time information about banks' derivatives and contingent exposures, as well as additional details about the reallocation of risk exposures.

JEL classification: C820, F340.

The BIS consolidated banking statistics provide internationally comparable measures of national banking systems' exposures to country risk. They have evolved over time in response to changes in both the international financial system and the character of risks managed by banks. The latest enhancements to the statistics – first published for positions outstanding on 31 March 2005 – expanded the coverage of exposures to include derivative contracts and contingent facilities. In addition, the expanded data set provides more detailed data on risk reallocations. This special feature outlines the compilation of the BIS consolidated banking statistics, focusing in particular on the latest enhancements, and discusses a few of the analytical uses of the data.[2]

Evolution of the consolidated banking statistics

Consolidated statistics net out banks' intragroup positions ...

The BIS consolidated banking statistics are but one of several data sets compiled by the BIS that capture activity in the international banking market. The oldest of these data sets, the BIS locational banking statistics, is based on the residency of the reporting bank and includes positions vis-à-vis banks'

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

[2] The Committee on the Global Financial System (CGFS) is responsible for oversight of most of the BIS international banking and financial statistics. The BIS, in cooperation with central banks and monetary authorities worldwide, compiles and disseminates the statistics in accordance with CGFS recommendations. The BIS statistics and various publications about them are available on the BIS website (www.bis.org/statistics/index.htm). For a summary of the international banking and financial statistics compiled by the BIS and a brief discussion of their uses, see Wooldridge (2002). For a more detailed explanation of the statistics, see BIS (2003a,b, 2004). The BIS consolidated banking statistics are published every quarter in a press release with a lag of approximately four months.

foreign offices. By contrast, the BIS consolidated banking statistics are based on the nationality of the reporting bank and net out intragroup positions. In other words, the consolidated statistics are based on the country where the reporting bank's head office is located and look through inter-office positions to capture exposures to unaffiliated counterparties.

Differences in the way in which the locational and consolidated banking statistics are compiled reflect differences in the motivation for their collection. The locational statistics were originally intended to complement monetary and credit aggregates and so are compiled in a way which is consistent with balance of payments statistics and the system of national accounts. By contrast, since their inception the consolidated statistics have been intended to facilitate the monitoring and management of banks' risk exposures.

The consolidated banking statistics had their origins in the expansion of international banking activity in the Caribbean and other offshore centres in the 1970s. At the time, very little information was available about such activity. Therefore, those central banks which contributed to the locational banking statistics asked their banks to consolidate any positions booked at their offshore offices with positions booked at their head offices. Banks provided information about the geographical and maturity breakdown of their (partially consolidated) claims, although only for developing countries.[3]

The consolidated banking statistics were expanded in the early 1980s, following the onset of debt crises in Mexico and other developing countries. These crises focused attention on transfer risk, ie the risk associated with policy measures that have a territorial jurisdiction, such as capital controls and payments moratoriums. To better capture the aggregate exposures of national banking systems to developing countries, banks were asked to fully consolidate their on-balance sheet claims on borrowers residing outside the country where the bank was headquartered.

The next major improvement to the consolidated banking statistics occurred following the Asian financial crisis of 1997–98. A lack of transparency was frequently cited as a factor contributing to the crisis (G22 (1998)). Therefore, a concerted effort was made to improve the timeliness, frequency and coverage of the consolidated statistics. They began to be published quarterly instead of semiannually; the reporting lag was shortened; additional banking systems, including those of Hong Kong SAR and Singapore, joined the reporting population; and the geographical breakdown was expanded to include all countries instead of only developing countries.

The Asian and subsequent international financial crises also highlighted the changing character of banks' risk exposures. During the 1990s, traditional cross-border lending gave way to other types of business (McCauley et al (2002), Domanski et al (2003)). Banks were increasingly active in derivatives markets, either to accommodate customers' risk management requirements or to hedge their own risk exposures – or even, at times, to take speculative

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[3] To be precise, banks reported their claims on borrowers residing in non-reporting countries, ie countries which did not contribute to the consolidated statistics. The vast majority of non-reporting countries were developing countries.

BIS reporting banks' foreign claims on emerging markets

By residency of immediate borrower, in billions of US dollars

Asia-Pacific

- Local claims (rhs)[1]
- International claims (rhs)[2]
- Local/foreign (lhs)[3]

Eastern Europe

Latin America
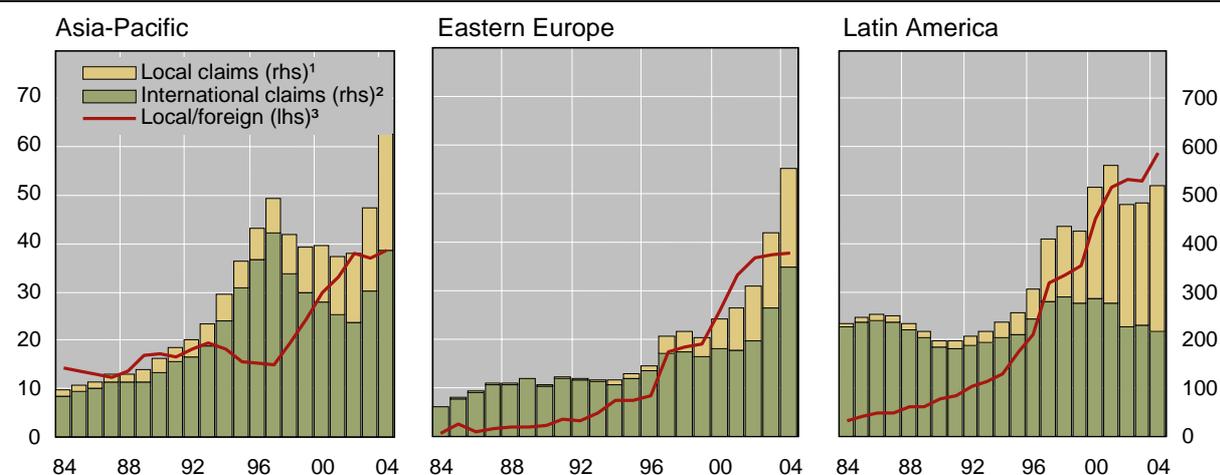
[1] Claims on local residents denominated in local currencies and booked by reporting banks' local affiliates.   [2] Cross-border claims in all currencies plus claims on local residents denominated in foreign currencies and booked by reporting banks' local affiliates.   [3] Local claims as a percentage of foreign claims.   Graph 1

positions. They were also active in capital markets, for example as bond underwriters or asset managers. Furthermore, many banks invested heavily in foreign subsidiaries, in the process greatly expanding their locally funded operations. In Asia, claims on local residents denominated in local currencies and booked by reporting banks' affiliates in the corresponding country grew from 14% of banks' foreign claims in 1985 to nearly 40% two decades later (Graph 1). Latin America saw an even sharper increase over the same period, from 3% to almost 60%.

<div style="margin-left:0">

In the 1990s attention shifted to country risk

</div>

As a result, attention gradually shifted from transfer risk to country risk, or the risk associated with the economic, business, political and social environment in which the debtor operates.[4] Country risk is a broader concept than transfer risk and thus the measurement of country risk exposures requires more comprehensive data than for transfer risk exposures. Therefore, in the late 1990s, the consolidated banking statistics were expanded to capture guarantees received and other credit enhancements which result in the reallocation of reporting banks' risk exposures from the immediate borrower to another (ultimate) obligor. Furthermore, in 2000 the Committee on the Global Financial System recommended that the consolidated statistics be expanded to fully incorporate risk reallocations, derivatives exposures, guarantees extended and credit commitments (CGFS (2000)). Its recommendations led to the latest enhancements to the statistics.

<div style="margin-left:0">

Expanded statistics are compatible with banks' risk management practices

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A key goal of the enhanced statistics is to provide aggregate information compatible with individual banks' own risk management practices. As these practices became more sophisticated and their focus shifted from transfer risk

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[4]   While transfer risk refers to the risk that sovereign policy will impede capital flows and hence loan repayments, country risk refers to country-wide events which lead to systemic instability that prevents obligors – whether direct debtors or guarantors of claims on other borrowers – from fulfilling their obligations.

to country risk, the reporting system set up in the early 1980s became less useful to banks. The expanded BIS consolidated banking statistics, with their greater focus on country risk exposures, are intended to enhance the relevance of the statistics in today's more complex international financial system.

Structure of the consolidated banking statistics

Recent enhancements to the BIS consolidated banking statistics greatly increase the richness of the data set. At the same time, they add to its complexity because some of the breakdowns available in the expanded data set differ from those that were previously available. The BIS consolidated statistics are structured around six breakdowns: residency of the borrower; basis for allocating risk exposures; type of exposure; booking office location; sector of the borrower; and maturity. While these various breakdowns are complementary, providing a complete matrix of positions would impose a very high reporting burden on banks. Therefore, banks are required to report only a limited range of disaggregated data. Table 1 gives an overview of the structure of the consolidated banking statistics. The table aggregates data reported by the 18 national banking systems which provided a full set of consolidated statistics for the first quarter of 2005.[5]

Banks contributing to the consolidated statistics report a full country breakdown of claims booked by their offices worldwide. Only assets are reported; no data on liabilities are collected.[6] Furthermore, the country breakdown is based on the residency of the borrower, as opposed to the nationality. Finally, only claims on borrowers residing outside the country in which the reporting bank is headquartered are included; claims on residents of the reporting bank's home country are excluded.

Banks report a full country breakdown …

Importantly, the BIS consolidated statistics distinguish between the residency of the immediate borrower and the residency of the ultimate obligor. The ultimate obligor refers to the counterparty who is ultimately responsible for servicing any outstanding obligations in the event of a default by the immediate borrower. The residency of the ultimate obligor – or the country of ultimate risk – is defined as the country in which the guarantor of a financial claim resides or the head office of a legally dependent branch is located.[7] If a reporting bank purchases protection against default in the credit derivatives market, then the country of ultimate risk is defined as the country in which the counterparty to the contract resides. Collateral may also be considered as an indicator of

… and distinguish between the country of the immediate borrower and the country of ultimate risk

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[5] An additional 12 reporting countries provided partial data. Data for most of the individual reporting countries can be found in Tables 9B and 9D in the Statistical Annex. Some reporting countries publish more detailed data for their national banking systems.

[6] There is one exception: banks report their foreign affiliates' local liabilities to local residents denominated in local currencies.

[7] These definitions are consistent with the risk reallocation principle for measuring country risk exposures recommended by the Basel Committee on Banking Supervision. For a more comprehensive discussion of risk reallocations in the consolidated statistics, see BIS (2004).

Consolidated foreign exposures of BIS reporting banks[1]			
Positions outstanding at end-March 2005, in billions of US dollars			
	Basis for risk allocation		
	Immediate borrower	Net risk transfers	Ultimate risk
By type of exposure			
Claims (loans and securities)[2]			
Foreign claims	13,667.6	−321.7	13,344.4
Cross-border claims	International claims[3] ⎱ 9,044.8		8,125.3
Local claims – in foreign currency			5,215.8
– in local currency	4,622.8		
Derivative contracts			1,702.8
Contingent facilities			
Guarantees extended			674.9
Credit commitments			2,661.2
Other breakdowns[4]			
Claims by sector	9,044.8		13,344.4
Public sector	1,627.0		2,095.3
Banks	3,451.3		4,206.5
Non-bank private sector	3,933.5		6,549.5
Unallocated	33.0		493.1
Claims by maturity	9,044.8		
Up to and including 1 year	4,428.7		
Over 1 year up to and including 2 years	309.8		
Over 2 years	2,513.7		
Unallocated	1,792.6		
Memorandum: Starting date of time series	December 1983	June 1999	March 2005

[1] Sum of positions reported by banks headquartered in Australia, Belgium, Canada, Chile, Finland, France, Germany, India, Italy, Japan, the Netherlands, Norway, Portugal, Singapore, Taiwan (China), Turkey, the United Kingdom and the United States. [2] Outstanding loans and deposits, plus holdings of debt and equity securities; historically referred to as on-balance sheet claims. [3] Cross-border claims denominated in all currencies plus local claims of foreign offices denominated in foreign currencies. [4] For claims on an immediate borrower basis, the breakdowns refer to international claims; for claims on an ultimate risk basis, the breakdowns refer to foreign claims. Table 1

where the final risk lies to the extent that it is recognised as a risk mitigant under the Basel Capital Adequacy Framework.

Claims on an ultimate risk basis equal the sum of claims on an immediate borrower basis and net risk transfers. Net risk transfers, in turn, equal the difference between inward transfers of risk to the country of the ultimate obligor and outward transfers of risk from the country of the immediate borrower.[8]

To illustrate the difference between claims on an immediate borrower basis and claims on an ultimate risk basis, consider a loan from a US bank to the subsidiary of a German auto manufacturer incorporated in Mexico. On an immediate borrower basis, this loan would be reported by the US bank as a

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[8] In principle, for every outward risk transfer there is an equivalent inward risk transfer and so in aggregate net risk transfers should equal zero. However, this equality does not hold in the consolidated banking statistics because banks do not report risk reallocations to or from their home country.

claim on a borrower in Mexico. If the parent company guaranteed the loan, then on an ultimate risk basis the loan would be reported by the US bank as a claim on a borrower in Germany. In other words, the US bank would record an outward risk transfer from Mexico and an equivalent inward risk transfer to Germany.

The recent enhancements to the consolidated statistics greatly expanded the availability of data on different types of exposures. Whereas the reporting system set up in the early 1980s mainly captured on-balance sheet exposures, the expanded statistics also capture exposures that were historically classified as off-balance sheet. Owing to changes in accounting standards, some of these latter exposures, in particular derivatives, have since been brought on to the balance sheet.[9]

For positions on an immediate borrower basis, banks report their outstanding loans and holdings of securities. In the consolidated banking statistics, the term "claims" is usually interpreted as referring to these instruments. For positions on an ultimate risk basis, banks report separately their derivative contracts and contingent facilities as well as their outstanding claims. Only derivative contracts which give rise to a counterparty risk exposure are reported; thus, derivatives exposures are calculated as the positive market value of outstanding contracts.[10] Derivatives exposures include contracts covering all types of risks: foreign exchange, interest rate, equity, commodity and credit risks. However, credit protection bought to hedge an outstanding claim is classified as a risk transfer, and any credit protection sold is classified as a guarantee.

Consolidated statistics have been expanded to include derivative contracts …

Contingent facilities refer to the unutilised portion of irrevocable contractual obligations which, if utilised, result in the extension of a loan or purchase of a security.[11] This includes any guarantees made by a reporting bank to fulfil contractual obligations to a third party in the event that the bank's client fails to fulfil them.[12] It also includes commitments to extend credit at the client's request, such as standby loans or purchase facilities. Guarantees and credit commitments are reported at face value so as to measure reporting banks' maximum possible exposure to exceptional circumstances.

… and contingent exposures

Positions can be further disaggregated by the booking office location. As previously mentioned, the consolidated statistics capture exposures to borrowers residing outside the country in which the reporting bank is

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[9] For example, under IAS39 of the International Financial Reporting Standards, derivatives positions are recorded on the balance sheet at market values. IAS39 has been implemented in numerous countries, including (since 2005) those in the European Union.

[10] Contracts which have negative market value are classified as liabilities and so are not reported. The reported measure of derivatives exposures takes into account legally enforceable bilateral netting arrangements but not collateral.

[11] Banks had, until December 2004, reported undisbursed credit commitments and backup facilities on an immediate borrower basis. This was discontinued following the expansion of the consolidated banking statistics and so such contingent exposures are now only published on an ultimate risk basis.

[12] The face value of protection sold through credit derivatives is also recorded as a guarantee.

headquartered. For derivative contracts and contingent facilities, banks report their total foreign exposure. For outstanding claims – more specifically, for claims on an ultimate risk basis – banks distinguish between cross-border and local claims. Cross-border claims are claims on non-residents booked by either the banks' head office or a foreign affiliate. Local claims are those booked by a foreign affiliate on borrowers residing in the country in which the affiliate is located.

A similar breakdown is available for claims on an immediate borrower basis. The main difference compared to the breakdown on an ultimate risk basis is that local claims denominated in local currencies are reported separately, and local claims denominated in foreign currencies are grouped together with cross-border claims in an aggregate labelled international claims.[13] Given that the breakdown by booking office location for claims on an immediate borrower basis differs from the breakdown on an ultimate risk basis, net risk transfers cannot be derived from the disaggregated data and consequently are available only for total foreign claims (Table 1, column 3).

Outstanding claims are also broken down by sector of the borrower and by maturity of the claim. Borrowers are identified as belonging to one of three sectors: the public sector or general government; banks, defined as deposit-taking institutions; or the non-bank private sector, for borrowers not classified as public sector or banks.[14] For data on an immediate borrower basis the breakdown applies to international claims, whereas for data on an ultimate risk basis it applies to foreign claims. A maturity breakdown is available for international claims on an immediate borrower basis. It is based on remaining maturity, and therefore claims with an original maturity of more than one year but maturing within the next year are grouped together with claims with an original maturity of one year or less.

Uses of the consolidated banking statistics

Since the inception of the consolidated banking statistics, the primary motivation behind their collection and dissemination has been the monitoring of banks' foreign assets. Yet what is an asset to a creditor is a liability to a borrower. Therefore, the consolidated statistics are also a valuable supplementary source of information about countries' external debt.

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[13] International claims also include: (a) cross-border claims booked by foreign affiliates located inside a reporting country but headquartered outside the reporting area; and (b) cross-border claims on residents of the reporting bank's home country booked by affiliates located inside the reporting area. For example, international claims include any cross-border claims booked by the UK office of a Philippine bank, as well as any claims on US residents booked by the UK office of a US bank.

[14] In the expanded consolidated banking statistics, some borrowers have been reclassified from one sector to another. This has resulted in a structural break in the sectoral breakdown of claims on an *immediate borrower* basis in March 2005. Official monetary authorities and multilateral development banks have been reclassified as public sector borrowers instead of banks, and non-financial public enterprises have been reclassified to the non-bank private sector from the public sector.

Risk exposures of reporting banks

What makes the consolidated statistics especially useful for monitoring banks' risk exposures is the netting out of intragroup positions. Whereas in the BIS locational banking statistics about one third of cross-border assets represent inter-office positions, in the consolidated statistics banks look through their inter-office positions and record only claims on unrelated counterparties.

For monitoring transfer risk exposures, the most appropriate data are those on an immediate borrower basis, specifically international claims. Transfer risk arises from cross-border claims as well as local claims denominated in foreign currencies, which are often funded from abroad. Local claims in local currencies are usually funded locally and so are not affected by external payment restrictions.[15] Therefore, foreign claims can provide a misleading estimate of transfer risk exposures, especially for those countries where reporting banks have sizeable local claims.

International claims can be used to monitor transfer risk

Data on an ultimate risk basis, especially cross-border claims, can provide supplementary information useful for monitoring transfer risk exposures. For example, if a country were to declare an external debt moratorium, then guarantees provided by a borrower's foreign parent (ie outward risk transfers) might reduce a reporting bank's exposure to transfer risk. At the same time, claims on overseas branches of banks headquartered in the crisis-stricken country (ie inward risk transfers) might increase a reporting bank's exposure to transfer risk. For most emerging markets, outward risk transfers exceed inward risk transfers. At end-March 2005, net risk transfers reduced foreign claims (immediate borrower basis) on emerging market borrowers by as much as 27% in the case of German banks but by as little as 1% in the case of US banks (Table 2).

Turning to country risk exposures, the most comprehensive data available are those on an ultimate risk basis. Given the size and growth of reporting banks' local claims, foreign claims provide a more meaningful measure of country risk exposure than international claims. Historically, claims were synonymous with country risk exposures. However, owing to banks' increasing use of derivatives, claims can significantly underestimate actual exposures. For example, at end-March 2005, derivative contracts boosted Belgian banks' aggregate exposure to emerging markets by more than 50% compared to outstanding claims on an ultimate risk basis. In contrast, such contracts boosted Japanese and Portuguese banks' exposure to emerging markets by less than 1%.

Country risk exposures include claims and derivatives exposures

Loans and derivatives represent actual exposures to country risk at a given point in time. However, actual exposures may be only loosely related to potential exposures. Derivatives facilitate leveraged trading and so small movements in the price of the underlying instrument can result in large changes in derivatives exposures. Indeed, these exposures can multiply during

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[15] Local claims in local currencies are sometimes funded in foreign currency from abroad, for example in countries where local debt issues are indexed to the exchange rate. In such countries, transfer risk exposures may be increased by the amount by which local claims in local currencies exceed local liabilities in local currencies.

Nationality of reporting bank	Foreign claims on an immediate borrower basis	Net risk transfers	Foreign exposures on an ultimate risk basis			
			Foreign claims	Derivative contracts	Guarantees extended	Credit commitments
	In billions of US dollars			*As a share of foreign claims (ultimate risk basis)*		
All banks[1]	1,452.3	−140.1	1,313.9	5.9	8.1	15.5
Australia	7.9	−0.3	9.9	5.5	32.5	3.5
Belgium	44.2	−1.7	42.5	56.2	7.8	15.9
Canada	40.5	0.1	40.6	1.0	1.8	6.8
France	161.5	−20.5	140.9	3.5	15.9	16.0
Germany	286.1	−76.4	209.7	7.3	14.7	16.4
Italy	79.0	−1.9	77.1	1.3	9.0	15.7
Japan	95.4	−19.2	76.2	0.9	10.4	6.0
Netherlands	130.0	−5.6	124.4	9.4	6.9	6.2
Portugal	14.3	−1.1	13.2	0.9	3.6	6.4
United Kingdom	229.5	−8.8	220.7	3.1	6.5	17.7
United States	285.3	−2.4	282.9	2.9	...	20.9

BIS reporting banks' exposures to emerging markets[1]

Positions outstanding at end-March 2005

[1] Sum of positions reported by banks listed in the table plus banks headquartered in Chile, Finland, India, Norway, Singapore, Taiwan (China) and Turkey.

Table 2

periods of extreme market volatility. US banks' derivative exposures to Korea totalled only $1.3 billion at the end of September 1997. Three months later, after the flotation of the Korean won, they had ballooned to $4.7 billion even while US banks' international claims had declined slightly.

Contingent claims add to potential country risk exposures

Furthermore, in exceptional circumstances, such as a severe recession, borrowers may draw down lines of credit and call on guarantees provided by reporting banks. If such contingent exposures become outstanding claims, they can greatly increase banks' actual exposure to country risk. Relative to outstanding claims on emerging markets on an ultimate risk basis, guarantees equalled approximately 33% of Australian banks' claims at end-March 2005 but only 2% of Canadian banks' claims. Credit commitments accounted for close to 20% of UK and US banks' outstanding claims but only 6% of those for Dutch banks.

Exchange rate movements can affect reported positions

Exchange rate movements can lead to changes over time in estimated measures of transfer or country risk exposures. No currency breakdown is available for the consolidated banking statistics; outstanding positions are converted by reporting banks into US dollars at end-of-quarter exchange rates. Therefore, movements in exchange rates can result in changes in reported positions even when actual positions remain unchanged. For example, the locational banking statistics indicate that around half of cross-border claims on borrowers in the 10 new EU countries are denominated in euros. Owing to the appreciation of the euro against the US dollar between 2001 and 2004, the consolidated statistics probably overestimate the growth of euro area banks' claims on the region.[16]

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[16] The currency breakdown from the locational statistics can be applied to the consolidated statistics to adjust for exchange rate movements. The resulting estimates, however, should be regarded as no more than very rough approximations.

External vulnerabilities of countries

In many countries, liabilities to banks account for a declining proportion of external debt. Borrowers instead increasingly tap capital markets to meet their financing requirements. Nevertheless, when analysing countries' external vulnerabilities, it is important to monitor banks' activities because of the often short maturity of their claims as well as banks' key role in trade financing.

The BIS locational banking statistics provide creditor-side information on external liabilities to banks consistent with balance of payments measures of external debt. In fact, many national statistical agencies use the locational statistics to enhance their own balance of payments data (IMF (1992), Bach (2001)).

In countries with limited international banking business, there is often little difference between external debt owed to banks based on the locational statistics and the same stock based on the international component of the consolidated statistics. For example, as of March 2005, cross-border (locational) claims on emerging markets were in aggregate no more than 8% larger than international (consolidated) claims.[17] Therefore, the sectoral and maturity breakdowns from the consolidated statistics can help to highlight risks that may not be apparent in other statistics. In fact, the consolidated statistics provide one of the few internationally comparable measures of short-term external debt (BIS (2002)). For instance, the rapid build-up of short-term debt in Latin America in the late 1970s and Asia in the mid-1990s was evident in the consolidated banking statistics several years before the eventual crises.

Claims on an immediate borrower basis are the most comparable to conventional measures of external debt. Nevertheless, risk transfers and claims on an ultimate risk basis can provide useful supplementary information about countries' external vulnerabilities. Data on the residency of the ultimate obligor may be useful to monitor debt rollovers or initiate a debt restructuring. For example, borrowing by a bank's foreign affiliate in London or another international financial centre will not be captured by external debt statistics. Yet it could potentially result in liquidity problems in the bank's home country if the affiliate has difficulty rolling over its obligations. For instance, in the last three months of 2002, total inward risk transfers to Brazil fell sharply as reporting banks reduced credit to Brazilian banks' offices abroad. Consequently, net outward risk transfers from Brazil rose substantially between September and December 2002 (Graph 2).

Moreover, risk transfers may provide an early warning indicator of perceived changes in borrowers' creditworthiness. As concerns about country risk mount, banks may seek third-party guarantees before rolling over maturing credits, hedge their exposures in derivatives markets or cut back their lending to borrowers' overseas affiliates. Indeed, owing to the improving liquidity of

Consolidated data highlight risks not apparent in external debt statistics

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[17] From December 2004, reporting banks were no longer requested to separately identify claims on banks with headquarters outside the country of residence, for example claims on the Mexican subsidiaries of non-Mexican banks. Consequently, it is no longer possible to estimate the overlap in reporting banks' claims. As of September 2004, such claims equalled 2% of international claims on emerging markets.

Net risk transfers from emerging markets[1]

By residency of immediate borrower, as a percentage of foreign claims on an immediate borrower basis[2]
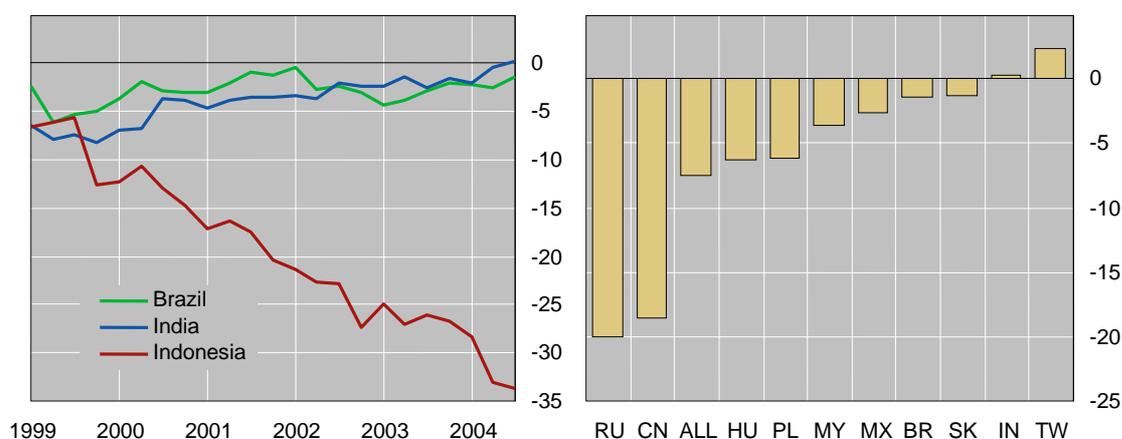
[1] Inward transfers to emerging markets minus outward transfers from emerging markets; sum of positions reported by banks headquartered in all 30 reporting countries. [2] Data in the right-hand panel refer to positions outstanding at end-March 2005; ALL = total for emerging markets; BR = Brazil; CN = China; HU = Hungary; IN = India; MY = Malaysia; MX = Mexico; PL = Poland; RU = Russia; SK = Slovakia; TW = Taiwan (China). Graph 2

credit derivatives markets, banks often find it more cost-effective to buy protection against problematic credit risks rather than sell their exposures outright or wait for them to mature. Even though claims on Indonesia on an immediate borrower basis grew in late 2004 for the first time since the Asian financial crisis, the continued increase in net outward risk transfers suggests that banks remained wary of taking on Indonesian risk (Graph 2). By contrast, the steady improvement in India's economic fundamentals has in recent years contributed to a gradual decline in banks' net outward risk transfers from India.

... and contingent exposures

Contingent exposures can also provide an early warning indicator of perceived changes in borrowers' creditworthiness. Credit commitments and utilisation ratios will tend to fluctuate with investment spending, inventory accumulation and other facets of borrowers' business. Yet, a steady decline in commitments could indicate that borrowers are facing difficult financing conditions, and are therefore either drawing down their backup facilities or losing access to bank financing.

Furthermore, credit commitments are a key determinant of borrower's vulnerability to liquidity crises. Borrowers with access to large lines of credit are likely to be able to adjust to a temporary deterioration in financing conditions more smoothly than borrowers without such access. Whereas reporting banks' credit commitments to Philippine borrowers equalled nearly 20% of their claims on an ultimate risk basis at the end of March 2005, to Taiwanese borrowers they were only 7% (Graph 3).

Debtors, like creditors, are vulnerable to fluctuations in the value of derivative contracts. The data on derivative contracts available in the consolidated banking statistics provide, at a given point in time, a very rough approximation of the additional external liabilities arising from derivatives activity. However, they are based on foreign claims and so include derivatives exposures of reporting banks' local affiliates to residents – exposures which do

Contingent exposures to emerging markets[1,2]

By residency of ultimate obligor, as a percentage of foreign claims on an ultimate risk basis

Credit commitments

PH CZ TH HU MY PL KR SK IN TW

Guarantees extended

TH PH IN CZ SK KR TW MY HU PL
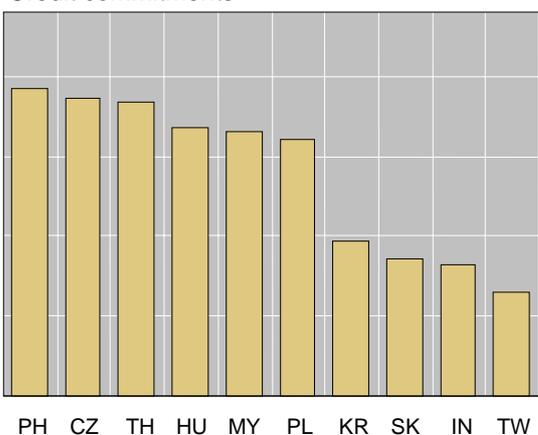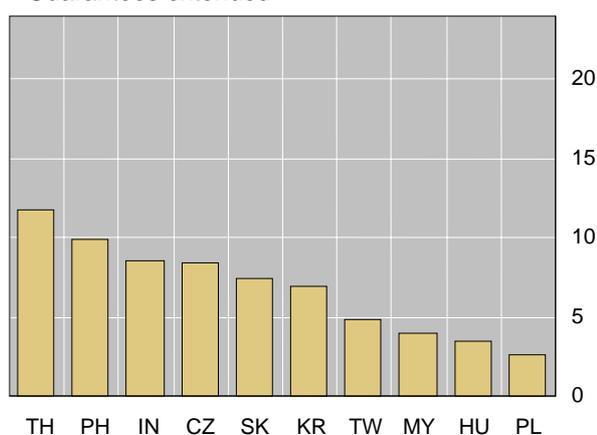
[1] Sum of positions reported by the banks listed in footnote 1 of Table 1; at end-March 2005. [2] CZ = Czech Republic; HU = Hungary; IN = India; KR = Korea; MY = Malaysia; PH = Philippines; PL = Poland; SK = Slovakia; TH = Thailand; TW = Taiwan (China).

Graph 3

not necessarily result in an external liability. Furthermore, they are reported on an ultimate risk basis and so derivatives exposures to countries where the major dealers are headquartered will tend to be higher than on an immediate borrower basis.

Finally, because the consolidated statistics net out intragroup positions, they provide a more accurate measure of the degree of concentration among creditors, or at least among banks, than external debt statistics. The concentration of creditors is a measure of funding risk and, moreover, one possible channel for contagion. For example, creditors who experienced losses following the default by the Russian government in August 1998 sought to reduce their risk by closing positions in other markets (CGFS (1999)). Countries with liabilities to a broad range of creditors are less likely to be affected by such contagion.

Monitoring the concentration of creditors

Future enhancements to the consolidated banking statistics

Since their inception in the 1970s, the BIS consolidated banking statistics have been a rich source of information on banks' foreign assets. The comprehensiveness of the statistics has improved over time and will continue to be enhanced in years to come. The number of countries that report the full set of consolidated statistics, including derivatives and contingent exposures, should eventually include all of the 30 countries which currently contribute to the consolidated statistics. In addition, several emerging market countries have been making the necessary preparations to join the reporting population. Banks in emerging economies play an increasingly important role in the international banking market, and their participation will ensure that the coverage of international banking activity in the consolidated statistics remains virtually complete.

The reporting population is set to expand

Changes in the international financial system and in the character of risks managed by banks will continue to highlight areas where more data might be desirable. For example, over the past decade non-bank financial institutions, especially hedge funds, have become major players in financial markets as well as representing sizeable credit exposures on banks' balance sheets. The introduction into the consolidated banking statistics of a finer sectoral breakdown, which distinguishes between non-bank financial institutions and the non-financial private sector, might thus provide useful additional information on risk exposures. Against the benefits of such a change, however, must be weighed the costs to reporting banks of continually fine-tuning the reporting system.

Regardless of whether future enhancements are made, the consolidated banking statistics are likely to remain an essential source of information for understanding the risks to which banks are exposed through their foreign operations. Despite the trend towards globalisation, geography still matters. Political risks, macroeconomic risks, legal systems and market conventions – to name but a few factors – all differ from one country to another. Therefore, identifying where in the world risk exposures lie will long continue to be a key focus of banks' risk management.

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The rise and fall of US dollar interest rate volatility: evidence from swaptions[1]

Interest rate volatility, as implied by swaptions prices, rose in all major economic areas between 2001 and early 2004. The increase was particularly sharp for US rates and was more sizeable for short-term rates and swaptions with short expiration. Since the spring of 2004, US dollar volatilities have declined to the values recorded for euro rates and their term structure has flattened. The rise and fall of US dollar implied volatility reflected changes both in expectations of realised volatility and in the compensation for volatility risk.

JEL classification: G120, G130, G140.

The volatility of US dollar interest rates, as implied by the price of swaptions, increased substantially between 2001 and early 2004. The rise was much more marked than for euro rates, and increased especially for short-term rates and over short horizons, ie for swaptions with time-to-expiration of six months or less. However, both the higher average volatility of US rates and the relative peak in volatilities at short rates and horizons have receded considerably since the spring of 2004. As of end-March 2005, the volatility term structure was almost flat and the implied volatilities of US rates had fallen below those observed for the euro.

This special feature explores whether the rise in US dollar implied volatility was simply the counterpart of higher expected volatility, or whether it also reflected increased compensation for volatility risk. To investigate this issue we compare implied volatilities with forecasts of historical volatility derived from simulations of a GARCH model. We also seek to identify the main determinants of the gap between implied and forecast volatility, which is a metric of the compensation required for bearing volatility risk.

To anticipate the main results, a rise and fall in compensation for volatility risk has contributed significantly to the moves in US dollar implied volatilities. Compensation for volatility risk has usually been higher in the United States than in the euro area, particularly for short-term swap rates. After peaking in

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early 2003, it had retreated to roughly similar levels for both the United States and the euro area at end-March 2005. Among the determinants of compensation for volatility risk, the level of the interest rate and its volatility have had a sizeable positive effect. Positively sloped yield curves and negatively sloped volatility term structures are associated with lower compensation for volatility risk. Finally, macroeconomic surprises can affect compensation for volatility risk as well, though the size of these effects is quite variable.

The recent behaviour of volatility in swaption markets

Swaption markets provide an excellent opportunity to study the behaviour of implied interest rate volatility.[2] Compared to options on government bonds, swaptions are available on a larger set of interest rates (all the swap rates between one and 10 years) and for a broader spectrum of times to expiration (from one month to 10 years). This allows the construction of a term structure of implied volatilities for any given swap rate. Also, unlike options on government bonds or eurodeposits, swaptions have a constant life to expiration, which simplifies the empirical analysis.[3]

The implied volatilities used in this study are extracted from at-the-money swaptions on the US dollar and euro swap rates. They refer to the one-, five- and 10-year swap rates and are taken from swaptions with time-to-expiration of six months and two and five years. For both dollar and euro rates the sample analysed runs from 23 July 1997 to 30 March 2005.

Implied interest rate volatilities are quite variable over time, and frequently differ substantially across currencies. From 1997 to the end of 2000, volatility was approximately equal for dollar and euro swap rates, generally moving in the 10–25% range. However, in 2001, implied volatilities on US rates started to rise well beyond those of euro swaps, and particularly sharply for short-term swap rates and options with short time-to-expiration (Graph 1). Though relatively subdued compared to US dollar volatility, the implied volatility for euro swaps also rose more for short-term rates and for short-expiration swaptions. Thus, the slope of the term structure of implied volatilities, ie the difference between long- and short-dated volatilities, became increasingly negative for both dollar and euro swaps.

Implied volatilities rose significantly from 2001, particularly for US rates

Some of the largest movements in the level of implied volatilities appear to be largely common to US dollar and euro rates. For instance, a jump in volatility occurred across currencies at the time of the 1998 Russian debt crisis and the failure of Long-Term Capital Management (LTCM) in the United States,

Some large moves in implied volatilities were common to both dollar and euro rates ...

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[2] Swaptions are options on swap rates. Since a swap rate is made up of a sequence of predetermined and stochastic payments related to future Libor rates, swaptions amount to options on the portfolio of such future Libor rates. They are priced according to the Black (1976) formula, where the volatility of the future swap rate plays the same role as the equity volatility in Black and Scholes (1973).

[3] As an example, a new three-month swaption on the 10-year rate is priced every day. By contrast, a newly issued three-month option on a 10-year bond has a decreasing maturity as it moves towards its expiration date.

Implied volatility of US dollar and euro swap rates

Annualised, in per cent

| Six months ahead | Five years ahead |

US dollar

One-year
Five-year
Ten-year

Euro

1997   1999   2001   2003   2005

1997   1999   2001   2003   2005

Source: Datastream.   Graph 1
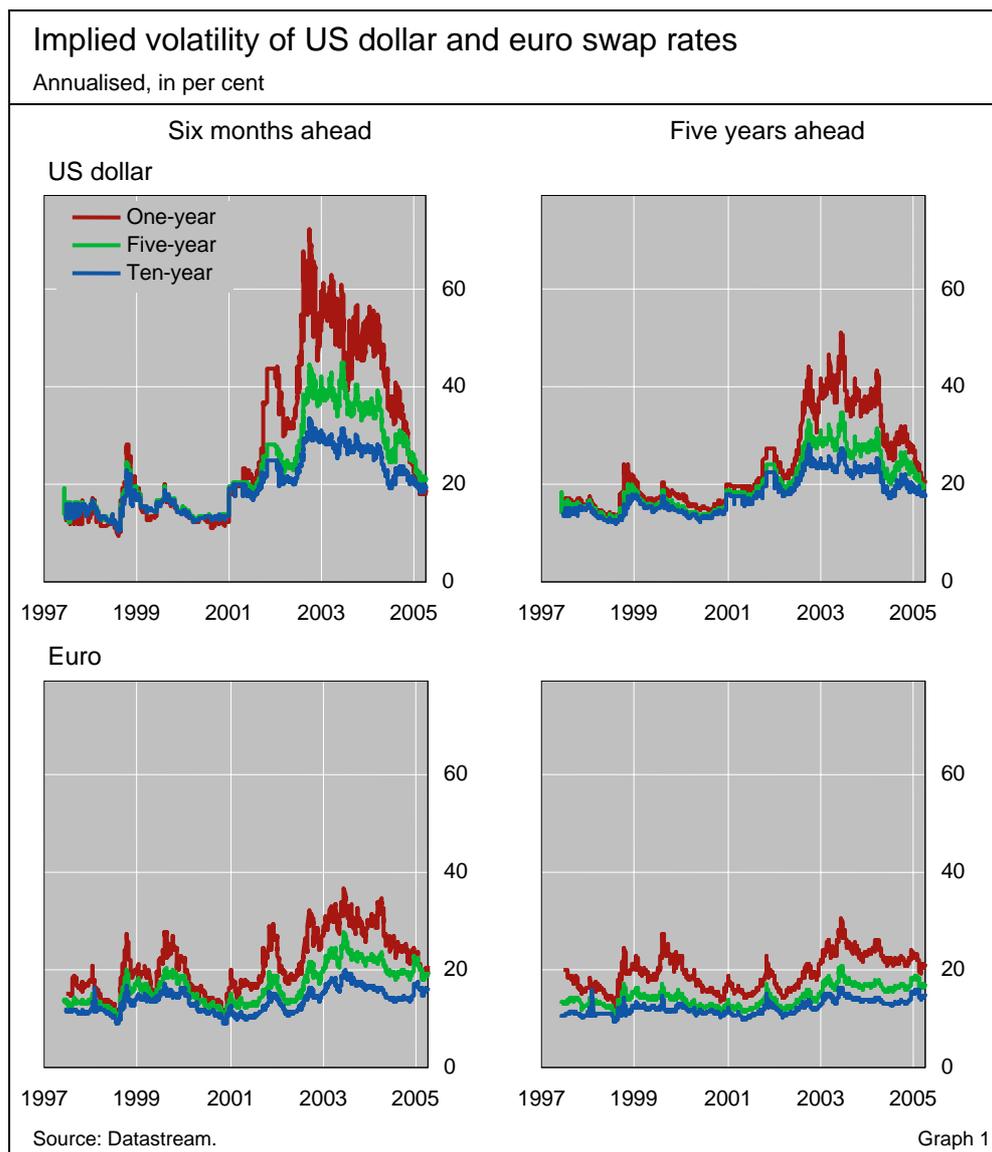
when implied volatilities rose by approximately the same amount at different interest rate maturities and option expirations. The period of this rise was approximately the same length for both the dollar and euro. The jumps recorded at the end of 2000 and after the September 2001 terrorist attacks were also common to both dollar and euro swap rates, though the latter shock had a more pronounced impact on US dollar volatilities.

... while others were specific to the dollar

By contrast, the spikes in volatilities observed for US dollar yields from mid-2002 to early 2004 were generally unaccompanied by major movements in euro area volatilities. For example, between January 2002 and May 2004, the implied volatilities on the one-year US swap rate peaked at around 70% at the six-month horizon and 50% at the five-year horizon. The corresponding peaks for the implied volatilities of analogous euro swap rates were around 35% and 30%.

Monetary policy uncertainty may have contributed to dollar volatilities

It is likely that uncertainty about US monetary policy during the period, in particular the 2002–03 deflation scare, may have been partially responsible for an increase in anticipated volatility and hence may help to explain the gap

between dollar and euro area implied volatilities.[4] Indeed, implied volatility was at high levels during the period, and was higher for short-term swap rates, which are more influenced by monetary policy. However, since the first tightening of Federal Reserve policy at the end of June 2004, markets appear to have been more certain about the path of interest rates. In this phase of diminishing monetary policy uncertainty, implied volatility has declined as target rate hikes have proceeded broadly in line with expectations of a gradual tightening (see BIS (2005, Chapter VI) for further discussion).

Did the increase in implied volatilities simply reflect expectations?

Implied volatilities should clearly reflect economic agents' expectations about future volatilities over the interval spanned by the life of the option. However, since volatility changes through time in an unpredictable fashion, agents may also require compensation to bear volatility risk, ie the likelihood that future volatility deviates from its expected level. This compensation drives a wedge between implied and expected volatilities, which will be larger in a period of rapidly changing realised volatilities (ie when uncertainty about future volatility may be presumed to be highest).[5]

Did the rise in implied volatilities between 2001 and 2004 simply reflect a rise in the uncertainty about the future path of the swap rates or did it also reflect growing compensation required by market participants to bear that uncertainty? To answer this question, we must first specify a model for the behaviour of historical volatility which can generate volatility forecasts over various horizons. This will then be taken as a proxy for market participants' expectations of future volatilities. We assume that the historical interest rate volatility is well represented by an asymmetric GARCH model and estimate it for the logarithmic rates of change of the one- and five-year swap rates on expanding samples, all starting on 23 January 1997.[6] For each calendar day we use the features of the estimated model to simulate historical volatilities of

Implied volatilities should move with expectations …

… though compensation for volatility risk may create a wedge

*We model expected volatilities with an asymmetric GARCH model …*

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[4]   Differences in the level of interest rates in the two areas do not seem to account for the size of the gap recorded in implied volatilities. Admittedly, a rise in interest rate volatility – expressed as the standard deviation of the logarithmic rates of change of yields – could be expected in the context of falling interest rates, and interest rates fell more in the United States than in the euro area in 2002 and early 2003. But interest rates, whether at the short or long end, were not so far apart as to account for the volatility gap.

[5]   The compensation for volatility risk, which in the remainder of the article will be measured as the difference between the implied volatility and the expected realised volatility simulated through a GARCH model, is proportional to the relative risk aversion parameter of a power utility function. Bollerslev et al (2004), using data on the S&P 500 Index and its options between January 1990 and May 2004, find the coefficient of proportionality to be close to unity, so that the negative of the compensation for volatility risk equals the investor relative risk aversion (see also Bakshi and Kapadia (2003).

[6]   We use a GARCH scheme to estimate and forecast interest rate volatility since it is well known that this class of models is optimal even in the presence of various types of misspecification. On these issues see Nelson and Foster (1995) and, more recently, Fornari and Mele (2005). Jumps are not considered in this special feature. However, the typical average jump intensity and jump size identified for interest rates would not change the main message of our results. Our simulation methodology can be reconciled with Rosenberg and Engle (2002) and has been applied in a different fashion in Tarashev et al (2003).

Implied volatilities and confidence band for expected realised
volatility of the US dollar and euro swap rates
Annualised; in per cent

One-year rate, six-month horizon

Five-year rate, six-month horizon

95% confidence band
US dollar

Euro

Sources: Bloomberg; BIS calculations.

Graph 2
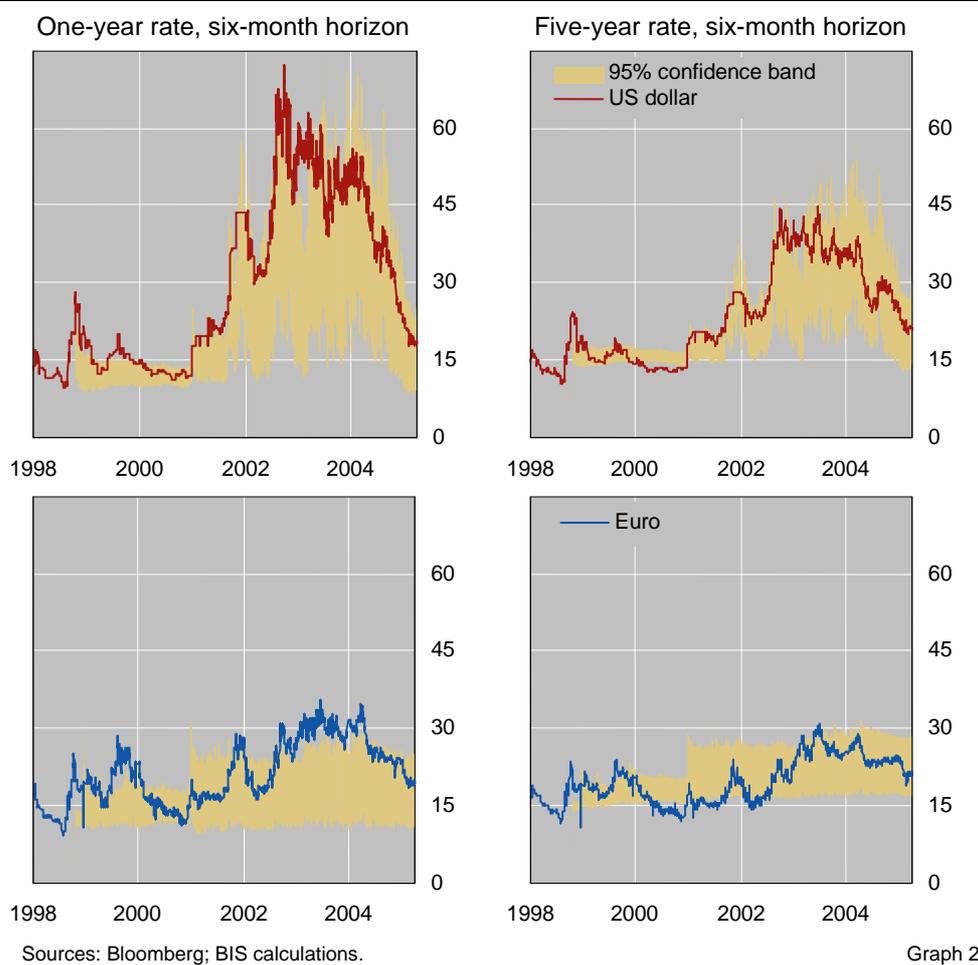
the two interest rates (one- and five-year) over two forecast horizons (six and
24 months). For each of the two horizons and at each swap rate, forecast
volatilities are then compared to implied volatilities. We define the
compensation for volatility risk as the difference between the implied and
average forecast volatilities.

In principle, point estimates of the compensation for volatility risk would
suffice for our analysis. However, we also use the simulations to calculate a
probability distribution for the future expected volatility (see the box on
page 93), whose percentiles provide a 95% confidence interval for the point
estimates. The days in which the implied volatility lies outside the confidence
interval can be assumed to represent periods of exceptionally high or low
compensation for volatility risk. We look at the confidence interval so as to limit
the risk of interpreting changes in our ability to estimate expected realised
volatilities as changes in the compensation for volatility risk.

Especially in 2002 and 2003, implied volatilities were frequently and
persistently outside the confidence interval of the forecasts for historical
volatility (Graph 2). Episodes outside the confidence interval were rather
common for one- and five-year dollar rates at both the six- and 24-month

Compensation for volatility risk of the US dollar and euro swap rates[1]
Annualised; in per cent

One-year swap rates
- USD 6-month
- USD 2-year
- EUR 6-month
- EUR 2-year

Five-year swap rates

[1] The compensation for volatility risk is the difference between the implied volatility and the expected realised volatility; over the six-month and two-year horizons; one-month moving average.

Sources: Bloomberg; Datastream; BIS calculations.   Graph 3
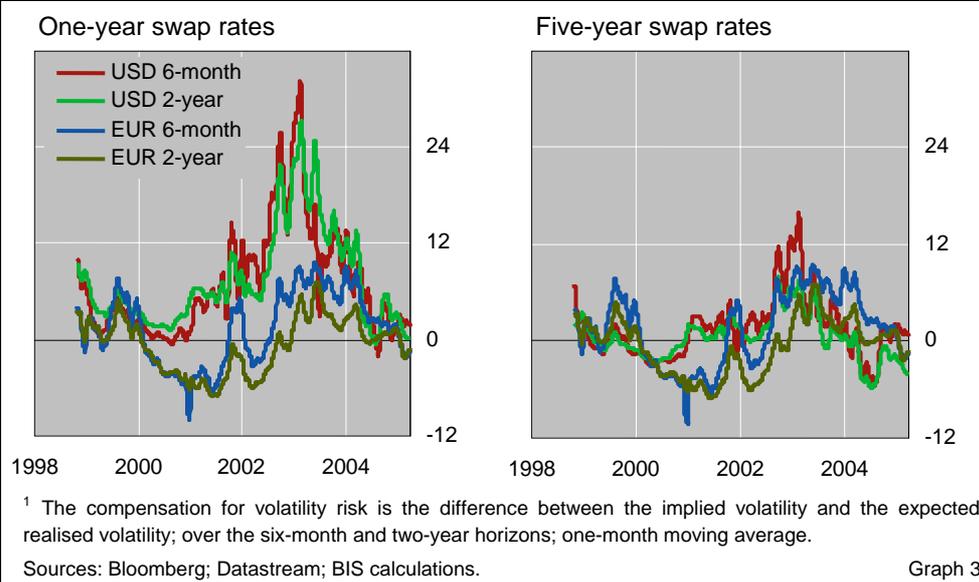
forecast horizons (Graph 2, upper panels, reports evidence for the six-month horizon). Results differ for euro rates, where implied volatilities move for an extended period above the upper limit of the confidence band only for short-term swap rates and, in fact, fall below the lower limit at times for longer-term rates (Graph 2, lower panels).

Compensation for the volatility of dollar rates, as calculated by our model, has moved significantly through time and was exceptionally high for one-year swap rates at forecast horizons of six months, and between late 2001 and early 2004 (Graph 3). By contrast, for the one-year euro swap rate, the rise in volatility compensation in 2003 was much less sizeable than that for the analogous US rate. And for the five-year euro rate, in particular, compensation for volatility risk remained quite low, with implied volatilities less than forecast volatility being the rule rather than the exception.

While there was a noticeable correlation in volatility premia across countries and forecast horizons, co-movement was higher *within* countries than *across* countries. For both US swap rates (one-year and five-year), across the forecast horizons, the correlation was on average 0.9; for euro area rates, it averaged 0.6. By contrast, the US-euro area correlation was much lower, at 0.3 on average for both swap rates across the forecast horizons.

What determines compensation for volatility risk?

The obvious next question is what might explain the time variation in the compensation for volatility risk. According to standard finance theory, it should be related to the variables which influence the payoff of the derivative instrument. In the present application, we would thus expect the main determinants of the volatility risk premia to be the short-term interest rate level and its volatility.

Modelling historical volatility and generating volatility forecasts

We assume that historical interest rate volatility can be well represented by the following asymmetric GARCH(1,1) model (see Engle and Ng (1993)):

$$r_t = \mu + \phi \bullet r_{t-1} + \varepsilon_t$$
$$\varepsilon_t \mid I_{t-1} \sim N(0, \sigma_t^2)$$
$$\sigma_t^2 = \omega + \alpha \bullet \varepsilon_{t-1}^2 + \beta \bullet \sigma_{t-1}^2 + \gamma \bullet max(0, -\varepsilon_{t-1})^2$$

where r_t denotes the logarithmic daily rates of change of a swap rate and σ_t^2 is its daily conditional variance; I_{t-1} is the information set, ie the past history of the interest rate series.

In a first step, the model was estimated for the one- and five-year swap rates of the United States and the euro area. To reproduce as closely as possible the expectations of economic agents at time t, the estimation was performed on expanding samples, the shortest of which starts on 23 January 1997 and ends on 15 October 1998 (450 daily observations). In this way volatility forecasts rely only on information available when forecasts were made. For each day we retain the parameters of the GARCH model, $\theta_t = (\mu, \phi, \omega, \alpha, \beta, \gamma)$, the time series of forecast errors (ε_t) and the historical volatilities (σ_t).

In a second step we use the information retained to produce, for each calendar day after 15 October 1998, forecasts of the historical volatility over various horizons. Each day we generate 2,000 future paths of the interest rate and its volatility, for each of the two interest rates (one- and five-year) and for two forecast horizons, six and 24 months. For each of these horizons we compute the expected volatility by averaging first across time-to-expiration[1] and finally across the 2,000 replications. This value is then compared, for each calendar day, to the implied volatility for the same swap rate and the same horizon. It is important to average volatility across time-to-expiration because implied volatility is an average volatility expected by a risk neutral investor over the life of the option.[2]

The structure of the simulation scheme is pretty much the same as the asymmetric GARCH(1,1) described above. The only difference is due to the distributional assumption placed on the standardised forecast errors ($\varepsilon_t / \sigma_t = z_t$). The implicit GARCH assumption that z_t are independently and identically normally distributed is rejected, due to the presence of asymmetry in excess of zero and kurtosis in excess of three. To reproduce these features we directly employ the estimated z_t in the simulation. For each calendar day, we randomly select an element of z_t and then loop over the following two equations, up to a two-year horizon:

$$\sigma_{t+1}^2 = \omega + \alpha \bullet (\sigma_t \bullet z_t)^2 + \beta \bullet \sigma_t^2 + \gamma \bullet max(0, -(\sigma_t \bullet z_t))^2$$
$$r_{t+1} = \mu + \phi \bullet r_t + \sigma_{t+1} \bullet z_t$$

Given that in each calendar day we have 2,000 values for the expected volatility of each interest rate over the two forecast horizons, we can recover the distribution function of such expected volatilities. From this we calculate two measures of dispersion of the volatility forecasts, the standard deviation and the 2.5 and the 97.5 percentiles, both allowing us to build a confidence interval for the expected volatility.[3]

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[1] As an example, in each working day, the expected six-month historical volatility is the average across replications (2,000) of the average volatility simulated in the six months after that specific day. [2] Hence, comparing the time-t implied volatility to the time-t historical volatility (and not to the average historical volatility between t+1 and t+τ, τ being the time-to-expiration of the swaption) defines a compensation for risk which rests on the assumption of a random walk in volatility, which has been strongly rejected by many applications of the GARCH methodology. [3] The volatility of volatility, ie uncertainty about future volatility, is the variable that should lead economic agents to adjust the swaptions price relative to what they would do by looking at the volatility forecast only. Swaptions are priced according to the Black (1976) model, whereby traders insert the expected volatility into a pricing formula similar to that of Black and Scholes (1973). However, given that volatility is time-varying, they will be more uncertain about this volatility when the volatility of volatility is very high and they will therefore increase the price of the swaption relative to the central forecast of the volatility when the confidence interval is wider.

We also include in our analysis the slope of both the term structure and the volatility term structure, as well as macroeconomic surprises. The term structure slope is a well known indicator of business cycle developments, and compensation for volatility risk may be influenced by the perceived stage of the business cycle. The slope of the volatility term structure, on the other hand, conveys information about the horizon over which interest rate uncertainty is concentrated. As for macroeconomic surprises, implied and forecast volatilities are likely to change significantly around the release of economic data, since economic agents map the size and sign of the surprise into the shape of the future distribution of interest rates, approximating the process according to which monetary authorities will react to such a surprise.[7]

Implied volatilities tend to fall after surprises, independently of their sign, since uncertainty is resolved after economic announcements are made (see Ederington and Lee (1993, 1996)). On the other hand, realised volatility, which is a major input into forecasting models, will always tend to rise after surprises. This suggests that our measures of risk compensation might be expected to fall upon a macroeconomic surprise. In general, we also divide surprises into positive and negative surprises, since the impact of surprises on interest rates and volatilities has been found to differ according to the sign of the surprise.

To shed light on the determinants of the compensation for volatility risk, we regress the premium, measured as the difference between the implied variance and the forecast historical variance (for the maturities and times-to-expiration reported in Graph 3), on the level of the three-month rate and a measure of interest rate implied volatility, on the slope of the yield curve, on the slope of the volatility term structure and on a set of economic surprises.[8]

The results, as reported in Table 1, suggest that the premium required for the volatility risk of US rates has been mainly dependent on the level of the three-month rate and the level of short-term implied volatility. The slope of the term structure also appears to be a strong determinant of the compensation for risk, though the results are more variable. Its coefficient is negative in two out of the three significant cases, meaning that positively sloped term structures of interest rates tend to lead to lower compensation for volatility risk. Since

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[7] Estimates of the effect of surprises on both interest rates and implied interest rate volatilities are reported in Fornari (2004). For a further discussion of the impact of macroeconomic surprises, see Fleming and Remolona (1999). Other variables originally selected, such as the credit spread (ie the yield differential between low-rated and high-rated bonds) and the swap spread (the differential between the swap rate and the government bond rate), were not statistically significant.

[8] The implied volatility of the one-year rate over a three-month horizon was employed in all regressions. All surprises are defined as the difference between the actual release of a variable and the consensus forecast and are then standardised to allow comparisons across types of news. The overall number of indicators is 35 (16 belonging to the United States, five to the euro area, seven to Italy, two to Germany and five to France). For the US economy: CPI, jobless claims, non-farm payrolls, durable goods orders, GDP, housing starts, Chicago PMI, index of leading indicators, PPI, retail sales, factory orders, capacity utilisation, industrial production, balance of trade, productivity. For the euro area: CPI, consumer confidence, industrial confidence, industrial production, PPI. For Germany: retail sales, IFO. For France: consumer confidence, consumer spending, CPI, industrial production, PPI. For Italy: advance CPI, industrial production, PPI, hourly wages, retail sales, business confidence, consumer confidence.

Regression of the compensation for volatility risk of US dollar swap yields on determinants				
	One-year swap rate		Five-year swap rate	
	Six-month horizon	Two-year horizon	Six-month horizon	Two-year horizon
Three-month rate	0.108 (9.1)	0.092 (9.5)	0.041 (5.9)	0.078 (17.9)
Implied	0.025 (11.8)	0.047 (26.0)	0.025 (16.5)	0.025 (21.5)
Slope	0.036 (2.4)	−0.042 (−3.5)	−0.032 (−3.5)	
Slope vol	0.016 (5.8)	0.041 (17.4)	0.025 (12.6)	0.020 (13.0)
ISM (+)	0.068 (2.6)	0.067 (2.5)	0.046 (2.1)	0.041 (2.7)
Jobless claims (+)			0.033 (2.6)	0.014 (1.8)
Industrial capacity (+)				0.064 (1.6)
Housing starts (−)	−0.132 (−3.4)	−0.082 (−2.0)	−0.064 (−2.2)	
Monetary policy		0.092 (2.0)		0.048 (2.6)

Note: The swap rate denotes the dependent variable of the regression, the horizon the time-to-expiration of the swaption. As an example, the combination of the one-year swap rate and the six-month horizon denotes the difference between the implied volatility of the one-year swap rate taken from a swaption whose time-to-expiration is six months and the corresponding forecast realised variance. The figures in parentheses are Student's t ratios. "Three-month rate" is the three-month eurodollar rate; "Implied" is the implied volatility of the one-year swap rate expected over a three-month horizon; "Slope" is the slope of the yield curve (10-year rate minus three-month rate); "Slope vol" is minus the slope of the term structure of volatility (volatility of the one-year rate minus the volatility of the 10-year rate, taken from swaptions with a three-month time-to-expiration); "ISM" is the index of supply managers; "Monetary policy" refers to dates on which Fed representatives gave speeches during the 2003 deflation scare. The symbol (+) or (−) after a macroeconomic surprise indicates that only the positive or the negative values of such a surprise have been used as regressors. The regression is run on daily data from 1 January 1999 to 8 April 2005.   Table 1

positive slopes are indicative both of rising forward interest rates – which would command higher compensation for volatility risk – and of business cycle expansions – which might instead be expected to command lower compensation for volatility risk – the second component seems to have prevailed over the sample period. The slope of the volatility term structure has also had a negative impact on volatility risk compensation. When short-term expected volatilities are higher than long-term ones, which was typical of the sample analysed, risk compensation tends to rise.

Out of 32 surprises regarding US macroeconomic variables (16 variables split according to the sign of the surprise), three are found to influence risk compensation on days when the surprise is positive: the Index of Supply Managers (ISM), jobless claims and industrial capacity. Positive surprises tend to increase risk compensation. The only negative surprise which systematically affects the compensation for volatility risk is housing starts. A lower than expected figure for this variable is associated with a rise in the compensation.

By contrast, monetary policy events – FOMC meetings or speeches given by Federal Reserve representatives during the deflation scare period – have had only a mixed impact on the compensation for volatility risk, with the variable significant only intermittently, and the level of the regression coefficient implying a very limited economic effect.[9] These results suggest that the degree of monetary policy uncertainty may have driven implied volatilities and expectations of future volatilities in a similar fashion.

When a similar regression is run for the euro area swap rate, we find that the coefficient of the three-month Euribor rate is negative, ie higher interest

Regression of the compensation for volatility risk of euro swap yields on determinants				
	One-year swap rate		Five-year swap rate	
	Six-month horizon	Two-year horizon	Six-month horizon	Two-year horizon
Three-month rate	−1.06 (−2.8)	−2.98 (−10.2)	−2.32 (−14.6)	−1.76 (−6.1)
Implied	0.61 (5.5)	0.89 (11.8)	0.35 (9.0)	0.70 (10.3)
Slope	−3.95 (−7.1)	−3.79 (−7.9)	−2.57 (−14.2)	−5.83 (−15.6)
Slope vol	0.32 (2.2)	0.68 (6.9)	0.25 (4.8)	0.76 (7.9)
Italy retail sales (−)	−0.85 (−2.0)	1.08 (1.8)		0.90 (1.9)
Germany Ifo (+)	2.22 (1.9)	1.08 (2.1)		0.98 (2.9)
Italy PPI (+)		−2.10 (−3.8)		−1.76 (−6.1)
Euro area CPI (−)		−3.35 (−2.9)		0.70 (10.3)
Euro area PPI (−)	−2.83 (−3.4)	−1.45 (−2.7)		−5.83 (−15.6)
Italy PPI (−)		−2.98 (−10.2)		0.76 (7.9)
Euro area conf ind (+)		0.89 (11.8)		0.90 (1.9)

Note: The swap rate denotes the dependent variable of the regression, the horizon the time-to-expiration of the swaption. As an example, the combination of the one-year swap rate and the six-month horizon denotes the difference between the implied volatility of the one-year swap rate taken from a swaption whose time-to-expiration is six months and the corresponding forecast realised variance. The figures in parentheses are Student's t ratios. "Three-month rate" is the three-month euro rate; "Implied" is the implied volatility of the one-year swap rate expected over a three-month horizon; "Slope" is the slope of the yield curve (10-year rate minus three-month rate); "Slope vol" is minus the slope of the term structure of volatility (volatility of the one-year rate minus the volatility of the 10-year rate, taken from swaptions with a three-month time-to-expiration); "CPI" is the consumer price index; "PPI" is the producer price index; "conf ind" is the confidence index. The symbol (+) or (−) after a macroeconomic surprise indicates that only the positive or the negative values of such a surprise have been used as regressors. The regression is run on daily data from 1 January 1999 to 8 April 2005.   Table 2

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[9] For a list of episodes and the associated dates, see Bernanke et al (2004).

rates tended to lead to lower compensation for volatility risk (Table 2). This finding appears to be mostly driven by behaviour subsequent to 2000, when the Euribor rate moved in a much narrower range compared to the eurodollar rate, in a context of rising compensation for volatility risk in the euro area. The remaining financial variables (implied volatility, slope of the yield curve and slope of the volatility term structure) have the same sign as that observed for US dollar-based regressions, with the slope of the yield curve in fact exhibiting a more uniform and pronounced pattern. Unlike what has been observed for daily changes in interest rates, the compensation for volatility risk of euro yields does not seem to be driven more by US-specific news than by European news (Ehrmann et al (2005)). The macroeconomic variables found to be significant include both country-specific and euro area-wide surprises.

Conclusions

Interest rate volatility, as implied by swaptions, rose in all major economic areas from 2001 to early 2004, but particularly sharply for US rates at short-maturities and for short-expiration swaptions. We have analysed whether the rise in implied volatility was in line with expected volatility or was instead reflective of a significant increase in the compensation demanded for volatility risk. Our results suggest that between late 2001 and early 2004, dollar volatilities embodied a sizeable compensation for risk, which subsequently diminished considerably.

Compensation for volatility risk is mainly related the level of interest rates and volatility. Other variables, such as the slope of the term structure – which leads business cycle developments – and the slope of the volatility term structure – indicative of the horizon over which volatility is most pronounced – also affect the compensation. Positive macroeconomic surprises tend to lead to a rise in risk compensation as well. In contrast to the rise in implied volatilities, however, the rise in risk compensation does not appear to have been strongly affected by episodes of monetary policy uncertainty.

The compensation for volatility risk, as calculated, is of course dependent on the model employed to compute such forecasts. The models used in this paper do not take into account the possible presence of jumps in the interest rate process, nor more complex distributional assumptions for the forecast errors. An agenda for future research might be to explore the robustness of our findings to more general models.

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Structural models of default: lessons from firm-level data[1]

Structural credit risk models account for the average level of default rates within rating categories only when calibrated on a firm by firm basis. Nevertheless, firm-specific information matters little when one is interested in forecasting the path of default rates over time. This is because economic factors common to all firms strongly influence the evolution of default predictions.

JEL classification: C520, G100, G300.

Financial industry practitioners as well as regulators are constantly searching for reliable measures of default (or credit) risk, ie the risk of a borrower not fulfilling its debt contract. Such measures are of fundamental importance for the sound management of lender institutions and for the supervisory assessment of their vulnerability. The family of "structural" credit risk models developed in the academic literature evaluates the likelihood of default on the basis of borrower characteristics. This special feature examines the performance of three representative models from that family by comparing the probabilities of default (PDs) they deliver with realised default rates.

While a number of related studies focus exclusively on the "representative" borrower endowed with average characteristics, the analysis here calibrates the models to individual firms. The new approach extracts theoretical predictions that account for the *average level* of default rates and stand in contrast to the PD of the representative borrower, which is biased downwards. However, the difference in the calibration approaches is largely inconsequential if one is interested only in explaining *changes* in default rates over time. In this respect, the explanatory power of the models is mixed under either approach.

The reason for this seemingly puzzling contrast in the relevance of data disaggregation is rather straightforward. Under a calibration at the firm level, the estimate of a default rate increases in the dispersion of borrower characteristics because of the non-linear structure of the models. If one focuses instead on the representative borrower, and thus on aggregate data,

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

one ignores any dispersion of characteristics across borrowers and hence underpredicts credit risk. By contrast, when tracking default rates over time, the models rely on the *evolution* of borrower characteristics, which are influenced by common economic factors, related to stock market developments and the cost of borrowing. Since the PD of the representative borrower reflects these common factors, the use of aggregate data does not impair the capacity of the models to forecast changes in credit risk.

The next two sections introduce the three structural credit risk models used in the empirical analysis and sketch their calibration. The subsequent sections evaluate in turn the ability of the models to (i) predict average default rates, (ii) identify future defaulters, and (iii) explain the time path of default rates.

Three representative structural credit risk models

We use three structural credit risk models developed in Leland and Toft (1996; henceforth, LT), Anderson, Sundaresan and Tychon (1996; AST) and Huang and Huang (2003; HH), respectively. All of these models extend the contingent claims framework of Merton (1974), in which a default occurs when the value of the borrower's assets falls below a particular threshold.

Three structural models differ ...

The determination of the threshold (default trigger) value of assets is what differentiates the three models from each other. In this respect, the HH model is closest to Merton's in adopting an exogenous default trigger, which does *not* incorporate the incentives of the borrower but is set to be consistent with an estimate of loss-given-default (LGD).[2, 3] In the AST and LT models the default trigger is endogenous, ie determined strategically by the borrower. The LT model, in which a defaulting firm is surrendered to its lenders, derives a trigger that maximises the equity value of the firm for any asset value. For its part, the AST model allows the borrower to restructure the debt contract and thus adopts a definition of default that comes closer to the one used by credit rating agencies. In such a setting, the borrower may default at a higher asset value than in the LT model in order to renegotiate its contract.

Theory-implied PDs are quite sensitive to the default trigger value of assets, which are set differently across models. The calibration of the HH model relies heavily on an estimate of the *average* LGD in each cross section in the sample. This limits the dispersion of exogenous default triggers across firms. In addition to matching the same estimates of average LGDs, the endogenous default thresholds in the LT and AST models depend on an array of *borrower-specific* characteristics, such as leverage, coupon rate and asset volatility, and, consequently, vary considerably more in each cross section.

... in the implied default triggers

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[2] LGD is the amount of assets lost at default, as a fraction of the face value of debt.

[3] Tarashev (2005) finds that the PDs implied by the HH model are extremely similar to those obtained by Longstaff and Schwartz (1995), who also assume an exogenous default trigger.

Data

To compare model-implied PDs to realised default rates, this special feature relies on a data set covering corporate borrowers domiciled in the United States. The data set provides quarterly series of default rates and allows for the construction of a parallel series of firm-specific model-implied PDs, from the first quarter of 1990 to the second quarter of 2003. The horizon of default rates and PDs is one year. For the calculation of default rates, we follow standard practice and group potential defaulters according to their credit rating: BBB, BB or B.[4]

Calibrating the models at the firm level requires the use of several data sources.[5] The overlap of the alternative sources is not perfect, which restricts the size of the cross sections of theoretical PDs. The size increases continuously over time, with the average cross section consisting of 77 BBB-, 77 BB- and 59 B-rated firms. Non-financial firms comprise more than 90% of the sample.

Model-implied PDs and realised default rates

The models match average default rates ...

If a correct model is applied to a random selection of firms in a given credit rating class, the average one-year PD in the cross section is an unbiased estimate of the default rate realised in the same rating class over the following year. This estimate requires firm-level data, whereas an alternative estimate, the PD of the representative (average) borrower, necessitates only aggregate data for the rating class. To examine whether a model is unbiased and whether its bias depends on how disaggregated the data are, we average one-year default rates and their alternative estimates over time (Table 1).

Bias in alternative estimators of default rates[1]							
		LT model[3]		AST model[3]		HH model[3]	
Rating	Default rate[2]	Average of firm-specific PDs	PD of representative firm	Average of firm-specific PDs	PD of representative firm	Average of firm-specific PDs	PD of representative firm
B	6.30	6.50	0.90	4.50	0.40	3.80	1.40
BB	1.20	1.40	0.05	1.20	0.01	0.90	0.20
BBB	0.20	0.20	$2*10^{-4}$	0.20	$5*10^{-4}$	0.09	$3*10^{-4}$

[1] In percentage points. The sample period is 1990 Q1–2003 Q2. [2] Fraction of firms that default within one year, by rating class; averages over time. [3] Theoretical one-year PDs; by rating class; averages across firms (when applicable) and time.

Table 1

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[4] This data set is described in detail in Tarashev (2005). The paper also derives that the overall performance of the models changes little when the horizon is expanded to five years. However, for horizons longer than one year, the time span of the available data severely limits studies of the intertemporal changes in theoretical predictions.

[5] The data sources used here are Moody's KMV, Bloomberg and Datastream. For further information on the calibration of the structural models, see the box on page 102 and the sources cited therein.

Calibration of structural credit risk models

This box sketches the calibration of the parameters that play important roles in the models. The procedure is described more fully in Tarashev (2005) and closely follows Leland (2004) and Huang and Huang (2003).

Most of the borrower and debt characteristics can be set at the firm level. Specifically, the coupon rate and time to maturity of outstanding debt are obtained directly from the data and reflect averages across the debt instruments of the firm. Leverage is measured by the ratio of book value of total debt to the sum of book value of total debt and market capitalisation. The payout ratio, ie the fraction of assets paid out to debt and equity holders, is set equal to a weighted average of the coupon and dividend rates, with the weights determined by leverage. The asset risk premium and volatility are calibrated to be consistent with the equity risk premium and volatility of the corresponding firm. Except for the coupon rate and time to maturity, which change yearly, the other firm-level parameters are set quarterly.

The default trigger value of assets is different across models. In the "endogenous default" LT and AST models, the value is pinned down on the basis of firm-level characteristics (eg debt principal, coupon rate, leverage, asset payout rate and volatility) and an estimate of LGD, which is assumed constant within each cross section of firms but is allowed to vary from year to year. In the HH model, the exogenous default trigger is set to account for the same estimate of LGD and a value of the debt principal. Calibrated in this way, the LT, AST and HH default triggers change both quarterly and across firms but the variation across firms is considerably smaller for the HH trigger.

Finally, the theoretical PDs analysed here are based on a time-invariant estimate of the risk-free rate of return: namely, the average one-year Treasury rate over the entire sample. Tarashev (2005) finds that, if the risk-free rate is allowed to fluctuate through time, the general level of model-implied PDs changes little and their ability to explain the evolution of default rates worsens slightly. Since the risk-free rate is a macroeconomic variable, common to all firms, its calibration does not influence the models' capacity to differentiate borrowers according to their credit risk.

The results reveal that the bias of a model does depend on the level of data disaggregation. Under all the models considered, the theoretical PDs of the representative firms severely underpredict realised default rates in all the rating classes. This underprediction was first observed by Leland (2004). In contrast, when calibrated at the firm level, the two "endogenous default" models exhibit virtually no bias,[6] whereas the bias of the "exogenous default" HH model is reduced substantially but not eliminated.

... only when calibrated at the firm level ...

The non-linear structure of the models explains the different bias across estimators. A deterioration in a borrower's characteristics has a substantially larger (positive) impact on the theoretical PD than a commensurate improvement in these characteristics (which lowers the PD). As a result, the average of firm-level PDs is raised by any dispersion of borrower characteristics, while the PD of the representative firm abstracts from such dispersion. Likewise, the sustained negative bias of the HH model can be traced to the limited dispersion of the exogenous default trigger across borrowers (see above), which depresses the average PD in each cross section.

Does any single borrower characteristic drive the models' capacity to match the general level of default rates? We calculate borrower-specific PDs using firm-level values for only *one* parameter at a time (leverage – ie the ratio

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[6] The only exception to this general conclusion is the AST model's underprediction of the average default rate in the B rating class.

Impact of three borrower-level characteristics on theoretical PDs[1]										
Rating	Default rate[2]	LT model[3]			AST model[3]			HH model[3]		
		Leverage	Equity volatility	Coupon rate	Leverage	Equity volatility	Coupon rate	Leverage	Equity volatility	Coupon rate
B	6.30	5.00	0.80	1.11	3.10	1.10	0.60	2.30	2.40	1.50
BB	1.20	0.90	0.08	0.07	0.40	0.07	0.05	0.50	0.50	0.20
BBB	0.20	0.20	$3*10^{-3}$	$3.7*10^{-4}$	0.10	$7*10^{-3}$	$2*10^{-3}$	0.02	0.04	$4*10^{-4}$

[1] In percentage points. The sample period is 1990 Q1–2003 Q2.   [2] Fraction of firms that default within one year, by rating class; averages over time.   [3] Theoretical one-year PDs, under the assumption that only the parameter identified in the column heading varies across firms; by rating class; averages across firms and time.   Table 2

of debt to assets – equity volatility, *or* the coupon rate) and setting the remaining borrower characteristics equal to their averages in each quarter/rating class pair. The averages of these PDs for different specifications are reported in Table 2. A comparison across parameters indicates that the dispersion of leverage ratios does the most to raise the average firm-specific PDs implied by the AST and LT models. By contrast, no single borrower characteristic dominates the predictions of the HH model.

Model-implied PDs of actual defaulters

As argued above, structural credit risk models account for sample averages of default rates only when calibrated on a firm by firm basis. This prompts the question of whether the models can also identify *specific* future defaulters. The available sample contains too few defaults and, as a result, does not allow one to reach a definitive answer. Nonetheless, some noteworthy empirical regularities stand out.

... and can identify future defaulters

To evaluate the models' success in flagging future defaulters, we calculate quarterly cross sections of firm-specific PDs. For a given quarter, we identify the defaulters in all subsequent periods and record what fraction of these firms are being assigned PDs higher than the median model-based PD in the current cross section.[7] The average of these fractions over time represents the "success" ratio of a given model and is reported in Table 3.

Ability of models to flag future defaulters[1] Averages over time			
Number of future defaulters[2]	9.6		
	LT model	AST model	HH model
Success ratio[3]	0.75	0.69	0.76

[1] The sample period is January 1990–December 2004 for defaults and 1990 Q1–2003 Q4 for model calibration.   [2] Number of borrowers that are observed in a particular quarter, from 1990 Q1–2003 Q4, and default in any one of the subsequent quarters.   [3] Fraction of future defaulters flagged by the model.   Table 3

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[7] We consider defaults occurring up to December 2004 but derive theoretical PDs up to the second quarter of 2003. Thus, potential defaulters are tracked for at least 18 months.

Based on this rather crude criterion, the models perform reasonably well: on average, they flag up to three out of four future defaulters. "Misses" are due to low leverage ratios, which is in line with the strong impact of this borrower characteristic on the level of theoretical PDs. All of the defaulters missed by the LT and AST models feature a leverage ratio that is smaller than the median leverage in the corresponding cross section. Similarly, the leverage ratio is low for 90% of the firms that are not flagged by the HH model but default later.

Model-implied PDs and the time path of default rates

Policymakers are interested not only in the average level of default rates but also in their time profile. In this section, we consider the correlation between predicted and realised default rates in a time series context. More specifically, we regress the default rate realised over a particular year on its one-year lag and on a default prediction delivered by a particular model at the end of the previous year. If a model provides useful information for explaining changes in default rates over time, the PDs it implies should enter the regressions with statistically significant coefficients. Furthermore, the PDs of a truly successful model would incorporate *all* currently available information that is useful for forecasting default rates. Thus, if a model is truly successful, past default rates should not be statistically significant in the regressions.

When one predicts the time profile of default rates ...

The predictive power of average firm-specific PDs[1]									
Dependent variable: realised default rate									
	B-rated firms			BB-rated firms			BBB-rated firms		
Constant	0.02 (0.12)	**0.03** (0.00)	0.02 (0.23)	**0.004** (0.01)	0.003 (0.21)	**0.007** (0.00)	−0.002 (0.11)	−0.001 (0.44)	−0.001 (0.34)
One-year lag of realised default rate	**0.37** (0.06)	**0.45** (0.04)	**0.46** (0.01)	.	**0.40** (0.08)	.	**0.66** (0.02)	**0.63** (0.03)	**0.62** (0.03)
LT PD[2]	0.13 (0.61)	.	.	**0.42** (0.01)	.	.	**0.62** (0.08)	.	.
AST PD[2]	.	−0.26 (0.21)	.	.	0.26 (0.23)	.	.	−0.39 (0.47)	.
HH PD[2]	.	.	0.13 (0.69)	.	.	**0.62** (0.00)	.	.	−0.14 (0.87)
Adjusted R-squared	0.27	0.29	0.26	0.31	0.24	0.23	0.13	0.07	0.07

Note: The regressions in Tables 4–7 are weighted, with the weight increasing with the size of the cross section in the corresponding quarter/rating class pair. In Tables 4 and 5 the lagged dependent variable is included only when its coefficient is statistically significant at the 10% level. In Tables 6 and 7 the lagged dependent variable is included if and only if it appears in the corresponding regression in Table 5. The p-values are based on Newey-West robust covariance matrices (for the regressions pertaining to BB- and B-rated firms) or on Huber-White robust covariance matrices (for the regressions pertaining to BBB-rated firms). In the BBB rating class, 22 of the 54 realised default rates equal zero. To account for this, the BBB regressions are based on the Tobit model and the default rates are assumed to be "censored" at a low positive value (ie 0.03%). The adjusted R-squared of the BBB regressions reflects the goodness of fit vis-à-vis an estimated uncensored version of the dependent variable, which is a linear function of the regressors.

[1] Regressions based on one-year theoretical PDs and default rates. Fifty-four observations from 1990 Q1–2003 Q2. P-values are in parentheses. Entries in bold indicate coefficients that are statistically significant at the 10% level.   [2] Cross-sectional averages of firm-specific PDs.   Table 4

The predictive power of representative firm PDs[1] Dependent variable: realised default rate	B-rated firms			BB-rated firms			BBB-rated firms		
Constant	**0.02** (0.01)	**0.03** (0.01)	0.01 (0.31)	**0.008** (0.00)	**0.008** (0.00)	**0.009** (0.00)	−0.003 (0.10)	−0.001 (0.41)	−0.002 (0.28)
One-year lag of realised default rate	**0.34** (0.07)	**0.43** (0.03)	**0.51** (0.00)	.	.	.	**0.73** (0.01)	**0.60** (0.03)	**0.64** (0.03)
LT PD	0.73 (0.15)	.	.	**4.20** (0.03)	.	.	**435.00** (0.03)	.	.
AST PD	.	−0.62 (0.57)	.	.	**45.40** (0.00)	.	.	−202.40 (0.18)	.
HH PD	.	.	**1.02** (0.07)	.	.	**1.73** (0.00)	.	.	52.60 (0.75)
Adjusted R-squared	0.29	0.26	0.36	0.11	0.41	0.31	0.16	0.10	0.07

Note: See note in Table 4.

[1] Regressions based on one-year theoretical PDs and default rates. Fifty-four observations from 1990 Q1–2003 Q2. P-values are in parentheses. Entries in bold indicate coefficients that are statistically significant at the 10% level.   Table 5

We first consider the explanatory power of the models on the basis of disaggregated information. Hence, as a predictor of default rates, we use the average of the *firm-specific* PDs in each quarter/rating class pair. For a given rating class, we report three regressions in Table 4: one for each of the three structural models.

The estimates of these regressions reveal that none of the models delivers fully successful forecasts. The information in lagged default rates tends to be clearly superior to that contained in theoretical predictors. More concretely, in all but three cases lagged default rates enter the regressions with statistically significant coefficients while the coefficients of average model-implied PDs are insignificant. Two of the three exceptions are due to the LT model, which contributes to the forecasts of BBB default rates and even renders the lagged dependent variable insignificant within the BB rating class. The third exception is due to the HH model, which exhibits strong explanatory power for BB default rates.[8]

... firm-level data have limited value added ...

Next, we examine whether calibrating the models to the representative borrower would affect their capacity to explain the time path of default rates. To this effect, Table 5 reports the same regressions as above with representative borrower PDs substituting for average PDs across borrowers. This substitution does not affect the goodness-of-fit measures in any systematic way and, in several cases, leads to improved significance of theoretical forecasts.[9]

[8] Tarashev (2005) finds that one model may contain information about default rates that complements the information in another model. As a result, using PDs from different models in the same regression of default rates may substantially improve the goodness-of-fit measure.

[9] The magnitude of the regression coefficients increases substantially when one uses representative borrower PDs instead of average firm-specific PDs. This is so because, as reported in Table 1, the former estimate is orders of magnitude smaller than the latter one.

How do we reconcile the similar forecasting power of average borrower-specific PDs and representative borrower PDs with the earlier finding that only predictors of the former type account for the average level of default rates? One possibility is the existence of market factors that induce individual borrower characteristics to change in the same direction over time (which makes the two alternative theoretical forecasts move in tandem) but affect these characteristics differently at each point in time (which helps to differentiate across firms, with an impact only on average borrower-specific PDs).[10] As candidates, we consider two sets of common factors. One is associated with stock market developments, as reflected in leverage, equity risk premiums and volatility; the other is related to the cost of borrowing, as reflected in coupon rates.[11]

To examine the role of the stock market and cost of borrowing factors, respectively, we fix the corresponding parameters at their sample averages and use these for calculating modified PDs of the representative firm (Tables 6 and 7). If a particular factor drives model-implied predictions, then suppressing its time variability would lead to weak explanatory power of the modified PDs for realised default rates.

... because of the importance of common factors

The effect of calibrating constant stock market variables[1]

Dependent variable: realised default rate

	B-rated firms			BB-rated firms			BBB-rated firms		
Constant	**0.03** (0.03)	**0.03** (0.06)	0.03 (0.11)	**0.004** (0.06)	**0.006** (0.00)	**0.006** (0.07)	**−0.004** (0.03)	−0.001 (0.51)	0.001 (0.35)
One-year lag of realised default rate	**0.49** (0.00)	**0.44** (0.01)	**0.37** (0.08)	.	.	.	**0.60** (0.02)	**0.60** (0.03)	0.30 (0.27)
LT PD[2]	−0.59 (0.57)	.	.	**20.15** (0.00)	.	.	**9,540.60** (0.01)	.	.
AST PD[2]	.	−1.17 (0.82)	.	.	**182.40** (0.05)	.	.	*−7,968.10* (0.07)	.
HH PD[2]	.		−0.11 (0.69)	.	.	5.90 (0.18)	.	.	*−2,611.20* (0.00)
Adjusted R-squared	0.27	0.26	0.26	0.11	0.15	0.17	0.25	0.14	0.29

Note: See note in Table 4.

[1] Regressions based on one-year theoretical PDs and default rates. Fifty-four observations from 1990 Q1–2003 Q2. P-values are in parentheses. Entries in bold indicate coefficients that are statistically significant at the 10% level. Italicised entries mark statistically significant coefficients that are of the "wrong" sign. [2] Theoretical PDs of the representative firm when stock market variables (ie leverage, equity premium and volatility) are held constant over time.   Table 6

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[10] Tarashev (2005) relates the performance of the models to a variety of directly observable macroeconomic indicators: the Treasury term spread and the deviations from trend of the credit/GDP ratio, an asset price index and real GDP. The paper reaches the conclusion that these variables cannot fully account for the explanatory power of the models.

[11] Admittedly, leverage ratios could respond to credit market conditions as well. The calculation of these ratios, however, uses book value of debt, which is typically stable over time, and market capitalisation, which is a volatile variable.

The effect of calibrating a constant coupon rate[1] Dependent variable: realised default rate								
	B-rated firms			BB-rated firms			BBB-rated firms		
Constant	**0.02** (0.01)	**0.03** (0.00)	0.01 (0.40)	**0.008** (0.00)	**0.008** (0.00)	**0.008** (0.00)	**−0.003** (0.09)	−0.001 (0.41)	−0.002 (0.23)
One-year lag of realised default rate	**0.36** (0.05)	**0.44** (0.04)	**0.55** (0.00)	.	.	.	**0.75** (0.01)	**0.65** (0.03)	**0.66** (0.03)
LT PD[2]	0.74 (0.30)	.	.	**3.38** (0.02)	.	.	**281.10** (0.02)	.	.
AST PD[2]	.	−1.80 (0.25)	.	.	**59.20** (0.02)	.	.	−1,139.20 (0.53)	.
HH PD[2]	.	.	**1.65** (0.03)	.	.	**3.25** (0.00)	.	.	110.20 (0.49)
Adjusted R-squared	0.28	0.30	0.38	0.00	0.01	0.28	0.18	0.07	0.08

Note: See note in Table 4.

[1] Regressions based on one-year theoretical PDs and default rates. Fifty-four observations from 1990 Q1–2003 Q2. P-values are in parentheses. Entries in bold indicate coefficients that are statistically significant at the 10% level.   [2] Theoretical PDs of the representative firm when the coupon rate is held constant over time.   Table 7

Taken together, the findings reported in Tables 5–7 reveal that market-wide factors do indeed contain useful information about future default rates. When measures of borrower features linked to stock market developments are assumed to be constant, all three models effectively cease to explain the time path of default rates in the B and BB rating classes. Namely, the associated slope coefficients become statistically insignificant or negative and the goodness-of-fit measures often plummet. The picture is similar for BBB-rated firms, where the LT PDs provide the only exception. In general, holding the coupon rate constant through time affects the performance of the models only slightly. It worsens materially, however, the goodness of fit of the regressions that rely on the "endogenous default" models for predicting default rates of BB-rated firms.

Conclusion

This special feature has analysed the capacity of three structural credit risk models to predict default rates. To account for average default rates, these models need to be calibrated at the firm level. However, common factors, reflected in aggregated data, influence strongly the evolution of individual borrower characteristics over time. As a result, the use of firm-level data does not improve the (limited) explanatory power of the models for the time profile of default rates.

The above results are an encouraging step towards understanding the empirical performance of structural credit risk models. The results, however, should be considered with caution because they are based on a small sample of borrowing firms that covers a short time period. Longer data series, incorporating several credit cycles, would put the analysis on firmer foundations and help one to better assess the extent to which the models

account for upturns and downturns in economy-wide credit risk. Similarly, larger cross sections would significantly increase confidence in the forecasts of individual defaults and of default rates at different points in time.

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Recent initiatives by Basel-based committees and the Financial Stability Forum

The various Basel-based committees and the Financial Stability Forum (FSF) took a number of initiatives during the second quarter of 2005. In the case of the Basel Committee on Banking Supervision, the activities reflected further progress towards the implementation of Basel II. The FSF held its first African regional meeting as well as a roundtable meeting on the implementation of international standards and codes. Table 1 provides a selective overview of these and other recent initiatives.

Basel Committee on Banking Supervision

BCBS meets with wider group of supervisors ...

In July, the BCBS met in session with the Core Principles Liaison Group (CPLG), the Committee's working group that includes banking supervisors from 16 non-Committee member countries, the IMF and the World Bank. As part of the dialogue with the wider supervisory community, views were exchanged on the ongoing efforts to update the Core Principles for Effective Banking Supervision, the implementation of Basel II and corporate governance, as well as accounting and auditing issues. At the time of the meeting, the Committee, together with the International Organization of Securities Commissions (IOSCO), released capital recommendations for trading-related exposures and double default effects. In addition, it published guidance on the estimation of loss-given-default (LGD) during economic downturns. Furthermore, consultative materials were issued on the fifth Quantitative Impact Study (QIS 5) and on supervisory guidance for the use by banking organisations of the fair value option amendment issued by the International Accounting Standards Board (IASB). Finally, later in July, the Committee issued for public comment revised guidance to help promote the adoption of sound corporate governance practices by banking organisations.

... and releases documents related to Basel II ...

... and corporate governance

Updated rules for trading-related exposures and double default

Concerning *trading-related exposures and double default effects*, a paper setting out capital rules was jointly issued with IOSCO, based on a consultative document published in April 2005 which elicited comments from around 40 banks, investment firms, industry associations, supervisory authorities and other organisations. The rules released in July supplement some aspects of Basel II and of the 1996 Market Risk Amendment by dealing with counterparty credit risk, double default effects, short-term maturity adjustments and failed

Main initiatives by Basel-based committees and other bodies			
Press releases and publications over the period under review			
Body	Initiative	Thematic focus	Release date
BCBS	Basel Committee meets with wider group of supervisors, releases documents related to Basel II	• Capital requirements for banks' exposures to trading-related activities, including counterparty credit risk, and for the treatment of double default • Guidance on the estimation of loss-given-default • Release of consultative materials on QIS 5 • Consultative paper on supervisory guidance for use by banking organisations of the IASB's fair value option amendment	July 2005
	Enhancing corporate governance for banking organisations	• Consultative document updating 1999 guidelines	
CGFS	*Foreign direct investment in the financial sector – experiences in Asia, central and eastern Europe and Latin America*	• Summary of follow-up workshops to the March 2004 CGFS report • Discussion of national experiences with FSFDI and issues for private sector operators and authorities in charge of financial stability and public policy	June 2005
CPSS[1]	*New developments in large-value payment systems*	• Examines new developments in LVPSs since 1997 report	May 2005
	Central bank oversight of payment and settlement systems	• Sets out publicly what has been learned about effective oversight	
	General guidance for payment system development	• Sets out 14 guidelines	
FSF	Roundtable meeting on implementation of international standards and codes	• Stocktaking of achievements since 2000 and way forward	April 2005
	First African Regional Meeting	• Strengths and vulnerabilities in global and regional financial systems, efforts to strengthen financial systems at the regional level	May 2005

[1] Timothy F Geithner, President and Chief Executive Officer of the Federal Reserve Bank of New York, was appointed CPSS Chairman by the Governors of the central banks of the G10 countries with effect from June 2005.

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

transactions. In addition, the guidelines improve on the current trading book regime, in particular with regard to the treatment of specific risks.

Regarding the *estimation of LGD*, the BCBS published a number of principles that banks are expected to adhere to in order to become eligible to use own estimates of LGDs within the internal ratings-based approach of

Eligibility criteria
and flexibility for
loss-given-default

Basel II. The Committee recognised that potentially higher than average realised losses during times of high default rates might prove a material source of unexpected credit losses for some exposures. The BCBS considered that a principles-based approach, which provides a significant degree of flexibility, was most appropriate at this time.

The Committee also released three consultative documents, one on QIS 5, another on banks' use of the fair value option and a third on enhancing corporate governance. Consistent with the schedule set out in March 2005 for *QIS 5,* the BCBS issued a draft of the QIS 5 workbook and accompanying instructions for comment by participating banks by 5 August 2005. The Committee intends to publish the final version of the QIS 5 package in September 2005, in time for the data collection exercise to take place between October and December 2005.

The consultative document containing supervisory guidance on banks' use of the IAS 39 *fair value option* addressed two key points: first, it defined a set of sound risk management and control processes around use of the option; and, second, it analysed the possible effects of a bank's use of the option on supervisory assessments of its risk management systems and regulatory capital. In addition, the guidance suggested additional information that supervisors might collect to better understand the use of the fair value option by banks and its potential impact on the supervisory assessment of institutions' financial strength. The paper is open for comment until 31 October 2005.

Lastly, the Committee issued revised guidance to help promote the adoption of sound corporate governance practices by banking organisations. The paper, entitled *Enhancing corporate governance for banking organisations*, is an update of the BCBS's earlier guidance published on this topic in 1999. It is open for comment until 31 October 2005. The new paper emphasises the importance of the role of auditors (and other control functions), boards of directors, senior management and supervisors in contributing to sound corporate governance. The need for effective management of conflicts of interest is also stressed, together with transparency in governing. Particular attention is paid to activities conducted through structures that may lack transparency, or which function in jurisdictions that pose impediments to information flows.

Committee on the Global Financial System

In June 2005, the CGFS published a *summary of the follow-up workshops* held with central banks from emerging Asia, central and eastern Europe and Latin America, based on its earlier report entitled *Foreign direct investment in the financial sectors of emerging market economies*. Recognising the relevance of regional factors in the assessment of financial sector foreign direct investment (FSFDI), the Committee organised the workshops with a view to exploring issues raised in the original report with a broader range of central banks in the regions concerned. The original report, published in March 2004, pointed out the benefits brought about by foreign direct investment in terms of financial stability and efficiency for the recipient regions, but also highlighted the need to

focus on the management of country risk and the assessment of conditions in host country financial systems. During the subsequent workshops held in 2004, the discussion of national experiences with FSFDI underscored the beneficial effects emanating from intensified competition, greater availability of banking services, technology transfer and easier access to financing in host countries. Improved financial market liquidity and better risk management were manifestations of these benefits. When it was countercyclical, foreign bank lending was seen as reinforcing financial stability. However, foreign bank entry could in some instances also distort credit allocation or amplify asset price cycles. Workshop participants identified several areas warranting the attention of policymakers wishing to maximise the benefits of FSFDI. These included strengthening the legal and accounting framework in the host countries, enhancing local market discipline, and harmonising the views of home and host country authorities in charge of financial stability.

CGFS publishes summary of workshops on financial sector FDI

Committee on Payment and Settlement Systems

In May, the CPSS released three new reports prepared by working groups acting under its aegis. The first paper examines *new developments in large-value payment systems (LVPSs).* This report takes stock of developments in LVPSs since the Committee's 1997 report on real-time gross settlement systems. The main conclusions of the report are that interbank payments today settle faster, require a lower amount of liquidity (mainly central bank money), and have lower costs. The demand for cross-border payments has increased over time and while the trade-offs between risks and costs can be complex, today's LVPSs offer more flexibility in addressing them. The second paper deals with *central bank oversight of payment and settlement systems.* This report sets out publicly what has been learnt about this function, which became a formal function of central banks only relatively recently, sometimes in conjunction with one or more other authorities. The report examines the need for oversight, its scope and the activities involved, together with the source of central banks' oversight responsibilities. Ten principles for effective oversight are provided. The third publication provides *general guidance for payment system development* in the form of 14 guidelines. The report notes that, while the central bank is always a driving force in the development of the national payment system, it requires a cooperative effort from various stakeholders such as banks and regulatory agencies.

CPSS issues reports on large-value payment systems …

… and central bank oversight of payment systems …

…as well as general guidance for payment system development

Financial Stability Forum

On 17 April, the FSF Secretariat, in cooperation with the IMF and World Bank, convened a roundtable meeting on the international implementation of financial sector standards and codes among various interested parties, including representatives of the FSF members. This was in response to a decision at the FSF meeting in March to initiate a review of progress in the implementation of the standards and codes highlighted by the FSF in 2000. Participants took stock of the achievements to date and discussed ways to further promote

FSF meeting on international standards and codes in the financial sector

progress. The FSF plans to discuss this review at its forthcoming meeting in September 2005.

First FSF African Regional Meeting

On 29–30 May, the FSF held its *First African Regional Meeting* in Pretoria, South Africa. Participants discussed the strengths and vulnerabilities of international and regional financial systems, global imbalances and the effects of strengthening commodity prices on national economies. The positive impact of progress in domestic structural reform and of international developments on African economies (in terms of growth and price stability) was acknowledged. Regional policymakers are faced with challenges emanating from globalisation, the ongoing evolution of the global economy, and volatile growth and export earnings. Against this background, participants reviewed initiatives to maintain and strengthen national financial systems, including measures to pursue macroeconomic stability and to create a robust legal and financial infrastructure. The meeting also noted progress in regional cooperation.

BIS Conference: "Past and Future of Central Bank Cooperation"

On 27–29 June 2005, the Fourth BIS Annual Conference, the timing of which coincided with the 75th anniversary of the Bank, was held on the theme of the "*Past and Future of Central Bank Cooperation*". The conference provided an overview of the history of central bank cooperation, from the interwar period to the present day, also assessing the contributions that the BIS has made in this domain. While central bank cooperation in the area of monetary stability was of primary importance during the Bretton Woods era, the balance of activities shifted towards coordinated efforts to promote financial stability in the years that followed. The challenges facing the future of central bank cooperation were discussed in a policy panel session at the end of the conference. The conference presentations are available at www.bis.org/events/conf050628.htm.