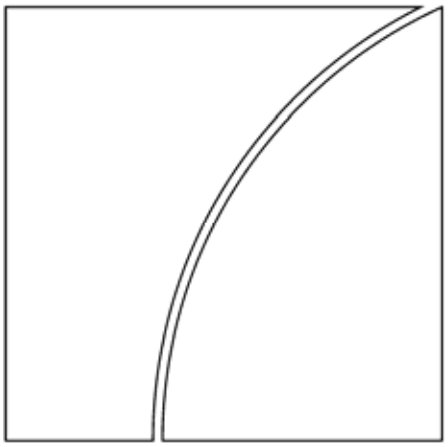
BANK FOR INTERNATIONAL SETTLEMENTS

BIS Quarterly Review

June 2007



International banking and financial market developments

BIS Quarterly Review
Monetary and Economic Department

General queries concerning this commentary should be addressed to Frank Packer (tel +41 61 280 8449, e-mail: frank.packer@bis.org), queries concerning specific parts to the authors, whose details appear at the head of each section, and queries concerning the statistics to Philippe Mesny (tel +41 61 280 8425, e-mail: philippe.mesny@bis.org).

Requests for copies of publications, or for additions/changes to the mailing list, should be sent to:

Bank for International Settlements
Press & Communications
CH-4002 Basel, Switzerland

E-mail: publications@bis.org

Fax: +41 61 280 9100 and +41 61 280 8100

This publication is available on the BIS website (www.bis.org).

ISSN 1683-0121 (print)

ISSN 1683-013X (online)

BIS Quarterly Review

June 2007

International banking and financial market developments

Special features

Recent initiatives by Basel-based committees and groups

Notations used in this Review

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

Differences in totals are due to rounding.

Peter Hördahl
+41 61 280 8434
peter.hoerdahl@bis.org

Patrick McGuire
+41 61 280 8921
patrick.mcguire@bis.org

Overview: markets rebound after sell-off

Global financial markets quickly recovered following a sell-off in late February and early March 2007, and valuations in many asset classes headed for new highs. In this environment, government bond yields in major industrialised economies rose between late February and the beginning of June. Euro yields increased the most as the outlook for economic growth in the euro area improved further. US yields were slower to display a sustained rise, reflecting investors' gradual upward adjustment of the US economic outlook, which gathered pace only towards the end of the period under review. In addition to the effects of perceived improvements in growth prospects, increasing term premia contributed to the rise in bond yields.

The rally in global equity markets continued during the period, despite the broad market repricing in late February and early March. Although brief, the bout of turbulence lifted implied volatilities in most markets from their near historical lows. Nonetheless, the major US and European equity indices quickly recovered, reaching fresh six-year highs by mid-April. In contrast, the rally in Japanese equity markets, which had started in November 2006, stalled during the period under review.

Credit markets were somewhat slower to recover from the sell-off than equities. By end-May, however, US dollar and euro credit markets had more than recouped their losses, with high-yield credit spreads touching new lows in some markets. While the spillover from the problems in the US subprime housing market was thought to be limited, investors remained concerned about the effect that further problems might have in some CDO markets.

In emerging markets, spreads tightened to new lows and equity prices climbed further during the period under review. While good economic performance contributed to these favourable developments, high risk tolerance among market participants may also have played an important role. Compared to US corporate spreads, emerging market spreads of similar credit rating continued to trade at tighter levels.

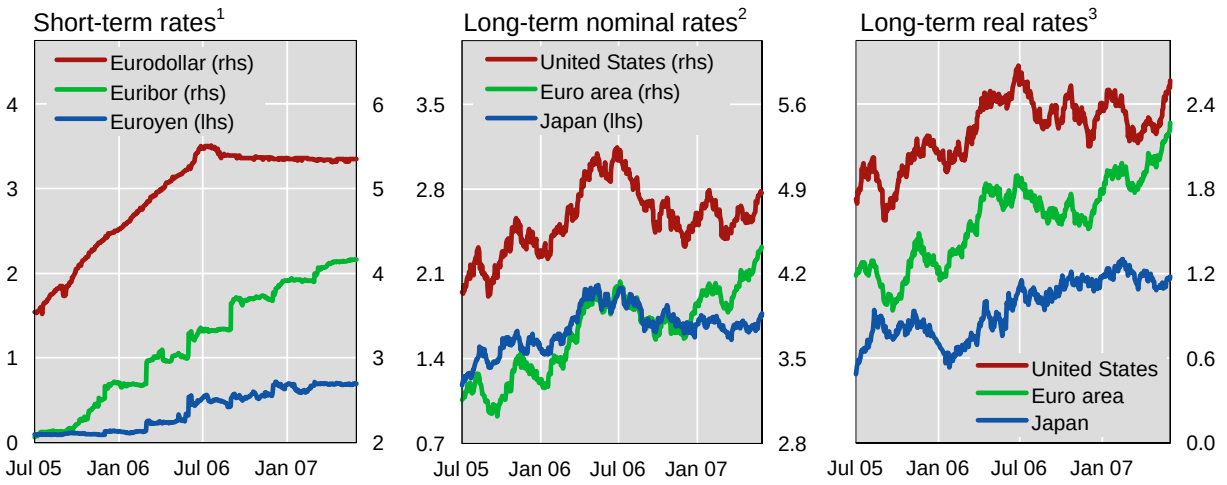
Strong growth expectations lift euro bond yields

Euro area bond yields rise the most …

Government bond yields in the G3 economies rose between late February and the beginning of June 2007, with euro area long-term yields displaying the most pronounced increases (Graph 1, centre panel). On 27 February, global

Interest rates

In per cent



[1] Three-month rates. [2] Ten-year government bond yields; for the euro area, German bund. [3] Ten-year yields on index-linked government bonds. For the euro area, based on French government bonds linked to euro area inflation.

Source: Bloomberg.

Graph 1

financial markets suffered a sell-off which continued for a number of days thereafter, and which brought about significant declines in government bond yields. As the market jitters faded, bond yields soon recovered. Between 26 February and 1 June, yields on 10-year US government bonds rose by about 30 basis points to 4.90%, while Japanese 10-year yields increased by 10 basis points to above 1.75%. In the euro area, 10-year yields rose by some 40 basis points, bringing them to around 4.45%. In money markets, meanwhile, US and Japanese short-term rates remained broadly stable, while euro area rates rose as the ECB continued to hike policy rates and expectations of future rates shifted upwards as well (Graph 1, left-hand panel).

... as the euro area economy strengthens further

The sustained upward pressure on euro area yields was consistent with investors' perceptions of the strength of the euro area economy, which continued to steam ahead at an above average pace. Thus, the rise in euro area nominal yields between late February and the beginning of June was largely accounted for by increasing real yields (Graph 1, right-hand panel). Against this backdrop, market analysts continued to revise upwards their expectations of 2007 GDP growth (Graph 2, left-hand panel).

Concerns about the US economy weigh on yields initially ...

In the United States, continued signs of a slowdown in economic activity weighed on bond yields initially during the period under review. The market sell-off in late February and early March resulted in sharper declines in US bond yields than in other major markets. This was in line with investors' view of a particularly vulnerable US economy in an environment of falling prices of risky assets and persistent worries related to the weak housing market. While many of these fears subsequently subsided and markets recovered, yields were slow to increase above their pre-sell-off levels, as investors remained uncertain about the outlook. Analysts' forecasts for 2007 GDP growth in the United States were again revised downwards, following a brief period of increases at the beginning of the year (Graph 2, left-hand panel). Nonetheless,

… but an improving outlook eventually raises yields

in the second half of May, bond yields rose as the release of stronger than expected employment data and other favourable economic indicators induced renewed optimism among investors concerning the US economy. The 10-year US real yield largely mirrored developments in corresponding nominal bond yields in the period under review (Graph 1, right-hand panel).

During the past three months, bond prices seemed little affected by the outlook for inflation, as inflation expectations remained steady in the euro area and Japan, and despite signs at times that markets expected upward price pressures to persist in the United States. US headline inflation figures remained elevated, notwithstanding questions about the strength of the economy and signs of a moderation in core inflation in the recent past. Survey forecasts for 2007 US inflation rose from March to May, as the weakening of the dollar and a rebound in oil prices seemed to result in expectations of persisting inflationary pressures (Graph 2, centre panel). In this environment, the 10-year break-even inflation rate remained relatively unaffected (Graph 2, right-hand panel). The euro area and Japan also saw steady long-term break-even rates, as survey expectations of near-term inflation remained stable.

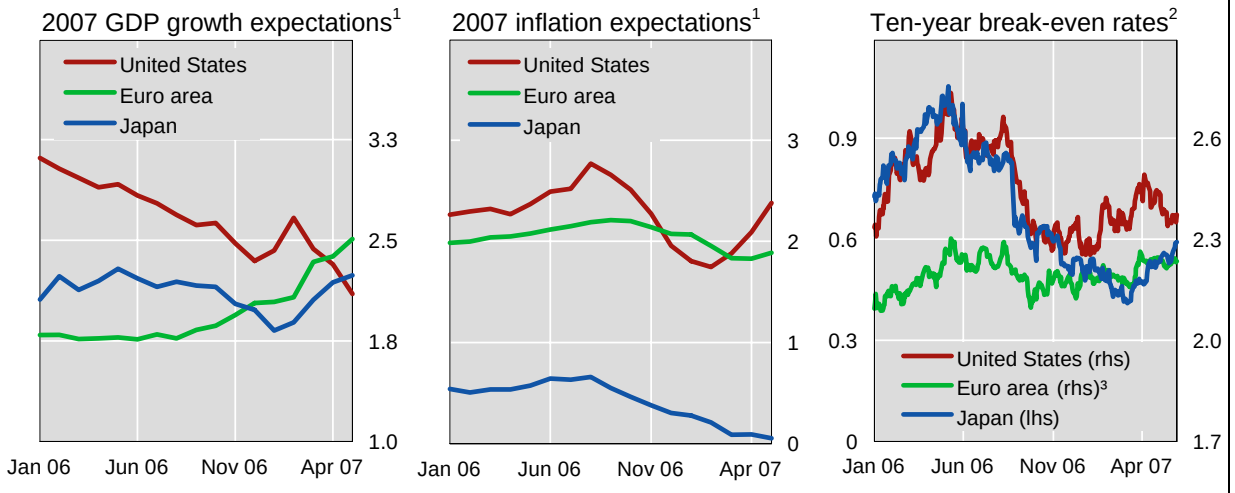
Break-even inflation rates remain steady …

… as expectations of Fed rate cuts are scaled back …

In line with the perceived outlook for inflation, on balance investors seemed to revise their expectations for US monetary policy towards a tighter stance than previously anticipated. While the Federal Reserve had for some time been expected to cut interest rates during 2007, by the beginning of June such expectations had faded almost completely (Graph 3, left-hand panel). Signs of a more robust US economy in the second half of May boosted this shift in policy expectations. Changes to the expected policy rate trajectory seemed to play an important role for developments in US bond yields as well. The two largest daily increases in the 10-year yield during the period under review occurred on days when stronger than foreseen employment reports

Macroeconomic outlook and break-even inflation

In per cent



[1] Forecasts as published monthly by Consensus Economics; observations are positioned in the month in which the forecast was made. [2] Nominal minus real government bond yields. [3] Based on French government bonds linked to euro area inflation.

Sources: Bloomberg; © Consensus Economics; national data. Graph 2

were released, which reduced the perceived likelihood of near-term interest rate cuts.

Revisions to monetary policy expectations among investors also affected bond yields in the euro area and Japan. Expectations that monetary policy in the euro area would turn out to be tighter than previously anticipated added to the upward pressure on bond yields. The ECB raised policy rates by 25 basis points in early March, and investors expected this move to be followed up by another tightening in June. Moreover, expectations for policy rates further ahead were revised upwards (Graph 3, centre panel). In Japan, markets continued to expect monetary policy to be normalised gradually, despite subdued price pressures, with the next rate hike foreseen for the autumn. However, the expected pace of adjustment, was revised downwards to some extent between late February and the beginning of June (Graph 3, right-hand panel).

… and the ECB is expected to tighten further

While the macroeconomic outlook accounted for part of the observed movements in US and euro area yields during the period under review, fluctuations in estimated term premia seemed to contribute importantly as well. Between end-February and end-May, the estimated 10-year US term premium rose by 25 basis points, while the corresponding euro premium increased by 30 basis points (Graph 4, left-hand panel). This suggests that a significant part of recent changes in nominal long-term bond yields was due to changes in investors' perceptions about risks driving yield movements, or to shifts in the price attached to such risks.

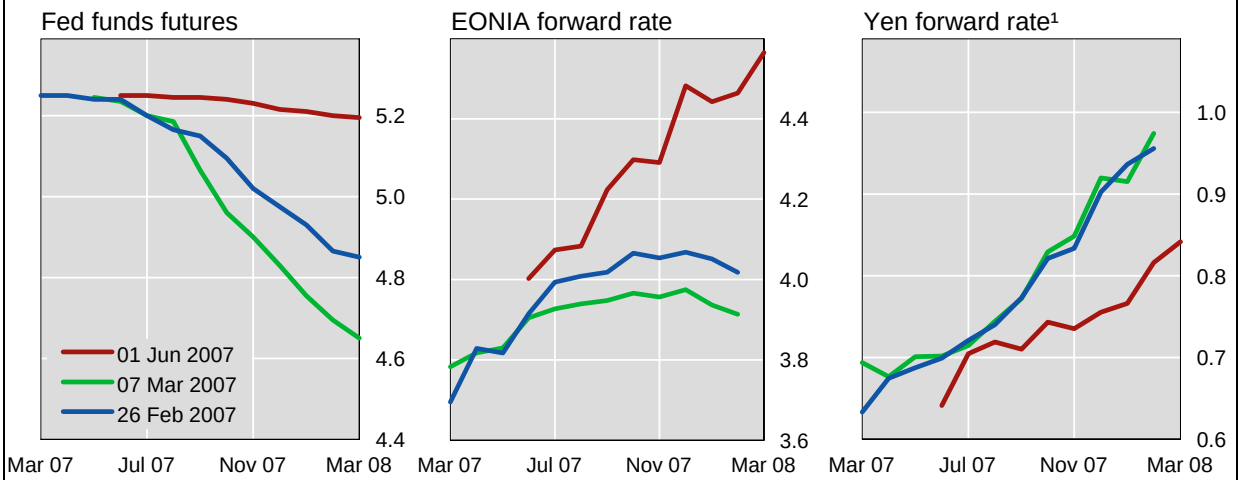
Term premia rise in the United States and euro area …

Implied swaption volatilities in the United States and euro area remained at historically very low levels (Graph 4, centre and right-hand panels). While the February–March sell-off prompted some increases in implied volatility, especially for short maturities, these effects faded in the following weeks. In particular, short-term swaption volatilities on one-year euro swap rates quickly began to fall again, and reached new lows by mid-May. The implied volatility on

… while swaption volatilities remain low

Forward curves

In per cent

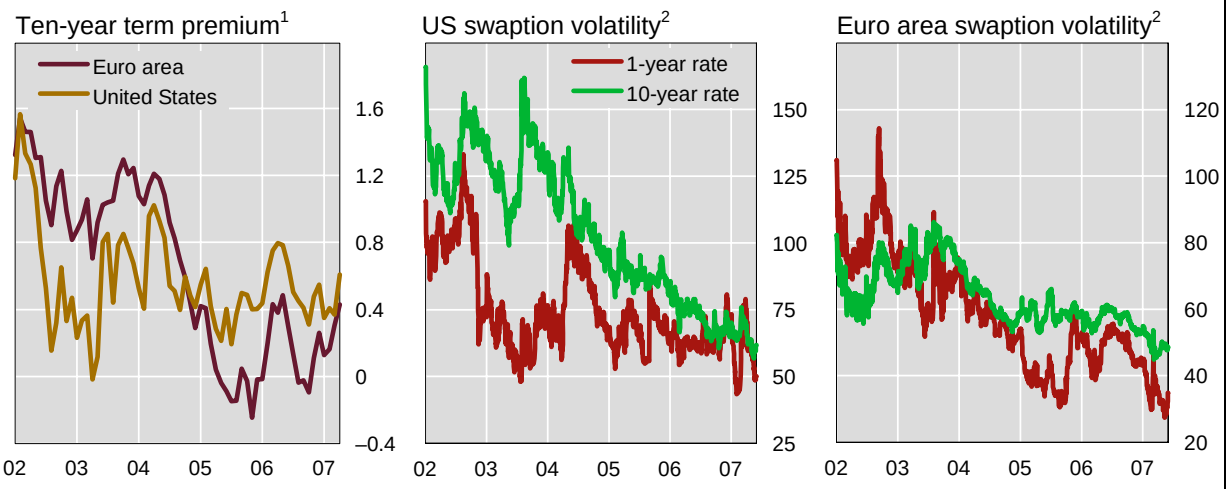


[1] Implied one-month rates; calculated from Libor fixing rates.

Sources: Bloomberg; BIS calculations.

Graph 3

Term premia and swaption volatilities



[1] Nominal term premia, in per cent, based on estimates from a modified version of the term structure model in P Hördahl and O Tristani, "Inflation risk premia in the term structure of interest rates", *BIS Working Papers,* no 228, May 2007. [2] Three-month swaption volatility, in basis points.

Sources: Bloomberg; BIS calculations. Graph 4

comparable US swaption contracts had also declined to levels not seen in recent years before the sell-off. However, US short-term swaption volatilities were somewhat slower to resume a downward path, and had not fully reverted to their pre-sell-off lows by 1 June.

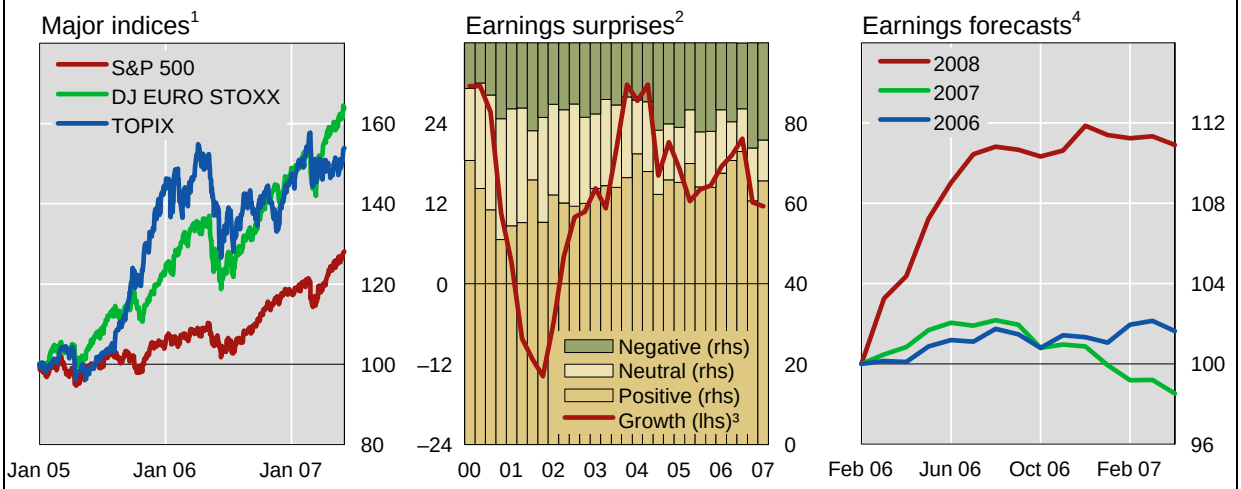
These differing developments in euro swaption volatilities compared to US contracts might have reflected contrasting perceptions about the degree of uncertainty associated with near-term moves in short-term interest rates and hence monetary policy. It is conceivable that the market became relatively more uncertain about the outlook for US interest rates in the wake of the sell-off. At the same time, investors may have felt that short-term euro interest rates remained unlikely to deviate substantially from expectations, given the robustness of real economic conditions and the signals conveyed by euro area monetary policymakers. Meanwhile, implied swaption volatilities for 10-year interest rates remained low for both US and euro rates, in line with expectations of low volatility in long-term interest rates and their macroeconomic determinants.

Equity market rally weathers turbulence

Equity markets in the United States and Europe continued their upward trajectory during the period under review, despite a brief period of market turbulence in late February. Between end-February (just prior to the sell-off) and late May, the S&P 500 was up by 6%, and hit a historical high of 1,530 on 30 May. Similarly, the DJ EURO STOXX index rose by 6%, and reached a new six-year high during the period (Graph 5). By contrast, Japanese equity markets, which had rallied strongly to mid-February, struggled to find their footing.

The market sell-off, which started in China on 27 February, had a significant, if temporary, effect on global equity markets. While concrete

Equity markets and corporate earnings



[1] In local currency; 3 January 2005 = 100. [2] Based on 12-month trailing earnings per share; companies in the S&P 500 Index, in per cent. [3] Share-weighted average annual growth rate in reported earnings. [4] I/BE/S analysts' forecasts as of the date on the horizontal axis of total earnings for the year indicated in the legend, February 2006 = 100; based on 12-month forward earnings per share; companies in the S&P 500 Index, in per cent.

Sources: Bloomberg; I/B/E/S; BIS calculations. Graph 5

triggers seemed to be absent, an allusion to the possibility of a recession in comments by the former chairman of the Federal Reserve, and a particularly weak US durable goods orders number, were cited by market participants as factors which cast doubt on the sustainability of growth in the United States. The Chinese equity market sold off 9% on the day (see the emerging markets section below), but was quick to recover. By contrast, the S&P 500 Index sold off 5.2%, and European and Japanese equity markets fell 6% and 8% respectively, over the next four days. Implied volatility in equity markets in the United States and Europe jumped during the sell-off, and remained elevated for a few weeks (Graph 6, left-hand panel). Volatility had subsequently abated by mid-May in both markets, but remained above the lows reached in mid-February.

Slower corporate earnings growth …

In the background, a slowdown in corporate earnings growth seemed to add to investors' unease about equity market valuations. Corporate earnings growth in the United States in the fourth quarter of 2006 was 12% (share-weighted basis), down significantly from the 20% average in the first three quarters. In the first quarter of 2007, two thirds of reporting companies beat analysts' expectations, although these expectations had to some extent been revised downwards in recent months (Graph 5, right-hand panel). In Europe, the expected growth in earnings per share in 2007 for companies in the DJ STOXX 600 index was only 6% in late May, compared to 15% growth in 2006.

Market-based indicators suggest that changes in investors' willingness to bear risk also contributed to the market repricing in late February. As equity investors become less tolerant of risk, they attach less value to the possibility of receiving high payoffs than to that of avoiding low payoffs. Thus, differences in the statistical distribution of actual equity returns and expected returns implied by options prices can be used to construct a rough indicator of investors' risk appetite (Graph 6, right-hand panel). This indicator dipped in March to its lowest level since

late 2003. While risk tolerance recovered somewhat in April and May, it remained lower than the overall average level evident since early 2005.

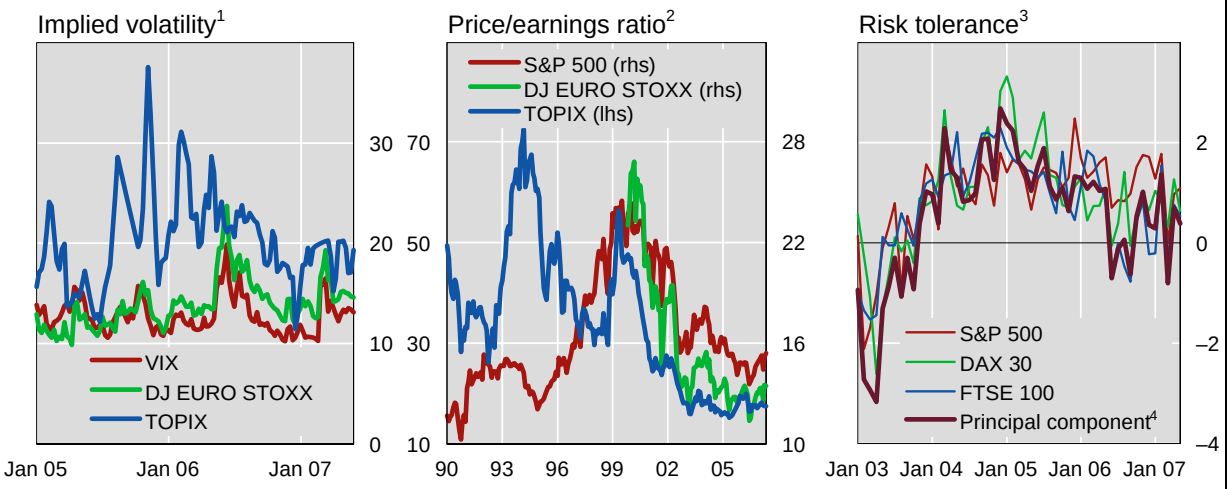
... and rallying equity prices ...

By end-May, equity markets in the United States and Europe had more than recouped the losses sustained during the February sell-off. The S&P 500 finished March just shy of its pre-sell-off level, as did the DJ EURO STOXX index. By early May, both indices had reached six-year highs, with the S&P 500 closing above 1,500 on 3 May for the first time since 2000. These advances occurred in spite of discouraging news about the state of the US housing market, which at times depressed equity markets (see below). For example, an announcement by the Mortgage Bankers Association on 13 March that the delinquency rate for borrowers with prime credit ratings was the highest in four years (2.6% in the fourth quarter of 2006) contributed to a large drop in bank and financial shares which pushed the S&P 500 index down by 2% on the day. But markets later reacted positively to the Fed's decision to hold rates steady on 21 March and, more importantly, the softer reference to the likelihood of future rate hikes in the accompanying statement.

... contribute to an uptick in P/E ratios

Unlike in early 2000, valuations in equity markets during the current rally have remained low by historical standards. Prior to the collapse in equity prices in 2000, price/earnings ratios (based on 12-month forward earnings) for companies in both the S&P 500 and the DJ EURO STOXX had risen to well above 20. They subsequently trended downwards during the bust, and bottomed out in mid-2006 at 14 and 11 respectively. P/E ratios have risen nowhere near as much during the recent rally, as generally strong earnings growth since 2005 has kept pace with the rise in equity prices. However, they have moved higher in recent months, exacerbated by the downward revisions in earnings forecasts (Graph 6, centre panel).

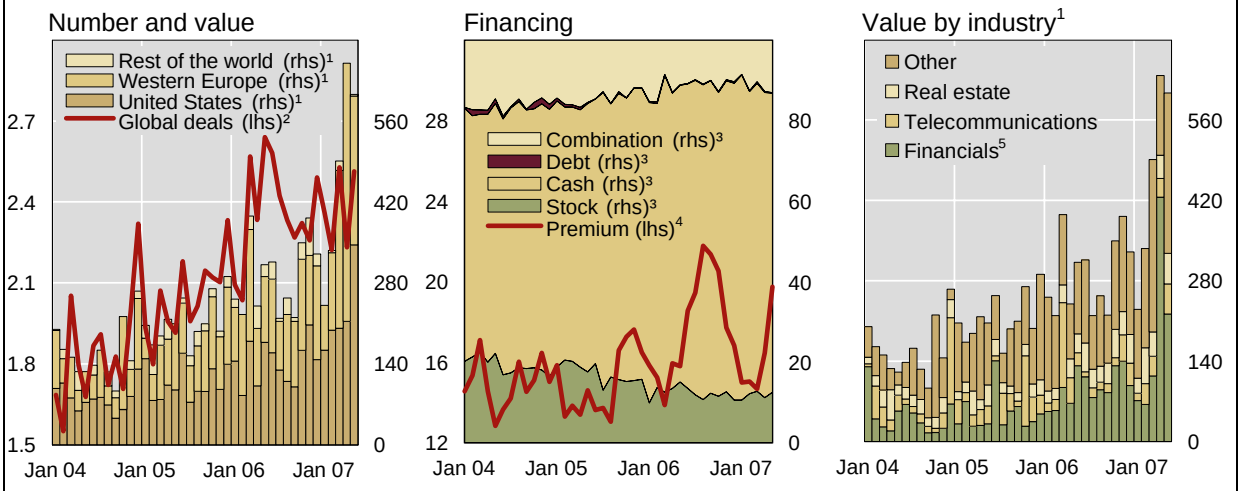
Volatility and valuations in equity markets



[1] Volatility implied by the price of at-the-money call options contracts on stock market indices; weekly averages, in per cent. [2] P/E ratios based on 12-month forward earnings, as calculated by I/B/E/S. [3] Derived from the differences between two distributions of returns, one implied by option prices, the other based on actual returns estimated from historical data. [4] First principal component of risk tolerance indicators estimated for the S&P 500, DAX 30 and FTSE 100.

Sources: Bloomberg; Chicago Mercantile Exchange; Eurex; I/B/E/S; London International Financial Futures and Options Exchange; BIS calculations. Graph 6

Global M&A activity



[1] Value of announced M&As, in billions of US dollars. [2] Number of global deals, in thousands. [3] Share of global M&A activity, in per cent. [4] Average premium; three-month moving average, in per cent. [5] Banks and financial services.

Source: Bloomberg. Graph 7

In contrast to the United States and Europe, the rally in Japanese equity markets, which had started in November 2006, stalled during the period under review. The TOPIX index peaked in late February at 1,817 and ended the period down by more than 3%. At times, depreciation of the yen and news supporting the expectation of sustained US growth helped boost the share prices of Japanese exporters. However, concerns that corporate earnings would be weaker than forecast seemed to discourage equity investors.

LBO-related loan signings surge in first quarter

The global boom in merger and acquisition (M&A) and leveraged buyout (LBO) activity continued unabated in the period under review, providing support for the rally in equity markets. The total value of announced M&A deals in the United States in 2007, at $1.1 trillion to end-May, was the strongest five-month period on record (Graph 7). Activity in Europe was also strong during this period, at just over $1 trillion, with particularly heavy activity in the banking and financial services sectors. For example, the announced $91 billion bid by Barclays for ABN AMRO on 23 April – which, if completed, would be the largest financial services deal on record – contributed to the spike in announced global activity in April. In previous M&A booms, deals financed with equity have tended to depress the acquiring firm's stock price, and any gains in shareholder value were captured mainly by the shareholders of the target company (see BIS *76th Annual Report*, Chapter VI). In the current boom, however, equity financing of M&A deals has been on the low side, at 12% of the total volume in the first quarter of 2007 compared to an average of more than 50% in the 1998–2000 M&A boom. Instead, companies have been taking on more debt to finance deals; total signings of syndicated loans for LBOs surged to $82.3 billion in the United States in the first quarter of 2007, almost double the amount in the previous quarter.

Credit markets slower to recover

Credit markets also recovered from the bout of market turbulence in late February and early March, but were somewhat slower to do so than equities. While investment grade credits were only marginally affected, with spreads widening by a few basis points, US and European high-yield credit indices widened by more than 40 basis points from their historical lows in the two weeks following the sell-off (Graph 8). Whereas equity markets had largely recouped their losses by the end of March, it was not until mid-May that euro high-yield credit spreads had returned to their mid-February lows. High-yield spreads in the US dollar market took somewhat longer, hitting their pre-sell-off level only in late May.

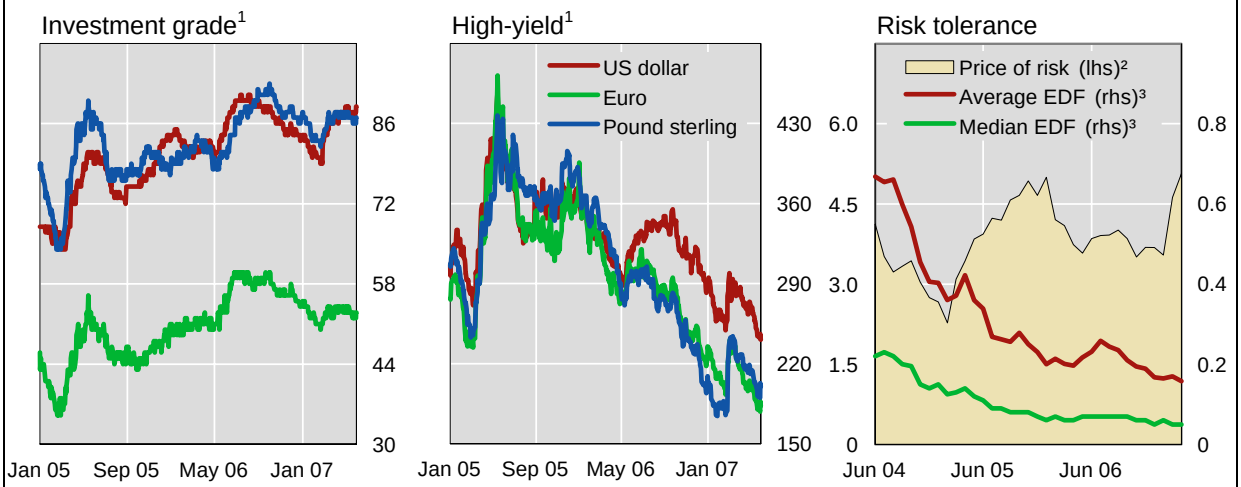
Risk tolerance falls in March and April

As in equity markets, the repricing in credit markets in February and March seemed in part to reflect changes in investors' tolerance for risk. A rough estimate of the price of a "unit" of risk in a particular credit market segment is the ratio of default probabilities derived from credit spreads to model-based estimates of default risk, such as Moody's-KMV estimated default frequencies (EDFs). This measure of the price of credit risk rose sharply in March and April as credit default swap (CDS) premia remained above their February lows, even as EDFs continued to move slowly downwards (Graph 8, right-hand panel). Indeed, the median EDF for the sample of names used in this analysis hit cyclical lows in April in both the US dollar and the euro markets, at 0.05% and 0.04% respectively.

Problems in the US mortgage market …

In the background, problems in the US subprime mortgage market may have unsettled investors, contributing to uncertainty and the bout of market turbulence. Delinquency rates on subprime loans, which had hovered near 11% for much of 2004 and 2005, reached 13% by end-2006, with much of the increase occurring in the fourth quarter. Moreover, problems seem to be concentrated in the most recent vintages of loans, those extended in 2005 and 2006 (Graph 9, left-hand

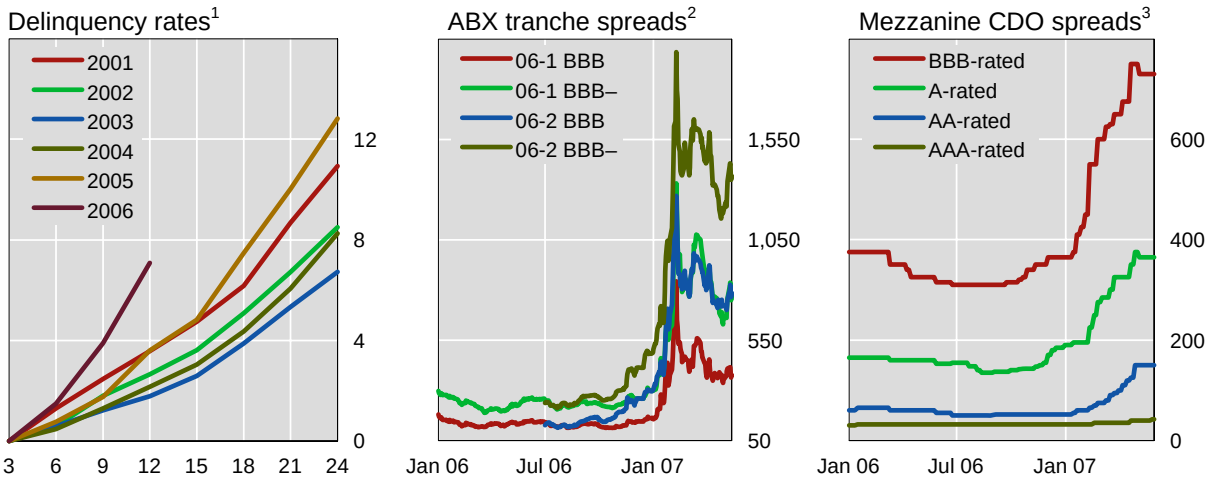
Credit spreads and risk tolerance



[1] Merrill Lynch corporate bond indices; option-adjusted spreads, in basis points. [2] Ratio of risk neutral to empirical probabilities of default. A lower value indicates a greater risk tolerance. Empirical probabilities are based on Moody's-KMV EDF data. Estimates of risk neutral probabilities are derived from US dollar CDS spreads (document clause MR) and estimates of the recovery rate. The reported ratio is the value for the median name in a large sample of non-investment grade entities. [3] In per cent.

Sources: Markit; Merrill Lynch; Moody's KMV; BIS calculations. Graph 8

US subprime mortgage market



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

Sources: JPMorgan Chase; LoanPerformance. Graph 9

panel). On the one hand, it could be supposed that the broader risks will be limited because of the relatively small size of the subprime sector. Subprime and Alt-A loans (or loans to borrowers who do not merit prime status) combined comprise roughly 14% of total US mortgage loans outstanding at end-2006. On the other hand, rising delinquencies had already induced a series of bankruptcies of subprime lenders, and there was a significant widening as from November 2006 of spreads on non-investment grade tranches of home equity collateralised debt obligations (CDOs) (Graph 9, centre panel).

… affect CDO valuations

These spreads narrowed somewhat between late February and end-May as the direct consequences of the problems in the subprime sector became clearer. However, investors also became increasingly concerned about the effect that a continued deterioration might have on valuations of CDOs backed by asset-backed securities (ABSs). Exactly where in the CDO market the risks posed by subprime and Alt-A mortgages are concentrated is difficult to measure. Estimates based on commercially available data on individual CDO deals suggest that ABSs (of all types) account for about one third of the total collateral backing cash CDOs. Industry estimates suggest that, of these, exposure to subprime mortgages is substantial. Spreads on tranches of CDOs backed by mezzanine tranches of ABSs moved significantly wider in late January 2007, signalling that investors placed a higher probability on a significant deterioration in the underlying collateral pool (Graph 9, right-hand panel).

Spreads on high-yield corporate credits resumed their downward trajectory in mid-April, as investors were apparently reassured by the better than expected earnings season in the United States and the generally upbeat macro news in Europe. Despite the surge in M&A activity and LBO-related loan signings in the first quarter, high-yield spreads in both the US dollar and euro markets ended the period a few basis points below their mid-February lows. That said, not all credit markets have returned to the pre-sell-off levels. In

contrast to the cash markets, indices of US dollar and euro non-investment grade CDS spreads finished the period noticeably wider than in mid-February.

Synthetic CDO issuance surges in first quarter

Robust issuance of CDOs and other structured products also helped to support valuations in the broader credit markets. Overall, global issuance of CDOs in the first quarter of 2007, at $251 billion, was the strongest on record. While the total issuance of US dollar cash CDOs slowed, issuance of those backed by ABSs reached $58 billion in the first quarter compared to $48 billion in the previous one. Even more significantly, issuance of investment grade synthetic CDOs, or CDOs backed by CDSs, hit a record $121 billion in the first quarter, up from $92 billion in the previous one. Synthetic CDOs generate returns by selling protection in the CDS market, most commonly on investment grade names. Issuance of these instruments has, since mid-2006, coincided with a decoupling of CDS premia and spreads on comparable corporate bonds in both the US dollar and euro markets. After the sell-off in credit markets in March 2005, investment grade CDS spreads tightened almost continuously up to mid-February 2007, whereas comparable corporate bond spreads changed little overall.

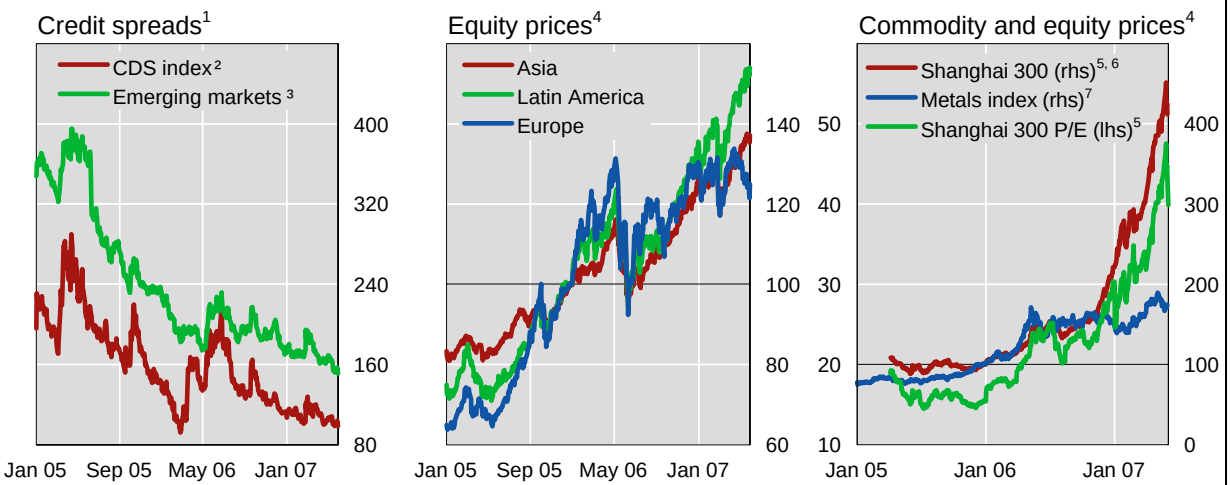
Emerging markets quickly rebound after sell-off

Emerging market spreads reach new lows

Continuing a trend seen for some time, emerging markets spreads tightened to new historical lows and equity prices climbed further during the period under review (Graph 10, left-hand and centre panels). The EMBI Global spread index fell from 175 to around 150, while emerging market CDS spreads also declined somewhat. Meanwhile, the MSCI Emerging Market equity index rose by 7%, bringing the total increase to 10% since end-2006.

Although the overall trend in emerging markets was positive during the past three months, these markets also sold off in late February and early

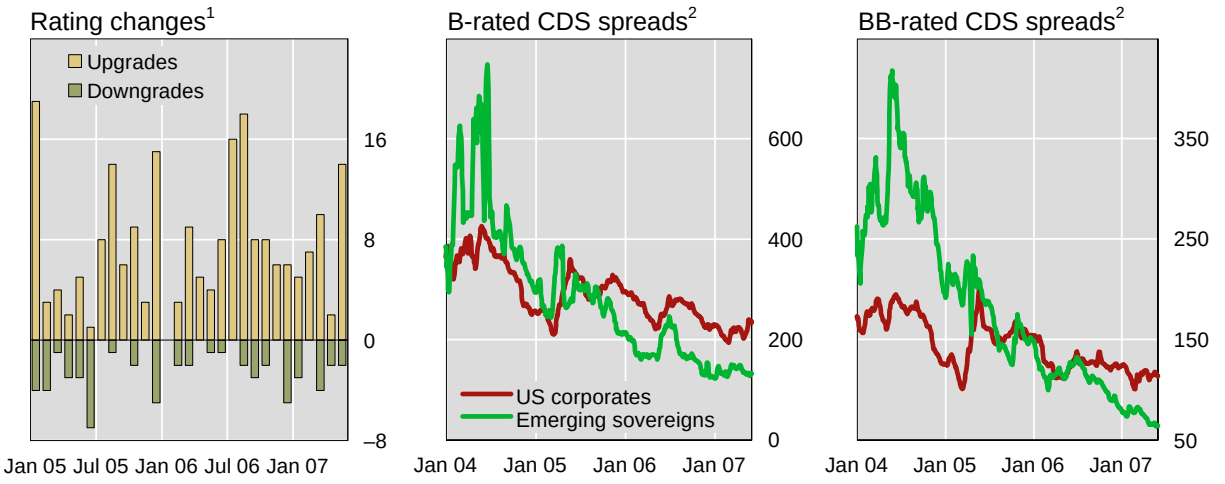
Emerging market equity prices and sovereign spreads



[1] In basis points. [2] Emerging markets CDX five-year on-the-run CDS mid spread. [3] EMBI Global index; sovereign spread over government bond yields. [4] In local currency; 31 December 2005 = 100. [5] The 300 most representative A-share stocks listed on the Shanghai or Shenzhen stock exchanges. [6] Equity price index. [7] London Metal Exchange index composed of aluminium, copper, lead, nickel, tin and zinc; in US dollars.

Sources: Bloomberg; Datastream; JPMorgan Chase; BIS. Graph 10

Rating changes and credit spreads



[1] Monthly long-term foreign and local currency sovereign rating changes from Fitch, Moody's and Standard & Poor's. [2] Daily median CDS spreads; five-day moving averages, in basis points.

Sources: Bloomberg; Dealogic; Markit; BIS calculations. Graph 11

March. Both bond and CDS spreads rose by 20–25 basis points in the week following 26 February, and equities fell about 10% during this period. While the main underlying factor behind this sell-off was probably related to concerns about the US economy, one of the immediate triggers seemed to be a 9% drop in the Shanghai stock index on 27 February. This, in turn, was due to heightened fears among investors that the authorities were about to take steps to cool down what some had described as bubble-type conditions in Chinese equity markets. Signs of overvaluation were clear from estimated P/E ratios, which reached historically high levels (Graph 10, right-hand panel). The introduction in mid-May of measures aimed at cooling the economy – including a hike in interest rates, increased reserve requirements and a widening of the currency band – did little to dent the confidence of investors, who instead pushed the Shanghai stock index up to new all-time highs in the second half of May. Renewed efforts to curb speculation in the market, in the form of a tripling of the stamp duty on share trades, did, however, bring the Shanghai stock index down by almost 7% on 30 May, and the index saw further declines in the following days.

Effects of the sell-off fade quickly

While any concerns arising from the market sell-off in February–March were quickly brushed aside by investors, China remained very much on the minds of market participants. The Chinese economy continued to expand at a rapid pace, with GDP growth accelerating to 11% in the first quarter of 2007. This strong performance was largely welcomed by investors, who saw both this development and rapid growth in India and other emerging economies as counterbalancing to some extent the slowdown in the United States. Moreover, continued rapid Chinese growth was viewed as positive for a number of emerging economies, notably producers of commodities demanded by China. This was particularly evident for producers of metals such as nickel, tin and lead, prices of which reached new highs during the period under review (Graph 10, right-hand panel). Accordingly, the release of the Chinese GDP

Buoyant Chinese growth positive for emerging markets

figures in late April resulted in rising equity prices in South Africa, commodity-producing countries in Latin America and a number of other countries.

In general, investors' outlook for emerging markets remained upbeat, as their economic performance continued to be positive and fiscal positions remained strong. Moreover, positive rating changes continued to outnumber negative ones (Graph 11, left-hand panel), further supporting asset prices in these markets.

As in the recent past, isolated bouts of local turbulence in individual countries had little impact on asset prices in emerging markets as a whole. In Turkey, equity prices plummeted, yields jumped and the currency weakened in late April as investors' worries about the political situation increased, following unrest linked to the process of selecting a new president. Venezuelan spreads rose as plans for the country to withdraw from the IMF were made public, which led to concerns among investors about the possibility of a technical default on Venezuelan bonds. Yet, episodes such as these led to no significant spillovers abroad and had little impact on emerging markets more generally.

High risk tolerance in emerging markets …

While better economic performance contributed to the favourable developments in emerging markets over the past couple of months, investors' high risk tolerance also appeared to play an important role. Even when compared to the buoyant conditions in credit markets of advanced economies, the performance of emerging market debt was remarkable. CDS spreads on emerging market sovereigns continued to trade at tighter levels than US corporate CDS spreads within the same rating category, and this difference widened further during the period under review (Graph 11, centre and right-hand panels). While this could be due to changes in investors' assessment of the relative riskiness of emerging market credit vis-à-vis US corporate credit, it is possible that a comparatively strong appetite for emerging market credit risk may have been part of the story. The quick recovery of emerging market asset prices after the sell-off suggested that the willingness of investors to take on emerging market risk remained robust, and that market confidence was not easily dislodged, even by sharp moves in asset prices.

… not shaken by the sell-off

Goetz von Peter
+41 61 280 8326
goetz.von.peter@bis.org

Ryan Stever
+41 61 280 9615
ryan.stever@bis.org

Christian Upper
+41 61 280 8416
christian.upper@bis.org

Highlights of international banking and financial market activity[1]

The BIS, in cooperation with central banks and monetary authorities worldwide, compiles and disseminates several datasets on activity in international banking and financial markets. The latest available data on the international banking market refer to the fourth quarter of 2006. The discussion of the international debt securities market and exchange-traded derivatives markets draws on data for the first quarter of 2007.

The international banking market

Locational banking statistics

Expansion of credit to non-banks …

Total cross-border claims of BIS reporting banks expanded by $1 trillion in the last quarter of 2006. After more modest growth in mid-2006, a pickup in interbank claims accounted for 54% of this expansion. A surge in credit to non-bank entities contributed $473 billion, pushing the stock of cross-border claims to $26 trillion, 18% higher than in late 2005. The non-bank sectors in the United States and in the euro area borrowed over $100 billion each in the course of the quarter, followed by non-banks in offshore centres and in emerging markets with $92 billion and $60 billion, respectively.

… and to offshore centres

Credit to offshore financial centres[2] continued to grow at a brisk pace overall. BIS reporting banks' claims on offshore centres stood 23% higher at end-2006, at $3.3 trillion, than a year before. Some 60% of this stock represents claims on banks, with the remainder thought to be financing primarily other financial entities domiciled in offshore centres. In the latest quarter, the Cayman Islands alone accounted for over 80% of the $189 billion increase in banks' claims on offshore centres, as a result of claims of banks in the United States, Switzerland and the United Kingdom.

---

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

[2] This group includes the BIS reporting offshore centres (those listed in Graph 1 plus Bahrain) as well as eight smaller offshore centres (Aruba, Barbados, Gibraltar, Lebanon, Mauritius, Samoa, Vanuatu and the West Indies (UK)).

Banks located in offshore centres tend to distribute funds mostly within the continent in which they are located (Graph 1). During the last two quarters of 2006, banks in the Caribbean offshore centres raised the share of credit to the Americas to over 80%. Similarly, banks in the Channel Islands increased the share vis-à-vis Europe by 4 percentage points to 79%. By contrast, after the Asian crisis and the gradual retreat of Japanese banks' international lending out of Hong Kong in the late 1990s, banks in Asian offshore centres continued to reduce the share directed to borrowers in the Asia-Pacific region.

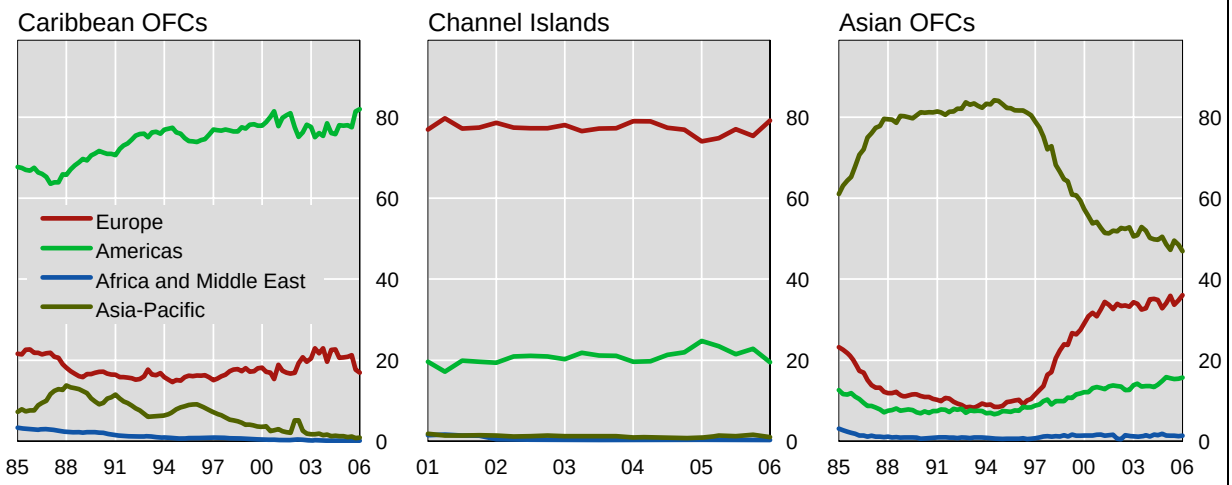
Credit to emerging markets soars throughout 2006

The flow of credit to emerging markets reached new heights through the year 2006. Claims on emerging markets grew by $96 billion in the final quarter of 2006, bringing the volume of new credit throughout the year to $341 billion. This amount exceeded previous peaks ($232 billion in 2005 and $134 billion in 1996), both in nominal value and in terms of growth. The current annual growth rate has risen to 24%, having surpassed for the sixth consecutive quarter the previous peak of 17% recorded in early 1997.

Emerging Europe overtook emerging Asia as the region to which BIS reporting banks extend the greatest share of credit. Since 2002, growth in claims on the region has consistently outpaced that vis-à-vis other regions. With a record quarterly inflow, emerging Europe received over 60% of new credit to emerging markets, bringing its share in the stock of emerging market claims to 34%. Less of the new credit went to the major borrowers (Russia, Turkey, Poland and Hungary) than to a number of smaller markets, notably Romania and Malta, as well as Ukraine, Cyprus, Bulgaria and the Baltic states. Of the remaining $38 billion in new credit to emerging markets, borrowers in Africa and the Middle East accounted for 24% and those in Latin America for 12%, while borrowing by emerging Asia as a whole remained flat.

Claims of banks in offshore financial centres (OFCs)[1]

Share of total claims channelled to the regions identified by the legend, in per cent



[1] The Channel Islands comprise Jersey and Guernsey, with the Isle of Man also included. Caribbean OFCs include the Bahamas, Bermuda, the Cayman Islands, the Netherlands Antilles and Panama. Asian OFCs include Hong Kong SAR, Macao SAR and Singapore. Of the $4.2 trillion in bank claims of BIS reporting offshore centres, Caribbean OFCs account for 49%, Asian OFCs for 30% and the Channel Islands for 17%. The vis-à-vis regions are defined as continents: Europe includes the advanced European countries, emerging Europe and European OFCs; Americas includes Canada, the United States, Latin America and the Caribbean OFCs; Asia-Pacific and Africa and Middle East are defined accordingly. Graph 1

Emerging Europe borrows more in euros

The currency denomination of cross-border claims on emerging Europe tilted further towards the euro. In the stock of claims outstanding, the euro and dollar shares were 44% and 31%, respectively, but the gap in the latest flow data was more pronounced (61% and 5%). While the sterling share has remained close to 1%, the yen has lost ground to the Swiss franc, thus continuing a trend seen over the last six years. Yet there is little evidence in the cross-border data of unusual borrowing in Swiss francs that might correspond to Swiss franc-denominated retail lending in several countries. Borrowing in the Swiss currency remains on average below 4% of cross-border claims, and exceeds 10% only in Croatia and Hungary. By contrast, the role of local currencies appears to have become more important: the share of local currencies has been rising to stand at 18%, and exceeds 35% in Poland and the Czech Republic.[3]

The imposition of capital controls in Korea and Thailand in December slowed cross-border banking flows. The stock of claims on borrowers in Korea remained constant, following large inflows in the two previous quarters. In Thailand, an 8% decline in lending, compounded by outflows from the country in the form of deposit placements with BIS reporting banks (+4%), resulted in an overall net outflow of $3.8 billion. Consequently, BIS reporting banks' net claims on Thailand, which had turned negative in September 2004, expanded by 68% to –$9.2 billion.

The quarterly expansion of cross-border liabilities of BIS reporting banks was only two thirds that of claims. That banks' cross-border claims have been growing faster than their liabilities in recent years was not due to emerging markets. They have been placing cross-border deposits in excess of new borrowing, extending their position as net creditors to the international banking system such that BIS reporting banks' net liabilities to emerging markets reached $349 billion. This figure has grown consistently since turning positive in early 2000. In the latest quarter, the most active depositors were residents of Asia-Pacific, as well as those of Africa and the Middle East.

Deposits placed by emerging markets outpace their borrowing

Oil-producing countries continued placing deposits predominantly with banks in Europe (Graph 2). In the course of the latest quarter, OPEC and other oil-producing countries withdrew deposits from banks in the United States and placed deposits in Europe. Of the $1 trillion stock of deposits by oil-producing countries, 71% are placed in banks in Europe, 15% in banks in the United States and 12% in banks in offshore centres.[4] OPEC member states make more extensive use of offshore centres (20% of deposits) – especially Bahrain – than do other oil producers (6%). As a result, OPEC members place only an estimated 11% of their reported deposits with banks located in the United States. This choice may reflect geographical preferences rather than considerations of currency composition, since OPEC member states in fact

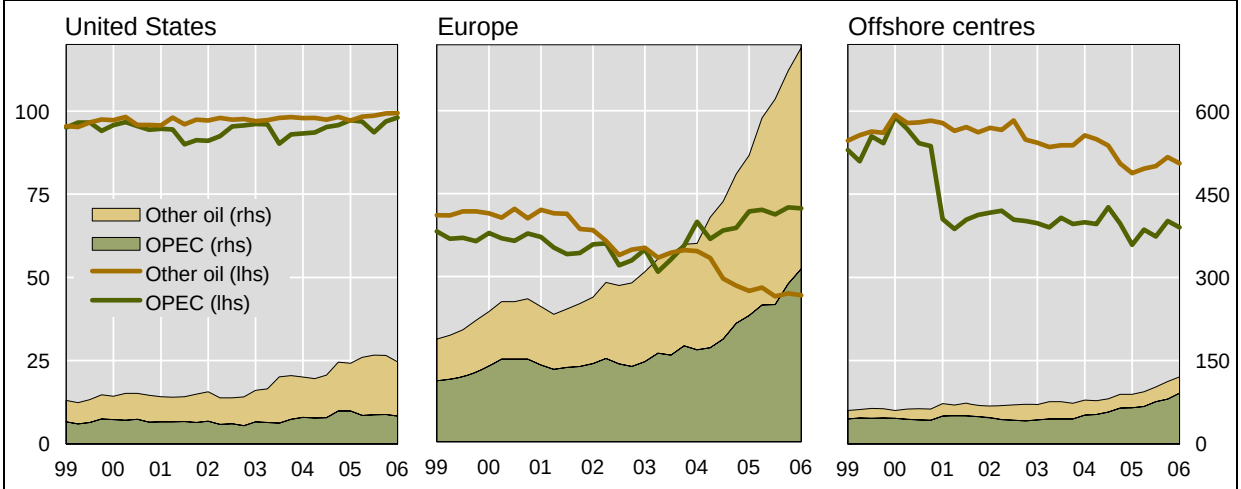
OPEC deposits remain in dollars but go to Europe

[3] The local currency share is estimated as a residual; it includes claims that are neither in the main currencies, nor in the domestic currencies of reporting banks.

[4] This holds for deposits booked by banks located in the 40 BIS reporting countries vis-à-vis the oil-producing countries listed in Graph 2.

Deposit placements by oil-producing countries[1]

Amounts in billions of US dollars; US dollar shares in per cent



[1] Total deposit liabilities of BIS reporting banks vis-à-vis entities resident in OPEC member countries and other oil-producing countries, and the share of deposits denominated in US dollars. The US dollar shares are calculated at constant 2006 Q4 exchange rates. For offshore centres, this calculation excludes deposits in those offshore centres not reporting a currency breakdown (Bahrain, Hong Kong SAR, Macao SAR, the Netherlands Antilles and Singapore, which jointly accounts for 85% and 27% of the total deposits of OPEC and "Other oil" in banks and offshore centres, respectively). OPEC member states are Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates and Venezuela (as of December 2006). Other major oil-producing countries included here are Angola, Colombia, Ecuador, Egypt, Kazakhstan, Mexico, Norway, Oman, Russia, Syria and Yemen. Europe comprises advanced European countries, including Switzerland and the United Kingdom, and excluding central and eastern European countries and European offshore centres. Graph 2

hold a greater share of their European deposits in dollar accounts than do other oil-producing countries.

Consolidated banking statistics on an immediate borrower basis

The expansion in international banking activity in the fourth quarter of 2006 was primarily driven by growth in the foreign claims of French, German, Swiss and Japanese banks. Lending within the euro area tends to boost European banks' total international claims. However, even excluding their claims on euro area residents, French and Swiss banks' international claims increased markedly. This stemmed primarily from a rise in claims on residents of the United States.[5] Japanese banks' claims on US residents also expanded, as did their claims on euro area residents.

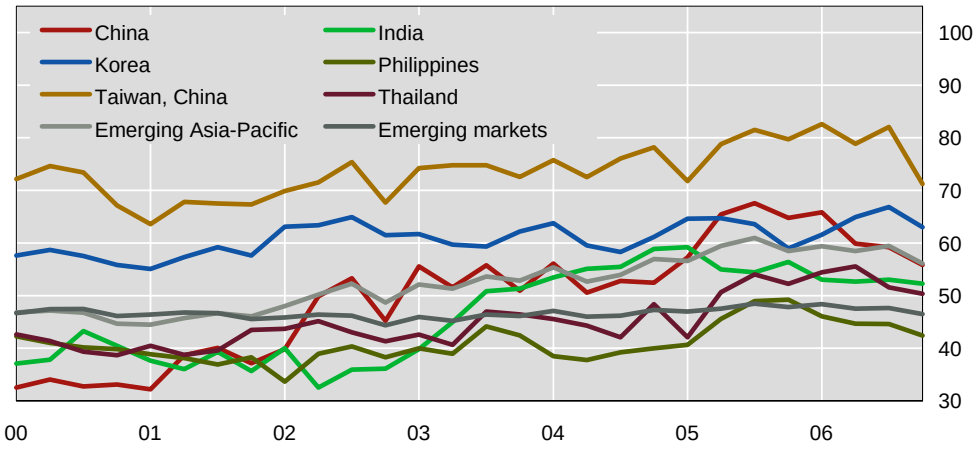
Claims on US residents expand significantly

Among banks headquartered in emerging markets, Indian, Taiwanese and Turkish banks' claims expanded, while those of Brazilian and Mexican banks decreased. The growth in claims of banks from India, Taiwan (China – hereafter Taiwan) and Turkey was entirely from international activity, rather than from increases in local currency claims of offices abroad. Nearly all of these new claims are short-term, having remaining maturities of less than one year, and most are to the non-bank private sector. Banks from Taiwan channelled funds to euro area residents, whereas Turkish banks did so to US residents. Indian banks extended most of their new funds to residents in

[5] In the consolidated banking statistics (immediate borrower basis), foreign claims are composed of international claims and local claims in local currency. International claims include cross-border claims and local lending in foreign currency.

Short-term international claims vis-à-vis emerging economies[1]

As a percentage of total claims



[1] Share of reporting banks' international claims (immediate borrower basis) with remaining maturity of less than one year vis-à-vis individual emerging markets. Graph 3

advanced European countries, the United States, emerging Europe and offshore centres.

Claims on Romania double in fourth quarter

Nearly 20% of reporting banks' foreign claims were in the form of funds channelled to emerging market borrowers. Claims on residents of emerging Europe continued to account for the largest share of these funds. Reporting banks' claims on residents of Romania doubled in the fourth quarter of 2006, in large part because of the opening of local offices by euro area banks. The continued growth in claims on Latin American residents was primarily due to an expansion in reporting banks' local claims in local currency. This was especially true for Brazil, Mexico and Venezuela, which receive the bulk of these funds from local offices of banks headquartered in the euro area. Growth in claims on residents of Asia-Pacific was more subdued than for other emerging markets. For the first time in three quarters, there was no substantial increase in claims on residents of Korea.

Short-term share of claims on emerging Asia declines

The most recent data reveal a shift in the maturity of BIS reporting banks' international claims on emerging Asia. As from 2001, there had been a tendency for the share of short-term claims on emerging Asia to rise, but this trend came to a tentative halt in the fourth quarter of 2006 (Graph 3). The 3 percentage point drop in this share was the result of a near 4 point decline in the short-term share of claims on residents of China and Korea and a more than 10 point decrease in this share for claims on Taiwan. By contrast, the share of short-term claims on all emerging economies has been stable at just below 50% since 2000.

Consolidated banking statistics on an ultimate risk basis

Expressed on an ultimate risk (UR) basis, total foreign claims of BIS reporting banks reached $22 trillion in the fourth quarter of 2006. Cross-border claims reached $13 trillion, nudging the share of local claims in total foreign

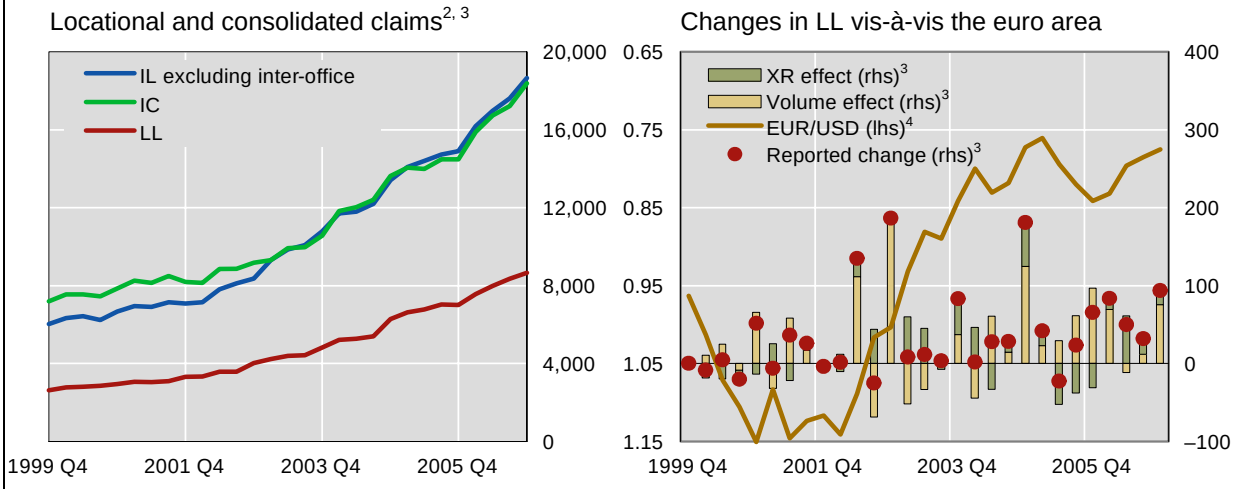
Currency effects in consolidated bank claims

Blaise Gadanecz and Karsten von Kleist

The BIS consolidated banking statistics track reporting banks' foreign claims on unaffiliated counterparties in countries worldwide. They are based on the nationality of the reporting bank and net out intragroup positions. The claims are denominated in many currencies, but are converted to USD amounts at end-of-quarter exchange rates for reporting to the BIS. In some quarters, exchange rate movements generate substantial USD value changes in reported stocks, which can make it difficult to distinguish banks' strategically motivated claim allocations (active volume changes) from passive exchange rate related movements. In this box, we set out to obtain estimates of the breakdown of the reported changes in consolidated claims into these volume and exchange rate effects, using as input the currency breakdown of the locational banking statistics.①

The consolidated banking statistics track reporting banks' *foreign* claims, which are the sum of *international* consolidated claims (IC, the green line in the left-hand panel of Graph A) and *local claims in local currency* (LL, the red line, which have contributed about one third to foreign claims since 1999).② International claims in turn consist of *cross-border* claims and *local claims in foreign currency* (LF), although these two components are reported jointly. LF and LL correspond to claims booked through the offices of the reporting banking systems located in the borrowing countries.

Comparison of IL[1] and IC; decomposition of euro area LL



[1] International locational claims. [2] Vis-à-vis the whole world. [3] In billions of US dollars. [4] Inverted scale. Graph A

Decomposing LL into volume and exchange rate effects is straightforward, since, by definition, the currency of denomination is that of the vis-à-vis country. The right-hand panel of Graph A shows such a decomposition for lending to euro area borrowers, where the currency valuation effect for LL is largest. The decomposition is done in the following way. The change in the asset volume denominated in a specific currency is calculated by first converting the reported dollar amounts back to the original currency and then taking the difference in stocks. This change in stocks is then reconverted to USD. The difference between this volume effect and the raw change in the reported stock of LL is defined as the exchange rate effect – caused in outstanding asset stocks by the movement of the foreign currency against the USD during the quarter. We note that exchange rate effects have accounted for up to one third of total reported changes in stocks of LL since 1999. We have plotted the EUR/USD exchange rate in the right-hand panel of Graph A to illustrate the consistency of the calculated exchange rate effects with the evolution of the exchange rate.③

For IC, separating volume and exchange rate effects is more difficult, but the locational banking statistics can be helpful in providing an estimate. Indeed, at the *global* level, the (stock) coverage of both the locational and the consolidated datasets is similar, since they cover all major banks worldwide, and since both identify borrowers by their country of residence. Therefore, currency- and volume-related changes in both datasets should be highly correlated.

However, there are three conceptually important differences. First, banks' inter-office transactions are included in the locational but excluded from the consolidated data to focus the

latter on credit claims on unaffiliated borrowers. Second, LF are indistinguishably included in IC, and separately identifiable only in the locational statistics.[4] Third, foreign-located banks' claims on residents of their own country (ie German banks' lending from outside Germany to residents of Germany) need to be added to the consolidated data.

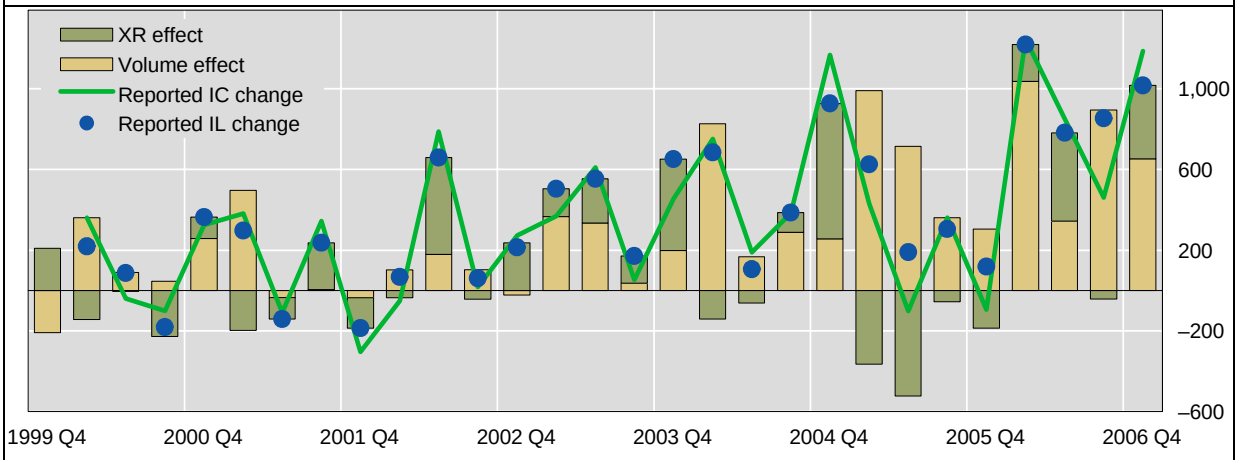
We adjust claims for these factors at the global level and observe that they are then closely related (the blue and green lines in the left-hand panel of Graph A). This has been especially true since 2003, when the British Crown Dependencies (Guernsey, Isle of Man, Jersey) became separate reporting countries, and additional offshore centres and emerging economies (Bahamas, Brazil, Chile, Panama) started to report in the locational system.

The close agreement between the two datasets allows us to apply, pro rata *at a global level*, to the quarterly changes in IC (the green line in Graph B) the currency valuation and volume decomposition of the quarterly reported changes in international locational claims (IL, the blue dots).[5] For each reported currency, we distinguish between volume and exchange rate effects, as above. Thus, for instance, in the fourth quarter of 2006, about 40% of the $1 trillion increase in IC can be attributed to exchange rate valuation effects.

The exchange rate effect was substantial in several quarters. In the second quarter of 2006, for example, the appreciation of all the major currencies against the USD resulted in a calculated exchange rate valuation effect accounting for 56% of the reported change in international claims. The exchange rate effect can obviously both over- and understate the underlying changes in lending. In the first and second quarters of 2005, for example, the decline in the euro exchange rate dragged down reported lending, with the actual volume of lending substantially higher than reported. Exchange rate effects may even reverse the sign of the change in lending, as for instance in 2000 Q3.

Changes in international claims: calculated volume and exchange rate effects

In billions of US dollars



Graph B

While the decomposition of the changes in IL into exchange rate and volume effects can be applied to the changes in IC at the *global* level, the exercise cannot be repeated for individual borrowing *regions*. Indeed, the currency composition of IL is not the same globally as for the various regions. In particular, eastern Europe as well as developed countries do roughly half of their borrowing in euros, while the USD tends to dominate in Asia and Latin America. In addition, IL cannot be made consistent with IC at a regional level, as inter-office claims and LF cannot be broken out from the locational data vis-à-vis individual borrowing regions.

---

[1] The BIS locational banking statistics, based on the residency of the reporting banks, include positions vis-à-vis banks' own foreign offices. [2] See P McGuire and N Tarashev, "The presence of foreign banks in national credit markets", *BIS Quarterly Review*, June 2005. [3] The 15 EMEs for which lending in local currency has been most significant in absolute terms are BR, CL, CN, CZ, HK, HU, IN, KR, MX, MY, PL, SG, SK, TH and TW. The exchange rate valuation effect for LL has averaged 20% of volume changes in recent years. [4] The locational banking statistics provide a distinction between cross-border and local lending in foreign currency, but only for reporting countries. [5] In quarters where the absolute change in outstanding stocks is very small, the relative error in this pro rata application is comparatively large, but in such cases we would not expect to put too much emphasis on decomposing a small absolute change into volume and exchange rate effects.

claims lower.[6] The shares of total claims on banks, the public sector and the non-bank private sector did not change substantially.

Reporting banks headquartered in advanced economies modestly raised their share of foreign claims (UR basis) on emerging market borrowers. US banks were the largest contributor to this increase, as the portion of their claims on the emerging markets rose from 28% to 30%. This primarily came from an expansion in the share of claims on residents of Latin America, especially those in Mexico and Brazil. Swiss banks also increased their fraction of claims on Latin America, while euro area banks, for the most part, raised their share of total claims on residents of emerging Europe.

US banks increase their share of claims on emerging markets

Although the rate of cross-border flows into Korea and Thailand did appear to slow, there was not a significant change in the growth of consolidated foreign claims on these countries. Banks from most countries in the developed world reported typical growth in their exposures to Korea and Thailand. UK banks were the exception, as they reported a slight reduction in claims with an ultimate liability on the residents of these countries, although this might be attributable to exchange rate effects (see box).

Political turmoil in selected emerging markets did not seem to affect the allocation of reporting banks' foreign claims. Claims on residents of Venezuela as a share of claims on Latin America climbed to a two-year high of 4%, while the same share for Ecuador has remained relatively constant over the last two years. Claims on Hungary as a proportion of claims on emerging Europe fell for the eighth quarter in a row, dipping to just below 10% in the latest quarter.

Share of claims on Venezuela hits two-year high

The international debt securities market

International bond and note issuance, on a net basis, was subdued in the first quarter of 2007. While total gross issuance rose to $1.7 trillion, following $1.4 trillion the previous quarter, repayments of $682 billion pushed net issuance down by 2% to $866 billion. This was the first time since 2002 that net issuance in the first quarter actually declined from the previous quarter. The increase in repayments primarily reflected a rise in the early retirement of bonds and notes. Year-on-year growth in early repayments reached 12% in the latest quarter, well above the 7% growth of scheduled redemptions.

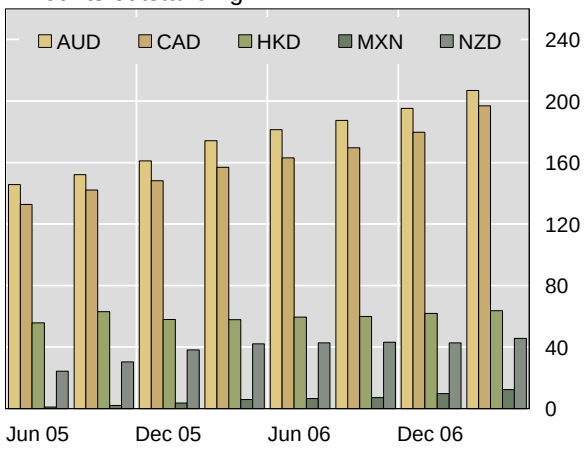
Net issuance of bonds and notes denominated in dollars and yen fell by $39 billion and $7 billion, respectively, while issuance in other major currencies saw modest, but positive, growth. Net issuance in euros and sterling edged up by $2 billion and $1 billion, respectively. Meanwhile, growth in the amount outstanding in a number of other currencies was significant (Graph 4, left-hand panel). Growth of net issuance denominated in Hong Kong dollars accelerated to 43% on a year-on-year basis. Canadian dollar- and Mexican peso-denominated net issuance volumes were at all-time highs for the second consecutive quarter.

US dollar- and yen-denominated issuance decreases ...

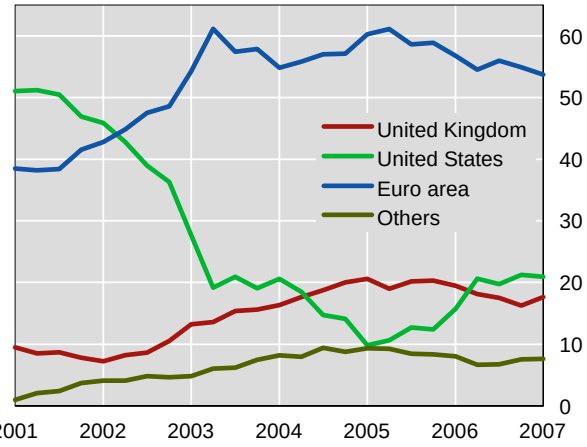
[6] Claims (UR basis) are composed of cross-border and local claims in all currencies. Claims expressed on a UR basis take into account risk transfers, and thus reallocate positions to the country of residence of the ultimate obligor.

International bond and note issuance

Amounts outstanding[1]



Share of net issuance[2]



[1] In billions of US dollars, recalculated using constant 2007 Q1 exchange rates. [2] Share (in per cent) of four-quarter moving averages, by residence of issuer in developed countries.

Sources: Dealogic; Euroclear; ICMA; Thomson Financial; BIS. Graph 4

... while in the United Kingdom net issuance is robust

In the advanced economies, resident issuance slowed slightly in the euro area and the United States from the previous quarter and continued to expand in the United Kingdom. Net issuance in the United Kingdom increased 15% year on year, following strong growth of 11% the previous quarter. In the United States and the euro area, net issuance actually declined. As a result, the United Kingdom's share of the advanced world's net issuance rose to 18% in the latest quarter (Graph 4, right-hand panel).

A primary reason net issuance in the United Kingdom remained strong was the activity of issuers located there but whose parent company is domiciled abroad. Typically, over a third of the United Kingdom's issuance is by firms headquartered overseas, much higher than the analogous share in the United States. In the first quarter, such issuance in the United Kingdom expanded at the fastest rate in six quarters. As is usually the case, the non-resident UK issuance came largely from financial firms.

Public banks in emerging markets fuel bond and note issuance

In emerging markets, banks were the most active issuers in the international bond and note markets. Fuelled in particular by issuance from public sector banks, net issuance by banks in emerging markets was over 20% greater than the previous high. By contrast, net issuance of corporate bonds in emerging markets decreased by nearly $7 billion, despite its seasonal tendency to increase in the first quarter. The $6 billion of net issuance by emerging market borrowers in the government sector was slightly above the $5 billion the previous quarter, but year-on-year growth remained well below zero.

Issuance from India picks up

A few countries in emerging Asia and Europe were much more active in the international debt market than in the past. Net issuance of $5 billion in India in the first quarter nearly doubled its previous quarterly high, while net issuance of $4 billion from Russia contributed to year-on-year growth in issuance of 60%. Growth in debt outstanding in Turkey was also strong for the second

consecutive quarter at $4 billion. About half of this amount was government-sponsored debt denominated in dollars.

Derivatives markets

Exchange-traded derivatives

Trading on the international derivatives exchanges accelerated in the *first quarter of 2007*. Combined turnover of interest rate, currency and stock index derivatives increased by 24% to $533 trillion between January and March, after declining by 7% in the previous quarter.[7] Activity was strong across risk categories with the exception of commodities. There turnover stagnated as higher activity in energy products (23%) and precious metals (32%) was offset by weaker trading in agricultural commodities (–20%).

Sell-off lifts turnover in stock index and FX contracts

Rapid trading during the turbulence in international financial markets in late February and March boosted growth in equity and foreign exchange contracts. Turnover in futures and options on stock indices increased by 33% to $60 trillion in the first quarter, the highest level on record. Trading volumes of listed FX derivatives rose by 26% to $6 trillion. The largest increases took place in currencies typically associated with carry trades (see below for a discussion of OTC derivatives in this context). For example, turnover in contracts on the New Zealand dollar more than doubled in March, while volumes in derivatives on the Australian dollar increased by 85% in that month. Rapid growth was also recorded in contracts denominated in the funding currencies, yen and Swiss franc, where turnover in March rose by 62% and 42%, respectively. Across all currencies, turnover in March was 37% higher than in February.

More modest growth in interest rate derivatives

Turnover in exchange-traded interest rate derivatives increased by 22%, slightly more than the estimated seasonal increase.[8] Activity was buoyant across the curve and across currencies, although particularly rapid growth was recorded in derivatives denominated in Swedish kronor (100%) and sterling (58%). In Sweden, the Riksbank's forecast of the path of future policy rates published in February took the market by surprise, as traders had anticipated rates to increase more rapidly than predicted by the monetary authority. This led to a spike in the turnover on short-term krona rates in that month. Similarly, trading in derivatives on short-term sterling rates soared after the hike by the Bank of England in early January, which had also not been widely anticipated.

OTC derivatives

Growth in the over-the-counter (OTC) derivatives market reverted to a pace in line with the long-term average in the second half of 2006. Notional amounts increased by 12% to $415 trillion at the end of December, after rising

[7] All growth rates in the section on exchange-traded derivatives refer to quarter-on-quarter increases, unless otherwise noted.

[8] See *BIS Quarterly Review*, March 2006, pp 45–6.

24% in the first half of the year.[9] Growth remained very strong in the credit segment, but fell to rates in the range of 5–11% in other risk categories. Gross market values, which measure the cost of replacing all existing contracts and thus represent a better measure of the size of the exposures at a given point in time than notional amounts, remained roughly stable at $10 trillion at the end of December 2006. This reduces to $2 trillion if netting agreements are taken into account.

Rapid increase in CDS positions

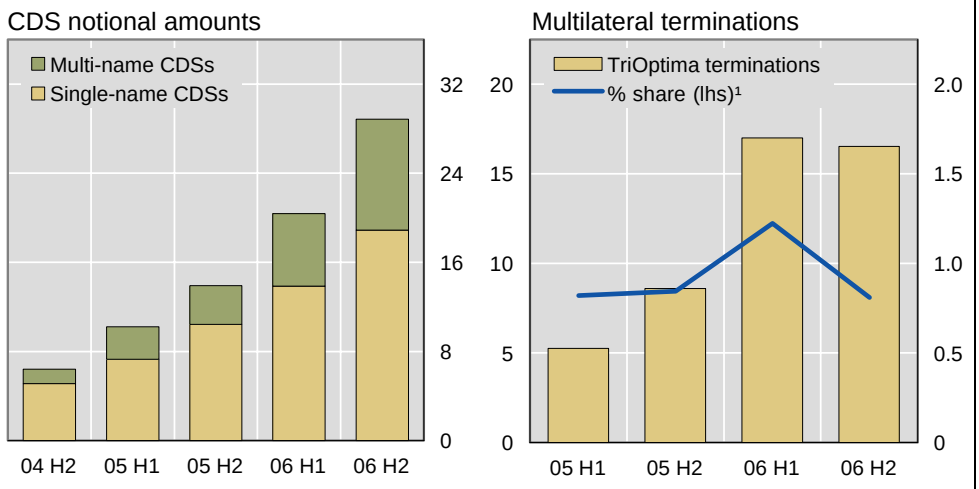
The market for credit default swaps (CDSs) continued to expand at a fast pace in the second half of 2006. At 42%, the rate of growth was only marginally below the 46% recorded in the first half of the year (Graph 5). With a cumulative volume of $1.7 trillion[10] between July and December, multilateral terminations of CDS contracts were of a similar volume as in the first half of the year and shaved approximately 8% off the rate of growth in this market.

Only mixed evidence for increase in carry trade activity

The currency breakdown of OTC foreign exchange derivatives provides only very mixed support for an expansion of carry trades during the period under review.[11] The notional amounts of contracts on the yen changed little over the period, suggesting that carry trades were not an important driver of activity in that market segment. By contrast, positions in the Swiss franc, widely considered to be the second funding currency behind the yen, increased by 10%, thus outpacing the growth of the market as a whole. Turning to potential target currencies, the volumes outstanding of contracts on sterling expanded by 17%, which may partly reflect carry trade activity. However, important

Credit default swaps

Amounts outstanding, in trillions of US dollars



[1] Multilateral terminations during each half-year as a share of notional amounts outstanding of CDSs at the beginning of the period.

Sources: TriOptima; BIS. Graph 5

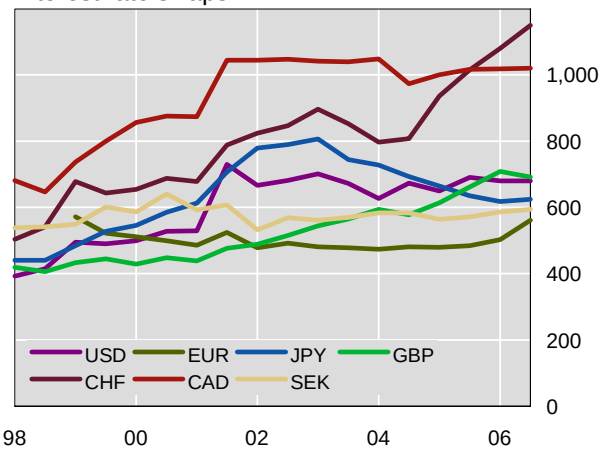
[9] Growth rates for OTC derivatives refer to changes over six months.

[10] Figures supplied by TriOptima. The volumes of terminations of contracts between BIS reporting dealers have been divided by two to adjust for double-counting.

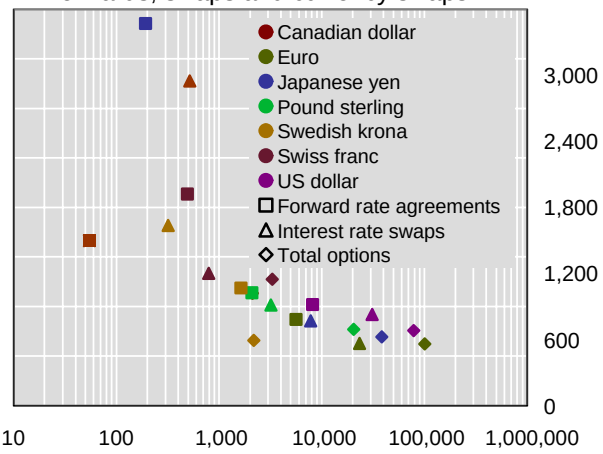
[11] See *BIS Quarterly Review*, March 2007, pp 8–9.

Herfindahl indices

Interest rate swaps



FX forwards, swaps and currency swaps[1]



[1] Horizontal axis: notional amounts, logarithmic scale.

Source: BIS.

Graph 6

caveats have to be borne in mind when using the BIS semiannual survey to track carry trade activity. First, the low frequency of the data and the coarse instrument breakdown make it difficult to separate carry trades from trades based on different motives. Second, the data are less than comprehensive for non-G10 currencies such as the Australian dollar, because local banks do not form part of the reporting population. In addition, some activity in non-G10 currencies might be captured under "other currencies" since reporting dealers do not have to identify positions in these currencies.

Concentration low but increasing

Concentration in the OTC derivatives market appears to have increased since the survey was established in 1998, although it remains low on average (Graph 6). The Herfindahl indices (HIs) for FX and interest rate derivatives in the major currencies are in the range of 400 to 700, below the level that most economists would consider as indicating an oligopolistic market. For example, an HI of 500 would correspond to 13 dominant firms, assuming that the remaining reporting dealers shared equally the other 20% of the market. A market with nine dominant firms of equal size and a joint market share of 80% would have an HI of just over 700. However, while concentration tends to be low on average, it is quite high in some smaller markets. For example, the HI of forward rate agreements in yen increased from under 2,000 in the first half of the decade to almost 3,500, which would correspond to the case of three firms with equal market share accounting for 100% of the market. Nevertheless, not all small markets display such a high degree of concentration. For example, the HIs for interest rate swaps in Swedish kronor are the second lowest in the swaps segment behind the euro, and are much lower than those for swaps in Canadian dollars or Swiss francs, whose markets are of comparable size.

Don H Kim
+41 61 280 8819
don.kim@bis.org

Athanasios Orphanides
+357 22714471
Athanasios.Orphanides@centralbank.gov.cy

The bond market term premium: what is it, and how can we measure it?[1]

We review the concept of the term premium, examine alternative methods used to estimate it and discuss some of the challenges encountered in such efforts. We also explain how survey forecasts could be useful for providing an informal, model-free cross-check on simple regression-based forecasting models of term premia and for formal estimation of flexibly specified no-arbitrage models.

JEL classification: E43, E47, G12.

The term structure of interest rates can be an invaluable source of information for central banks. It offers continuous readings of market expectations and their evolution in response to changes in economic conditions. It serves to provide instant feedback to central bank policy decisions and communications. And it can serve as an early warning indicator of improvement or deterioration in macroeconomic conditions. Proper reading of this information, however, requires separating expectations of future interest rates from the term premium in the bond market. In recent years, understanding the term premium has attracted considerable attention. Indeed, explicit mention of the term premium – once a rather obscure part of academic jargon – has become commonplace in policy discussions and central bank communications.[2]

Unsurprisingly, the term premium has also become a focus of attention in market commentary and the financial press. To a considerable extent, this heightened attention in recent years has been instigated by the puzzling behaviour of long-term interest rates in the United States and numerous other

[1] Don Kim is currently at the BIS on leave from the Federal Reserve Board. Athanasios Orphanides is Governor of the Central Bank of Cyprus. The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS, the Federal Reserve Board or the Central Bank of Cyprus. We thank Jim Clouse, Peter Hördahl, and especially Claudio Borio and Frank Packer, for helpful input and discussions.

[2] See, for example, Kohn (2005) and Bernanke (2006) for discussions regarding the United States, and Papademos (2006) for a related discussion about the euro area. We focus our analysis on issues pertaining to the estimation of term premia in the United States, but essentially similar issues arise elsewhere (see eg Hördahl et al (2006) and Kremer and Werner (2006)).

countries following the start of a series of policy tightenings by the Federal Reserve in the summer of 2004 (see eg Kim and Wright (2005)). Rising short-term interest rates have typically been associated with a rise in longer-term yields, but in this episode yields at longer maturities have stayed surprisingly low – arguably too low to be explained purely in terms of revisions to expectations.

The heightened interest in term premia also coincides with developments in the academic literature. Over the past several years, progress has been made in modelling time-varying risk premia in asset markets in general, and the links between the macroeconomy and the yield curve in particular. Still, there is relatively little consensus about the empirical properties of term premia. The discussion is further complicated by the existence of multiple definitions of the term premium.

In this article, we review the term premium concept, take stock of recent progress in its modelling and discuss some of the challenges that remain with respect to the critical task of its real-time measurement. We also explain how the incorporation of information from survey forecasts might be useful in arriving at more robust estimates of the term premium.

Term premium: definitions and heuristics

The basic theory of the term structure of interest rates is the expectations hypothesis. According to this hypothesis, the expected return from holding a long bond until maturity is the same as the expected return from rolling over a series of short bonds with a total maturity equal to that of the long bond. That is, the long bond yield is the average of the expected short-term rates. Equivalently, the forward rate (the short-term rate at which investors agree now to borrow or lend in the future) is the expected future short-term rate.

Though the expectations hypothesis provides a simple and intuitively appealing interpretation of the yield curve, it ignores interest rate risk. Except if calculated until maturity, the nominal return on a long bond is uncertain, and investors may require compensation for this risk. The "term premium" refers to such compensation and any other sources of deviation from the expectations hypothesis.

Term premia represent deviations from the expectations hypothesis

The compensation demanded for holding long bonds can depend on both the amount of risk and the price of that risk, either of which can change over time due to variable fundamentals. For instance, the degree of systematic risk could change with varying perceptions of uncertainty about inflation, real activity and monetary policy. In addition, the compensation could vary with the business cycle, as investors might be more risk-averse in recessions than in booms.

Besides these fundamentals-based mechanisms, there may be other factors influencing term premia, such as liquidity considerations and preferred investor habitats. One example is the "flight to quality" effect in some major government securities markets at times of extreme volatility. News on geopolitical risk events, for instance, might induce a particularly strong demand for relatively safe assets, temporarily pushing down bond yields. Special

Box 1: Term premium formulae

In this box, we gather together several formulae for the term premia in "discrete time" notation. For simplicity, we only describe the term premia associated with expectations of one-period rate and holding period returns; the multi-period case is similar. The return premia ϕ^r_{nt}, forward premia ϕ^f_{nt} and yield premia ϕ^y_{nt} (for time t and time to maturity n) can be written as departures from the respective expectations hypothesis as follows:

$$E_t(\Re_{n,t+1}) = r_t + \phi^r_{nt}$$

$$f_{nt} = E_t(r_{t+n-1}) + \phi^f_{nt}$$

$$y_{nt} = (1/n)\Sigma_{i=0}^{n-1} E_t(r_{t+i}) + \phi^y_{nt}\,.$$

Here, $\Re_{n,t+1}$ is the log return on an n-period bond one period later (= $\log(P_{n-1,t+1}) - \log(P_{nt})$), f_{nt} is the $(n-1)$-to-n-period (ie $(n-1)$-period-ahead) forward rate (= $\log(P_{n-1,t}) - \log(P_{nt})$), y_{nt} is the n-period yield (= $-\log(P_{nt}) / n$) and r_t is the short rate, ie the one-period yield $y_{1,t}$. The notation $E_t(X_{t+u})$ denotes the expectation at time t of the quantity X u periods later.

From the definitions, it follows that the yield premium equals the average of the forward premia, ie:

$$\phi^y_{nt} = (1/n)\Sigma_{i=1}^{n} \phi^f_{it}\,.$$

The relationship between the forward premium and the return premium, derived in Cochrane and Piazzesi (2006), is given by:

$$\phi^f_{nt} = \phi^r_{nt} + E_t(\phi^r_{n-1,t+1} - \phi^r_{n-1,t}) + \ldots + E_t(\phi^r_{2,t+n-2} - \phi^r_{2,t+n-3})\,.$$

demand for government securities from large institutions such as pension funds and foreign central banks might also influence the level of yields.[3] Behavioural mechanisms, such as over- or underreaction in the bond market to certain news events, have also been proposed as a source of term premium variation.

Although the underlying intuition is the same, there are in fact several distinct definitions of the term premium. Three commonly used definitions are:

(1) The expected return on holding a multi-period zero coupon bond for one period minus the one-period yield (short rate).

(2) The forward rate minus the expected future spot rate.

(3) The yield on a zero coupon bond minus the average of expected short rates from the present to the maturity of the bond.

The term premia defined in (1), (2) and (3) can be called the "return premium", the "forward premium" and the "yield premium" respectively. Box 1 expresses these term premia in mathematical form, with ϕ^r_n, ϕ^f_n and ϕ^y_n denoting the return premium, the forward premium and the yield premium for maturity n, respectively. These term premia tend to move in the same direction, though quantitatively they can differ from one another substantially. (Box 1 explains the mathematical relation between the three definitions.)

[3] See *BIS Annual Report*, 2006, Chapter VI for a recent discussion on these issues. Other "exogenous" circumstances affecting the supply of and demand for bonds (eg the concern in the late 1990s about the reduced supply of Treasuries due to budget surplus) can also influence term premia. See, for example, Reinhart and Sack (2002).

Estimating term premia is a challenging task regardless of the definition, for in each case both the premia and their expectation counterparts are unobservable. In the following sections, we first examine simple regression-based approaches to term premia estimation, and then turn to more complex no-arbitrage model-based approaches.

Measuring term premia: regression models

Simple regression models can produce measures of term premia. Under the joint assumption of the expectations hypothesis and rational expectations, ie expectations that are unbiased and incorporate all available information,[4] the difference between the forward rate and the ex post realised short rate should not be forecastable with ex ante variables. If, in fact, ex ante variables help to predict this difference, it would imply the presence of a term premium or a failure of rational expectations. Adopting the former interpretation, one may use the predictable component of the rate difference resulting from the regression as a measure of the term premium.

The estimation of near-term forward premia

The regression of the forward rate minus the ex post realised short-term rate on explanatory variables nests several well known models (see Box 2). The case with a constant and the forward spread (forward rate less the current spot rate) as regressors reflects the work of Fama and Bliss (1987). When we estimate this regression for the four-month horizon using the federal funds futures[5] data from 1989 through 2006, we obtain an average term premium of 0.18% (Graph 1, top panel).[6] A recent paper by Piazzesi and Swanson (2004) takes a constant, the futures rate, and year-on-year employment growth (non-farm payroll) as explanatory variables. The estimated forward premium from the Piazzesi-Swanson regression is not only large but also highly countercyclical, peaking shortly after the recessions of 1991–92 and 2001–02 (Graph 1, bottom panel).

Estimated forward premia are often large and highly variable

These results are striking, in terms of both the absolute size of the estimated term premia and their time-varying nature; even so, to our knowledge, central banks are not widely utilising "corrected" near-term expectations from such regression-based term premia estimates in their analysis. For example, when looking at futures-based policy expectations,

---

[4] The use of the term "rational expectations" can at times be misleading. In a realistic description of the economy (in which its structure and people's beliefs evolve over time), a seemingly biased expectation measured over a short sample period may be fully consistent with rationality.

[5] Futures rates and forward rates differ by the so-called convexity premium arising from the fact that the payoff to a forward contract is non-linear in interest rates. This wedge, however, is extremely small for short horizons. We shall therefore refer to the term premium in the (near-term) futures curve also as the "forward premium".

[6] We show the four-month-ahead term premium here for illustration, but the procedure can be used for interest rate changes for arbitrary horizons to map out the "term structure" of term premia.

Box 2: Estimating forward premia at short horizons

The original Fama-Bliss regression is

(1) $$r_{t+T} - r_t = \alpha^* + \beta^* (f_{t,T} - r_t) + e_{t+T}.$$

The pure expectations hypothesis implies $\alpha^* = 0$ and $\beta^* = 1$. Most studies of this regression have focused on whether the forward rate moves one-for-one with the expected future short rate, ie $\beta^* = 1$, with the rejection of this condition being interpreted as evidence for a time-varying term premium. Early studies using Treasury yields tended to find a significant time-varying term premium, but more recent studies using federal funds rate (and federal funds futures) data often find that β^* is insignificantly different from 1. Indeed, in the regression with the four-month-ahead federal funds futures rate from 1989 through 2006, we obtain a β^* of 1.22, which is within two standard deviations (2 x 0.12) from 1.

The forward rate expectations hypothesis regressions can be also written as

(2) $$f_{t,T} - r_{t+T} = \alpha + \beta_1 X_{1t} + ... + \beta_n X_{nt} + e_{t+T},$$

as in Piazzesi and Swanson (2004). Having a single regressor $X_t = f_{t,T} - r_t$ besides the constant term makes this equivalent to the Fama-Bliss regression (1) above, whose α^* and β^* are related to α and β as $\alpha = -\alpha^*$, $\beta = (1 - \beta^*)$. The term premium estimate in the regression (2) is simply $\alpha + \beta_1 X_{1t} + \ldots + \beta_n X_{nt}$. Note that when this term is zero, the futures-based forecast errors ($r_{t+T} - f_{t,T}$) are unpredictable.

The results from regression (2) imply a fairly sizeable near-term forward premium. If we assume that the premium is constant (setting β to zero as suggested by the Fama-Bliss regression with federal funds futures data from 1989 through 2006), the model generates a term premium of 0.18% for the four-month futures rate. Alternatively, if we assume that the term premium is time-varying, we can use the unrestricted estimate of the coefficients from the regression to obtain a time-varying term premium as a linear function of the futures spread (Fama-Bliss) or as a linear function of the futures rate and non-farm payroll growth (Piazzesi-Swanson).

Federal Reserve staff have been known to use a simple rule of thumb and apply a 1 basis point per month term premium correction (eg 4 basis points for a four-month-ahead futures contract).[7] This is obviously much smaller than the constant premium estimated above.

Lack of robustness of regression-based term premia

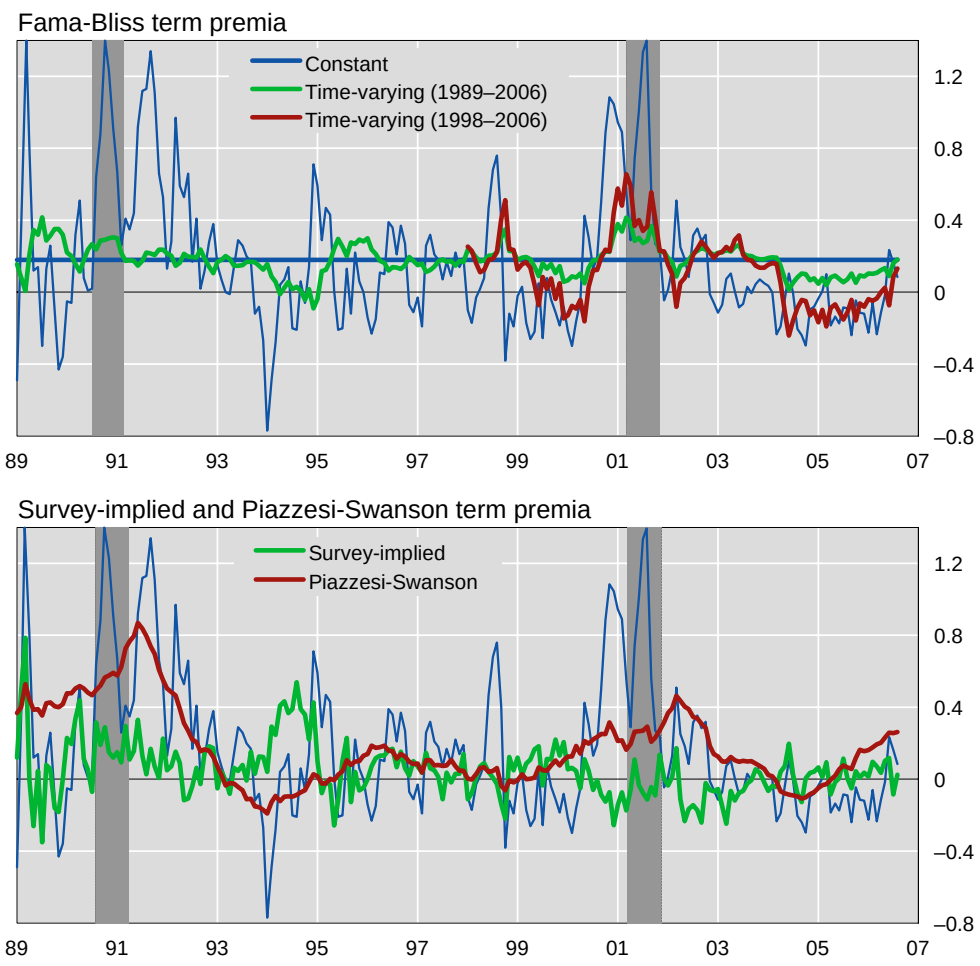
One reason for official reluctance to use regression-based term premium estimates is their apparent lack of robustness to the choice of the sample and regressors. For example, the time-varying forward premia estimated from the Fama-Bliss regression vary considerably depending on whether the sample is taken from 1998 or a decade earlier (Graph 1, top panel). In turn, the estimates using the Piazzesi-Swanson regressions are markedly different from either of the Fama-Bliss regression estimates (Graph 1, bottom panel).[8]

[7] These adjustments have been subject to periodic changes, but have always been small. The historical adjustments made by Federal Reserve Board staff to the federal funds and eurodollar futures curves on various dates are described in the Blue Book, a document that discusses monetary policy alternatives prepared by the staff prior to every regularly scheduled FOMC meeting. Blue Books are made available to the public by the Secretariat of the FOMC with a five-year lag.

[8] Incidentally, the Piazzesi-Swanson regression estimated over the 1989–2006 sample and the Fama-Bliss regression estimated over the 1999–2006 sample generate very similar in-sample forecast RMSEs in the 1999–2006 period, despite considerable differences between the term premia implied by the two regressions.

Four-month-ahead forward premia

In percentage points



The thin blue line in both panels denotes the futures rate less the ex post realised short rate. The shaded areas represent US business cycle contractions (recessions) as defined by the National Bureau of Economic Research.

Sources: Federal Reserve Board; authors' calculations. Graph 1

Regression models often generate "good" in-sample forecasts, but it is not clear whether in-sample forecast performance is an appropriate criterion for model selection. Because future information (ie the ex post realised short rate) is used to fit the models generating these forecasts, the forecast errors are likely to be understated relative to what would have emerged from a real-time application of the model. In addition, even out-of-sample forecast root mean squared error (RMSE) comparisons may be misleading, particularly in relatively small samples, as the RMSE measure has its own uncertainty (sampling variability).[9]

An even more basic concern is whether a fixed-coefficient linear function of a few financial and macro variables (as specified in the above-mentioned regression models) could possibly capture the complexity of term premium

[9] The presence of a substantial amount of unforecastable variation in interest rates means that out-of-sample forecast RMSEs have low power. Clark and McCracken (2006) emphasise this point in the analogous case of inflation forecasting.

variation over time. Practitioners might reasonably harbour doubts in this regard, and thus strive to take into account the evolving beliefs of market participants and the changing economic environment more flexibly in a judgmental fashion.

Surveys provide a real-time measure of expectations

An alternative approach to regression-based estimates of term premia is to take survey forecasts of financial market participants as a "model-free" proxy for market expectations. Unlike the in-sample regression-based premia discussed above, this measure is calculated in real time. The forward premium in this case is the futures rate minus the expectation of the federal funds rate implied by the survey.

The approach yields estimates of term premia that appear to have reasonable properties. The bottom panel of Graph 1 shows the four-month-ahead forward premium based on the monthly surveys of the federal funds rate published in *Blue Chip Financial Forecasts* (BCFF). Admittedly, there is jaggedness in the survey-implied premium, part of which is probably due to measurement errors, including errors associated with interpolation and the dating of the survey.[10] Still, it is notable that over the past several years the survey-based forward premium appears to be centred around zero and is consistent with an assumption of a small or even no forward premium at near-term maturities, in line with current thinking at the Federal Reserve Board and in contrast with the regression-based estimates.

Using survey forecasts may shed some light on some of the more extreme values resulting from regression-based term premia estimates. While the survey-implied forward premium is positive on average in the 1990s, in line with other estimates, it differs markedly from the Piazzesi-Swanson premium, particularly when the latter is very large, as in 1991 and 2002. These large discrepancies suggest the strength of the results documented by Piazzesi and Swanson may be somewhat exaggerated.[11]

The estimation of long-term premia

As the horizon becomes longer, a more substantial role for the term premium is likely. Unfortunately, direct estimation of the forward premium at long horizons in forward rate regressions is hampered by the fact that overlapping observations greatly shrink the effective size of the sample. But the estimation of the *return premium* on long bonds is less affected by this problem, since short holding periods (over which the excess return is typically calculated) diminish the problem of overlapping observations. In a manner analogous to the forward rate regressions discussed above, the excess returns on bonds

[10] BCFF is a monthly survey of about 50 private sector economists (mostly affiliated with financial institutions). Because it provides forecasts of quarter-averaged federal funds rates, we rely on a linear interpolation to obtain the four-month-ahead forecast. This procedure thus introduces some error.

[11] The regressors in the Piazzesi-Swanson regression include the futures rate, which is very persistent (ie takes a long time to revert to the mean). Mankiw and Shapiro (1986) have noted that in small samples, this type of regression can overstate the predictive power of explanatory variables. The persistent regressor also raises concerns about spurious regression; see, for example, Ferson et al (2003).

should be unpredictable under the expectations hypothesis and rational expectations. Therefore, the predictable variation found in the regression of realised excess return on ex ante variables can be viewed as a return premium (a version of ϕ^r in Box 1).

An interesting measure of the return premium …

Of particular interest in this regard is a measure of the return premium presented in the well known paper by Cochrane and Piazzesi (2005). They report impressive predictability in the excess returns for holding two-, three-, four- or five-year bonds for one year (with R-squared statistics as high as 40%) when using a single "return forecasting factor" that is a linear combination of forward rates. The factor is highly variable and has a strong countercyclical component, tending to fall in expansions and rise in recessions. Return premia for bonds of different maturities are simple multiples of this factor, and thus exhibit similarly strong countercyclical behaviour.

One can approximate the forward premium implied by Cochrane and Piazzesi's return premia by applying a simplifying assumption that makes the forward premia linear functions of the return forecasting factor.[12] Arguably, though, the *variability* of the resulting forward premia seems too large: for the Cochrane-Piazzesi sample period (1964–2002), the standard deviation of the monthly change of the four-to-five-year forward premium is 0.47%, which is larger than the monthly variability of the four-to-five-year forward rate itself (0.34%), a rather implausible result.[13] This echoes the concern voiced by Sack (2006) that Cochrane and Piazzesi's return premia may be excessively volatile.

… but it may be too volatile

Measuring term premia: no-arbitrage models

Reduced-form no-arbitrage models have shown promise …

In recent years, a class of dynamic term structure models, called "no-arbitrage models", has been increasingly used to extract expectations and term premia from the yield curve, especially at longer maturities. The no-arbitrage concept implies, among other things, that securities with the same risk characteristics (same payoff in all states of the world) should have the same price. This condition constrains the way bond yields of various maturities can move relative to one another, simplifying the formulation of the dynamics of the entire yield curve. Reduced-form no-arbitrage models do not explicitly specify the structure of the economy and the risk preferences of investors; instead, they assume that market equilibrium conditions support a given functional form for the dynamics of risk factors (variables that move the yield curve) and the market price of risk.

---

[12] More specifically, we use the relationship between ϕ^f and ϕ^r given in Box 1, assuming that the annually sampled return forecasting factor follows an AR(1) process. The annual AR(1) model is more general than the monthly AR(1) model, since the latter implies the former, but not vice versa. In particular, with the monthly AR(1) model there is a concern that high-frequency movements that do not affect expectations at annual horizons push down the estimate of the AR(1) coefficient. We use the median of the AR(1) coefficient estimates from 12 possible samplings (January to December).

[13] To have a forward premium variability that is larger than the forward rate variability, the expected short rate and the forward premium would have to be negatively correlated.

Early generations of no-arbitrage models did not perform well empirically, as the assumed functional forms were too simple. For example, the well known Vasicek model assumed the presence of a single risk factor that followed an autoregressive process and a constant market price of risk. In effect, this implied a version of the expectations hypothesis (with constant term premia) by construction. Later research introduced multiple risk factors and specified the market price of risk more flexibly as a function of the risk factors (eg Dai and Singleton (2000) and Duffee (2002)).

A workhorse among the no-arbitrage models is the so-called Gaussian affine model. "Affine" means that the bond yields depend linearly on the risk factors. Though the linearity here may appear simplistic (as in the case of the "linear term premia" in regression models), when the risk factors are defined as unobserved (statistical) variables, such a specification can accommodate a rich array of possible term premium variation. "Gaussian" refers to the distributional assumption for the risk factors, which simplifies the yield dynamics considerably. In most applications, this tractable class of models provides a reasonable approximation to more complicated term structure models.

Problems with empirical estimation

Despite its promise, the implementation of this class of models for the estimation of forward premia has also run into practical problems. Many of these mirror the difficulties mentioned earlier regarding computation of regression-based term premia. Term premia based on conventional estimation procedures (such as the maximum likelihood estimation) often lack robustness to various choices involved in estimation,[14] and often exhibit implausible properties.

… though they often exhibit implausible properties

One manifestation of such difficulties is that the estimated no-arbitrage models frequently imply that long-horizon (eg 10-year-ahead) expectations of the short rate do not vary much from the estimated long-run average of the short rate. As a result, the variability of long-horizon forward rates is attributed almost entirely to variation in forward premia. By contrast, most practitioners in the United States recognise that long-horizon expectations of the short-term interest rate have generally trended down over the past 25 years since the Volcker disinflation, in line with the gradual decline of long-horizon inflation expectations (see eg Kozicki and Tinsley (2001)).

Conventional estimation faces small-sample problems

The main problems can be summarised as follows. First, the highly persistent nature of interest rates reduces the effective size of the samples typically used in the analysis, causing term premia to be estimated very imprecisely. Second, conventional estimation techniques have the tendency to make a stationary time series appear to revert to its long-run average faster than it does in reality,[15] leading to artificially stable long-horizon expectations. Third, owing to their lack of tight structure and large number of free

[14] These include the sample choice (length of the sample, yield maturities to be used), choice of the method for optimising the likelihood function and differences in specification.

[15] Marriott and Pope (1954) discuss this bias in the case of the AR(1) model.

parameters, flexibly specified term structure models may overfit the available data to produce "too good" in-sample forecasts.[16]

Diagnostic criteria often used in the finance literature have difficulties in detecting these problems. Long-horizon forward premium estimates are hard to evaluate on purely econometric grounds because the long time interval between the forecast and the realisation limits the effective sample size. And the in-sample and out-of-sample RMSEs of near-term interest rate forecasts are often insufficiently reliable guides to model selection, like the RMSEs for regression-based forecasts discussed above.

The use of survey forecast information

Information from survey forecasts could help

One way to help overcome some of these empirical problems is to incorporate additional information into the estimation procedure. Surveys of financial market participants' forecasts are one such potentially useful source of information. To the extent that these forecasts can serve as an, admittedly, noisy proxy for market expectations, incorporating them in the estimation can alleviate the severity of the aforementioned problems. At the same time, this can also help overcome a major shortcoming of the survey forecasts – their less frequent availability compared to financial data.

An example of term premia estimation incorporating information from surveys is provided in Kim and Orphanides (2005). In this paper, estimations of a three-factor Gaussian affine term structure model are augmented with the BCFF forecasts of the three-month T-bill rate, under the assumption that these forecasts correspond to the market expectation plus a measurement error.[17] Introducing information from survey forecasts results in significant increases in the precision of the term premium estimates. The estimates so obtained also accord better with widely held priors than those from the conventional estimation procedures.[18]

Plausible long-horizon expectations …

Graph 2 presents some of the time series estimates of forward premia and long-horizon expectations obtained from this estimation. The long-horizon (10-year-ahead) expectation of the short rate shown in the top panel displays substantial variation as well as a downward trend over the last 15 years, lining up reasonably well with survey forecasts.[19] At the same time, the use of

[16] Although the importance of these problems would wane with the length of the sample period, Monte Carlo experiments performed in Kim and Orphanides (2005) suggest that the problems are quite serious for the sample sizes that are commonly used in practice.

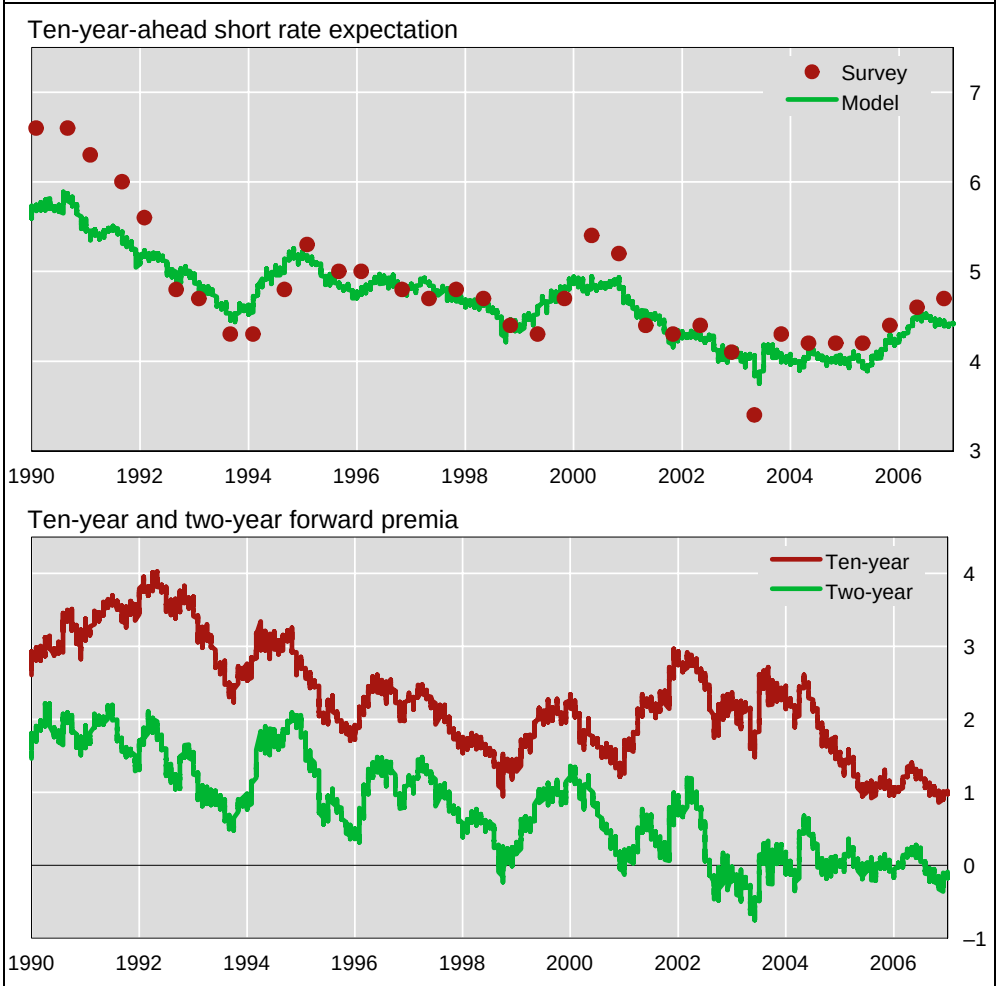
[17] To be specific, we use six- and 12-month-ahead forecasts interpolated from the forecasts of quarter averages available every month, and also the long-horizon forecast (the average expected rate over an approximately six- to 10-year horizon) available twice a year.

[18] Because the survey forecasts are an imperfect proxy for market expectations, alternative assumptions about the nature of measurement errors in the survey forecasts were examined. The results were fairly robust across various alternative specifications. Although our (limited) real-time experience with the use of survey data has been encouraging, we emphasise that all term premium estimates, including our own, should be taken with a grain of salt.

[19] One might dispute the significance of this latter result, since the long-horizon forecast was also used in the estimation. However, the result is not trivial, because the long-horizon survey forecast information is introduced only weakly (imposing a large measurement error).

Expectations and term premia

In per cent



Sources: *Blue Chip Financial Forecasts*; authors' calculations. Graph 2

survey data produces forward premia that exhibit a declining trend while still retaining a significant amount of variation (Graph 2, bottom panel). Interestingly, the two-year forward premium has been close to zero since about 2003, implying that the forward rate curve (futures curve) is currently a good description of policy expectations at horizons out to two years.

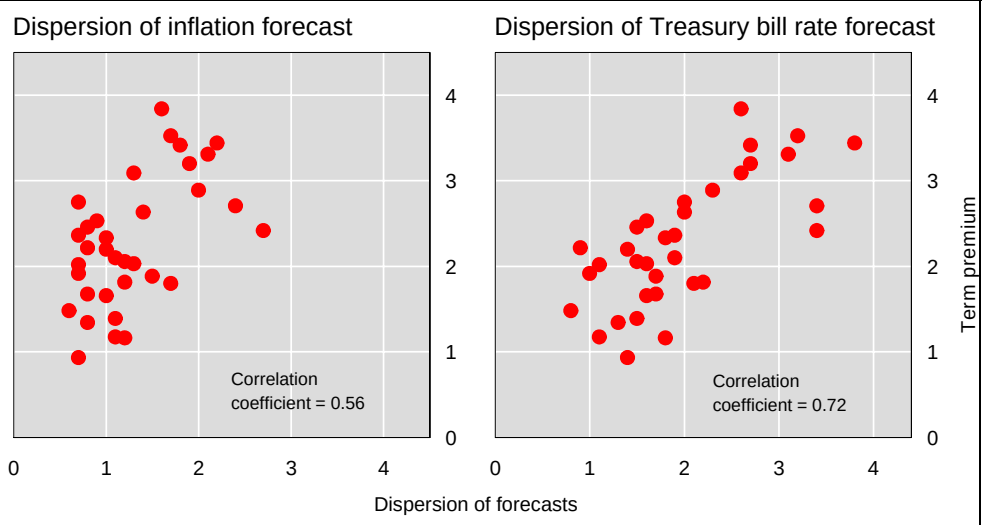
Although the model does not have sufficient structure to explain the underlying sources of the forward premia variation in terms of macroeconomic fundamentals, information from the BCFF survey can be used to shed some light on this issue. In addition to the mean forecast, BCFF provides measures of dispersion of the individual responses to the survey questions, which can serve as rough proxies for the uncertainty associated with the implicit market forecasts of the underlying macroeconomic variables.[20] To the extent that term

Estimates of the model without the long-horizon survey data (ie with only six- and 12-month data) produce a similar variation in the long-horizon short rate expectation.

[20] Although direct empirical evidence on the relation between long-horizon forecast dispersion and uncertainty is not available, evidence from short-horizon probabilistic forecasts suggests that the dispersion of individual forecasts is strongly positively correlated with average individual uncertainty (eg D'Amico and Orphanides (2006)). Furthermore, Gadanecz et al

Ten-year term premia and economic uncertainty

In percentage points



Sources: *Blue Chip Financial Forecasts*; authors' calculations. Graph 3

premia are related to the amount of risk in the economy, one might expect to see a correlation between term premia and these survey-based proxies. Indeed, as can be seen in the scatter plots in Graph 3, the estimated long-horizon (10-year-ahead) forward premium is strongly positively correlated with the dispersion of both long-horizon inflation forecasts and long-horizon Treasury bill rate forecasts. That said, much of the variation in term premia remains poorly understood, and other explanatory factors (including time-varying risk appetite and liquidity considerations) are likely to be important as well.

… and a positive relation between term premia and measures of uncertainty

Conclusion

Recent advances in no-arbitrage term structure modelling and new regression-based studies have resulted in a plethora of term premium estimates over the past few years. Numerous studies have reported interesting variations in term premia based on both futures rates and bond returns. Estimated premia vary substantially over time, and some estimates suggest a prominent business cycle component. These results make a strong case that proper correction for time-varying term premia is crucial for assessing changes in expectations regarding interest rates and their implications for the economy.

Practical estimation of term premia, however, remains a challenging task. Many estimates appear sensitive to small-sample problems, while questions regarding their reliability and seemingly excessive variability often limit their appeal to practitioners. We find that incorporating survey forecast information in estimating flexibly specified term structure models leads to term premium estimates that are more precise and align better with reasonable priors. That

(2007) report a substantial correlation (of about 70%) between a survey forecast dispersion and an economic derivative-based uncertainty measure for non-farm payroll announcements.

said, more research is needed in modelling and estimating term premia in order to refine our interpretations of the information content of the yield curve.

References

Bank for International Settlements (2006): *76th Annual Report*.

Bernanke, B (2006): "Reflections on the yield curve and monetary policy", speech, 20 March.

Clark, T and M McCracken (2006): "The predictive content of the output gap for inflation: resolving in-sample and out-of-sample evidence", *Journal of Money, Credit and Banking*, vol 38, pp 1127–48.

Cochrane, J and M Piazzesi (2005): "Bond risk premia", *American Economic Review*, vol 95, pp 138–60.

——— (2006): *Decomposing the yield curve*, working paper.

Dai, Q and K Singleton (2000): "Specification analysis of affine term structure models", *Journal of Finance*, vol 55, pp 1943–78.

D'Amico, S and A Orphanides (2006): *Uncertainty and disagreement in economic forecasting*, working paper.

Duffee, G (2002): "Term premia and interest rate forecasts in affine models", *Journal of Finance*, vol 57, pp 405–43.

Fama, E and R Bliss (1987): "The information in long-maturity forward rates", *American Economic Review*, vol 77, pp 680–92.

Ferson, W, S Sarkissian and T Simin (2003): "Spurious regressions in financial economics?", *Journal of Finance*, vol 58, pp 1393–413.

Gadanecz, B, R Moessner and C Upper (2007): "Economic derivatives", *BIS Quarterly Review*, March, pp 69–81.

Hördahl, P, O Tristani and D Vestin (2006): "A joint econometric model of macroeconomic and term-structure dynamics", *Journal of Econometrics*, vol 131, pp 405–44.

Kim, D and A Orphanides (2005): "Term structure estimation with survey data on interest rate forecasts", *FEDS Working Paper*, no 2005-48.

Kim, D and J Wright (2005): "An arbitrage-free three-factor term structure model and recent behavior of long-term yields and distant-horizon forward rates", *FEDS Working Paper*, no 2005-33.

Kohn, D (2005): "Monetary policy perspectives on risk premiums in financial markets", speech, 21 July.

Kozicki, S and P Tinsley (2001): "Shifting endpoints in the term structure of interest rates", *Journal of Monetary Economics*, vol 47, p 613.

Kremer, M and T Werner (2006): *Do term premia affect the predictive power of the German yield curve for future economic activity*?, working paper.

Mankiw, G and M Shapiro (1986): “Do we reject too often? Small sample bias in tests of rational expectations hypothesis”, *Economics Letters*, vol 20, pp 139–45.

Marriott, F and J Pope (1954): “Note on bias in the estimation of autocorrelation”, *Biometrika*, vol 41, pp 390–402.

Papademos, L (2006): Opening remarks at the press briefing on the occasion of the publication of the December 2006 ECB *Financial Stability Review*, 11 December.

Piazzesi, M and E Swanson (2004): “Futures prices as risk-adjusted forecasts of monetary policy”, *NBER Working Papers*, no 10547.

Reinhart, V and B Sack (2002): “The changing information content of market interest rates”, *BIS Quarterly Review*, June, pp 40–49.

Sack, B (2006): Comment on Kuttner’s “Can central banks target bond prices?”, in *Proceedings of the Bank of Korea International Conference*, Bank of Korea, Seoul.

Elisabeth Ledrut

+41 61 280 8171
elisabeth.ledrut@bis.org

The BIS statistics on payments and settlements[1]

The methodology and presentation of the BIS payment and settlement statistics have been modified to enhance the comparability of data provided by different countries. The statistics show the impact of technological innovations on the use of payment instruments and on the processing of payments and securities settlements over the years. The addition of central bank intraday credit to the statistical collection allows for an analysis of liquidity needs in payment systems.

JEL classification: E51, E58, G2.

Among the least well known of the BIS statistics are the statistics on payments and settlements. They include data on the use of payment instruments, payment systems, and securities trading, clearing and settlement systems. They have been collected yearly since 1988 for the G10 countries, being expanded over time to include all the members of the Committee on Payment and Settlement Systems (CPSS).[2] They are published in the so-called "Red Book" on *Statistics on payment and settlement systems in selected countries*.[3] A methodology and a glossary were added to the publication in 1998. The methodology and representation of the data have changed as from the 2004 data for payment instruments and payment systems, and will be revised as from the 2006 data for securities. The revisions have been coordinated with the ECB, which publishes a similar report for the European Union (the Blue Book).

This special feature provides an overview of the payment and settlement statistics collected by the BIS, focusing on recent and planned enhancements.

---

[1] The views expressed in this article are those of the author and do not necessarily reflect those of the BIS. I would like to thank Stephan Arthur for excellent research assistance.

[2] The CPSS is responsible for the collection of these statistics. The CPSS serves as a forum for central banks to monitor and analyse developments in domestic payment, clearing and settlement systems as well as in cross-border and multicurrency settlement schemes. For more information, see www.bis.org/cpss/index.htm.

[3] The first two publications were dated 1980 (with data for 1978) and 1985, and also included a detailed description of payment and settlement arrangements in the reporting countries. Such qualitative information was further published in 1989, 1993 and 2003. The statistical addendum of the Red Book has been published yearly since the edition containing the 1988 data. Other countries, in cooperation with the CPSS, have also published Red Books on their payment and settlement systems. These publications can be found at www.bis.org/statistics/payment_stats.htm.

It also shows some of the possible uses of the data for the analysis of the use of payment instruments, payment systems and securities infrastructures.

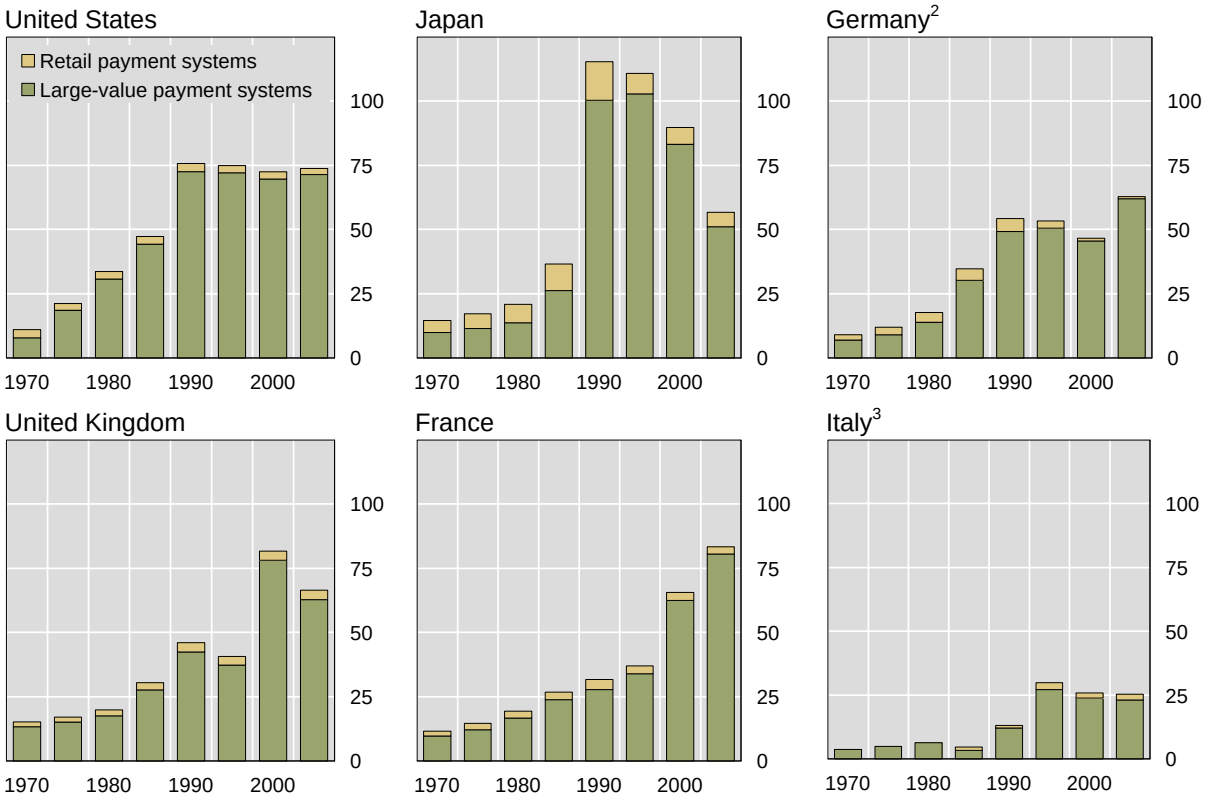
Evolution of the payment and settlement statistics

The collection of payment and settlement statistics by the CPSS, which was motivated by an interest in money as a means of payment,[4] started directly ahead of a period of continuous technological progress and on the eve of a major increase in transactions. Over the last 25 years, the automation of processing has greatly reduced transaction costs in payment systems,[5] as well as in securities trading and settlement systems, and has allowed for spectacular growth in the volumes and values settled. Between 1978, the first year for which the BIS collected statistics on cashless payments, and 2005, the

Strong growth in domestic payment systems …

Indicators of trends in the value of payments[1]

Ratio of the annual value of funds transfers to GDP



[1] Payments through the main interbank funds transfer systems in operation in the years shown; does not include payments settled in cross-border payment systems such as EURO1, STEP1, STEP2 or CLS. [2] Prior to 1995, western Germany. [3] Break in series in 1987 (1987 data shown instead of 1985 data); prior to 1987, a breakdown is not possible.

Sources: CPSS Red Book (various issues); BIS (1994). Graph 1

[4] The first Red Book stated that "it was felt that the material collected for the purpose of this study may be of interest to students of the subject of money, and in particular its use as a means of payment".

[5] Payment systems are generally used for transfers between individuals banking with different institutions. When the payer and the payee are customers of the same bank, the transfer is processed "in-house" and is not reflected in the statistics on interbank payment systems.

value of such payments in the G10 countries increased nearly thirteenfold, driven mainly by surges in financial activity, while the number of transactions increased more than threefold. Securities settlement systems in these countries in 2005 settled about 3.5 times the volume and 5.5 times the value processed in 1992, when the BIS started collecting the data.

… slows down in the 1990s

The spectacular growth recorded in the 1980s has since slowed in most countries (Graph 1). This may be due to the introduction and increased use of cross-border payment and settlement systems (eg EURO1 or CLS), the figures for which are not included in the payment system statistics in Graph 1. In addition, European monetary union has reduced the total number and value of domestic payments related to cross-border transactions. Japanese payment systems exhibited the strongest relative drop, matching the overall stagnation of the country's financial markets since 1990.

Issues evolve over time …

Although the important role of technological advances and the increase in transaction volumes and values applies to all segments of the market, the issues at stake are different at the retail customer level and at the wholesale or interbank level. In retail payments, the main issues for central banks relate to the efficiency provided by the use of various payment instruments, some of which reduce the costs of commercial transactions compared to cash, as well as the safety of these instruments. In contrast, the crucial issue for large-value payment systems is the potential for systemic risk. This arises because of the volumes and values involved and the often critical nature of the interbank payments – money market, foreign exchange and other large and often urgent transactions – settled. Systemic risk issues are also important in securities settlements, as weaknesses in the supporting infrastructure might transmit disturbances to securities markets and to other payment or settlement systems.[6]

… as do the statistics

The BIS payment and settlement statistics reflect the evolution of such central bank interests and concerns. The statistics include background information related to the holding of monetary assets by banks and non-banks, deposits (at banks and at the central banks) and currency (Table 1). The value on electronic money (e-money) storages and intraday credit provided by the central bank were added in 2000 and 2004, respectively. The statistics also include information about the use of retail payment instruments, such as credit transfers, direct debits, cards, cheques and e-money.[7] They provide transaction volumes and values for large-value and retail payment systems, as well as for securities trading platforms, clearing houses and settlement systems. The Red Book also contains qualitative information about, among other things, the organisation and risk management of payment and securities

[6] Central banks have made major efforts in the last decade to reduce the risks in large-value payment systems by introducing intraday finality, and the settlement risks associated with foreign exchange transactions by encouraging the use of payment versus payment (PVP). The introduction of delivery versus payment (DVP) and the use of central counterparties (CCPs) in securities transactions have achieved similar risk-reducing benefits. See CPSS (1997), Borio and van den Bergh (1993) and BIS (1994).

[7] The transaction values and volumes were introduced in 1997, while the outstanding e-money value (the difference between values loaded and values spent) was added in 2000.

Payment and settlement statistics published by the BIS			
	First year available	Type of data	Breakdown
Basic information: banknotes and coin, institutions, transferable deposits			
Settlement media used by non-banks	1978	stock	Notes and coin, transferable deposits, value on e-money storages (added in 2000)
Settlement media used by banks	1992	stock	Reserves at central bank and at other banks, central bank credit, of which intraday (added in 2004)
Banknotes and coin	1992	stock	Notes and coin by denomination, notes and coin held / not held by banks
Institutions offering payment services	1978	stock	Central bank, banks, post office, electronic money institutions. Number and value on accounts
Retail payment instruments			
Payment cards	1978	stock	Cards and terminals according to function
E-money	1997	flow	Transactions
Use of payment instruments and terminals	1978	flow	Type of payment instrument and terminal, domestic vs cross-border transactions (added in 2004)
Interbank funds transfers			
Interbank funds transfer systems	1978	stock/flow	Participants. Volume and value of transactions. Concentration ratio
Securities trading, clearing and settlement			
Trading platforms	2000	stock/flow	Participants. Securities listed. Trading volumes and values. Instruments
Clearing houses / central counterparties	1992	stock/flow	Participants. Clearing volumes and values. Instruments
Central securities depositories	1992	stock/flow	Participants. Securities issued/registered. Settlement volumes and values

Table 1

settlement systems. Furthermore, the full descriptive Red Book provides useful background information for interpreting the statistics.

Although new retail payment methods are regularly brought to market (eg proprietary online accounts, virtual credit cards), it has been decided not to collect specific information on them. They tend to be difficult to classify, being often mere variations on traditional payment instruments, and their adoption by the public is generally marginal. Recent innovations are presented in targeted surveys by the CPSS on e-money, internet and mobile payments.

Several enhancements have been introduced for 2004 data. First, the methodology for payment instrument and payment system statistics has been clarified, so as to increase the comparability of statistics reported by the CPSS countries. Second, new series have been introduced, such as intraday credit, as well as domestic and international transactions for payment cards and for payment systems operating across national borders. Similar enhancements are

planned for the securities trading, clearing and settlement data, with implementation scheduled with the release of 2006 data.

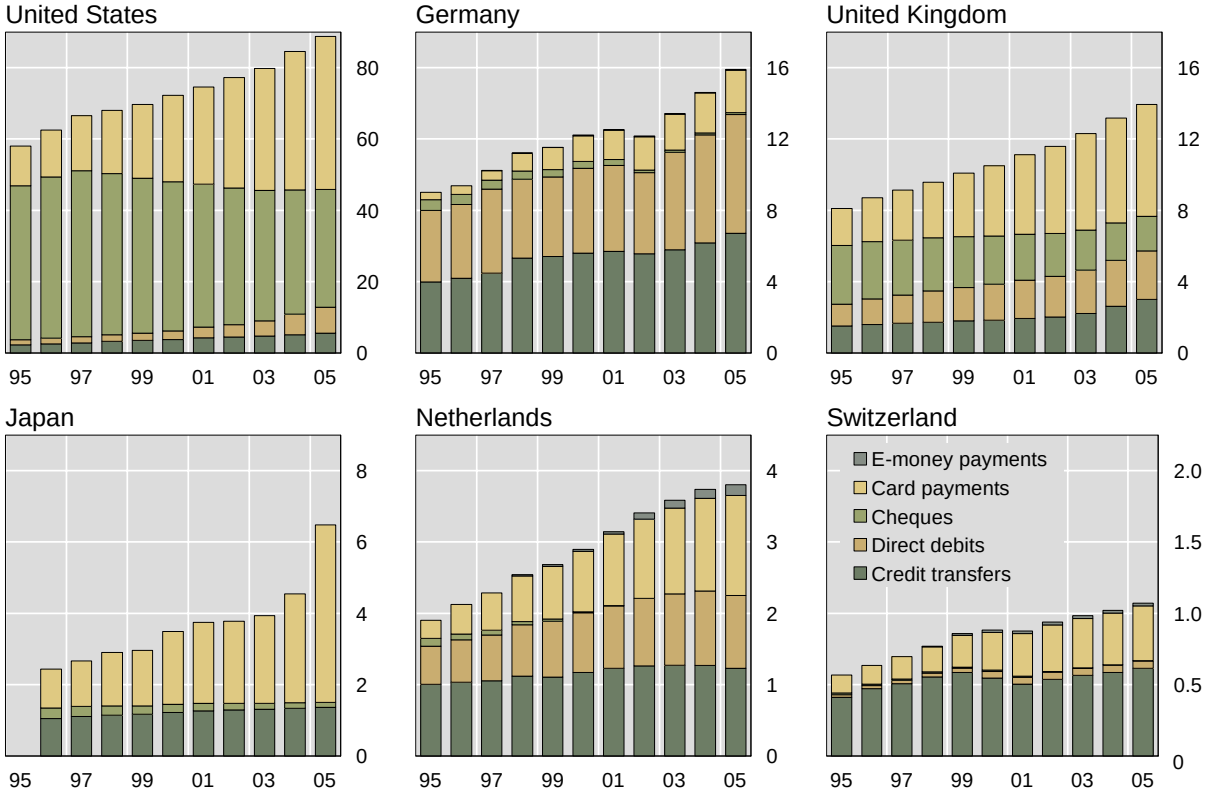
Increased consumer choice and efficiency in retail payments

Statistics document a shift from currency to bank accounts …

At the retail payments level, the automation of transaction processing noted above has led to a gradual relative shift from central bank money (currency) to commercial bank money (money deposited on bank accounts). For example, the computerised management of accounts has allowed for the payment of salaries directly on workers' bank accounts; in some countries, this procedure has now become compulsory. Furthermore, the reliance on commercial bank money for customer transactions has been facilitated by the introduction by banks of payment instruments allowing customers to make payments and retrieve money from their accounts. The BIS statistics document the relative shift from currency to deposits. The values of transferable deposit accounts held by non-banks increased from about 30% of GDP in 1990 to nearly 50% in 2005 for all reporting countries, while the share of currency remained broadly stable, at around 7.5%.[8]

Use of payment instruments by non-banks, selected countries

Annual number of transactions, in billions



In order to present a coherent historical perspective, breaks in some series have been removed through statistical estimation. As a consequence, prior to 2000 some series differ from those previously published by the CPSS.

Sources: CPSS Red Book (various issues); author's estimates. Graph 2

[8] G10 countries for 1990, CPSS countries for 2005, excluding Hong Kong SAR for deposit accounts.

The BIS statistics can be employed to analyse the evolution over time and across countries of the use of different payment instruments (Graph 2). Humphrey et al (1996) rely on the Red Book data to analyse the determinants of payment instrument use in the 14 CPSS countries. Based on the available statistics, the authors also deduce the substitution relationships between these instruments and their significance for the further evolution of the use of paper-based versus electronic carriers.

… and the replacement of paper-based by electronic instruments

Since the BIS started collecting these statistics, traditional paper-based instruments used to make face-to-face payments, such as the cheque, have tended to be replaced by electronic instruments, mainly debit and credit cards. For remote payments, direct debits and credit transfers have gained in importance, again at the expense of cheques. While cheques accounted for nearly 60% of all retail transactions in the CPSS countries in 1996, compared to about 20% for cards and 8% for direct debits, these instruments now account for some 26%, 45% and 14%, respectively. All countries have seen a similar evolution in the use of payment instruments, although the relative shares of these instruments differ substantially. In the United States and France, for example, cheques are still widely used, despite a notable decline; in contrast, in the Netherlands and Germany, direct debits account for a substantial share of retail payments.

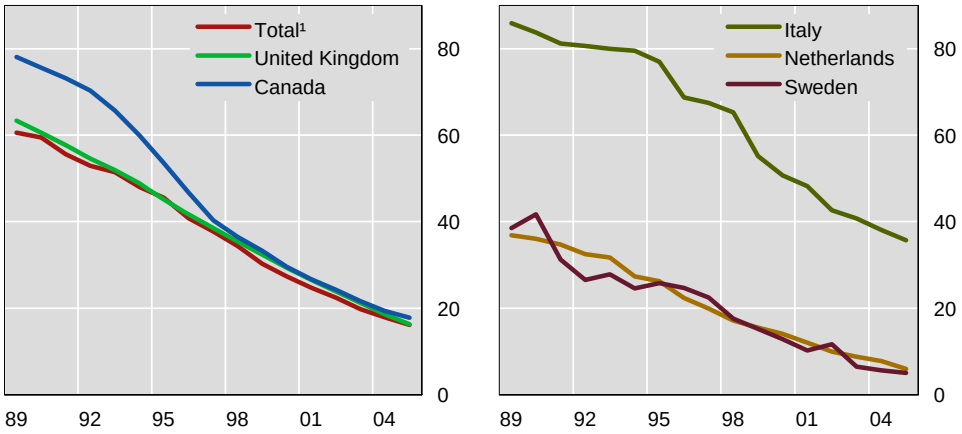
Another measure which can be derived from the BIS statistics and documents the electronification of payment instruments is the so-called paper ratio. This ratio indicates the proportion of payments initiated by the submission of a paper order (predominantly cheques and paper-based credit transfers), compared to payments submitted electronically. In recent years, paper-based orders have tended to be driven out by the increasing use of electronic banking and the initiation of credit transfers from the customer's computer. In the countries for which these data are available, between 1989 and 2005 the paper ratio declined from an average of nearly 60% to less than 20% of all retail transactions with payment instruments (Graph 3). At the same time, the paper ratio does not provide information on the modernisation of the processing of paper-based instruments through the elimination of paper in the early stages of the processing. For instance, in countries where cheques are still widely used, the processing has been largely automated, with the introduction of cheque truncation or the exchange of images instead of paper cheques.

Limited success for electronic money

Technological advances have also allowed the creation of so-called electronic money. In some respects, this is akin to currency, as the value is stored on a device in the consumer's possession that can be used as a general, multipurpose means of payment. In others, it resembles deposits on accounts, as it is prefunded at issuing institutions and mirrored (though not in real time) in their books. Central banks have been very attentive to developments in this field, because the replacement of currency by bank-issued electronic money could potentially threaten their seigniorage revenues. Central banks and academics have also discussed how electronic money might affect the implementation of monetary policy, but have concluded that any such effects would be minor. E-money has nonetheless generally been included in

Cheque payments and paper-based credit transfers

Number of transactions as a percentage of total transactions



In order to present a coherent historical perspective, breaks in some series have been removed through statistical estimation. As a consequence, prior to 2000 some series differ from those previously published by the CPSS.

[1] Unweighted average of the country ratios shown.

Sources: CPSS Red Book (various issues); author's calculations and estimates. Graph 3

central banks' definition of narrow money, as reflected in Red Book data on settlement media used by non-banks.

In practice, since its introduction, electronic money has only been a mixed success, and in most countries is still only marginally used. The BIS statistics show that, in most reporting countries, e-money accounts for only 0.1 to 5.4% (data for 2005) of all retail transactions and that its values are negligible. However, one country does stand out – Singapore: there, more than 80% of all retail transactions involve e-money. A general political drive to improve the country's information infrastructure was a key factor behind the success of the instrument. Although the collection of statistics on electronic money allows for the distinction between card-based and computer-based storage, no single country reports the latter, due to difficulties in obtaining data from the non-bank service providers that are usually involved.

Intraday finality and liquidity needs in large-value payment systems

In large-value payment systems, computerisation has been accompanied by a rapid increase in payment activity both within and between countries and by two waves of changes in system design. The Red Book documents the evolution of system design from predominantly deferred net settlement (DNS) systems to real-time gross settlement (RTGS) systems.[9] DNS systems calculated interbank obligations during the day and only settled the resulting net positions at the end of the day. Consequently, growing transaction values

[9] See Table PS1, p 210, CPSS Red Book, March 2007, and similar tables in previous issues. Netting refers to the offsetting of positions or obligations between participants.

exposed payment system participants to increased settlement risks.[10] In contrast, RTGS systems settle individual interbank transactions immediately and irrevocably, so that market participants can fully rely on the obtained funds. Today, there are some 90 RTGS systems worldwide (Bech and Hobijn (2006)).

Reserves and intraday credit in RTGS systems

Data on intraday credit in payment systems …

The BIS statistics provide information on the liquidity available to banks for use in each reporting country's main large-value payment system. This liquidity consists of banks' reserves at the central bank and intraday credit provided by the central bank; both items appear in the Red Book table on settlement media used by banks. There, central bank intraday credit is defined as the maximum daily volume of credit granted by the central bank, averaged over the last reserve maintenance period[11] (or, when not applicable, the last month) of the year (CPSS Red Book, March 2005).

Intraday credit has become important since the replacement of end-of-day by real-time settlement. During the day, banks tend to have payment flows that can be netted against each other, resulting in much smaller end-of-day positions in DNS systems. In RTGS systems, payments are settled gross continuously and therefore need to be funded individually. The cost of such funding provides incentives for banks to delay their outgoing payments. In addition, insufficient funds might increase the risk of payment system gridlock. In order to reduce liquidity strains in their payment systems, central banks generally offer intraday credit, which needs to be repaid at the end of the day.[12] Furthermore, some central banks have introduced new system designs with liquidity-saving mechanisms (CPSS (2005)).

… show differences between countries …

How much intraday credit is used varies between payment systems. It ranges from 4.3% of the value of all payments settled in Switzerland to over 18% in Japan. In most countries, however, it lies between about 6 and 9% (Table 2). The low figure for Switzerland seems to be a legacy of the relatively late introduction of such credit, in 1999. Prior to this, Swiss banks needed to synchronise their payments in order to efficiently manage their liquidity in the system. While the Bank of Japan has also introduced intraday liquidity quite recently (January 2001), the low opportunity cost of collateral for banks seems to have contributed to the widespread use of such credit.

---

[10] During the day, banks remained exposed to the risk that some would not be able to fulfil their payment obligations as a consequence of credit difficulties or liquidity strains. The design of DNS systems allowed for the unwinding of unsettled payments at the end of the day in case of a participant failure and a recalculation of the multilateral exposures of the remaining banks, introducing systemic risk. Faced by unexpected new end-of-day positions, these other banks might also have been forced to default on their payments. See CPSS (1997).

[11] The period of time (usually a month) over which banks are expected to keep, on average, a predetermined amount of reserves (the required reserves) on their central bank accounts.

[12] Such credit is generally offered against collateral deposited at the central bank, or repo'ed to the central bank. The US payment system Fedwire offers intraday credit against a fee per minute.

Intraday credit in CPSS countries, 2005			
	Total value of transactions (USD billions)[1]	Maximum intraday credit (USD billions)[2]	Maximum intraday credit as a percentage of total transactions[3]
Belgium	21,448	5.2	6.4
Canada	30,321	.	.
France	151,425	44.0	7.6
Germany	172,023	…	…
Hong Kong SAR	14,936	5.0	8.8
Italy	40,840	10.5	6.7
Japan	196,452	136.3	18.2
Netherlands	38,126	25.5	17.5
Singapore	7,564	…	…
Sweden	14,867	…	…
Switzerland	32,956	5.4	4.3
United Kingdom	94,293	24.6	6.8
United States	518,547	116.5	5.9
CPSS	1,333,807	373.0	8.8

[1] Payments processed by the main domestic interbank funds transfer systems during 2005. [2] Extended by the central bank; daily averages of the last reserve maintenance period in 2005; for Japan, calculated from the December value. [3] Maximum intraday credit as a percentage of the average daily value of transactions.

Sources: CPSS Red Book (various issues); BIS calculations. Table 2

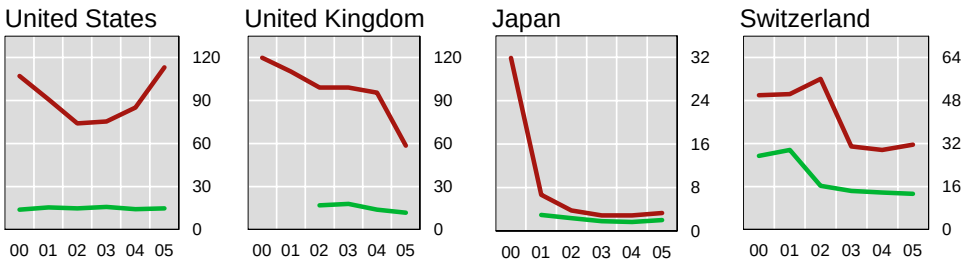
The turnover ratio

… reflected in different turnover ratios

Reserves and intraday credit give an indication of the maximum liquidity needed to settle all payments in the system on a given day. This can be expressed as a turnover ratio, which is the ratio of the value of total payments made to either total overnight reserves (Heller and Lengwiler (2003)) or the sum of overnight reserves and intraday credit (Imakubo and Chida (2006)).[13] To a certain extent, the turnover ratio reflects the efficiency of a payment system's design. But it is also influenced by factors affecting the level of reserves held by its participants. First, reserve requirements impose an upper bound on the turnover ratio (Heller and Lengwiler (2003)). Second, banks' intraday liquidity management, among other things, determines the level of free reserves that they are willing to hold. Therefore, a system with a low turnover ratio might be inefficient; it might also be safer, if banks hold relatively high reserves to cushion liquidity shocks. From that perspective, turnover ratios tend to decline when payment system participants are faced with uncertainty about incoming payments, as was the case following the events of 11 September 2001 in the United States (McAndrews and Potter (2002)). Due to the number of factors that might affect the turnover ratio, payment systems cannot be easily compared across countries on the basis of this measure. The

[13] The inverse of the turnover ratio, with utilises reserves in the numerator and total payments in the denominator, gives an indication of the likelihood of payment delays. The lower the level of reserves, the less likely payments are to be settled rapidly.

Turnover ratios for selected payment systems



The red line represents the ratio of credit transfers sent by the central bank's large-value payment system to the transferable balance held at the central bank; the green line represents the ratio of these credit transfers to the sum of these transferable balances and the intraday credit extended by the central bank.

Source: CPSS Red Book, March 2007. Graph 4

turnover ratio can nevertheless be used to illustrate developments over time in a given payment system.

Using the BIS statistics for calculating turnover ratios has an element of imprecision, due to different reporting periods for reserves and intraday credit (the last reserve maintenance period, if appropriate) and the values settled in the payment system (the total for the year). These ratios nevertheless show some interesting developments in CPSS countries (Graph 4). As a general rule, an increase in liquidity needs first seems to push intraday credit upwards, before leading to an increase in banks' free reserves, as can be inferred from the earlier drop of the lower line in Graph 4 for Switzerland in 2002 and the United Kingdom in 2004.[14] More specifically, the United States saw a decrease in Fedwire's turnover ratio as represented by the upper line after 2001, due to higher required and free reserves, followed by a return of both required reserves and the turnover ratio to pre-2001 levels. In Japan, the quantitative monetary easing policy, which targeted banks' overnight accounts at the Bank of Japan, negatively affected the turnover ratio. Imakubo and Chida (2006) show that the end of that policy in March 2006 immediately led to an increase in the turnover ratio. The Red Book figures for 2006 (not yet collected) can thus be expected to exhibit such a move upwards, all other things being equal.

Continuous Linked Settlement

CLS data are included in the statistics

The BIS statistics also provide, as from 2004 data, the values and volumes of the foreign exchange transactions settled by the Continuous Linked Settlement (CLS) Bank together with some more qualitative information. CLS Bank is an institution set up in 2002 by the private sector, which had been strongly encouraged in that direction by the central banking community, in order to reduce the settlement risks associated with foreign exchange transactions.[15] With settlement through CLS Bank, the two sides of the

[14] In the United Kingdom, banks' reserves surged by more than 60% in 2005 compared to 2004, which is double the increase in intraday credit used in the previous year. Other factors have certainly also played a role.

[15] In these transactions, settlement risks were compounded by the fact that the settlement of the two legs of the transaction took place in different domestic payment systems, at different times of the day. For example, in a USD-JPY transaction between a US and a Japanese bank,

transaction are simultaneous (PVP). In December 2006, CLS Bank settled slightly less than 300,000 payment transactions (counting each side), in 15 currencies, with a value in excess of $3.3 trillion per day.

Securities trading, clearing and settlement systems

The evolution of securities trading, clearing and settlement systems has also been affected by the automation of processing and the subsequent decline in transaction costs. For example, paper certificates representing the ownership of securities have been replaced by electronic records kept in central securities depositories (CSDs). This has increased both the tradability of assets, and the substitutability between securities and cash. Self-collateralisation is a perfect example of such substitutability: through it, securities can be used as collateral in order to raise the funds needed for their own purchase. More generally, the use of securities (and also cash) collateral has gained ground in all financial transactions.

Harmonisation of the securities statistics …

To date, however, the BIS statistics have been utilised only rarely for the analysis of developments in the use of the securities trading, clearing and settlement infrastructure. To a large degree, this is due to the inadequate harmonisation of the figures reported by the CPSS countries. Only securities settlement statistics and qualitative information on securities settlement systems are available for all countries. Red Book Table SSS1 shows how the use of DVP,[16] whereby the securities and the cash are delivered simultaneously, has gained ground, and which DVP models are used in the reporting countries.

… is enhanced in 2006

As from 2006 data, the Red Book statistical tables will be organised along functional lines, distinguishing between securities trading, CCP[17] and non-CCP clearing, and settlement. This will permit the compilation of comparative tables for securities trading and CCP clearing that are similar to the ones now drawn up for securities settlement. Furthermore, the new structure of the tables will increase the visibility of the various breakdowns that countries are currently reporting. The hope is that this transparency will lead towards greater harmonisation in reporting. In addition, a few new breakdowns will offer the opportunity to distinguish between different instruments (eg equities, bonds and short-term paper). They will also distinguish between the clearing and

---

the JPY value would first have to be delivered, Tokyo time, to the Japanese correspondent of the US bank. Later in the day, the USD payment to the American correspondent of the Japanese bank would be settled in the US payment system. See Galati (2002) and CPSS (1996, 1998).

[16] In the settlement of securities transactions, the time elapsing between trading and settlement (the settlement lag) represented a window of uncertainty similar to that in foreign exchange transactions. During that window, the counterparties were exposed to each other's potential failure to pay or to deliver. The potential loss was, here as well, the full value of the transaction. DVP was introduced in order to eliminate such principal risk.

[17] The use of CCPs, which interpose themselves between the counterparties to financial contracts, has generally been seen as an effective way to mitigate the risks involved in these transactions, provided the CCP adopts stringent risk management procedures. See CPSS (2004).

settlement of exchange-traded and over-the-counter (OTC) derivatives, depending on the availability of these figures for the reporting central banks.[18] OTC derivatives clearing and settlement have recently come under the central banks' focus, as the development of the settlement infrastructure has lagged behind that of derivatives markets more generally.[19]

Concluding remarks

The BIS payment and settlement statistics are a unique centralised source of information. Until now, these statistics, although regularly referred to, have not often been used for analytical work, due partly to issues of data comparability and partly to the low number of available observations. However, recent enhancements to the methodology and presentation of the reported data, together with the centralised storage of all statistical information, can be expected to increase the usefulness of the BIS statistics for research purposes. Issues that might be addressed by the enhanced statistics include the use of CCP clearing and its relation to market structure, the relative use of free-of-payment securities settlements, and developments in cross-border retail payment transactions, for countries for which such data are or will be available. Both the BIS and the CPSS strongly encourage the use of their data to improve understanding of the financial system.

References

Bank for International Settlements (1994): "Payment and settlement systems: trends and risk management", *64th Annual Report*, Chapter VIII.

Bech, M and B Hobijn (2006): "Technology diffusion within central banking: the case of real-time gross settlement", *Federal Reserve Bank of New York Staff Reports*, September.

Committee on Payment and Settlement Systems (1996): *Settlement risk in foreign exchange transactions*, March.

——— (1997): *Real-time gross settlement systems*, February.

——— (1998): *Reducing foreign exchange settlement risk: a progress report*, March.

——— (2004): *Recommendations for central counterparties*, November.

——— (2005): *New developments in large-value payment systems*, May.

——— (2007): *New developments in clearing and settlement arrangements for OTC derivatives*, March.

[18] Figures on OTC derivatives trading are published semiannually by the BIS, while data on exchange-traded instruments are published quarterly.

[19] It became increasingly apparent that these infrastructure deficiencies, which were endemic to the contract documentation, processing and settlement phases of all sorts of OTC derivatives, could create substantial risks. See CPSS (2007).

——— : *Statistics on payment and settlement systems in selected countries* (Red Book), yearly publication.

Borio, C and P van den Bergh (1993): "The nature and management of payment system risks: an international perspective", *BIS Economic Papers*, no 36, February.

Galati, G (2002): "Settlement risk in foreign exchange markets and CLS Bank", *BIS Quarterly Review*, December, pp 55–65.

Heller, D and Y Lengwiler (2003): "Payment obligations, reserve requirements and the demand for central bank balances", *Journal of Monetary Economics*, 15 January.

Humphrey, D, L Pulley and J Vesala (1996): "Cash, paper and electronic payments: a cross-country analysis", *Journal of Money, Credit and Banking*, vol 28, no 4, November.

Imakubo, K and H Chida (2006): "BOJ-NET funds transfers after the end of the quantitative monetary easing policy", *Bank of Japan Review*, November.

McAndrews, J and S Potter (2002): "Liquidity effects of the events of September 11, 2001", *Federal Reserve Bank of New York Policy Review*, November.

Tae Soo Kang
+822 759 4526
taesookang@bok.or.kr

Guonan Ma
+852 2878 7015
guonan.ma@bis.org

Recent episodes of credit card distress in Asia[1]

Not only has credit card lending in Asia grown rapidly, but also several episodes of sharp booms and busts have been experienced, posing new risks to financial stability. Policymakers need to learn more about the risks arising from this type of consumer lending and respond with appropriate prudential measures.

JEL classification: D14, G14, G23, G28.

Consumer credit in Asia has grown significantly in recent years. While housing finance has so far received the bulk of attention, smaller unsecured personal lending has also expanded rapidly. With rising affluence and a new orientation on the part of policymakers to pursue a growth path less dependent on corporate investment and exports, the credit card business has been one of the fastest-growing areas of unsecured retail finance in many Asian markets.

The levels of credit card holdings and loans in Asia have not converged smoothly to levels seen in mature markets. Rather, in this decade, Asia has witnessed several cycles of marked credit card booms and busts. This feature examines three such episodes: Hong Kong SAR in 2002, Korea in 2003 and Taiwan, China (hereafter Taiwan) in 2006. Our analysis attempts to shed light on three questions. First, why did competition in a line of business that is well established elsewhere lead to excessive credit card lending? Second, what was the character of the busts following the credit card lending booms? Third, what lessons can be learned from these episodes?

These three episodes of credit card lending booms and busts seem to share several common elements: intensified competition in the high-yield, less prime, credit card lending business leading to reduced lending standards; a rapid build-up in household indebtedness; a disproportionate concentration of debt burdens among riskier cardholders; a sudden deterioration of asset quality; and a subsequent contraction in credit card receivables. The bottom line is that, as consumer finance becomes an important part of Asia's financial

[1] The views expressed in the article are those of the authors and do not necessarily reflect those of the Bank of Korea or the BIS. The authors benefited from comments received at seminars at the BIS Asian Office and the Bank of Korea. In particular, we are grateful for comments and advice from Claudio Borio, Hanpack Chun, Heung Mo Lee, Robert McCauley, Frank Packer, Eli Remolona, Ilhyock Shim and William White, and excellent assistance provided by Hyung-Sik Kim and Andrea Tesei.

system, policymakers need to better understand the associated risks and be prepared to respond.

Asia's credit card sector

Lending to households outpaces total bank loans ...

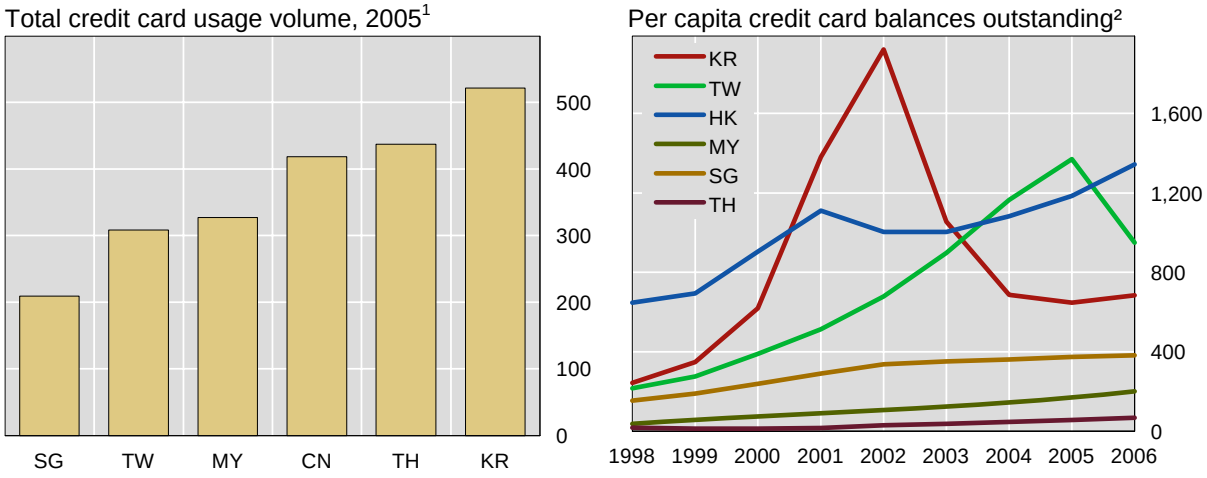
Since the 1997 Asian financial crisis, lending to households has outpaced the increase in total bank loans in most regional markets.[2] A combination of factors may have contributed to this shift to consumer finance. First, after the Asian financial crisis, weak corporate loan demand and the easing of monetary policy to spur the economy led to ample liquidity in the banking systems. During 1995–2000, the loan/deposit ratios in Hong Kong, Korea and Taiwan had declined by 15–20 percentage points. This put pressure on banks to tap the consumer finance business more aggressively. Since it had previously been neglected, such lending offered banks both potentially higher margins and diversification benefits. Second, rising living standards and house prices probably increased consumer demand for credit. Third, progress in information technology had reduced the costs of retail finance. Finally, financial deregulation, new local and foreign entrants and government policies boosted formal lending to the household sector.

... as the credit card business expands rapidly

In particular, the credit card segment is also rapidly gaining ground in Asia (Graph 1). Total credit card usage volume, including the use of cards both to make purchases and to withdraw cash, increased by 200–500% in many Asian markets between 1998 and 2005. Meanwhile, per capita credit card balances outstanding grew by two to six times in these markets during the same

Asia's expanding credit card sector

Total usage volume and card balances outstanding



CN = China; HK = Hong Kong SAR; KR = Korea; MY = Malaysia; SG = Singapore; TH = Thailand; TW = Taiwan, China.

[1] Total transactions on credit cards, including card purchases and new cash lending; 1998 = 100. [2] In 2005 US dollars.

Sources: Central banks; CEIC; national data; BIS. Graph 1

[2] For more updated overviews of general lending to households in Asia, see Fitch (2006), S&P (2006) and Mohanty (2006). For more recent discussions of housing finance issues in Asia, see Zhu (2006) and Chan et al (2006).

Credit card balances outstanding in Asia

End-2005

	Per capita[1]	% of total loans	% of household loans	% of GDP
Korea	675	5.5	11.0	4.2
Korea (2002)	*2,006*	*21.3*	*45.1*	*14.7*
Taiwan, China[2]	1,369	6.7	14.9	8.8
Hong Kong SAR	1,181	3.3	8.2	4.6
Malaysia	168	3.0	6.1	3.4
Singapore	379	1.5	2.9	1.4
Thailand	59	2.5	14.0	2.0
Japan[3]	527	1.8	6.6	1.6
Memo: United States [4]	*2,854*	*10.5*	*37.0*	*6.8*

[1] In 2005 US dollars. [2] Includes cash card balances. [3] Both total and household loans are those from domestically licensed banks and Shinkin banks only. Credit card balances include cash card balances. [4] Household loans do not include mortgages.

Sources: Central banks; CEIC; FitchRatings; BIS. Table 1

period.[3] By 2005, credit card receivables in these markets ranged between 2 and 7% of their respective total bank loans outstanding and between 3 and 15% of total household lending (Table 1).

Credit card loans are high-yield and unsecured

Our focus is on the lending side of the credit card business.[4] Credit cards serve two primary functions: payment and financing. Accordingly, credit card users fall into two groups: "transactors", who use credit cards mostly for payment convenience, and "revolvers", who borrow regularly on their credit cards. Revolvers tend to be inherently riskier personal borrowers than transactors. Moreover, compared to other forms of household credit, credit cards represent a high-yield unsecured personal lending business, on average providing more than half of the net earnings for credit card issuers in many Asian markets. Thus, credit card lending represents new opportunities but increases risks to the financial system.

As a share of GDP, credit card balances in most Asian markets do not seem excessive when benchmarked against the United States at 7% of GDP. Nevertheless, this same measure indicates comparatively high credit card indebtedness of 15% in Korea in 2002 and 9% in Taiwan in 2005. Moreover, it is not appropriate to simply compare levels without taking into account the fact that the market is very well established in the United States but not in emerging Asia.

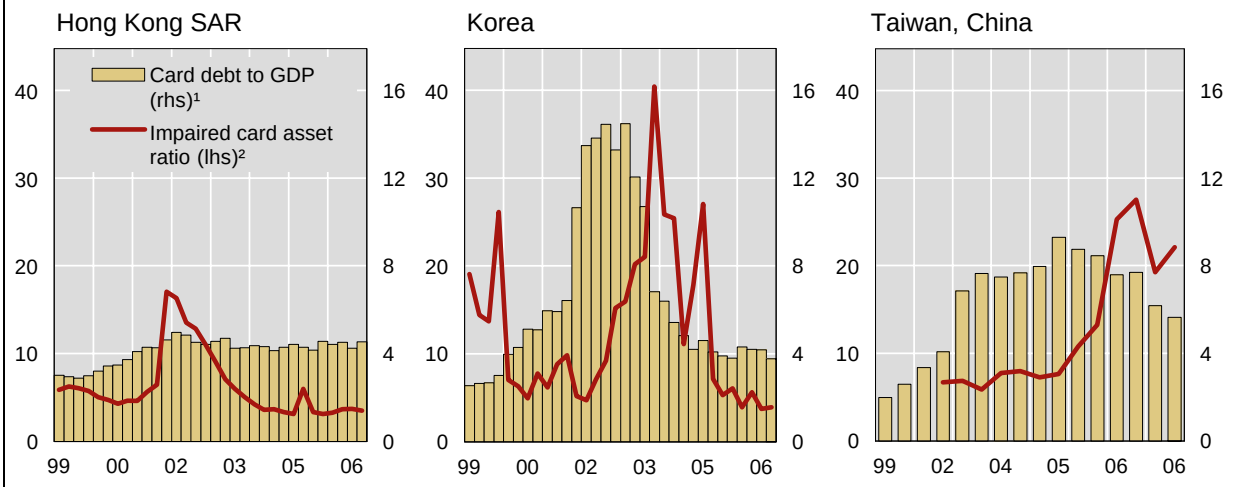
---

[3] Total credit card usage volume is the total transaction flow on credit cards, including both credit card purchases and new cash lending. In addition, unless otherwise specified, credit card debt, balances outstanding, receivables and credit card assets are used interchangeably as a stock measure of overall credit card indebtedness from both purchases and cash lending. Finally, following common practice in most Asian markets, delinquency is defined as a loan payment three months overdue.

[4] Credit card lending can be granted by issuers through revolving credit balances, instalments or cash lending including both cash advances and card loans. Therefore, we also include cards that perform only the financing function, such as "cash cards" which provide specialised cash advance services to the cardholders but are not used for purchase payments. Cash cards are particularly popular in Japan and Taiwan.

Three episodes of credit card distress in Asia

Credit card balances and non-performing credit card assets



[1] Ratio of total credit card receivables to GDP, in per cent. Credit card receivables in Taiwan include outstanding cash card balances.
[2] Ratio of the sum of delinquencies (three months overdue) and charge-off (annualised) over average card receivables, in per cent.

Sources: Hong Kong Monetary Authority; Korea's Financial Supervisory Service (FSS); Taiwan's Financial Supervisory Commission (FSC); authors' own estimates. Graph 2

Two patterns of growth in credit card receivables

The expansion of credit card balances outstanding in many Asian markets has followed two distinct patterns in recent years. Credit card lending in Malaysia, Singapore and Thailand has so far shown the relatively steady growth that might characterise a smooth catch-up to the scale of such receivables in relation to household income in mature markets. In contrast, credit card lending in Hong Kong, Korea and Taiwan has in each case exhibited large swings of a boom-bust nature (Graph 2). Thus, if there is an underlying trend in these three Asian markets towards convergence to levels prevailing in mature markets, it has certainly not been smooth.

Three episodes of booms and busts in credit card lending

Large fluctuations in credit card lending such as those seen in these three markets can pose potential systemic risks and present new challenges to the region's regulators. More broadly, such lending booms and busts can be viewed as part of a more general problem involving the build-up and unwinding of financial imbalances. These patterns can have implications for the economy, financial stability and in turn the design of policies (Borio and Lowe (2002), Borio and Shim (2007)).

Three episodes of credit card lending distress in Asia

The boom and bust phases

While their specific circumstances differ, the three more volatile Asian episodes just referred to share a number of stylised characteristics. These pertain to the episodes' causes, mechanics and effects on the financial system and real economy. Of the three cases, the Korean one has been the most severe. Conceptually, it is useful to examine these boom-bust cycles in credit card lending in two phases: the boom and the bust, respectively.

The boom

Lending boom: catch-up or easier lending standards?

The boom phase was characterised by large increases in credit card lending and credit availability. Credit card debt grew at a rapid pace within a short period of time. Hong Kong's card balances increased from 3% of GDP in 1998 to 5% in 2001. Korea's outstanding credit card debt grew most rapidly, from 4% in 1999 to a peak of 15% by 2002. Taiwan was in between, with balances growing from 5% in 2002 to 9% in 2005. At the time, such credit card lending booms might have appeared to reflect no more than a catch-up process, given rising incomes and previously unsatisfied demand. In retrospect, however, they seem to have also gone hand in hand with a relaxation in the screening and lending standards of issuers amid intensified competition.

Factors are: slack in the banking system …

Five factors lay behind the relaxation of lending standards and excessive growth in credit card lending. First, as noted earlier, ample liquidity in the banking systems and lower interest rates put pressure on banks to focus more on consumer lending. In Korea, banks financed not only their own credit card operations, but also the dominant monoline credit card issuers through loans. Declines in interest rates at the time also led Korean households to seek higher yields in fixed income mutual funds of investment trust companies (ITCs), themselves overweight in paper issued by monoline credit card companies.

… liberalisation and new entrants …

Second, during financial liberalisation, there were new and often less experienced entrants contesting these markets. These new forces intensified competition among issuers for market share, leading to more relaxed lending standards and stronger credit expansion (Dell'Ariccia and Marquez (2006)). In Hong Kong, some major foreign issuers without extensive local branch networks tried to enter the credit card market through direct marketing. In Taiwan, financial liberalisation in the early 1990s doubled the number of banks in an already crowded market. These newcomers targeted the consumer banking business, doubling their market share from 28% in 1994 to 56% in 2005. In Korea, tax incentives to consumers to promote the use of credit cards prompted some chaebol, with limited consumer banking experience, to rush headlong into the game, and capture as much as 76% of domestic transactions by 2002. These changes in the competitive landscape probably led some dominant incumbents to relax their screening standards as well.

… large sunk costs …

Third, economies of scale in the credit card business may also have contributed to competition for market share. The credit card industry often involves large initial sunk costs necessary to set up the infrastructure for data processing, credit scoring, account management and settlement. Moreover, the industry needs a sufficient cardholder base to attract merchants to sign on to credit card programmes (Evans and Schmalensee (2005)). Thus, once the investment is made, the marginal cost of adding new accounts is relatively low, reinforcing the imperative to chase market share. In Korea's case, local card issuers usually do not outsource their operations, further increasing the threshold of accounts needed to break even for their credit card operations.[5] All three episodes witnessed aggressive and costly marketing

[5] According to an informal survey by the authors, the estimated break-even threshold of cardholders for the top five Korean credit card issuers combined is about 30 million. Setting

campaigns to recruit new cardholders through mass mailing, telemarketing and even street solicitation, with little screening.

Fourth, a generally limited credit reporting infrastructure in some markets contributed to the excessive build-up of risks in credit card lending portfolios. This was particularly the case at the time in Hong Kong and Korea, where the coverage of local credit reporting systems was limited in terms of both customer base and types of data collected (Miller (2003), He et al (2005), Jeong (2006)). In particular, some leading local issuers did not participate in the local credit reporting system. On the other hand, Taiwan's credit bureau was arguably among the most sophisticated in the world, but the boom-bust cycle occurred anyway. Amid intense competition, some Taiwanese issuers outsourced the recruitment of new cardholders to "credit card brokers" which, for a fee, helped less creditworthy card applicants to "polish up" their applications and simultaneously submit them to several issuers. This effectively bypassed the local credit reporting system.[6]

... and initially high profits on card lending

Finally, higher lending rates on a fast-growing, but not well seasoned, credit card loan portfolio initially brought about attractive net earnings. This enticed card issuers to focus still more on the card lending business. In all three cases, competition was very intense on the lending side of the business. The seasoning effect in credit card lending appears to be similar to that of corporate high-yield bonds, which tend to have low default rates in the years immediately after their issuance. Thus, card issuers tend to record much higher yields initially from card lending, unless they provision explicitly for the losses expected later. In Korea, cash advance fees and interest charges exceeded 20%, compared to the prevailing unsecured personal loan rates of 6–7%.[7] During the Korean lending boom, the share of cash lending in total credit card assets approached 65%, as the sector's average return on equity reached 40% (Graph 3).

Market competition moves down the credit ladder

All five factors worked to heighten the risks of relaxing lending standards. Through either an understatement of the rules involved or the knowing acceptance of greater risks, the result was excessive lending and riskier credit card lending portfolios. Moreover, in addition to generally easier loan standards, there was a deliberate strategy to target the market for less prime and higher-yielding "revolvers". Thus, competition for market share started moving down the credit spectrum. As a consequence, the composition of the cardholder base changed markedly, leading to larger and higher-risk card lending portfolios. In Taiwan, the outstanding balance of cash card holders,

---

this threshold against the fact that there are around 20 Korean credit card issuers and a total working population of 25 million indicates keen competition for market share in Korea.

[6] Taiwan's credit reporting system (the Joint Credit Information Centre (JCIC)) was further undermined by the reported beggar-thy-neighbour behaviour of some card issuers, which encouraged delinquent borrowers to apply for new credit cards from other banks so as to repay their existing card debts in exchange for not reporting their delinquencies to the JCIC.

[7] In Hong Kong, banks' net interest margins on mortgage lending were squeezed at the time, making card lending relatively more attractive (He et al (2005)). In Taiwan, industry players estimate that net interest margins on card loans were at least four times higher than those on corporate lending.

who are mostly revolvers and thus riskier on average than credit card holders, amounted to half of credit card receivables by late 2005. This compared to only one quarter in mid-2004 (Graph 3). In Korea, LG Card, a leading local issuer, found that 70% of its bad loans came from card lending extended to accounts acquired during 2000–01, when the number of credit cards more than doubled.

As commonly happens with the boosting of credit to households, aggregate spending received a boost as well. Korea's private consumption expenditure as a share of GDP jumped from 48% in 2000 to 55% in 2002, as rapid credit card lending allowed Korean households to smooth consumption, helping to lift the economy out of the 1998 recession brought about by the Asian financial crisis (see the section on Korea). By comparison, for Hong Kong and Taiwan, the effects of credit card lending on personal consumption were less pronounced.

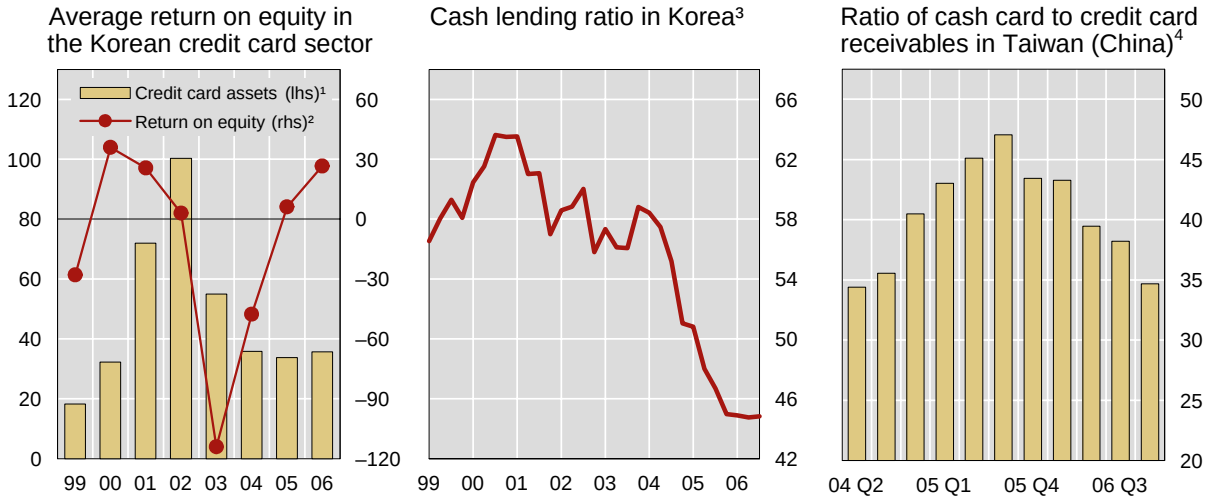
The bust

Overleveraged debtors start to default

The second phase of the cycles began with the recognition of excessive indebtedness, amid rising delinquencies. This resulted in tighter lending standards, contractions of credit, and prolonged balance sheet adjustments, affecting the real side of the economy.

Though increasing credit lines kept the lending boom going for a while, eventually some overstretched card borrowers hit limits. In addition, as card portfolios became more seasoned, delinquency and subsequently credit costs rose, due to mounting provisions and charge-off expenses, which squeezed cash flows and profit margins. Before long, card issuers sensed trouble and became more cautious in extending credit lines to riskier card borrowers. Moreover, they trimmed lending in some cases, further tightening credit availability.

Profitability and the card lending business in Korea and Taiwan (China)



¹ Total assets under management, in trillions of won. ² In per cent. ³ Sum of cash advances and card loans over total credit card assets outstanding, in per cent. ⁴ Ratio of total cash card balances outstanding to total credit card receivables, in per cent.

Sources: Korea's FSS; Taiwan's FSC; CEIC. Graph 3

Tighter credit in turn further pushed up delinquencies among overleveraged borrowers. This resulted in a scenario similar to a credit crunch, that is, a situation where credit contraction and a deterioration in asset quality tend to reinforce each other. These adverse dynamics are captured by both the rapid declines in credit card balances and sharp spikes in the impaired asset ratio, which is the sum of delinquencies and charge-offs over credit card receivables (Graph 2). In the two years following their respective peaks, Korea's credit card receivables fell by 65%, compared to a decline of 30% in Taiwan but only 10% in Hong Kong.

Adverse dynamics of contracting credit and rising delinquencies

In response to early signs of asset quality deterioration, the initial policies took the form of tighter administrative and regulatory measures, especially in the case of Korea. These policies included an intensification of the consultations between the regulators and local issuers over best practice guidelines for credit card operations and credit reference agencies. Examples included the establishment of a more inclusive credit reference agency in Hong Kong (He et al (2005)) and stronger write-off and disclosure requirements in Taiwan. In response to emerging signs of stress, the Korean authorities first upgraded credit card asset classification standards, strengthened provision requirements, started applying prompt corrective action to standalone card issuers, and then raised their minimum capital adequacy ratio from 7% to 8%. The Korean authorities also banned aggressive marketing practices, introduced a new rule requiring a cap on cash lending balances of below 50% of total credit card assets by a specified deadline, and applied pressure to credit card companies to lower their interest charges. While no doubt healthy from a longer-term perspective, in the shorter term some of these measures risked additional contractionary effects on credit card issuers and borrowers, thereby exacerbating the credit crunch.

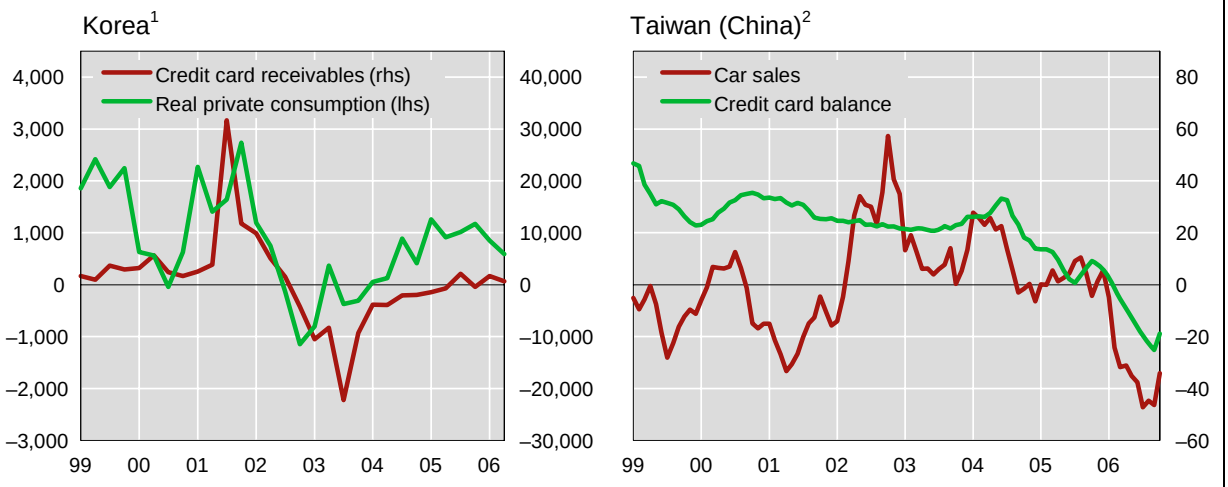
Policy responses initially involve tightening the rules …

In each case, as the situation worsened, policy interventions shifted more towards crisis management, often in the form of regulatory forbearance for issuers and debt rehabilitation for overleveraged cardholders. All three cases witnessed some form of personal debt workout programmes or procedures. The authorities in Hong Kong endorsed the workout guidelines proposed by the local bankers' association. In Taiwan, to facilitate renegotiation between issuers and multiple-card debtors, the authorities initiated a personal debt restructuring programme, covering 30% of total card balances. One third of the restructured debtors were reportedly performing at the time, but enrolled in the programme nevertheless to take advantage of better repayment terms.[8] Some restructured loans were immediately reclassified as performing, effectively granting issuers regulatory forbearance. In Korea, the authorities reversed some earlier tough measures and allowed issuers to roll over delinquent credit

… but later shift to crisis management

[8] Taiwan's debt restructuring programme offered lower interest rates of 3–4% compared to the prevailing card lending rates of 16–20%, and longer repayment periods of seven to eight years compared to three years normally. The programme might help ward off other more questionable measures proposed at the time. In Hong Kong, a more forgiving personal bankruptcy regime was introduced before the local credit card problems arose. In Korea, a "credit counselling and recovery service" programme was set up to facilitate debt rescheduling.

Credit card lending distress and consumption



[1] Quarterly change, in billions of won. Real private consumption is seasonally adjusted. [2] Year-on-year changes, in per cent.

Sources: Bank of Korea; Korea's FSS; Taiwan's FSC; CEIC. Graph 4

card loans, a practice known as "re-ageing". This eased the burden of provisions and charge-offs on issuers, thus also providing regulatory forbearance.

One third of card loan books were probably written off

The effects of these credit card lending boom-bust episodes on the financial system varied, depending on the scale of the initial excess, but in each case the damage remained manageable. Leading issuers suffered heavy losses from their card lending business. It is estimated that about one third of the entire card lending books at their peaks eventually had to be written off in the wake of these credit card stresses. The lending boom in Korea was the most spectacular; so was its subsequent bust. Although credit card lending normally amounted to less than 10% of the total loan books in these banking systems, Korea's credit card balances for both bank and monoline issuers were equivalent to as much as one fifth of total bank loans outstanding at the peak of the boom. Moreover, commercial banks were themselves heavily exposed to monoline credit card issuers. As of March 2003, Korean commercial banks' lending to the troubled LG Card was KRW 11.2 trillion, or 38% of the creditor banks' combined equity. Credit card debt distress even led to disruptive contagion in Korean financial markets (see the next section), contributing to a weakening in corporate capital spending into 2004.

Contracting credit affects consumer spending

Finally, rising delinquencies impacted negatively on the real economies concerned, mostly via weakened consumer spending. Worsening asset quality, funding difficulties and tougher regulations reinforced credit contractions and led to a credit crunch in some cases. The more disorderly unwinding in Korea visibly led the private consumption downturn in 2003 (Graph 4). By contrast, credit card woes in Hong Kong were overshadowed by the protracted local asset price deflation at the time (Lai and Lam (2002)) and seemed to have mainly dampened the spending on big-ticket items in Taiwan after 2004.

The Korean credit card crisis in 2003

A still closer examination of the Korean case highlights three points. First, government policies played a more prominent role at the start of the lending boom than in other countries. Second, since the monoline card issuers dominated the local industry, in contrast to other Asian markets, the credit card crisis spilled over into the capital market. Finally, the crisis involved institutional support for a troubled leading credit card issuer that was not a bank.

Government policy is a key trigger to the card lending boom

Government policies designed to cushion the downturn after the Asian financial crisis contributed in significant measure to the Korean credit card lending boom of 1999–2002. The policy package put in place included tax benefits for merchants accepting credit cards and income tax deductions linked to credit card purchases made by cardholders. On the regulatory front, the authorities abolished the ceiling of KRW 700,000 ($610) on monthly cash advances and removed the limit of the leverage (up to 20 times capital) on credit card issuers. Moreover, the weighted regulatory capital requirement for the specialty issuers was only 7%, despite the inherently undiversified nature of their unsecured credit card lending business. [9] In response, the market grew rapidly in 1999–2002, with the number of credit cards rising from 40 million to 100 million and credit card assets expanding fivefold (Graph 4).

Korean business model adds to the severity of distress

The business model adopted by Korean credit card issuers had also helped shape the dynamics of the local credit card lending distress. This was mainly because of interactions between asset quality deterioration and funding difficulties (Graph 5). Specialised credit card service providers dominated the Korean market but were prevented by regulation from deposit-taking. Thus, during the boom, monoline issuers funded the credit expansion by tapping into the capital market, with many of the papers they issued being purchased by ITCs. But as their card portfolios began to turn sour, investors, spooked by an accounting scandal at SK Global in March 2003, rushed to pull their investments out of ITC-managed funds. Panic redemptions even forced ITCs to sell their government bond holdings, as liquidity in the secondary corporate bond markets disappeared (Remolona and Wooldridge (2003), Lee and Kim (2005)). In a matter of two weeks, the outstanding value of the ITC-managed funds fell by 15%. Funding difficulties forced some issuers to cut their lending to cardholders, further pushing up delinquencies and further hurting the confidence of bond investors.

Rescues are controversial …

As the turmoil spread to the bond market, policy intervention came more to resemble a set of crisis management operations. This policy change was a response to the perception of higher systemic risks, though the extent to which a problem existed remains a matter for debate. Policymakers also shifted their tactics over time, opting to intervene by providing liquidity support to both the market in general and to credit card issuers in particular. They also arranged a

[9] The measures described were also part of a broader financial deregulation and intended to stimulate consumption, enhance tax collection and limit the informal loan market. There is some evidence that tax incentives in particular increased the adverse selection problem faced by credit card issuers (Lee (2005)).

rescue of the failing LG Card, which aroused controversy because of the possible moral hazard implications (Coulton (2005)).

... and extensive

The scale of these operations was considerable. In the wake of the March 2003 bond market sell-off, the Bank of Korea injected substantial liquidity through open market operations. The government also persuaded domestic investors to roll over the matured debts of credit card companies and not to exercise their put options in credit card asset-backed securities. Finally, the authorities pressured the majority shareholders of troubled credit card companies to inject capital, suspended the trading of LG Card bonds, directed a state-owned bank to extend credit to LG Card, and eventually coordinated a process of debt-equity swaps to ensure the joint control of LG Card by the creditor banks in 2004.

Lessons learned and policy implications

On-site examinations can detect early signs of trouble

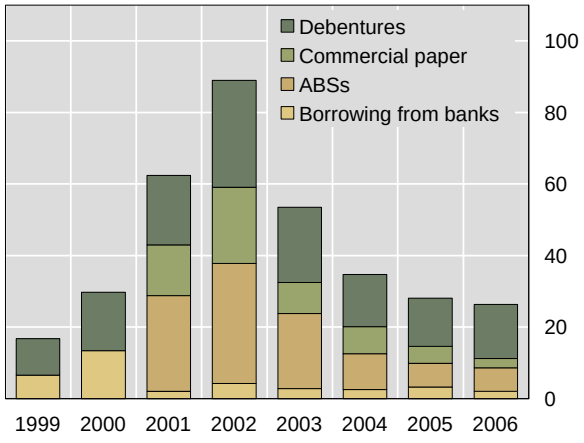
These three episodes of credit card lending distress point to a number of lessons. First, the episodes highlight the importance of placing greater emphasis on detecting early warning signs before imbalances build up excessively. Admittedly, it is a challenge to sound the alarm bell when profits are on the up, amid a lending boom, but reasonable average debt/GDP ratios and low initial losses should not give rise to complacency. Even from a low base, the rapid growth in indebtedness itself can pose new risks, especially during periods of structural change. Nor should a benign economic environment lead to the conclusion that a consumer debt crisis will not occur. Moreover, given the time lags in data collection, problem recognition, and the policy response, there is probably a need to strengthen the capacity of policymakers to conduct on-site examinations.

Enhancing information flows

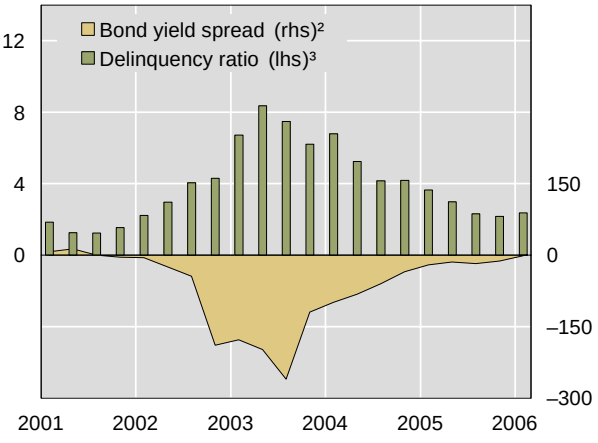
Second, governments can help enhance the provision of information in the consumer credit market. For example, to mitigate information asymmetries

Funding structure and asset quality of Korean credit card companies

Sources of external debt financing[1]



Yield spreads and delinquency ratio



[1] Year-end amount outstanding, in trillions of won. [2] Benchmark corporate yields less credit card company bond yields, in basis points. [3] Three months overdue, in per cent.

Sources: Bank of Korea; Korea's FSS. Graph 5

between lenders and borrowers, credit information sharing should be encouraged.[10] Moreover, timely disclosure of issuer information could help the financial market exercise its disciplinary role. In addition, with a wider population being offered access to credit cards, better consumer education may help contain misuse. Nevertheless, the episode in Taiwan suggests that credit reporting itself is no guarantee of safety and that careful consideration should be given to how best to maintain the integrity of credit information sharing and reporting systems.

Earlier and stronger prudential measures in times of transition

Finally, policymakers may find it helpful to upgrade their prudential and supervisory frameworks during the liberalisation process. Some guidelines on best practice and income tests for credit limits and minimum repayment requirements, often informally put in place through local bankers' associations, can be useful during difficult transition periods if they are deployed pre-emptively. Forms of such restrictions have been strengthened or reintroduced in some Asian markets following the recent episodes of distress.[11] Other regulations may be more ambiguous in their effect. For instance, excessively binding legal ceilings on credit card lending rates may drive some borrowers away from the formal sector and weaken issuers' ability to absorb shocks in the face of distress.[12]

Conclusions

This decade has witnessed episodes of credit card lending booms and busts in some Asian markets. The boom phase of these cycles is often associated with competition for market share, laxer lending standards, excess credit expansion and adverse selection; the subsequent bust phase is sometimes exacerbated by the adverse dynamics of contracting credit and moral hazard.

With deregulation and growing consumer finance, policymakers need to appreciate the risks arising from consumer lending and put in place appropriate prudential and supervisory measures to contain risks. Policymakers need to deploy these measures pre-emptively, ahead of anticipated structural changes and deregulation, as well as lay greater emphasis on both identifying indicators of excessive credit growth and reacting to them. Credit bureaus can help, but careful attention must be paid to their structure and operations, as well as to the incentives needed to maintain their integrity.

---

[10] Since the recent episodes of distress, credit reporting in both Hong Kong and Korea has improved. Three private credit bureaus are now competing against each other in Korea, and a specialised consumer credit information service providing negative and positive information about borrowers is operating in Hong Kong (He et al (2005)). Even in Taiwan, the local system has been refined and enhanced after the recent credit card lending boom and bust.

[11] Possibly drawing lessons from the Korean experience, and in response to an acceleration in local credit card lending, Thai regulators introduced formal guidelines on credit card operations in 2002 and tightened them in 2004 (Watanagase (2005)).

[12] Lower credit card lending rates may attract less creditworthy or less profitable borrowers because of information asymmetries, and search and switch costs, thus hurting the net earnings of card issuers (Ausubel (1991), Calem and Mester (1995)). Legal ceilings on interest rates on consumer finance range from 20% in Taiwan and 40% in Korea to 60% in Hong Kong. See also Yun (2004) for a discussion of the Korean experience.

References

Ausubel, L (1991): "The failure of competition in the credit card market", *American Economic Review*, 81 (1), pp 50–81.

Borio, C and P Lowe (2002): "Assessing the risk of banking crises", *BIS Quarterly Review*, December, pp 43–54.

Borio, C and I Shim (2007): "What can (macro-)prudential policy do to support monetary policy?", paper presented at the Bank of Thailand, and *BIS Working Papers*, forthcoming, Basel.

Calem, P and L Mester (1995): "Consumer behaviour and the stickiness of credit-card interest rates", *American Economic Review*, 85 (5), pp 1327–36.

Chan, E, M Davies and J Gyntelberg (2006): "The role of government-supported housing agencies in Asia", *BIS Quarterly Review*, June, pp 71–83.

Coulton, B (2005): "The global perspective on the Korean economy", *A New vision and strategy under changing leadership in Northeast Asia*, Korean Development Institute, Seoul, pp 50–55.

Dell'Ariccia, G and R Marquez (2006): "Lending booms and lending standards", *Journal of Finance*, 61 (5), pp 2511–46.

Evans, D and R Schmalensee (2005): *Paying with plastic: the digital revolution in buying and borrowing*, MIT Press, Cambridge, Massachusetts.

Fitch Ratings (2006): *Managing growth – the challenge of consumer lending in Asia*, 7 March, Hong Kong.

He, D, E Yao and K Li (2005): "The growth of consumer credit in Asia", *Hong Kong Monetary Authority Quarterly Bulletin*, March, pp 13–21.

Jeong, H (2006): "A study on the mechanism for sharing credit information", *Economic Papers*, 9 (1), Bank of Korea, pp 186–204.

Lai, K and R Lam (2002): "The nexus of consumer credit, household debt service and consumption", *Hong Kong Monetary Authority Quarterly Bulletin*, November, pp 35–48.

Lee, K (2005): "Risk in the credit card industry when consumer types are not observable", *Research Paper*, no 05-03, KDI School of Public Policy and Management, May.

Lee, M and S Kim (2005): "Developing the corporate bond market: the Korean experience", in "Developing corporate bond markets in Asia", *BIS Papers*, no 26, pp 96–113.

Miller, M (2003): *Credit reporting systems and the international economy*, MIT Press, Cambridge, Massachusetts.

Mohanty, M (2006): "Banks and aggregate credit: what is new?", in "The banking system in emerging economies: how much progress has been made?", *BIS Papers*, no 28, pp 11–40.

Remolona, E and P Wooldridge (2003): “A depositor run in securities markets: the Korean experience”, *BIS Quarterly Review*, June, p 10.

Standard & Poor’s (2006): *Banking industry country risk: the Asian picture*, 26 June, Singapore.

Watanagase, T (2005): “The future of cards and payments: a regulator’s perspective”, speech at “Cards and Payments: Asia Pacific 2005 Conference”, http://www.bot.or.th/bothomepage/General/PressReleasesAndSpeeches/Speeches/english_version/Governor&DeputyGovernor/21Sep05_Cardpayments_Tarisa.pdf.

Yun, S (2004): “Impact of direct regulation on the Korean credit card market and consumer welfare”, *Economic Papers*, 7 (1), Bank of Korea, pp 141–59.

Zhu, H (2006): “The structure of housing finance markets and house prices in Asia”, *BIS Quarterly Review*, December, pp 55–69.

André Amante
+5521 2189 5506
andre.amante@bcb.gov.br

Márcio Araujo
+5521 2189 5291
marcio.araujo@bcb.gov.br

Serge Jeanneau
+4161 280 8046
serge.jeanneau@bis.org

The search for liquidity in the Brazilian domestic government bond market[1]

The policy initiatives taken by the Brazilian authorities since the beginning of the decade have helped markedly improve the structure of government debt and the overall liquidity of fixed income and related derivatives markets. Despite this progress, there is room for improvement in the liquidity of the cash market for government bonds.

JEL classification: E440, G180, H630, O160.

The Brazilian domestic government bond market has expanded rapidly since the mid-1990s and is now by far the largest in Latin America. In recent years, economic stabilisation, combined with a favourable external environment, has allowed the government to shift away from short-term, floating rate and/or exchange rate-linked securities to longer-term fixed rate and inflation-indexed liabilities. This new structure of debt has made the country less vulnerable to financial shocks. At the same time, liquidity has developed rapidly in the fixed income derivatives market but there is room for improvement in the cash market. This special feature describes the efforts made by the authorities to develop the domestic government bond market, with a particular focus on the measures recently adopted to foster market liquidity.

Economic stabilisation and debt sustainability

One of the most significant challenges faced by Brazilian policymakers over the past decade has been the need to ensure the sustainability of the country's public debt. From 1995 to 2002, the net debt of the consolidated public sector rose from 28% to 56% of GDP, leading to growing concerns about the sustainability of fiscal policy. This, along with high inflation and macroeconomic instability, forced the government to make frequent adjustments to the currency and maturity composition of its marketable debt. Such adjustments took the form of higher yields on new issues, a shortening of maturities and a growing

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS or the Central Bank of Brazil (Banco Central do Brasil – BCB). The authors are grateful to Claudio Borio, Már Gudmundsson, Ivan Lima, Frank Packer, Camilo Tovar and Christian Upper for comments and to Rodrigo Mora and Marcus Vinicius Mendes for excellent research assistance.

supply of floating rate and/or dollar-indexed securities. The resulting structure of debt increased the country's vulnerability to domestic and external financial shocks, despite the significant efforts made to improve the overall macroeconomic environment. The severe financial crises of 1999 and 2002 (Herrera (2005)) made policymakers acutely aware of the vulnerabilities associated with heavy reliance on short-term, floating rate and dollar-linked financing. Consequently, much has been done in recent years to develop more stable sources of funding.

Financial crises encourage a shift to more stable debt structures

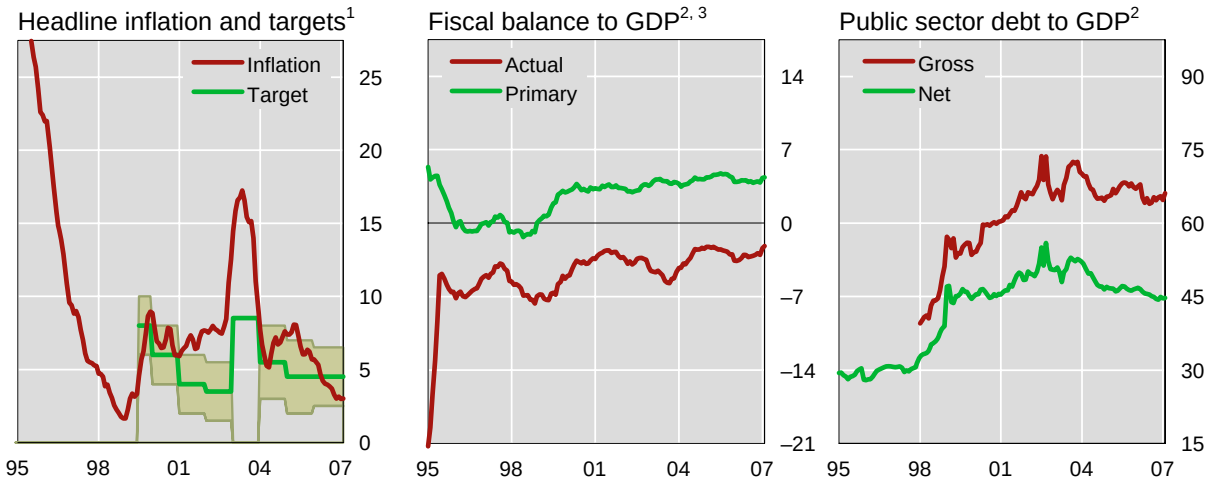
An important element in strengthening the demand for domestic debt has been the pursuit of stabilising macroeconomic policies. The implementation of an inflation targeting regime in July 1999, combined with greater transparency in the formulation of monetary policy, has led to a sustained reduction in inflation and inflation expectations to within the BCB's target range (Graph 1).[2] At the same time, the introduction of the Fiscal Stability Programme (FSP), which imposed stringent targets for the primary surplus, has been broadly successful in bringing debt accumulation under control. The FSP was complemented by the introduction in 2000 of the Fiscal Responsibility Law, which strengthened the federal government's control over the finances of lower levels of government. Moreover, the shift to a flexible exchange rate regime in early 1999 provided the country with greater scope for external adjustment and helped mitigate the strains resulting from speculative currency attacks.

Demand for government debt boosted by stabilising macro policies

In addition to this shift to a new macroeconomic framework, initiatives have been taken in recent years to improve debt management. In 2001, the Treasury began publishing annual financial plans, which provide indicative targets for the overall stock of debt as well as its composition in the coming

Initiatives to improve debt management ...

Inflation, fiscal balance and public sector debt in Brazil

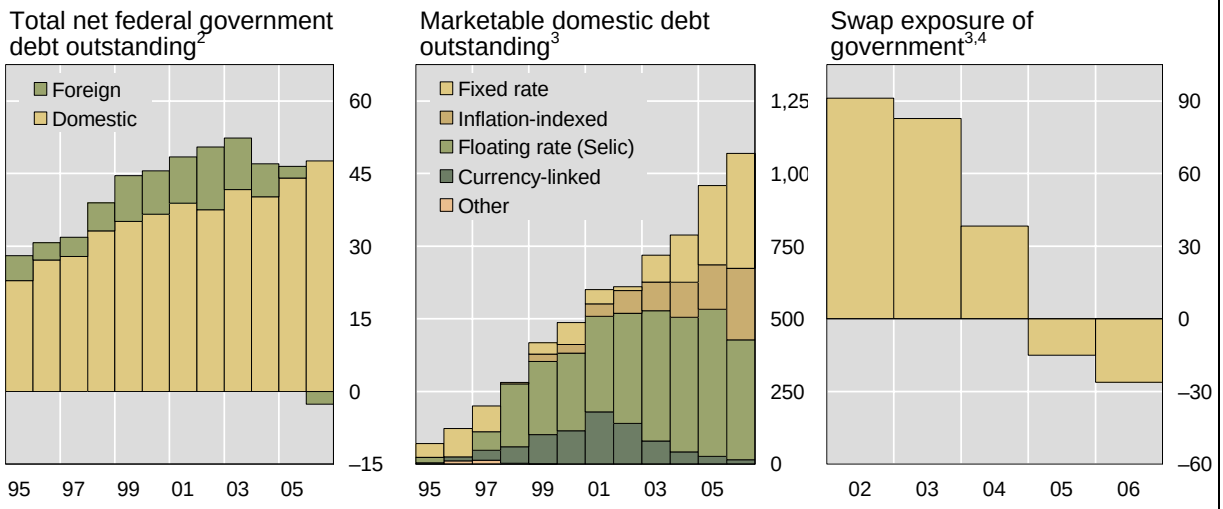


[1] Twelve-month accumulated rate of CPI inflation, in per cent; the target range is ±2% from July 1999 to December 2002; ±0% from January to December 2003; ±2½% from January 2004 to December 2005; and ±2% since January 2006. [2] As a percentage of GDP. [3] Public sector borrowing requirement; flows accumulated over 12 months; a negative figure indicates a deficit.

Sources: BCB; Instituto Brasileiro de Geografia e Estatística. Graph 1

[2] Transparency has been improved by publishing the minutes of the Monetary Policy Committee and quarterly inflation reports.

Brazilian federal government debt[1]



[1] At end-year. [2] As a percentage of GDP; a negative figure indicates a net creditor position. [3] In billions of reais. [4] A positive figure indicates a net liability position.

Source: BCB. Graph 2

year. Such plans have been an important tool in achieving greater predictability and transparency in debt management.

… seek to reduce financing costs and risks

Since 2003, the government has focused its debt management policy on minimising long-term financing costs, while ensuring that risks are kept at prudent levels. Within this framework, and subject to market conditions, the government has aimed at reducing market and refinancing risks by decreasing the share of the federal debt maturing within 12 months and that of floating rate debt, and raising the share of fixed rate debt. In addition, it has worked to phase out domestic dollar-linked debt. Taking into consideration the typically strong demand of institutional investors for inflation-linked securities, the government has also sought to increase the share of such securities.

Progress with policies supported by favourable environment …

The progress made on the macroeconomic and debt management fronts has been supported by a particularly favourable external environment, including robust export growth and a search for yield on the part of international investors. Those economic fundamentals have translated into a strong performance of the currency and expectations of declining interest rates, helping to bring about a significant improvement in the overall composition of domestic debt.

... allowing a shift from floating to fixed rate debt …

The share of floating rate debt has been reduced from more than 50% in the early 2000s to 38% at the end of 2006, while that of fixed rate issues has risen from almost nothing to 36% (Graph 2). The maturity of local currency fixed rate issues now extends to 10 years in the domestic market and 20 years in the international one. Moreover, unlike in the early part of the decade, the government has been able to maintain fixed rate issuance even during periods of rising or volatile interest rates. Meanwhile, currency-linked debt has been phased out, dropping from a high of 37% of domestic debt at the end of 2002 to

… a phasing-out of currency-linked debt …

Structure of the Brazilian domestic federal debt market

The Brazilian authorities focus on two main concepts of public sector debt: the gross general government debt (GGGD) and the net public sector debt (NPSD). The GGGD and NPSD both encompass the three administrative levels of government, but only the NPSD also includes the liabilities of the BCB and state-owned enterprises. These two main concepts of debt include both internal and external debt. The GGGD and NPSD amount to around 65% and 45% of GDP respectively (see Graphs 1 and 2). The NPSD results largely from the netting of domestic assets and liabilities, since the external debt component has declined steadily in recent years. Considering recent issuance, the federal domestic marketable debt (FDMD) corresponds to almost 95% of the NPSD.

The Brazilian Treasury (Secretaria do Tesouro Nacional – STN) is the authority responsible for the issuance and management of public sector debt, both internal and external. It was created in March 1986, when the Comissão de Programação Financeira and the Secretaria de Controle Interno do Ministério da Fazenda were merged. The BCB also plays an important role in the management of public debt since it is in charge of operating primary auctions of public sector securities. In addition, in the conduct of monetary policy, the BCB plays an active role in repurchase operations linked to these bonds. It should be noted that since May 2000 the BCB is no longer authorised to issue its own securities. As a result, the amount of BCB bonds outstanding has declined gradually to nothing.

The FDMD is composed of a wide range of securities, including floating rate, fixed rate, inflation-indexed and dollar-indexed instruments (see Table 1). The LFT, whose floating rate remuneration is based on the Selic rate, is the largest government security in terms of outstanding amounts.① The LTN, a zero coupon fixed rate security, has expanded sharply in recent years and is now the second most important type of outstanding marketable liability. The NTN-F, which is a standard coupon-bearing fixed rate security, has also expanded in recent years. The other NTN securities are indexed to various other indices. The NTN-B and NTN-C, inflation-indexed bonds, have increased their share of total marketable debt in recent years. The NTN-D and NBC-E, US dollar-indexed securities, used to represent a significant share of total marketable debt in Brazil but their participation is minimal nowadays. Overall, the securities discussed in this box represent 95% of the total domestic marketable debt of the federal government. Debt issuance by states and municipalities is modest.

① The Selic is an overnight interest rate based on an average measure of the rates on overnight repurchase operations involving the FDMD.

1.3% at the end of 2006 (or –1.1% if exchange swaps are included).[3] Inflation-linked debt has increased from a marginal amount in the early 2000s to a share of 23% at the end of 2006.

… and a rising share of inflation-linked debt

The steadfast maintenance of large primary surpluses, along with valuation changes related to the appreciation of the currency, brought the net debt of the government down to BRL 1.1 trillion or 45% of GDP at the end of 2006. This reduction has had a beneficial impact on investors' perception of Brazilian sovereign risk, as illustrated by a narrowing of the country's sovereign spread to a historical low of 199 basis points at the end of 2006.[4]

Overall debt reduction has a beneficial impact on sovereign risk

[3] Under such swaps, the BCB assumed a long foreign exchange position and a short interest rate position, with the result that it now has a net long position in currency-linked instruments.

[4] It is worth highlighting that since 2003 gross external debt has been declining and that since 2006 the federal government has been a net external creditor (if one includes foreign exchange reserves).

Main Brazilian federal public sector securities

In billions of reais

Securities issued by the federal government					
Instrument	Type of coupon	Maturity	Frequency of issuance	Amount outstanding at end-2000	Amount outstanding at end-2006
Letras Financeiras do Tesouro (LFT)	Par value indexed to Selic rate	3 and 5 years	Biweekly	260.9	412.0
Letras do Tesouro Nacional (LTN)	Fixed rate zero coupon	9, 18 and 30 months	Weekly	75.4	347.0
Notas do Tesouro Nacional Série F (NTN-F)	Fixed rate with coupon paid semiannually	5 and 7 years	Weekly		48.0
Notas do Tesouro Nacional Série B (NTN-B)	Coupon and par value indexed to Índice Nacional de Preços ao Consumidor Amplo (IPCA) with coupon paid semiannually	3, 5, 9, 18, 29 and 39 years	Biweekly		167.2
Notas do Tesouro Nacional Série C (NTN-C)	Coupon and par value indexed to Índice Geral de Preços de Mercado (IGP-M) with coupon paid semiannually	11, 15 and 25 years	Irregularly	6.9	65.6
Notas do Tesouro Nacional Série D (NTN-D)	Coupon and par value indexed to USD with coupon paid semiannually	6 months to 5 years	Not issued since October 2002	14.8	1.3
Notas do Banco Central do Brasil Série E (NBCE)	Coupon and par value indexed to USD with coupon paid semiannually	6 months to 6 years	No longer issued	83.7	–
Other federal public sector securities				69.00	52.4
Total federal public sector securities				510.7	1,093.5

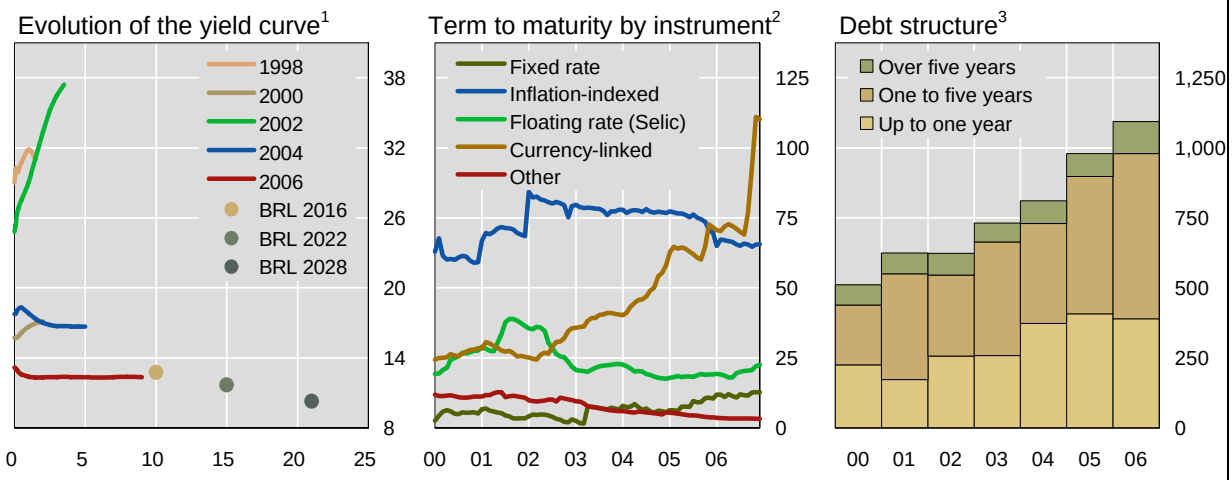
Source : BCB. Table 1

Refinancing risk remains an issue

Notwithstanding this positive evolution, the high share of debt maturing within one year (36% of the total amount of securities held by the public), the relatively short average maturity of fixed rate bonds and the significant share of floating rate debt (Graphs 2 and 3) indicate that the country still remains exposed to higher short-term interest rates and/or refinancing risk (Akira and Callegari (2006), Dias et al (2006)).[5]

[5] It should also be noted that the shift towards fixed rate debt was at the cost of a shorter average maturity. The indexed debt that was retired, particularly currency-linked debt, had a substantially longer maturity than fixed rate debt (Graph 3). The average maturity of the total stock of debt fell steadily from 35 months in 2001 to a low of 27 months in 2005. It began to lengthen again in 2006, edging back to 30 months as the share of fixed rate debt increased and its average maturity lengthened.

Yield and maturity structure of Brazilian domestic federal government debt



[1] Interest rates in per cent against years of 252 days, calculated as a cubic-spline interpolation of the interest rates observed for depositos interfinanceiros (DI) futures contracts at the end of each year; for the global BRL local currency bonds, yields in per cent against years of 365 days; BRL 2016 (12.75% in September 2005), BRL 2022 (11.66% in December 2006), BRL 2028 (10.28% in March 2007). [2] Average term to maturity of outstanding debt held by the public; in months. [3] End of the year; in billions of reais.

Sources: BCB; Bolsa de Mercadorias & Futuros; Câmara de Custódia e Liquidação. Graph 3

Improving market liquidity

Room to improve bond market liquidity

Despite the progress made in developing the government bond market and shifting it to a more stable structure, there would be room to improve its liquidity. There is no unique way of defining market liquidity, but market analysts usually refer to three main characteristics of a liquid market, namely depth, tightness and resilience (see CGFS (1999, 2007) for a more extensive discussion). Depth indicates a market's ability to absorb large transaction volumes without a sharp movement in its equilibrium price; tightness measures the cost-efficiency of transactions, as reflected in bid-ask spreads; resilience indicates the market's ability to absorb shocks. A liquid market would be expected to exhibit large turnover, low bid-ask spreads and low price volatility in normal and stressed periods.

This would yield important benefits

The development of market liquidity is an essential element in the creation of a mature bond market (IMF/WB (2001)). In normal circumstances, higher market liquidity will be reflected in a reduction of the liquidity risk premium embedded in government bond yields, resulting in lower financing costs for the government. In addition, improving the liquidity of the government bond market is of great importance for the development of other financial market segments since it allows for the creation of a representative "risk-free" yield curve to serve as a benchmark in the pricing and trading of other financial assets. Better market liquidity is also of crucial importance for the conduct of monetary policy, since liquid asset markets are required in order to conduct open market operations and extract market expectations. Moreover, market liquidity is important for financial stability since low liquidity or its drying-up under conditions of stress can have significant negative repercussions for the stability of the financial system (Borio (2004)).

Treasury and BCB introduce measures to improve liquidity …

With this in mind, the Treasury and the BCB have introduced a host of measures since 1999 aimed at improving the liquidity of federal government debt.[6] First, they have worked to develop benchmark issues through a reduction in the frequency of offerings and a concentration of issues in a few maturities along the yield curve. Second, the existing primary dealer system for open market operations was complemented in 2003 by the formation of a special group of secondary market trading specialists. In return for meeting certain performance-related targets, these specialists, along with primary dealers, were given financial incentives, such as the ability under certain conditions to purchase government securities in second-round sales at the average price determined by competitive auctions. Third, as part of its new debt management strategy, the Treasury took steps to smooth the maturity profile of domestic debt and promote the development of a local currency yield curve composed of domestic and external issues (see Tovar (2005) for an analysis of international issues in local currency). Fourth, the Treasury announced that it would be prepared to carry out purchase and sale auctions involving selected securities as a means of ensuring liquidity during periods of difficult market conditions. Finally, the BCB introduced a bond lending programme and allowed for the short selling of securities at the longer end of the repurchase market.

… and transparency …

The availability of market-determined prices is an essential element in the development of secondary markets and the valuation of intermediaries' portfolios. In recent years, the BCB and the National Association of Financial Market Institutions (Associação Nacional das Instituições do Mercado Financeiro – ANDIMA) have worked to promote market transparency through the publication of market prices. For example, the prices of transactions in government securities, which are settled through the Sistema Especial de Liquidação e de Custódia (Selic) operated jointly by the BCB and ANDIMA, are now made available daily to market participants. In addition, ANDIMA is developing various benchmark indices to encourage portfolio diversification.[7]

… and broaden the investor base

Measures have also been taken to broaden the domestic and foreign investor bases for local currency securities. These include the introduction of an electronic distribution channel aimed at domestic retail investors (Tesouro Direto), the acceleration and simplification of investment modalities for non-resident investors and a recent exemption of non-resident investors from the 15% withholding tax on fixed income assets (announced in February 2006).

In addition, other measures have focused on improving trading and holding conditions for domestic investors. These include the creation of special investment accounts that exempt individuals and non-financial corporations from the Contribuição Provisória Sobre Movimentação Financeira (CPMF, a 0.38% tax charged on most debits to current accounts) and the introduction of

[6] For a detailed account of these measures, see ANDIMA (2006).

[7] This price information has been complemented by publication by the BCB and the Treasury of periodic press releases which discuss the evolution of the government bond market. See "Open Market Press Release" at www.bcb.gov.br and "Federal Public Debt Monthly Report" at www.stn.fazenda.gov.br.

a new income tax rule that provides for a decline in the tax rate for longer holding periods.[8]

Low liquidity of the cash market

Relatively low volume of secondary market transactions …

Despite the structural initiatives just described, available evidence suggests that liquidity in the cash market for government bonds remains relatively low. The daily volume of all secondary market transactions has amounted to only 1–2% of the total stock of government debt in the past few years. By contrast, turnover in the US bond market, admittedly the most liquid in the world, amounted to about 14% of the stock of US government securities. Turnover in the Brazilian government bond market is also somewhat lower than that in its Mexican counterpart, where daily activity amounts to about 4% of the stock of debt and has been on a rising trend. Of course, such comparisons of activity across countries are subject to the usual caveat about the widely differing nature of national data on turnover.

… including by international investors

Another comparison based on the narrower trading universe compiled by the Emerging Markets Trading Association, which covers yearly trading by its member banks in the debt instruments of the region's largest countries, shows a similar ranking of secondary market transactions. Mexico has by far the most active secondary market, while Brazil has one of the least active ones along with Peru and Venezuela (Jeanneau and Tovar (2006)).

Bid-ask spreads are not particularly tight …

Bid-ask spreads, a measure of tightness, show that the Brazilian fixed rate government bond market is not particularly tight. Spreads on fixed rate bonds stand at about 5 basis points compared with 3–5 basis points in Mexico (Jeanneau and Tovar (2006)). Bid-ask spreads are also significantly wider than in mature bond markets, such as those of the United States, where they range from 1 to 2 basis points. However, as shown in Graph 4, there have been signs of improvement since the early part of the decade.

… but market resilience seems to be improving

Assessing market resilience, the third dimension of liquidity, is a more difficult task. Bond markets in emerging market economies often tend to dry up when they are hit by adverse shocks. Graph 4 shows the daily volatility of local currency bond returns in Brazil in recent years, which could be used as a rough proxy for market resilience. Based on this measure, the Brazilian bond market seems to have become more resilient in recent years. It should be noted, however, that the low level of volatility in recent years may have reflected the prevalence of favourable global and local market conditions as much as a genuine improvement in underlying liquidity. Analysing volatility under substantially less favourable conditions would provide a more convincing test.

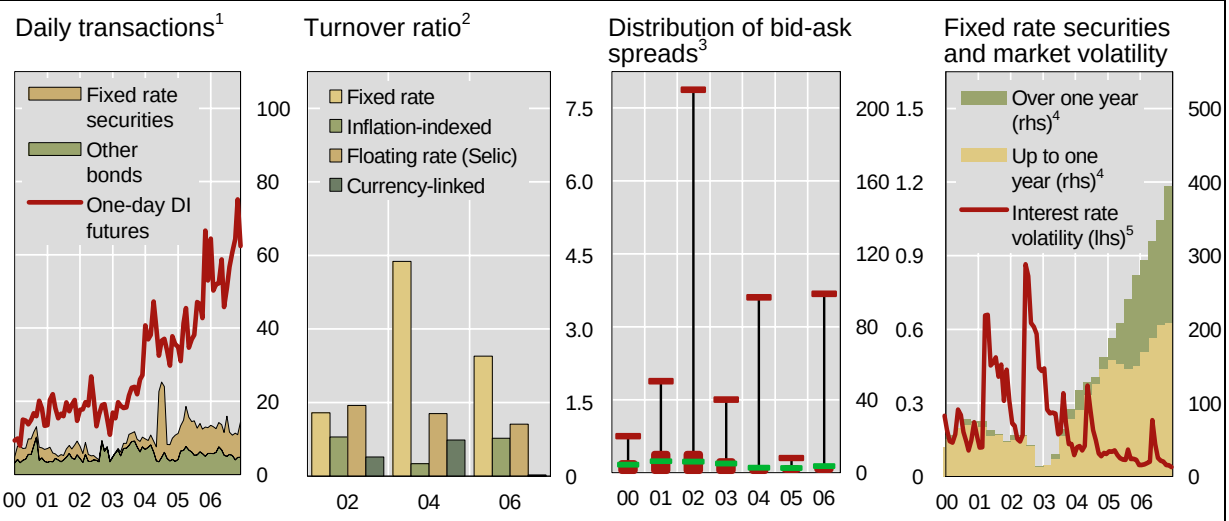
What accounts for low liquidity?

Liquidity is determined by a number of factors, including:

Why has liquidity in the cash market remained so low in recent years in spite of the efforts aimed at nurturing it? In trying to answer this question, we consider,

[8] Funds deposited in investment accounts that are inter alia transferred to mutual funds or used to purchase bonds and other securities are exempted from the CPMF.

Secondary market liquidity of Brazilian domestic federal government debt



[1] Monthly average of daily transactions in billions of reais. [2] Monthly average of daily transactions as a percentage of the amount outstanding at the end of the year. [3] Calculated on all LTN bonds; based on daily observations; in basis points. The bottom and top horizontal lines for each observation show the minimum and maximum data points for the year, respectively. The box represents the distribution of data points for the 25th to 75th percentiles, and the green line within the box shows the mean value of the distribution. [4] Monthly amounts outstanding, in billions of reais. [5] One-year interest rate volatility for the last day of the month, in per cent.

Source: BCB. Graph 4

in turn, the financial environment, the type of securities traded, the overall size of the market and individual bond issues, tax and regulatory arrangements, the investor base, and the existence of complementary trading instruments, such as fixed income derivatives.

Financial environment

(i) the financial environment, which is improving;

For much of Brazil's financial history, phases of volatility have hampered the development of liquidity in fixed income markets. However, the better macroeconomic and financial environment observed in recent years has created conditions for increased liquidity, particularly in short- to medium-term fixed rate securities. The significant reduction in market volatility since the early part of the decade has encouraged investors to look for added returns at the longer end of the yield curve (Graph 4). This ongoing move to longer-term assets represents a significant change in the behaviour of Brazilian investors.

Type of securities traded

(ii) the type of securities traded, which is not always conducive to active trading;

The type of securities traded can have an effect on secondary market activity. In Brazil, the high rates of inflation experienced until the early 2000s and the various financial crises have led investors to adopt the overnight Certificados de Depósito Interbancário (CDI) and Selic rates as the main trading benchmarks.[9] In spite of the progress made in reducing inflation and financial market volatility, such short-term benchmarks remain popular, as illustrated by the high share of securities indexed to the Selic rate (which represent close to

[9] The two rates are very similar. The CDI rate is for money market transactions without collateral and registered with CETIP, a local clearing house, and the Selic rate is for repurchase transactions with collateral and registered with Selic.

40% of total federal domestic marketable debt). In general, such indexed securities are less actively traded than money market instruments or fixed rate bonds (Graph 4). Floating rate securities play an important role in the cash and debt management practices of financial institutions since they satisfy the demand for short-duration positions. However, market agents have little incentive to trade them for capital gains since the high frequency of coupon resets means that opportunities for such gains are limited. A similar logic applies to the trading of inflation-indexed bonds.

By contrast, as shown in Graph 4, fixed rate bonds are much more actively traded than floating rate securities. They have longer duration and, consequently, more price variation, and for this reason tend to attract speculative investors searching for higher financial returns. As noted earlier, the process of economic and financial stabilisation observed in recent years has supported investment and trading demand for longer duration bonds, particularly fixed rate issues.

Size of market and individual bond issues

(iii) the size of the market …

The size of a bond market and of its individual issues is usually seen as an important determinant of its liquidity. A larger bond market can accommodate more market participants with a greater variety of market views and trading strategies. As a result, there is generally a positive association between the outstanding stock of publicly issued debt and turnover in cash and derivatives markets. Moreover, higher turnover is generally associated with lower bid-ask spreads as market-makers can more easily manage their inventory risks. Judging by the success of government bond futures markets as well as by bid-ask spreads in the G10 countries, McCauley and Remolona (2000) conjecture that there may be a size threshold in the order of $100–200 billion for the development of a deep and liquid bond market.

… which is reasonably large …

With a total amount of BRL 1.1 trillion ($511 billion) in outstanding securities, the Brazilian federal market exceeds that yardstick by a comfortable amount. However, for many years the availability of a wide array of instruments has impeded the build-up of a sufficiently large stock of homogeneous securities for truly active trading. Such an array enabled the Treasury to craft issuance according to the risk-return preference of various niches of investors, which may have had a positive impact on issuing costs. However, the lower liquidity resulting from the lower size of individual market segments limited the reduction in liquidity premia. Nevertheless, the situation is improving, particularly in the fixed rate segment, with the outstanding amount of Letras do Tesouro Nacional (LTN) rising from BRL 14 billion at the end of 2002 to BRL 347 billion at the end of 2006. Moreover, the average size of fixed rate issues has increased from BRL 5 billion in 2002 to BRL 43 billion in 2006.

... but has a wide array of securities;

Tax and regulatory arrangements

(iv) tax and regulatory constraints;

In Brazil, tax arrangements act as a significant constraint on trading operations, particularly on those involving a sale after a short holding period. Individual investors, non-financial corporate entities and certain institutional investors (such as pension funds and insurance companies) are subject to income tax

and at least two transaction taxes, namely the CPMF (mentioned earlier) and the Imposto Sobre Operações Financeiras (IOF or financial operations tax).[10]

Withholding tax no longer applies to foreign investors but is still imposed on domestic individual investors and non-financial companies. In order to favour longer-term investment, the tax now follows a declining schedule of 22.5% to 15% based on the length of the holding period. However, in doing so, it has inadvertently hampered the development of market liquidity, since a higher tax rate is applied for investment strategies favouring short holding periods. The withholding of interest payments at source has created other problems related to the allocation of the tax liabilities on accrued interest (Leal and Carvalhal-da-Silva (2006)).

The IOF is an additional graduated tax that has a restrictive influence on secondary market transactions. Operations are taxed at rates that decline with the length of time an asset is held (from 96% if the asset is kept only for one day to zero if it is kept for more than 30 days). The aim of this tax is again to encourage longer-term holdings.

The recent introduction of special investment accounts that exempt some investments from the CPMF should help improve liquidity. However, the other tax incentives favouring long-term holdings remain.

With respect to regulation, it should be noted that foreign investors must register their purchases of securities with the Brazilian securities regulator and the central bank, and nominate a legal representative that is required to monitor the fiscal status of their transactions. This complicates the investment process for foreign investors.

Investor base

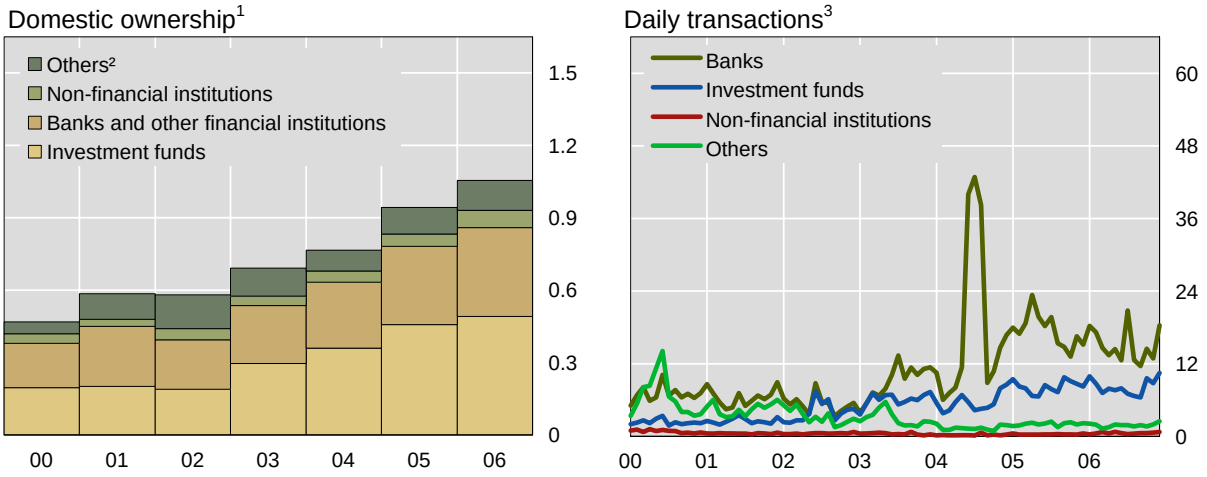
The types of investors and their behaviour can also have a significant influence on trading and liquidity. Brazil has thriving banking, mutual fund, pension fund and insurance industries (OECD (2005)). Mutual funds (termed investment funds in Brazil) are particularly prominent, accounting for 47% of the total ownership of federal government marketable debt. The high concentration of ownership among investment funds emerged after the introduction of the CPMF as underlying investors, principally individuals and non-financial corporate entities, attempted to minimise the incidence of this tax by directing their savings to such funds. As can be seen in Graph 5, investment funds are much less active traders than banks, which hold 34% of marketable debt. Such funds reportedly follow very similar investment strategies (essentially benchmarked to the DI rate), which has acted to limit the extent of contrarian trading.

(v) common investment strategies;

Moreover, the structure of the Brazilian retirement industry has not been conducive to more active trading. In contrast to several other Latin American countries (such as Chile, Colombia, Mexico and Peru), which have introduced private or defined contribution retirement accounts as a substitute for all or part

[10] Banks and other related financial intermediaries are not subject to such tax arrangements when trading in the bond market. Their trading behaviour is therefore not conditioned by those taxes.

Government bond ownership and transactions



[1] At end-year; in trillions of reais. [2] Includes securities used as guarantees to settle operations in various clearing houses. [3] Investment funds include financial investment funds (FIF) and other funds; non-financial institutions include institutional investors; monthly average of daily transactions, in billions of reais.

Sources: BCB; Comissão de Valores Mobiliários. Graph 5

of their pay-as-you-go (PAYG) pension systems, retirement systems in Brazil remain dominated by government-operated PAYG structures. In addition, existing privately funded pension funds are reported to have reached the maturity stage of their payment cycle, which means that they are not in a position to make significant net purchases of government securities (Akira and Callegari (2006)). This has slowed the expansion of investment by privately funded pension funds and acted as a constraint on the diversification of the local investor base.

Key role of derivatives

and (vi) the availability of highly liquid trading alternatives …

Any analysis of market liquidity in Brazil would not be complete without a consideration of activity in other, complementary, market segments, such as exchange-traded derivatives. Indeed, derivatives are a highly cost-effective means of adjusting risk exposures (Euro-currency Standing Committee (1994)). They allow for the unbundling of various kinds of price risks embodied in underlying assets, facilitate the transfer of risks to those more capable of bearing and managing them and permit the establishment of investment and arbitrage strategies that straddle various market segments. These features make derivatives important complementary tools for hedging, position-taking or duration adjustment. They can also act as substitutes for cash market assets in a variety of trading strategies. In some countries, derivatives are more actively traded and liquid than their underlying securities. In fact, with financial markets becoming more sophisticated, fixed income investors may not need to undertake as many cash market transactions as in the past since the risk profile of their portfolios can often be more easily modified through derivative instruments.

… such as derivatives

In Brazil, derivatives play a key role in providing market liquidity. Such markets have benefited to some extent from fiscal and regulatory advantages,

such as partial exemption from the CPMF and reserve requirements.[11] As a result, they have expanded at a brisk pace in recent years. The Contrato Futuro de Taxa Média de Depósitos Interfinanceiros de um día (DI) listed on the Bolsa de Mercadorias & Futuros (BM&F) is more actively traded in notional terms than fixed rate government bonds (Graph 4). The contract simulates a zero coupon bond financed at the CDI overnight rate and offers government bond holders the opportunity to transfer their risk positions in a highly liquid environment and, consequently, at low transaction costs. The futures market contributes strongly to the price formation process given that it is one of the main indicators of interest rate expectations. In fact, the reference yield curve implicit in the DI futures contract is the main benchmark for fixed income investment in Brazil.

Overall, the existence of a well developed futures market has helped to compensate to some extent for low liquidity in the cash market for government securities. Futures have allowed market participants to adjust their risk exposures in a cost-effective manner and helped to build a risk-free yield curve for fixed income markets. The existence of such highly active risk transfer instruments sets Brazilian fixed income markets apart from those of many other emerging market economies.

Concluding remarks

Brazil has made substantial progress in ensuring more stable macroeconomic and financial conditions. The reduction of inflation, the consolidation of fiscal accounts, the control of debt accumulation and the shift to a more flexible exchange rate regime have all had a beneficial impact on the investment climate. This has allowed the country to strengthen its domestic government bond market. In particular, the shift away from dollar-indexed liabilities has eliminated one potential source of vulnerability of the fiscal accounts, while the move to fixed rate debt has helped to reduce interest rate and refinancing risks. This should mitigate financial stress in the face of potential external shocks.

Moreover, Brazil has managed to develop a highly liquid fixed income derivatives market. Such a market has helped in reducing transaction costs to financial market participants and is now providing a recognised reference curve for economic agents. However, there appears to be room to improve liquidity in the cash market for government bonds, where, despite a variety of measures taken by the BCB and the Treasury to enhance liquidity, trading continues to be hampered by structural impediments.

[11] The term partial is used because the CPMF is only imposed on the net amount due on one transaction by one of the counterparties rather than on the notional amount of the transaction. Other indirect tax advantages result from the fiscal authorities' delay in recognising some operations as fixed income transactions.

References

Akira Hashizume, F and J Callegari (2006): "Brazil: the challenges beyond the October elections", JPMorgan Chase Bank, September.

Associação Nacional das Instituições do Mercado Financeiro (ANDIMA) (2006): "Mercado de Balcão de renda fixa: uma agenda de debates".

Borio, C (2004): "Market distress and vanishing liquidity: anatomy and policy options", *BIS Working Papers*, no 158.

Committee on the Global Financial System (1999): "Market liquidity: research findings and selected policy implications", May.

——— (2007): "Financial stability and local currency bond markets", May.

Dias, A, R Jerusalmi, C Ferreira and L F Azambuja (2006): "Brazil snapshot: Quick guide to Brazilian FI local market", Pactual, February.

Euro-currency Standing Committee (1994): "Macroeconomic and monetary policy issues raised by the growth of derivatives markets", Basel.

Herrera, S (2005): "Policy mix, public debt management and fiscal rules: Lessons from the 2002 Brazilian crisis", *World Bank Policy Research Working Paper 3512*, February.

International Monetary Fund/World Bank (2001): "Guidelines for public debt management", March.

Jeanneau, S and C Tovar (2006): "Domestic bond markets in Latin America: achievements and challenges", *BIS Quarterly Review*, June, pp 51–64.

Leal, R PC and A L Carvalhal-da-Silva (2006): "The development of the Brazilian bond market", mimeo, May.

McCauley, R and E Remolona (2000): "Size and liquidity of government bond markets", *BIS Quarterly Review*, November, pp 52–60.

Organisation for Economic Co-operation and Development (2005): "*OECD Economic Surveys: Brazil*".

Tovar, C (2005): "International government debt denominated in local currency: recent developments in Latin America", *BIS Quarterly Review*, December, pp 109–18.

Blaise Gadanecz

+41 61 280 8417
blaise.gadanecz@bis.org

Recent initiatives by the Basel-based committees and groups

During the period under review, the Basel Committee on Banking Supervision (BCBS) released a consultative document on principles for home-host supervisory cooperation and allocation mechanisms in the context of Advanced Measurement Approaches (AMA) for operational risk. The Financial Stability Forum (FSF) initiated an update of its work on hedge funds, and held a meeting with officials from the European region. The Committee on Payment and Settlement Systems (CPSS) announced new developments in clearing and settlement arrangements for over-the-counter (OTC) derivatives. Table 1 provides an overview of these and other developments.

Basel Committee on Banking Supervision

BCBS releases consultative document on:

On 7 February 2007, the BCBS released a consultative document on *Principles for home-host supervisory cooperation and allocation mechanisms in the context of Advanced Measurement Approaches (AMA)*. The paper, which was open for comments until 18 April 2007, sets out principles related to two important topics in the implementation of the AMA for operational risk under Basel II.[1] The first set of principles is intended to be a supplement to the paper *Home-host information sharing for effective Basel II implementation* (home-host paper) as it focuses specifically on supervisory cooperation in the context of banks implementing an AMA. The second set of principles builds on the paper *Principles for the home-host recognition of AMA operational risk capital* (hybrid AMA paper) and specifically addresses allocation mechanisms developed as part of a hybrid AMA.

principles for home-host cooperation on AMA methodologies and implementation …

First, the new paper sets out to clarify the key elements of supervisory cooperation with respect to the implementation of AMA and to establish a framework of principles to facilitate information sharing in the assessment and approval of AMA methodologies. The paper notes that the implementation of Basel II, particularly the AMA, by international banking groups presents unique

[1] The principles set out in this paper do not supersede the general principles described in the paper *High-level principles for the cross-border implementation of the New Accord* but rather provide further elaboration of these principles in an operational risk context. Also, to the extent that this paper refers to operational risk capital requirements, such references are limited to the Pillar 1 capital charge only.

Main initiatives by Basel-based committees and groups

Press releases and publications over the period under review

Body	Initiative	Thematic focus	Release date
BCBS	*Principles for home-host supervisory cooperation and allocation mechanisms in the context of Advanced Measurement Approaches (AMA) – consultative document*	• Key elements of supervisory cooperation with respect to the implementation of AMA; framework of principles to facilitate information sharing in the assessment and approval of AMA methodologies • Set of principles to promote the development and assessment of allocation mechanisms incorporated in a hybrid AMA	February 2007
FSF	*Second FSF European regional meeting*	• Assessment of strengths and vulnerabilities in regional financial systems • Coordination for home and host authorities in respect of cross-border financial groups • Prioritisation of financial system reforms • Progress in developing domestic capital markets	January 2007
	Update of report on highly leveraged institutions (HLIs)	• Reassessment of risks posed by hedge funds and steps that can be taken to mitigate these risks	February 2007 (request)
	Seventeenth meeting of the FSF	• Review of ongoing work to strengthen financial system stability and resilience • Assessment of risks and vulnerabilities in the international financial system • Developments in credit risk transfer	March 2007
CPSS	*New developments in clearing and settlement arrangements for OTC derivatives*	• Findings of a working group set up in early 2006, based on discussions with the industry • Assessment of the OTC derivatives clearing and settlement infrastructure • Areas for further progress and important outstanding issues	March 2007

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

information sharing needs. While communication between home and host supervisors is important, banks play the primary role in implementing Basel II and providing relevant information to home and host supervisors to allow them to meet their responsibilities. The paper then proceeds to outline the factors influencing information sharing, as well as its scope, frequency and mechanics. Finally, it dwells on the responsibilities of banks in the area of information sharing. The document provides examples of information sharing for effective AMA implementation.

… and for allocation mechanisms in a hybrid AMA

Second, the paper sets forth general principles to promote the development and assessment of allocation mechanisms incorporated in a hybrid AMA. These principles relate to: risk sensitivity, capital adequacy, subsidiary level management support, integration into Pillar 1, stability, implementation, documentation, internal review and validation, and supervisory assessment.

Financial Stability Forum

At the request of the G7 Ministers and Governors, the FSF is preparing an update of its earlier work on highly leveraged institutions (HLIs). The FSF has also asked the Joint Forum to revisit an earlier report on the credit risk transfer (CRT) market in light of the continued rapid pace of growth and innovation. The FSF took stock of these and other initiatives relating to financial stability at its seventeenth meeting in Frankfurt in March 2007, and discussed regional issues with counterparts from northern and eastern Europe at its second European regional meeting in Stockholm in January 2007.

FSF receives request to update report on HLIs …

In February 2007, the G7 Finance Ministers and central bank Governors asked the FSF to prepare an update of its 2000 report on *highly leveraged institutions*, to be submitted to the G7 in May. Since 2000, the role of hedge funds in price discovery, market liquidity and risk-bearing in markets has increased. The update, which will draw on input from the FSF member institutions, will review the supervisory, regulatory and private sector actions taken in recent years to strengthen market discipline, risk management practices and market infrastructure and make recommendations for further risk-mitigating action by the public and private sectors.

…and reviews progress

Members reviewed progress in this work at the FSF's *seventeenth meeting*, which was held in Frankfurt on 29 March 2007. They discussed how financial institutions are responding to the counterparty credit risks posed by hedge funds, including developments in collateral, margining and stress testing practices. More broadly, members emphasised the importance of enhancing the effectiveness of market discipline and continuing attention by supervisors to strengthening counterparty risk management practices.

Stocktaking on the CRT markets

Regarding the CRT markets, participants noted that while rapid innovation in CRT instruments has facilitated the management and diversification of credit risk, questions remain about how these instruments might behave during a period of stress. Members discussed steps that can be taken to strengthen the underpinnings of CRT activity, including strengthening infrastructure, improving transparency and enhancing stress testing. They asked the Joint Forum to revisit its 2005 report on CRT in view of the continued rapid growth and innovation in these markets since then. The Forum also asked the Committee on the Global Financial System (CGFS) and the International Organization of Securities Commissions (IOSCO) to reassess previous reviews of the role of credit rating agencies in the structured credit markets.

Forum analyses recent turbulence in equity and credit markets

Forum members also exchanged views on other risks and vulnerabilities in the international financial system. They noted that turbulence in equity and credit markets in late February and early March involved an adjustment in risk positions amidst some increase in macroeconomic uncertainty and concern about the scope of problems in the US subprime mortgage sector. The episode illustrated the extent of linkages among risk premia in different asset classes in the current environment. The Forum urged market participants to ensure that risk management scenarios take appropriate account of the risks and potential consequences that would arise from a more pronounced and prolonged reduction of risk-taking. Finally, the Forum followed up on other ongoing concerns, including assessing work and initiatives

currently under way to promote effective and efficient regulation, to plan and set up communication channels for financial crises and business continuity incidents, and to address remaining problems regarding offshore financial centres' compliance with international standards. Members received a report from the Chairman of the International Forum of Independent Audit Regulators on work at the international and national levels to improve audit quality. They also welcomed work by the International Association of Insurance Supervisors to improve transparency in the global reinsurance market, and by the CPSS and World Bank to strengthen the structures supporting international remittance services.

The Forum held its *second European regional meeting* in Stockholm on 22–23 January, bringing together senior representatives from finance ministries, central banks and supervisory and regulatory authorities from seven FSF member countries and 16 regional non-member countries, as well as senior officials from international and regional financial institutions.

Participants exchanged views on strengths and vulnerabilities in the global and regional financial systems, particularly in central and eastern Europe. They noted that cross-border financial flows, rapid credit expansion and current and prospective membership in the European Union have provided additional impetus to market growth in central and eastern Europe. Regional financial systems are developing rapidly and are generally in good condition.

FSF notes rapid growth of private sector credit in central and eastern Europe

One by-product of these developments for the region has been rapid growth of private sector credit, a significant share of which in some countries is denominated in foreign currency. Sustained high credit growth largely reflects robust domestic demand, low real interest rates and a catching-up process with the levels of private sector credit in advanced economies. However, participants noted several sources of potential risk, including the consequences of strong competition in lending markets, developing credit assessment processes, and exposure to foreign exchange risks by unhedged borrowers. Participants discussed the effectiveness of policy measures that have been taken to mitigate these risks.

Participants also exchanged views and experiences on a number of other issues, including the role of cross-border financial groups, prioritisation of financial system reforms, and progress in developing domestic capital markets.

Committee on Payment and Settlement Systems

CPSS report on OTC derivatives clearing and settlement …

On 16 March 2007, the CPSS published a report on *New developments in clearing and settlement arrangements for OTC derivatives*. In early 2006, the CPSS had set up a working group, comprising representatives of its member central banks and prudential supervisors of major derivatives dealers, to analyse existing arrangements and risk management practices in the broader OTC derivatives market and to evaluate the potential for risks to be mitigated by greater use of, and enhancements to, market infrastructure.[2]

[2] See "Recent initiatives by Basel-based committees and the Financial Stability Forum", *BIS Quarterly Review*, June 2006, pp 77–83.

The report, open for comments and based on interviews and meetings with major dealers in OTC derivatives, industry groups and providers of post-trade processing services, focuses on six issues:

- the risks created by delays in documenting and confirming transactions;
- the implications of the rapidly expanding use of collateral to mitigate counterparty credit risks;
- the potential for expanding the use of central counterparty (CCP) clearing to reduce counterparty risks;
- the implications of OTC derivatives prime brokerage;
- the risks associated with unauthorised novations of contracts; and
- the potential for significant market disruptions from the closeout of OTC derivatives transactions following the default of a large market participant.

Some of these issues had already been discussed in 1998 and others have attracted the group's attention during its discussions with OTC derivatives dealers and service providers.[3]

... notes stronger clearing and settlement infrastructure ...

The report concludes that, since 1998, the clearing and settlement infrastructure of OTC derivatives markets has been significantly strengthened, but further progress is needed to reduce confirmation backlogs in products other than credit derivatives, where efforts have until now been concentrated. In addition, market participants should work together to identify further steps that could be taken to mitigate the potential market impact of the closeout of one or more major participants. The report formulates concrete proposals for making progress in these areas. Lastly, it highlights two issues that will assume greater importance as the market infrastructure moves further in the direction of centralised processing of trades and post-trade events. First, providers of essential post-trade services for OTC derivatives should allow open access to their services and should aim to achieve convenient and efficient connectivity with other systems. Second, central banks and supervisors will need to consider whether certain existing standards for securities settlement systems, CCPs or systemically important payment systems should be applied to providers of clearing and settlement services for OTC derivatives that are not already subject to those standards.

... and makes proposals for further progress

In March 2007, an update was issued of the *Statistics on payment and settlement systems in selected countries – Figures for 2005*. The preliminary version, published in November 2006, did not include some data for 2005 that were not available at the time.

[3] Some of these issues were also described in *Toward greater financial stability: a private sector perspective* (July 2005), the report of the Counterparty Risk Management Policy Group II (CRMPG II), a private sector group chaired by E Gerald Corrigan.