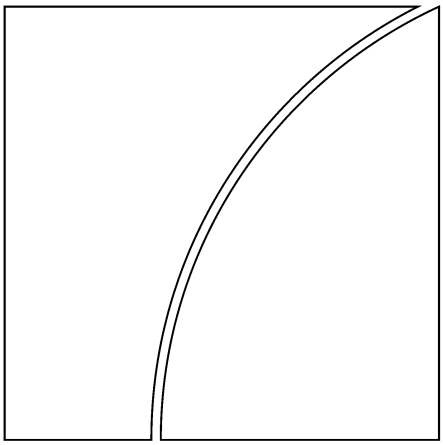
BANK FOR INTERNATIONAL SETTLEMENTS

BIS Quarterly Review

December 2002



International banking and financial market developments

BIS Quarterly Review
Monetary and Economic Department

Editorial Committee:

Joseph Bisignano	Robert McCauley	Paul Van den Bergh
Claudio Borio	Eli Remolona	William White
Renato Filosa	Philip Turner	

General queries concerning this commentary should be addressed to Eli Remolona (tel +41 61 280 8414, e-mail: eli.remolona@bis.org), queries concerning specific parts to the authors, whose details appear at the head of each section, and queries concerning the statistics to Rainer Widera (tel +41 61 280 8425, e-mail: rainer.widera@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).

© *Bank for International Settlements 2002. All rights reserved. Brief excerpts may be reproduced or translated provided the source is cited.*

ISSN 1683-0121 (print)

ISSN 1683-013X (online)

Also published in French, German and Italian.

BIS Quarterly Review

December 2002

International banking and financial market developments

1. Overview: expectant markets stage a recovery 1
   - *Stock market investors find hope in earnings numbers* 1
   - *Tokyo market assesses bank and corporate reforms* 4
   - *Box: Japanese bank reform: bold ideas tempered* 5
   - *Fixed income markets take heart from equity markets* 7
   - *Risks in corporate bond market heightened by underfunded pensions* 9
   - *Box: Underfunded pension plans and corporate earnings* 11
   - *Political developments overshadow emerging markets* 12

2. The international banking market 15
   - *Activity stabilises after several quarters of declines* 16
   - *Cross-border activity of Japanese and German banks* 18
   - *Shift in the sectoral composition of claims towards non-banks* 20
   - *Banks cut back claims on emerging markets with heavy public debt burdens* 21
   - *Box: International syndicated credits in the third quarter of 2002* 26

3. The international debt securities market 27
   - *Private sector issuance falls sharply* 28
   - *Credit conditions remain stringent during the third quarter* 31
   - *Emerging market borrowing declines* 32

4. Derivatives markets 35
   - *Buoyancy of European exchange-traded interest rate products* 36
   - *Stock index contracts active as volatility reaches new highs* 38
   - *Acceleration of OTC market activity in the first half of 2002* 39
   - *Market growth driven mainly by interest rate instruments* 39
   - *Buoyancy of the dollar interest rate swap market* 40
   - *Surge in currency options* 42
   - *Rise in gross market values* 42

Special features

Assessing the risk of banking crises 43
Claudio Borio and Philip Lowe
   - *The origin of banking crises* 43
   - *Empirical evidence* 45
   - *Conclusion* 52

Settlement risk in foreign exchange markets and CLS Bank 55
Gabriele Galati
   - *Introduction* 55
   - *Herstatt* 55
   - *Settlement risk* 56
   - *Initiatives to reduce settlement risk* 59
   - *CLS Bank* 60
   - *Conclusions* 64

Interest rate risk and bank net interest margins 67
William B English
Assessing interest rate risk 68
Box: Sources of interest rate risk 69
International evidence on the effect of market interest rates on bank net interest margins 70
Conclusions and caveats 77
Box: Data and measurement issues 80

Integrating the finances of East Asia 83
Robert N McCauley, San-Sau Fung and Blaise Gadanecz
Demand for international bonds of East Asian issuers 83
Syndication of loans for East Asian borrowers 87
Conclusion 91
Box: Asian buyers' share of bonds issued by Asian borrowers 92
Box: Asian banks' share of syndicated loans arranged by Asian borrowers 93

Recent initiatives by Basel-based committees and the Financial Stability Forum 97

Basel Committee on Banking Supervision (BCBS) 97
Committee on Payment and Settlement Systems (CPSS) 99
Financial Stability Forum (FSF) 99

Statistical Annex A1

Special features in the BIS Quarterly Review B1

List of recent BIS publications B2

Notations used in this Review

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

Differences in totals are due to rounding

Eli M Remolona

+41 61 280 8414
eli.remolona@bis.org

1. Overview: expectant markets stage a recovery

A revival of confidence ended six months of deepening pessimism in financial markets. The period from May to September 2002 had been marked by a series of blows to investor confidence. As a consequence, stock prices had tumbled and long-term interest rates had steadily declined. In October, a few favourable corporate earnings reports seemed enough to turn investor sentiment around. Over seven weeks in October and November, stock prices began to recover and long rates to rise. However, negative profit warnings continued to outnumber positive ones, and macroeconomic data initially tended to be weak. Whether the market recovery is sustained remains to be seen.

Investors in the corporate bond markets shared some of the new optimism prevailing in stock markets. Corporate spreads narrowed significantly in October and November, reversing part of the widening that had taken place as equity markets were falling. However, perceived credit risks in some sectors remained high. In particular, underfunded pension liabilities in the automobile and airline industries led to credit rating downgrades for some companies, including the finance company subsidiaries of US car manufacturers. During the third quarter, when corporate spreads were especially wide, net issuance of fixed rate securities fell by two fifths, a decline not seen since the immediate aftermath of the Russian crisis in 1998.

Political developments overshadowed the emerging markets. In Brazil, it became clear in October that the next president would be a candidate whose previous views had been a source of concern to investors. However, his assurances about a commitment to sound economic policy seemed to restore a degree of confidence to the sovereign debt market. In Asia, the terrorist attack in Bali in October depressed the Jakarta stock market and had momentary effects on the Bangkok and Kuala Lumpur markets. There were no discernible effects elsewhere. While financial inflows remained sluggish for emerging economies as a group, the stronger credits maintained access to capital markets.

Stock market investors find hope in earnings numbers

October appeared to mark a turning point in US and European equity markets. Stock prices had been on a downward course since May, interrupted only by a five-week rally in late July and part of August. The slide had been caused by a

series of events that had increasingly undermined investor confidence, including global political tensions, the financial restatement by WorldCom and worsening corporate earnings reports. September had been the worst month of the year for these markets, with the S&P 500 falling by 11% during the month and the DJ EURO STOXX by 18% (Graph 1.1). The mood, however, seemed to change by the second week of October, with the markets rallying over the next seven weeks. Between 10 October and 22 November, the S&P 500 rose by 16% and the DJ EURO STOXX by 18%. While the market had also rebounded in late July and the first three weeks in August, that episode had appeared to reflect a one-off sigh of relief that serious corporate governance problems were not as widespread as had been feared. Compared with the July–August rebound, the recent rally was more broadly based and evidently driven by expectations of corporate earnings growth.

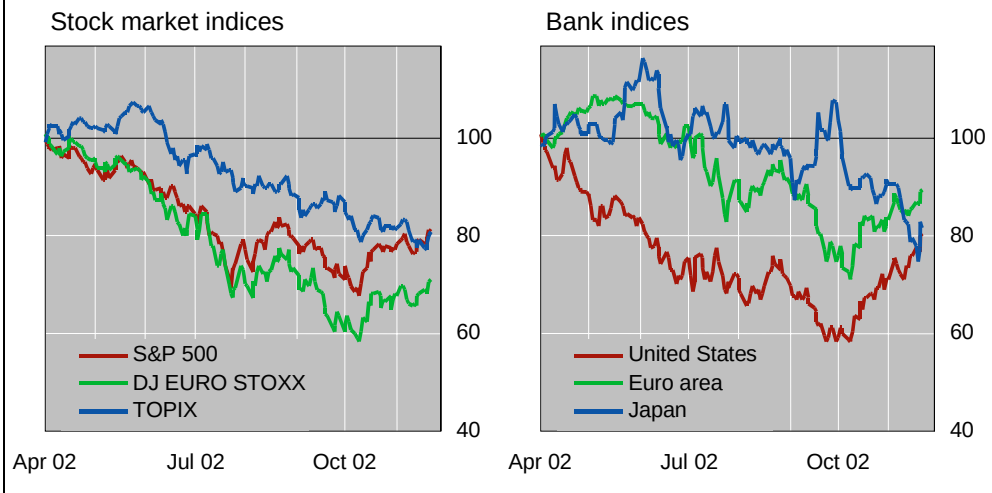
The mood changes in October ...

Investor sentiment seemed to turn on earnings reports from just a few bellwether companies. On 11 October, a strong profit report from GE and a favourable analyst report for IBM were enough to trigger a wave of buying. The S&P 500 rose by 4.3% and the Nasdaq Composite by 6.2% during the week, ending a six-week losing streak. The rally was extended the following week by earnings reports from a few major banks. The European markets tracked the US markets closely in spite of large loan loss provisions by German banks and further indications of asset quality problems among insurance companies. This positive overall sentiment took hold despite the fact that, on aggregate, negative profit warnings continued to outnumber positive ones, although the gap appeared to be narrowing (Graph 1.2). While macroeconomic data initially tended to be weaker than expected, the optimism of investors seemed to be validated by a strong retail sales figure on 14 November, which suggested that the US consumer was still willing to spend. The rebound in October was reportedly also supported by an effort to cover short positions in the market,

... despite more negative profit warnings than positive ones

Equity markets

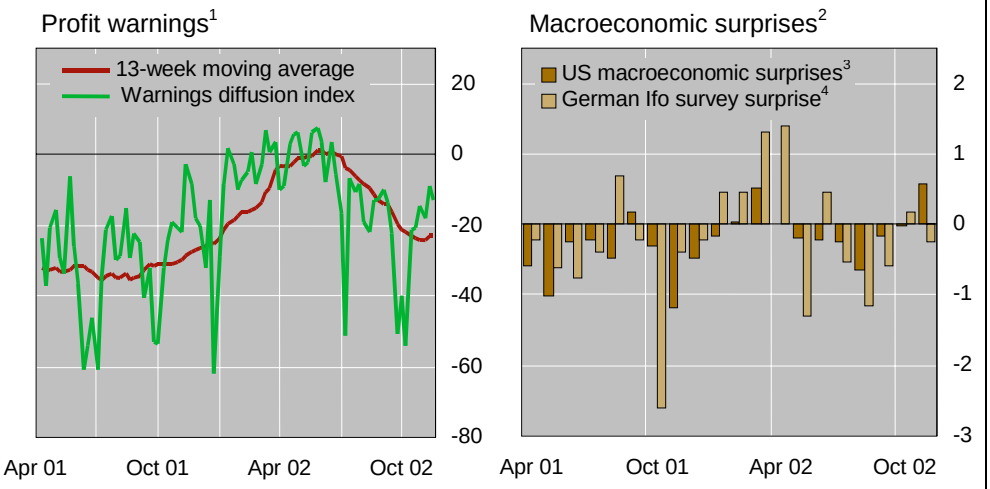
End-March 2002 = 100



Source: Datastream.

Graph 1.1

Closely watched public information



[1] Number of positive minus negative warnings as a percentage of number of positive plus negative warnings. [2] Normalised announcement surprises (with zero means and unit variances), based on the difference between released numbers and consensus forecasts. [3] Weighted sum of normalised surprises of ISM survey, non-farm payroll, retail sales, producer price and consumer price announcements. [4] The German Ifo survey is a business climate index derived by the Institut für Wirtschaftsforschung from survey responses.

Sources: Bloomberg; BIS calculations. Graph 1.2

which were said to have built up to unusually high levels. Such covering may have exaggerated the price responses to good news.

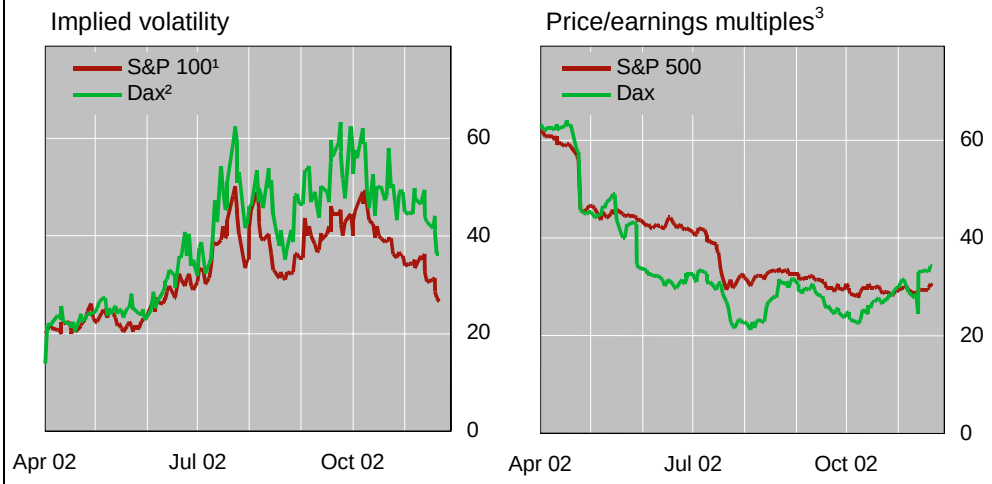
Bank stocks are market movers

Significantly, bank stocks in both Europe and the United States led the market recovery, while technology and telecoms stocks continued to contribute to the markets' volatility. The importance of bank stocks as market movers in recent months has been unusual. When markets were sinking in September, bank stocks were among those worst hit, with US bank stocks plunging by 18% and those of European banks by 19%. European banks were particularly affected by losses from credit risk as well as poor performance by insurance subsidiaries. During the seven-week rally starting on 10 October, US bank stocks rose by 31% while those of European banks rose by 21%. The recovery of these stocks was especially significant because it mitigated the risk of a credit crunch, in which banks might have become reluctant to lend as a consequence of pressures in capital markets.

Only one in seven economists predicts the Fed move

The US Federal Open Market Committee (FOMC) appeared to take advantage of the equity markets' momentum to enhance the effectiveness of a policy rate cut. On 6 November, the FOMC announced a surprisingly aggressive 50 basis point cut in the target federal funds rate. Out of 138 economists in a Bloomberg survey the day before, only 20 had predicted the 50 basis point cut. After some initial hesitation, investors in the stock market responded positively, with the S&P 500 rising by 1% by the end of the day. The FOMC had taken similar action on 18 April 2001, two weeks into a stock market rally. That move had taken place outside a scheduled meeting and had thus caught market participants by surprise, producing an 8% lift in the Nasdaq Composite that day. The day after the latest Fed policy rate cut, the ECB and

Volatility and valuations



[1] Based on implied volatility of S&P 100 (VIX) options. [2] Based on implied volatility of index call options. [3] Based on trailing earnings.

Sources: Chicago Board Options Exchange; Bloomberg. Graph 1.3

the Bank of England opted not to follow suit. The selling by disappointed investors led to market declines of 1% in Europe that day.

The market rallies in October and November kept equity valuations above historical norms. By mid-November, price/earnings multiples based on trailing earnings were 29 for the S&P 500 and 33 for the Dax (Graph 1.3), compared with a historical US average of 15. At the same time, volatilities implied by options on market indices remained unusually high, suggesting that equity risk premia were correspondingly substantial. If such risk premia were indeed high, their effect would be to depress equity prices, and they would thus not be the reason why valuations were so elevated. These valuations rather seemed to stem from robust forecasts of earnings growth. Indeed, when calculated on the basis of analysts' earnings estimates, the resulting price/earnings multiples are much closer to historical norms. The question then is whether these earnings forecasts are reasonable. Based on a simple BIS model that relies on yield curves to forecast corporate earnings for the US market as a whole, the consensus analysts' estimates in November seemed optimistic, although not nearly as optimistic as they had been in August.

Are earnings forecasts reasonable?

Tokyo market assesses bank and corporate reforms

In Japan, the stock market was driven by conflicting signals about the prospects for long-awaited financial reforms. In interpreting these signals, markets vacillated between two possible reform scenarios with rather different implications for stock investors. In a generous scenario, the government would inject capital into ailing banks in a way that would benefit shareholders, while introducing measures to ensure that capital ratios did not fall below the required 8%. In the alternative "hard landing" scenario, more stringent measures would drive down capital ratios (see box on page 5) and ultimately

The market vacillates between two reform scenarios

Japanese bank reform: bold ideas tempered

Patrick McGuire

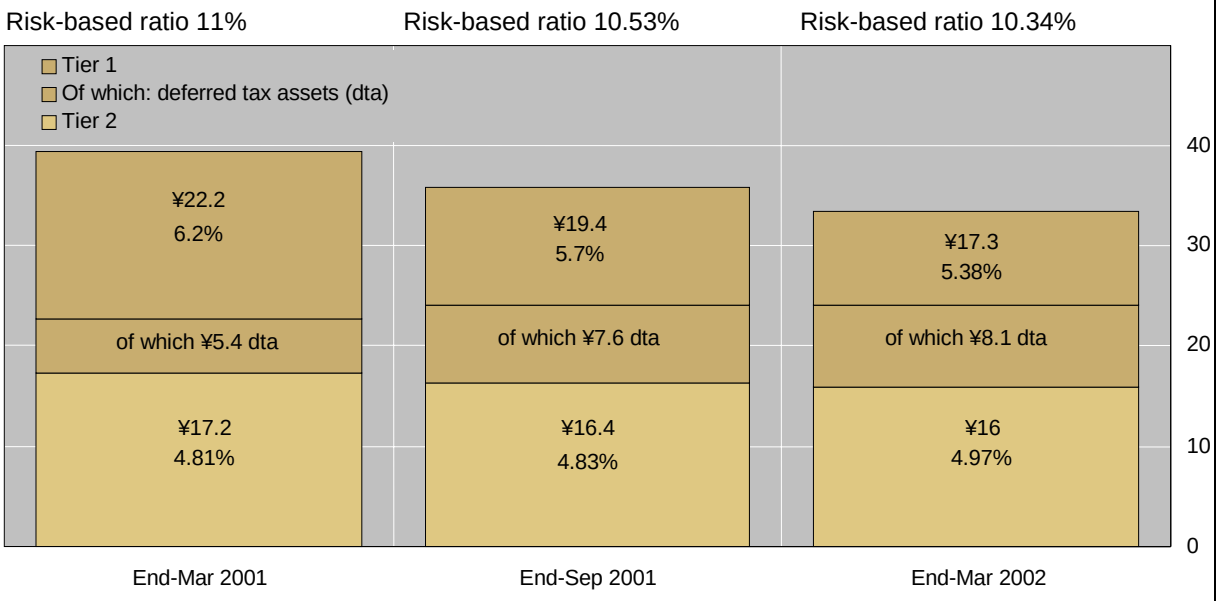
Market participants saw the appointment of a new head of the Financial Services Agency (FSA) as a bold move by the Japanese government, suggesting that the political constraints on financial reform policy were loosening. Headed by a long-time advocate of aggressive measures, the FSA immediately assembled a task force to propose a reform package. However, as the 22 October disclosure date drew near, and elements of the task force proposals were widely discussed in the press, a political backlash erupted that led to certain compromises. Whether these will ultimately prove a significant setback to the reform process remains to be seen.

Strong reform proposals

The impetus for bank reform presumably arises from a need to channel financial resources to productive companies. The non-performing loan (NPL) problem is considered to be the main obstacle to meeting this need. Japanese banks carry on their books an officially estimated ¥47 trillion in NPLs, roughly 8% of GDP, although some economists put the figure at double this amount. Rather than cut off unhealthy companies that are unable to repay previous loans, banks have been extending them new credit to avoid recognising the losses. The initial task force proposals, as reported in the press, were primarily aimed at forcing banks to recognise these losses in calculating their own capital bases, and thus foster a more efficient distribution of economic resources.

Arguably the most contentious element of the task force proposals involved limits to be placed on the use of deferred tax assets in core capital. Banks set aside reserves to offset potentially bad loans, but the reduction in taxable income occurs only when the borrower becomes insolvent. Currently, the expected future reduction in taxable income (over a five-year horizon) can be recognised in the profit and loss account as an expected refund. This can be included in core capital, and allows banks to significantly boost their measured capital adequacy ratios. Major Japanese banks recorded ¥8.1 trillion in deferred tax assets at end-March 2002, constituting approximately 47% of Tier 1 capital (see graph). However, the calculation of these assets assumes that there will be a future stream of taxable income from which the deferred assets can be deducted. Doubts over projections of such future income are presumably the reason why the task force intended to cap the deferred tax contribution at 10% and to reduce the calculation horizon from five years to one.

Components of bank capital for city, long-term credit and trust banks



Note: All levels in trillions of Japanese yen. Percentage figures indicate the ratio to risk-adjusted assets.

Source: Bank of Japan.

The plan also called for banks to value loans using discounted cash flow accounting. Incorporating the likelihood of future interest and principal repayments would force banks to value credit risk, and thus lead to greater loan loss provisioning. Related to this, the plan also called for a strengthening of the loan classification system. Currently, banks regularly classify loans to troubled or failing companies as healthy, or as "loans to borrowers needing attention". In fact, an estimated 70% of bankrupt companies had their loans placed in one of these categories a year before they failed. Under the proposed plan, such loans would be strictly classified as non-performing, which would further increase the need for banks to provision against loan losses.

Finally, the task force suggested converting preferred bank shares owned by the state (a result of previous capital injections) to common stock, thereby giving the government voting rights in Japanese banks. The task force also left open the possibility of future capital injections to under-capitalised banks, a reversal of the policy pursued by the previous head of the FSA.

Resistance from affected participants

Facing strong resistance from both corporate and political circles, the FSA had to delay the release of its reform plan. In particular, there was widespread concern expressed that implementation would push many banks below the required 8% capital ratio, and possibly lead to a reduction in loan growth and a rise in unemployment. Moreover, a number of private sector economists argued that banks would react rationally to the 10% cap on deferred tax assets, leading to similar effects. Rather than call in loans from companies unable to pay (forcing banks to recognise the losses), banks would cut loans to healthy companies, resulting in a reduction of economic activity. Members of the ruling Liberal Democratic Party feared the FSA proposals would lead to a "hard landing" without a corresponding government stimulus plan to soften the blow. It was also recognised that the resulting corporate bankruptcies would probably include construction firms, which traditionally have had strong ties with the government.

Compromise plan emerges

What ultimately emerged from the NPL task force on 30 October was a compromise. All the major reform initiatives mentioned above were individually discussed in the official press release from the FSA. However, they were couched in terms of strong suggestions, while hard numbers and implementation dates were often absent.

The plan calls for a halving of bad loans by March 2005, and outlines a potentially stronger role for the Resolution and Collection Corporation (RCC). However, on the issue of NPL disposal via the RCC, the press release noted, "financial measures will be examined, where necessary". In addition, it included a strong statement concerning the issue of deferred tax assets. First noting that "... the FSA will strictly evaluate the treatment of deferred tax assets ... and promptly examine also the upper limit ...," the press release then described a verification procedure whereby "... the FSA will request external auditors to rigorously audit deferred tax assets, and strictly check whether such assets ... are adequately booked on the occasion of inspections". However, the immediate cap on the use of such tax assets for capital purposes was absent, as was a clear timetable for implementation.

There is also to be a further tightening of loan classification and provisioning standards, with concrete methods for shifting to discounted cash flow accounting to be examined "as soon as possible". A scheme to promote the rigorous assessment of collateral, as well as a requirement that managers sign off on the accuracy of financial statements, is also under consideration. In addition, with regard to the conversion of preferred stocks, the "... FSA will improve the operational guidelines as quickly as possible aiming at converting them when they meet such conditions as advent of due date and significant deterioration of business conditions".

What is not clear at this point is whether the absence of firm deadlines will lead to material delays in the implementation of the plan. The 10 November release by the FSA of a revised bad loan figure that is 36% larger than the banks' previous assessment suggests that the political battle continues, and that more drastic reform may be forthcoming. Consistent with this, the FSA released a timetable on 29 November that called for a discussion of the limits on deferred tax assets to start within one month. It also announced that a decision on the use of discounted cash flow accounting will be made by the end of the fiscal year. Much depends on the discretionary powers now in the hands of the FSA and how aggressively they are applied in the future.

lead to a capital injection that involved replacing bank management with direct government control. Existing shareholders would lose the remaining value of their shares. Moreover, large companies owing non-performing loans (NPLs) would be allowed to go bankrupt and their equity investors would lose the remaining option value of their shares.

First a positive reaction ...

The reactions of investors in the Tokyo market in September and October hinged on which scenario seemed more likely at the time. The initial positive market reaction came on 18 September, when the Bank of Japan announced its intention to purchase corporate equities from commercial banks. The announcement seemed to fuel expectations of the generous scenario, and the Nikkei 225 rose by 2% that day. Market participants had the opposite reaction on 30 September, when an advocate of bold reforms was appointed as minister for financial services. The appointment seemed to generate fears of the "hard landing" scenario, and investors sold bank stocks as well as stocks of companies suspected to account for a significant share of non-performing loans. Over the ensuing 10 days, the Nikkei 225 fell by 11% to a 20-year low.

... then a negative one

Fixed income markets take heart from equity markets

The period from March to September 2002 was a time of eroding confidence in fixed income markets. Investors in the United States, Europe and Japan responded to a stream of weak macroeconomic data by moving to the long end of the yield curve. With short-term rates anchored to policy rates, the resulting decline in long-term rates caused the curves to flatten (Graph 1.4). This tempering of optimism – as represented by increasingly flat curves – continued even during the equity market rally in late July and August.

Yield curves remain relatively steep

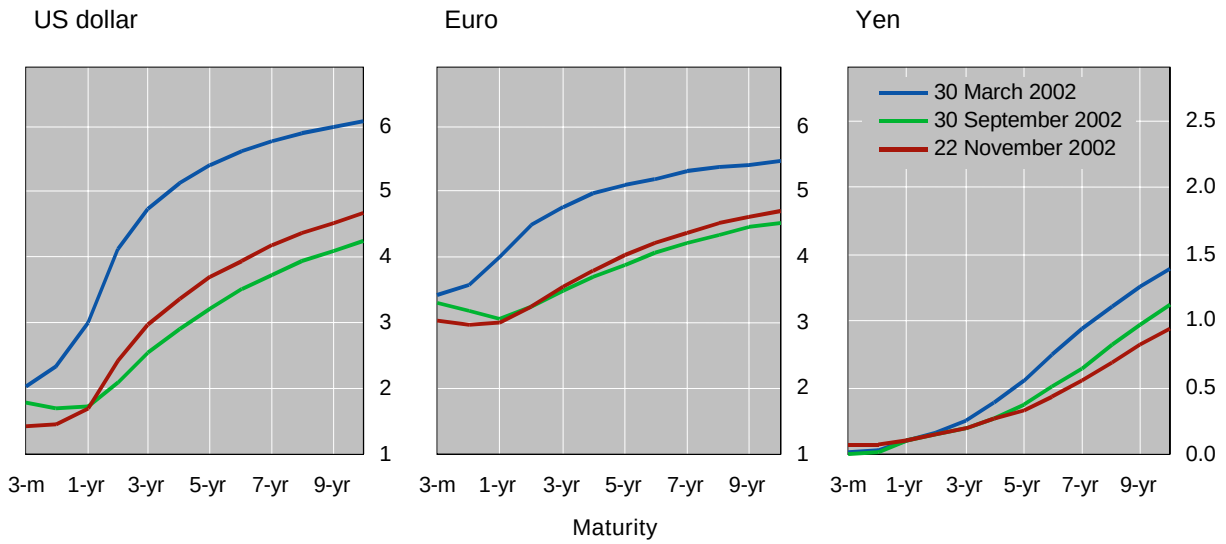
Even while yield curves in Europe and the United States were becoming flatter, they continued to indicate a degree of optimism about the global economy. The US swaps curve, in particular, remained steep relative to its average slope in previous years, suggesting continued expectations of strong growth in the United States. The slopes were especially steep in March 2002, when the difference between the 10-year swap yield and 90-day Libor was close to 400 basis points in the US dollar market and 200 basis points in the euro market (Graph 1.4). Based on historical experience, such steep curves would suggest that investors expected a growth rate of nearly 6% for the US economy over the next four quarters and over 2% for the euro area over the same period. Thereafter, the US curve flattened considerably more than the euro curve. At the end of September, both curves also displayed negative slopes at the short end, indicating near-term expectations of monetary easing.

Fixed income investors also regain confidence

In October, investors in fixed income markets in Europe and the United States started to demonstrate renewed confidence in the strength of the global economy. Unlike in July and August, these investors now seemed to shrug off recent macroeconomic data and to join their counterparts in equity markets in responding to a few favourable corporate earnings reports. Yield curves began to steepen significantly. The 50 basis point cut in the US policy rate on 6 November not only lowered the short end of the curve but also led to a

Yield curves for interest rate swaps

In percentages



Note: For three-month, six-month and 12-month, Libor rates.

Source: Bloomberg.

Graph 1.4

further rise at the long end. Between 10 October and 22 November, the spread between the 10-year swap rate and 90-day Libor widened by 68 basis points in the US dollar market and by 24 basis points in the euro market. The slopes of these curves in mid-November implied four-quarter growth expectations of close to 5% for the US economy and nearly 2% for the euro area. The last time the US economy grew so strongly was during the last three quarters of 1982 and the first quarter of 1983, when the economy expanded by 8.3%. This increased optimism, however, did not seem to extend to the Japanese economy, where long rates continued to decline and the curve to flatten.

In Japan, bond yields sometimes rise as equity prices fall

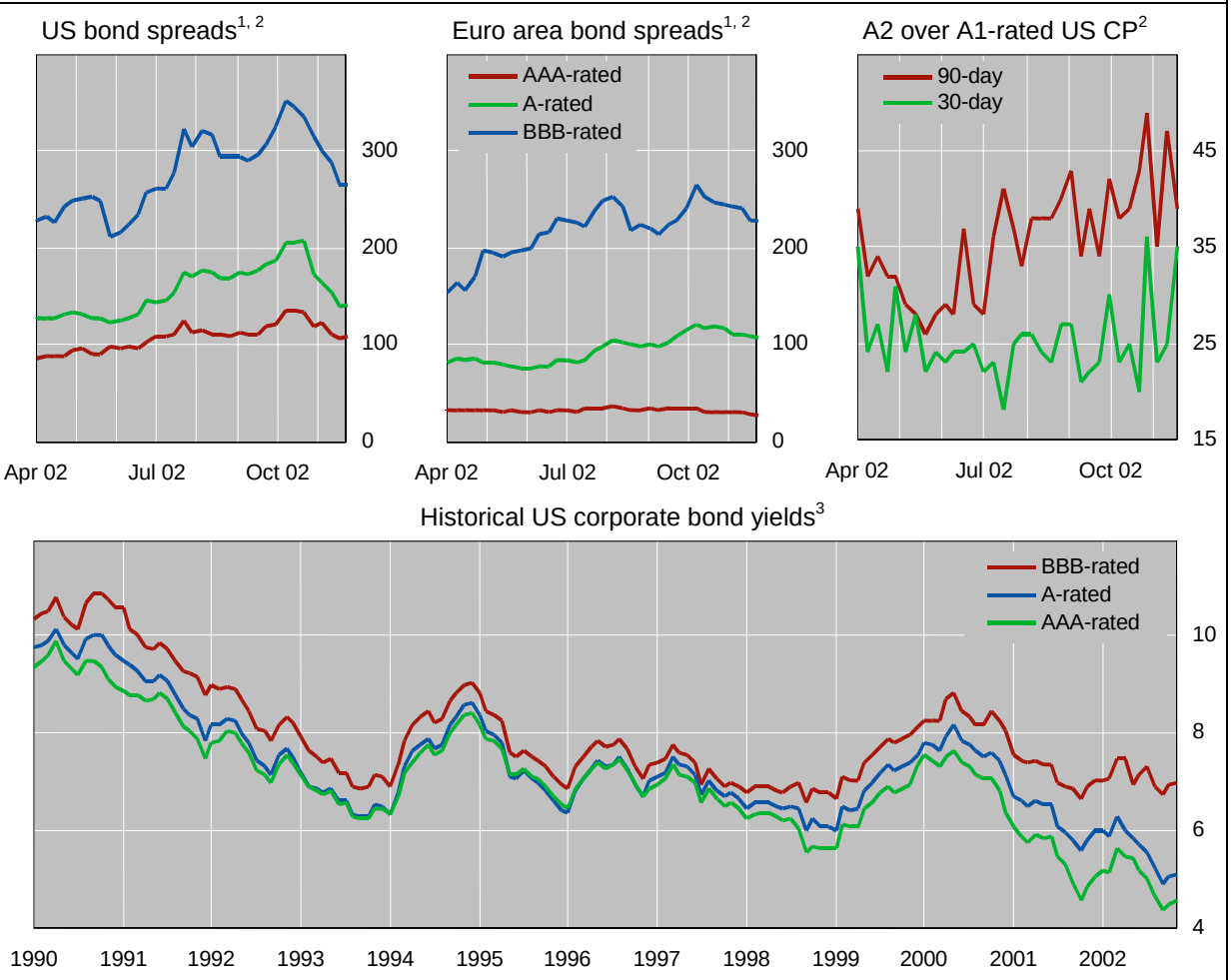
In Japan, while bond yields tended to decline, there were occasions in September and October when such yields rose and thus diverged from equity price movements. This phenomenon took place on days immediately following announcements related to financial reform policy. This divergence appeared to arise from the expected effects of the changing fiscal implications of banking reform on the supply of government bonds. On 2 October, the new minister for financial services chose a fellow advocate of bold reforms to lead the NPL task force. This appointment pushed up bond yields, even as equities fell. The expectation was apparently that a significant capital injection into the banking sector was now likely, and would ultimately be financed with government bonds. Five days later, bond yields and equity prices moved even further apart after the financial services minister said, “No bank is too big to fail”. Both events seemed to lead investors to conclude that the government would be forced to break its promise to keep new JGB issues under ¥30 trillion this year. Bond yields and equities diverged once again on 21 October, when it was announced that the FSA task force’s reform plan would be delayed. This delay was initially interpreted as signalling a hard landing approach.

Risks in corporate bond market heightened by underfunded pensions

Corporate spreads narrow ...

Investors in the corporate bond markets shared the new optimism prevailing in the stock markets. Starting in May, credit spreads on corporate bonds had tended to move in association with equity prices. When the S&P 500 had fallen by 25% from May to September, the average spread of seven- to 10-year triple-B US corporate bonds over corresponding Treasuries had widened by about 70 basis points. When stock markets recovered in October, the link to the corporate bond market remained in place. Thus, when the stock market index rose by 16% from 10 October to 22 November, the triple-B spread narrowed by about 85 basis points. The effect on the euro area corporate bond market was similar, albeit less pronounced. The 18% rise in the DJ EURO STOXX was accompanied by a 25 basis point narrowing of the triple-B spread in Europe. Such a narrowing of spreads was especially welcome to borrowers because it came at a time when the US commercial paper market remained inhospitable to low-rated corporate borrowers (Graph 1.5).

Corporate bond and CP spreads



[1] Option-adjusted spreads as calculated by Merrill Lynch for corporate bond indices with seven- to 10-year maturity. [2] End-week data, in basis points. [3] Monthly data, in percentages.

Sources: Bloomberg; Merrill Lynch; national data; BIS calculations. Graph 1.5

... as equity prices rises

The negative correlation between corporate bond spreads and equity prices in 2002 was particularly striking because it was so sustained. While such a correlation had been observed when stock prices had started to fall in 2000, the relationship had not continued beyond a few months. The link between prices in the two markets seems to have become more robust more recently. Anecdotal evidence suggests that hedge funds and insurance companies have recently started to follow dynamic hedging strategies that involve taking short positions in the stocks of companies to which they have credit exposures. These exposures can arise from investments in corporate bonds or from selling protection through credit default swaps. These hedging strategies may have strengthened the link between equity and corporate bond prices by introducing feedback from corporate spreads to stock returns.

Credit exposures hedged with equity

Notwithstanding the general improvement in borrowing conditions, the ability of some companies to raise funds was hindered by growing recognition of a new risk factor: underfunded pension liabilities. The decline of stock prices since 2000 inflicted heavy losses on corporate pension plans that had allocated large portions of their portfolios to equity investments (see the box on page 11). The resulting funding shortfall in pension plans was particularly serious for automobile companies, airlines and telecoms firms. In the United States, a significant degree of smoothing allowed in the accounting treatment of such shortfalls may have delayed the recognition of this problem. To gauge the extent of the problem, Standard & Poor's carried out a special survey in June of the companies in the S&P 500 Index. In October, the rating agency downgraded the debt ratings of two major US car manufacturing firms, including their finance company subsidiaries, at least in part because of the size of the shortfall in their pension plans. The downgrades were particularly onerous for the finance companies. They depended heavily on funds from the capital markets and previous downgrades had already led to their being denied access to the commercial paper market.

Underfunded pension plans affect credit ratings

The impact of credit spreads on corporate fund-raising was particularly evident during the third quarter. Net issuance of international straight fixed rate debt fell by 42% from the second to the third quarter, the largest proportionate decline since the Russian crisis in 1998. In particular, financial institutions in the United States, France and Spain sharply reduced the net amount of funds they raised in the international debt securities market. Large US finance companies, for example, reduced their borrowing activity by two thirds. Coming at a time when corporate spreads were especially wide, the reduction in borrowing seemed to be at least partly attributable to a tighter supply of funds. The corporate bond market had been the most significant bright spot in capital markets in 2001 and now seems to have been the last to tighten.

Underfunded pension plans and corporate earnings

Jacob Gyntelberg

Recent declines in equity prices have given rise to concerns about the effects on pension plans and the consequences for corporate earnings. For many defined benefit plans, the fall in equity prices has resulted in underfunding, in which the market value of pension assets has dropped below the value of actuarially calculated liabilities. Unlike defined *contribution* plans, defined *benefit* (DB) plans are supposed to guarantee the specified future values of benefits, thus fixing the plans' liabilities and creating the problem of funding these liabilities. Adding to the concerns, complex accounting standards often obscure the link between the pension plan funding status and corporate earnings. This box discusses these concerns for the United Kingdom, the United States and the Netherlands, chosen primarily because corporate DB pension plans constitute a significant part of their pension systems. Moreover, some comparable information is available for these countries, although cross-country comparisons remain complicated by substantial variation in accounting standards.

The extent of underfunding

The current underfunding levels are mainly the result of declines in asset prices. In the last decade, corporate sponsors of DB pension plans in the three countries changed their portfolio strategies to invest increasingly large sums in equities. Using such a strategy, the sponsors hoped to exploit a perceived high equity risk premium. By the end of 2001, UK funds had an average equity allocation of around 70%, US funds 60% and Dutch funds 40%. On the liabilities side, the main difference between funds in the three countries is the discount factor used when calculating the present value of liabilities. These range between 3.5% and 7.5%, with the higher figure being used in the United States (implying a lower estimated value of the liabilities) and the lower figure in the Netherlands. In the United States and the United Kingdom, discount rates are linked to interest rates, while this is not the case in the Netherlands.

As a consequence, companies in the United Kingdom now face some of the more significant underfunding problems. Estimates imply a shortfall of around £70 billion, corresponding to around 7% of GDP or 10% of pension fund assets, with 90% of pension funds being underfunded.

For US companies, there was apparently no aggregate underfunding problem at the end of 2001. Lacking sufficient information from financial statements to gauge the extent of potential problems, Standard & Poor's conducted a special survey. The survey found that the overall funding ratio declined from 100% to 94% over the first six months of 2002. There was also a significant increase in the number of pension funds with low funding ratios. At the end of June 2002, underfunding was estimated at $65 billion for surveyed companies covering two thirds of total assets held in DB pension plans. This implies a shortfall of around $100 billion for US companies as a whole, corresponding to around 1% of GDP or some 6% of total DB pension plan assets. Importantly, the problem is concentrated in 10 companies which account for 57% of total underfunding. Six of these companies belong to either the automobile or airline sectors, both tending to have large, mature, DB plans.

For Dutch corporate pension funds, it is estimated that the overall funding level will be around 112% at the end of 2002. However, approximately a third of the pension funds are underfunded. The estimated shortfall for underfunded funds is approximately €23 billion, corresponding to around 5% of GDP or about 5% of total pension fund assets.

Effect on reported earnings and credit ratings

The effect of pension fund performance on reported corporate earnings depends on the way the pension fund is consolidated into corporate accounts. In the case of full consolidation and mark to market accounting by the pension fund, any fluctuation in the funding ratio would translate immediately into the earnings of the sponsor company. None of the three countries above practice such full consolidation and mark to market accounting. In general, UK and Dutch companies do not fully consolidate pension plans in their corporate accounts, and provide limited public information on their pension funds. These practices make an assessment of the earnings impact difficult. However,

companies that make cash contributions to increase the funding level of their pension plans, often in response to regulatory requirements, will report lower earnings. Due to the limited data availability for UK and Dutch companies, we restrict our attention below to the earnings impact for US companies.

In the United States, the link between corporate earnings and pension underfunding is obscured by the method used when consolidating the pension fund into the income statement. This consolidation is accomplished by amortising over several years the difference between assumed and realised returns, taking into account changes in the present value of liabilities. Assumed returns are calculated using an expected rate of return, typically around 9–10%, together with an up to five-year average of past asset values. In situations like the present, a period following significant declines in equity prices, the consequence of this type of smoothing is to overvalue the assets compared to a mark to market valuation. This results in higher estimates of pension fund income than would otherwise be the case, and hence delays the recognition of the funding shortfall in reported corporate earnings. Over time, however, the smoothed value of pension fund assets will come more into line with the decline in equity prices and will gradually reduce reported earnings from the pension fund. If the assumed rate of return used to calculate earnings from pension fund assets were lowered, this would reduce reported earnings from the pension fund. In addition, companies with severely underfunded pension plans are required by regulations to make cash contributions to the pension fund, with an immediate negative impact on reported earnings.

Standard & Poor's calculates that in the year ending June 2002, for companies in the S&P 500 Index, pension funds on average contributed $6.54 per share, or close to 25% of earnings. Contributions were particularly high for the industrial and telecoms sectors. Earnings data also indicate significant variations between sectors. On average, there has actually been a positive contribution to reported earnings for these companies from their pension funds, despite negative actual returns on pension fund assets.

An underfunded pension plan effectively raises a company's liabilities and hence its leverage. This may potentially affect its creditworthiness and increase its funding costs. Indeed, in October Standard & Poor's lowered the long-term debt ratings on both Ford and General Motors (GM) and their finance company subsidiaries. For GM, the primary reason given was the poor return on the pension fund, and the fact that this compounded a substantial increase in an already large, underfunded pension liability. For Ford, the main reason given was concern about the adequacy of the ongoing restructuring of the company.

Political developments overshadow emerging markets

Investors in emerging markets were swayed less by prospective corporate earnings than by political developments. Presidential elections in Brazil and Turkey, accession discussions with the European Union and a terrorist attack in Southeast Asia figured prominently in investment decisions. Discussions in the international policy community about changes to the structure of the market for emerging market debt, such as the introduction of a formal mechanism for restructuring sovereign debt, were also reported by some market participants to have increased uncertainty, weighing on investor sentiment.

Developments in Brazil captured most of the attention. Investors first became concerned in May about the possibility that an advocate of policies inhospitable to investors would be elected president. Over the course of the next six months, the stripped spread on the Brazilian C bond widened by 890 basis points, and the Brazilian real lost 35% of its value in foreign exchange markets (Graph 1.6). In October, it became clear that the candidate would be elected. Nevertheless, following repeated assurances about his commitment to market-friendly policies, the sovereign debt spread narrowed by nearly 470 basis points, although the real stayed close to its September level. Even at the

A candidate's assurances help to the tune of 470 basis points

narrower spreads, however, the sustainability of the country's debt burden was not unquestioned. It remains to be seen whether more concrete evidence of good policies will improve investor sentiment to the point of placing the economy on a clearly sustainable path.

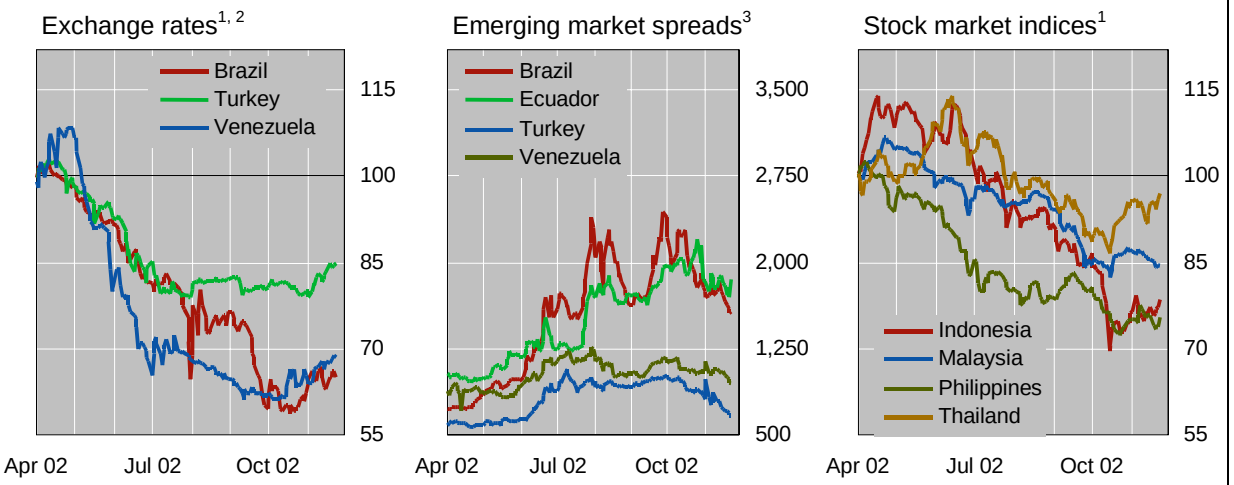
In other Latin American countries, uncertainty about the future direction of government policies also contributed to volatile market conditions. Concerns about certain candidates in Ecuador's presidential elections caused spreads on Ecuador's international bonds to track closely those on Brazil's. Venezuelan spreads were less affected by developments in Brazil, with investors focusing on the current president's prospects for remaining in office. In Argentina, the failure of the authorities to reach an agreement with the IMF on a new economic programme exacerbated the spillover from developments in Brazil.

A clear majority in Turkey also helps

In contrast to Brazil, the elections in Turkey did not unsettle investors. Before the election, the leading party committed itself to meeting the fiscal targets and reform measures set out in Turkey's programme with the IMF. The subsequent election of a party with a clear majority in parliament strengthened investors' confidence in the ability of the government to meet its commitments. Indeed, only a week after the election, in early November, the government took advantage of a narrowing in spreads to raise $500 million in the international bond market.

In Asia, the most dramatic development was the terrorist bombing in Bali on 12 October. The attack depressed the Jakarta stock market for a few weeks and briefly affected the Bangkok and Kuala Lumpur markets. The Jakarta market sank by 9% over the two trading days after the bombing, while the Bangkok market lost 1% and the Kuala Lumpur market 2% (Graph 1.6). Both the Bangkok and Kuala Lumpur markets, however, recovered their losses within four days. It took the Jakarta stock market until mid-November to return to pre-attack levels. There were no discernible effects in other Asian stock markets.

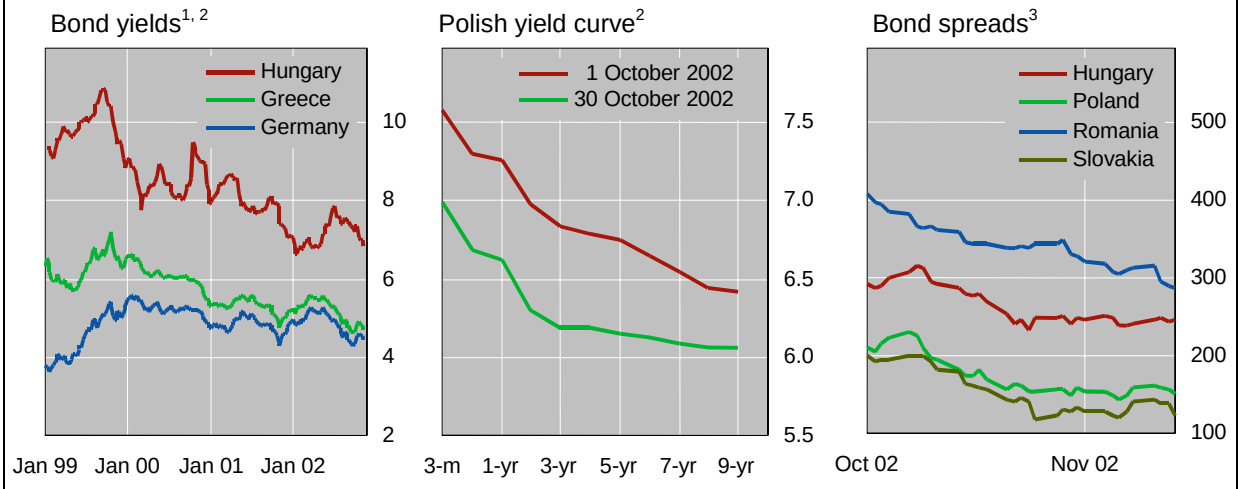
Emerging markets



[1] End-March 2002 = 100. [2] An increase represents an appreciation of the local currency against the US dollar. [3] In basis points; stripped spread of emerging market bond indices as calculated by JP Morgan Chase.

Sources: Bloomberg; Datastream; JP Morgan Chase; BIS calculations. Graph 1.6

Eastern European convergence



[1] Ten-year government bonds; weekly averages. [2] In percentages. [3] Ten-year government bond over 10-year German government bond; in basis points.

Source: Bloomberg. Graph 1.7

Political developments also affected financial markets in central and eastern Europe. The most significant events took place in October. On the 19th, Irish voters accepted the Nice Treaty. A week later, the Council of the European Union agreed at a special summit on a financial framework for EU enlargement involving the accession of 10 new member countries. With fixed income investors following convergence strategies, the yield on 10-year local currency Hungarian government bonds decreased by 30 basis points in the course of the month, while that on similar Polish bonds fell by 20 basis points (Graph 1.7). Indeed, in such accession countries, the whole yield curve tended to shift downwards. The capital flow into Hungary from convergence trading was apparently so strong that the forint appreciated against the euro. The decline in interest rates was also reflected in the bond spreads of countries such as Romania, which were seen as most likely to be in the second wave of EU enlargement. A similar pattern had been traced earlier by Greek bonds in anticipation of the adoption of the euro in that country. The yield differential for these bonds over German bonds had narrowed from 200 basis points in 1999 to less than 50 basis points at the beginning of 2002.

Convergence traders respond to Irish referendum

Although financing inflows remained sluggish for emerging economies as a group, the stronger credits among them maintained reasonable access to international debt markets. Even as net issuance of international debt securities by stronger borrowers slowed in the third quarter of 2002, they continued to arrange loans in the syndicated credit market. Mexican borrowers remained among the most active in the international bond and loan markets in the third quarter (see pages 32–33). Early in the fourth quarter, they even raised funds through a peso-denominated international bond issue.

Mexicans borrow abroad in pesos

Philip D Wooldridge

+41 61 280 8819
philip.wooldridge@bis.org

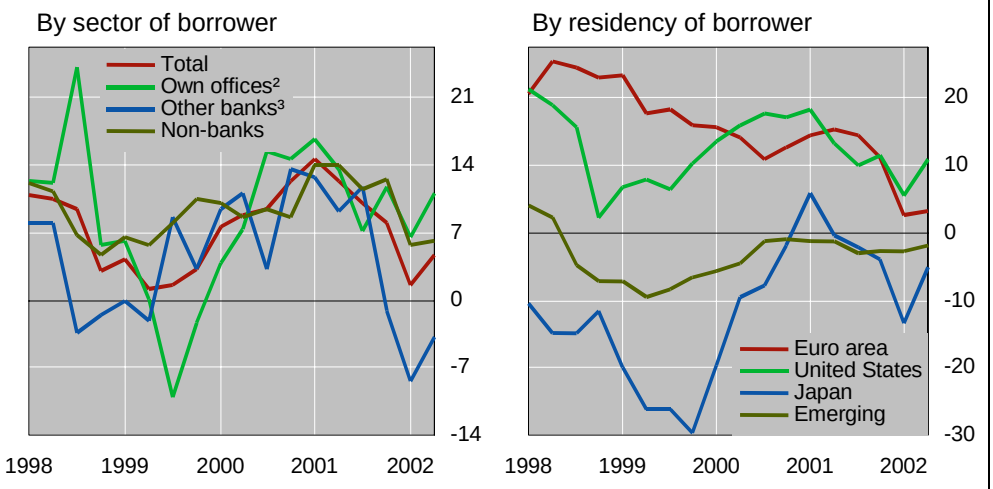
2. The international banking market

Following several quarters of decelerating growth, international banking activity began to stabilise in the second quarter of 2002. The retrenchment of Japanese banks and the fall-off in the growth of German banks' cross-border claims showed signs of settling down. The annual rate of increase in credit to governments and other non-bank borrowers was unchanged from the first quarter at 6%. The growth of credit to non-banks continued to outpace that of credit to banks, contributing to a shift in the sectoral composition of banks' international balance sheets towards non-banks.

In emerging markets, banks cut back their claims on Brazil and other countries with high public debt burdens. Faced with difficult financing conditions, residents of Brazil met their need for dollar liquidity by withdrawing funds from banks in the BIS reporting area. By contrast, cross-border claims on stronger credits such as Korea and Mexico increased, contributing to the third consecutive quarter of net inflows into emerging markets.

Cross-border claims of BIS reporting banks

Annual percentage changes[1]



[1] Calculated as the sum of exchange rate adjusted changes in amounts outstanding between periods *t*–3 and *t*, divided by the amount outstanding in period *t*–4. [2] Partly estimated. [3] Excluding claims on central banks and other official monetary authorities. Graph 2.1

Cross-border claims of BIS reporting banks

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

	2000	2001	2001			2002		Stocks at end-Jun 2002
	Year	Year	Q2	Q3	Q4	Q1	Q2	
Total claims	1,221.5	852.9	–95.7	–12.6	230.9	46.9	242.8	12,539.8
By instrument								
Loans and deposits	738.0	606.4	–105.1	–52.1	159.6	–8.6	101.4	9,382.5
Securities[2]	483.5	246.5	9.4	39.5	71.3	55.5	141.4	3,157.3
By currency								
US dollar	513.0	423.7	–5.2	13.3	184.5	48.2	190.4	5,475.4
Euro	455.6	439.3	8.2	46.5	–12.2	43.6	105.9	3,913.7
Japanese yen	94.6	–65.3	–14.9	–50.9	6.6	–81.5	5.1	703.7
Other[3]	158.3	55.2	107.6	–21.5	–52.0	36.6	–58.6	2,447.0
By sector of borrower								
Own offices[4]	523.0	451.4	–73.7	–22.8	350.0	3.9	80.0	4,339.4
Other banks[4, 5]	409.7	–40.6	–82.4	–3.3	–213.8	–0.3	83.8	3,925.3
Non-banks	288.8	442.1	60.4	13.5	94.7	43.3	79.0	4,275.1
By residency of borrower								
Advanced economies	1,126.4	799.6	–72.2	4.8	197.9	39.5	210.2	9,806.9
Euro area	389.0	368.7	18.8	9.2	8.4	55.2	35.2	3,997.8
Japan	–12.0	–23.3	–25.1	–24.6	28.0	–52.3	22.0	516.3
United States	309.0	236.6	16.6	16.6	73.8	14.4	132.8	2,515.4
Offshore centres	51.5	55.2	–23.3	3.1	24.9	–7.3	24.3	1,542.9
Emerging economies	–7.9	–23.3	–4.1	–18.6	1.4	–2.9	3.4	887.9
Unallocated[6]	51.5	21.3	4.4	–2.0	6.8	17.7	4.9	302.2
Memo: Local claims[7]	*207.1*	*88.9*	*–31.0*	*–1.2*	*–1.6*	*65.5*	*–41.4*	*1,666.4*

[1] Not adjusted for seasonal effects. [2] Mainly debt securities. Other assets account for less than 5% of total claims outstanding. [3] Including unallocated currencies. [4] Partly estimated. Owing to errors and omissions, claims reported above may differ from data reported in Table 8 in the Statistical Annex. [5] Borrowers other than own offices, official monetary authorities (eg central banks) and non-banks. [6] Including claims on international organisations. [7] Foreign currency claims on residents of the country in which the reporting bank is domiciled. Table 2.1

Activity stabilises after several quarters of declines

The annual growth rate of cross-border bank credit rose to 4½% in the second quarter following four quarters of deceleration (Graph 2.1). In seasonally unadjusted terms, the outstanding stock of cross-border claims booked by banks in the BIS reporting area increased by $243 billion between end-March and end-June 2002, to $12.5 trillion (Table 2.1).

Cross-border claims on US borrowers continue to increase ...

Among the largest economies, the growth of cross-border credit was again fastest vis-à-vis the United States (Graph 2.1). The annual growth of claims on US borrowers returned to the 11% year-on-year growth trend evident in late 2001, after unusually depressed growth in the first quarter. Claims were boosted by cross-border purchases of debt securities issued by US residents. In particular, Japanese banks, which had reduced their holdings of US debt securities in late 2001 and early 2002, stepped up their purchases in the second quarter. Interbank and inter-office activity between the United States and banking centres in the Caribbean also supported the growth of claims.

... while those on Japan contract

In Japan too, the trend in cross-border activity apparent in late 2001 re-emerged. Claims on Japanese borrowers contracted by 5% in the second quarter, less than the 13% fall in the first but in line with the rate of decline in the second half of 2001. Increased purchases of Japanese government bonds contributed to a modest acceleration in the annual growth of cross-border credit to non-banks in Japan, to 2% (see below). Furthermore, Swiss, French and Dutch banks channelled substantial amounts to their own offices in Japan, and Japanese banks resumed borrowing from other unrelated banks.

Intra-euro area activity expands relatively rapidly

The continued growth of cross-border claims on the euro area was underpinned by intra-euro area activity. Claims on euro area borrowers booked by banks located inside the euro area expanded by a relatively strong 9% year over year in the second quarter. By contrast, claims booked by banks located outside the euro area, which had expanded at double digit rates in the three years following the introduction of the euro, contracted by 2% in the second quarter. The unwinding of interbank and inter-office positions booked in London accounted for much of the weakness in lending by banks outside the euro area.

Notwithstanding the increase in total claims in the second quarter, developments in the international banking market seem more consistent with a stabilisation of activity than with the beginning of a new expansion. First, the annual growth rate of cross-border claims on non-bank borrowers was more or less unchanged in the second quarter at 6%. Since non-banks are the ultimate users of bank credit, changes in claims on non-banks reflect underlying activity better than interbank flows. The contraction in cross-border credit to unrelated banks did slow in the second quarter, to 4% year over year compared to 8% in the first, and the annual growth of claims on banks' own offices accelerated to 11% from 7%. Nevertheless, given the strong growth in deposits in the major economies and the slower increase in credit to non-bank customers, this modest pick up in interbank and inter-office activity is unlikely to have been driven by a strengthening of demand for bank funding (Graph 2.2).

Growth of domestic and international credit to non-banks stabilises

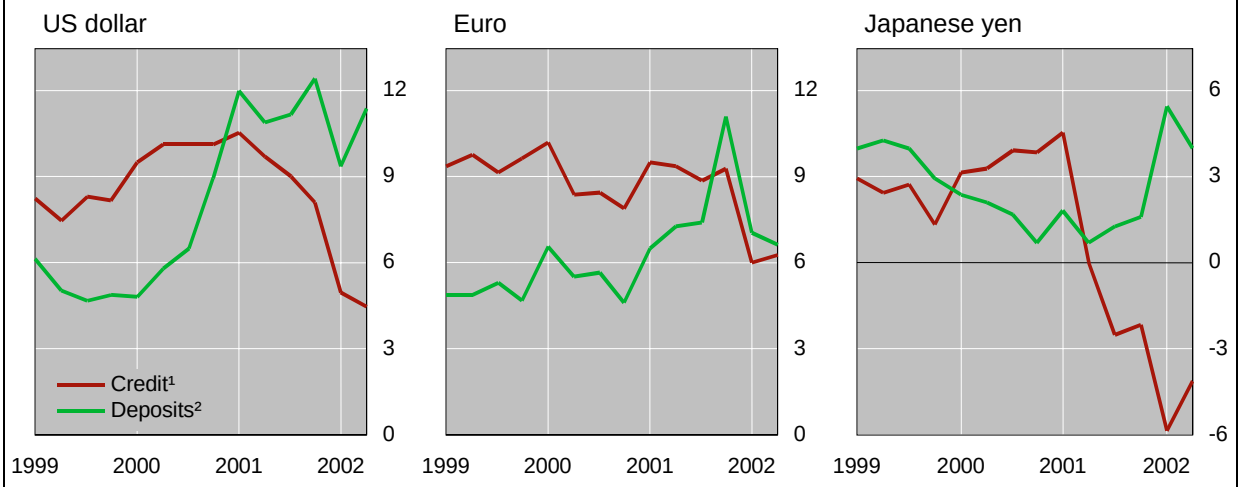
Second, a similar stabilisation of activity was evident in domestic banking markets in the second quarter. In particular, in the euro area and the United States the growth of credit to non-bank borrowers appeared to level out, while in Japan the contraction in credit slowed. Domestic credit accounts for virtually all – 97% – of yen-denominated bank claims on non-banks outstanding globally. International activity is more important in the euro and US dollar markets, where domestic credit accounts for 84% and 79%, respectively, of outstanding global claims on non-banks.

Third, syndicated lending data suggest that credit growth remained moderate in the third quarter of 2002. Gross signings of international facilities were down modestly from year-earlier levels for the fifth consecutive quarter, and refinancings accounted for a larger proportion of signings (see "International syndicated credits in the third quarter of 2002" on page 26). Note, however, that syndicated credits data are not necessarily a reliable proxy for future bank lending.[1]

[1] Blaise Gadanecz and Karsten von Kleist (2002): "Do syndicated credits anticipate BIS consolidated banking data?", *BIS Quarterly Review*, March, pp 65–74.

Global deposit and credit growth

Positions vis-à-vis non-banks, annual percentage changes



[1] Credit comprises domestic credit to non-banks from banks in the United States (USD), euro area (EUR) and Japan (JPY), plus international credit to non-banks from banks in the BIS reporting area (ie cross-border credit plus local credit in non-local currencies). [2] Deposits comprise domestic demand and time deposits placed by residents with banks in the United States (USD), euro area (EUR) and Japan (JPY), plus international deposits placed by non-banks with banks in the BIS reporting area.

Sources: IMF; BIS. Graph 2.2

Cross-border activity of Japanese and German banks

Contraction in Japanese banks' international activity slows

Other developments consistent with a stabilisation in international banking activity include signs of a slowdown in the retrenchment of Japanese banks. The annual rate of decline of Japanese banks' cross-border claims decelerated slightly in the second quarter to 12% (Graph 2.3). Claims on non-banks began to level out, reinforced by purchases of US debt securities, and interbank activity stabilised after a precipitous drop in late 2001 and early 2002. However, inter-office positions contracted by 6% year over year, after a full year with little change.

The international activity of German banks also began to stabilise in the second quarter. German banks' cross-border claims on non-bank borrowers contracted for the first time in over a decade, falling by 2% year over year in the second quarter. However, this was driven by the relocation of a large Pfandbrief bank from Germany to Ireland and the consequent reclassification of its claims as those of an Irish bank. Adjusted for this reorganisation, the growth of German banks' cross-border claims on non-banks was more or less unchanged. Interbank claims were down by 14% year over year, but inter-office claims continued to expand rapidly.

German banks are no longer driving the growth of international banking ...

Although the growth of German banks' total cross-border claims had not turned negative as of the second quarter of 2002, their contribution to the expansion of international banking activity was negligible compared with earlier periods (Graph 2.3). Propelled by an increase in cross-border activity in Europe, the annual growth rate of German banks' cross-border claims had averaged 17% over the 1998–2000 period. Indeed, German banks alone had accounted for as much as one third of the increase in total cross-border claims

during this period. The growth of German banks' cross-border activity began to decelerate in mid-2001, in tandem with the deceleration in credit to European borrowers. By early 2002, German banks were clearly no longer driving the growth of international banking.

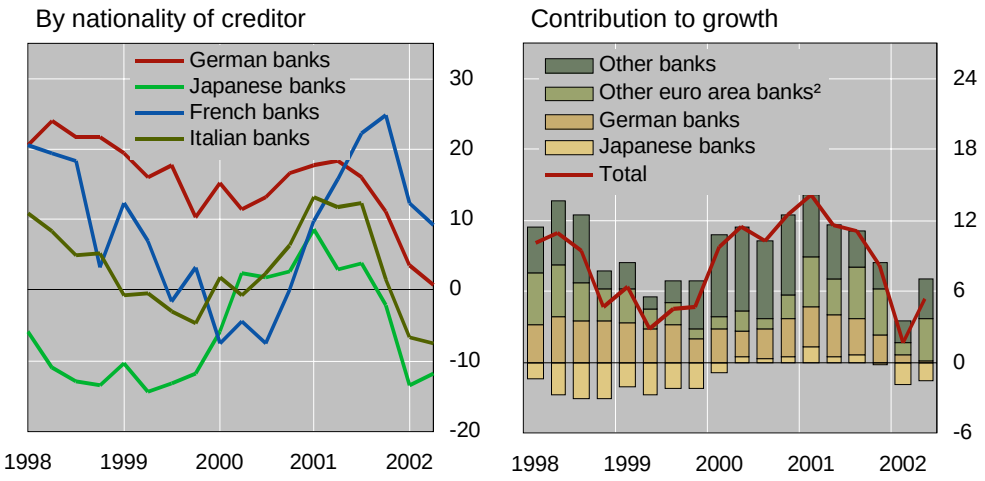
While the slowdown in the growth of German banks' cross-border claims had the largest impact on overall international banking activity, Italian and Spanish banks experienced an even more pronounced slowdown relative to other euro area banks. The annual growth rate of Italian banks' cross-border claims declined from over 10% in early 2001 to –7% in the second quarter of 2002, and that of Spanish banks fell from 20% to –2%. At the same time, the cross-border claims of Belgian, Dutch, French and some other euro area banks continued to expand relatively rapidly – faster than the annual increase for euro area banks as a group but slower than in previous periods.

... and seem to be exercising greater restraint in lending

Much of the slowdown in the growth of euro area banks' claims reflects weak demand for credit, related to both the general economic downturn in the euro area and elsewhere and the decline in financing for telecommunications firms and merger and acquisition activities.[2] For some banks, the slowdown was amplified by the adoption of a more cautious approach to the granting of credit. A deterioration in the credit quality of many borrowers over the past year, large numbers of defaults and bankruptcies, and narrow lending margins led some banks to cut back on their exposures and increase their interest rates on loans. German banks in particular seem to be exercising greater restraint in their lending activities.[3]

Cross-border claims of BIS reporting banks[1]

Annual percentage changes



[1] Unconsolidated, on-balance sheet positions, including positions vis-à-vis own offices. For data on the consolidated claims of BIS reporting banks, see Tables 9B and 9C in the Statistical Annex. [2] Excluding German banks (shown separately) and Greek banks (Greece is not in the BIS reporting area).

Graph 2.3

[2] Bank for International Settlements (2002): "The international banking market", *BIS Quarterly Review*, June, pp 14–15.

[3] Deutsche Bundesbank (2002): "The development of bank lending to the private sector", *Monthly Report*, October, pp 31–46.

Shift in the sectoral composition of claims towards non-banks

During the most recent cycle in international banking activity, the growth rate of cross-border credit to banks decelerated more sharply than the growth of credit to non-bank borrowers. Consequently, there has been a significant shift in the sectoral composition of banks' international balance sheets. The BIS consolidated banking statistics net out inter-office positions, and thus capture the end borrower more accurately than the locational statistics. According to these statistics, claims on unrelated banks fell to 45.3% of banks' outstanding international claims at end-June 2002 from 46.6% at end-June 2001, with a commensurate increase in the share of claims on non-banks. In particular, claims on corporations and other non-bank private sector borrowers increased by 1 percentage point to 40.7%, and claims on the public sector increased by ½ percentage point to 12.2%.

Shift towards non-bank borrowers is most pronounced in the euro area

The sectoral shift was especially pronounced vis-à-vis borrowers in the euro area, where the share of claims on other unrelated banks fell by 5 percentage points between end-June 2001 and end-June 2002, to 47.5% of consolidated international claims. In recent quarters, cross-border credit to non-banks in the euro area has continued to increase – mainly in the form of purchases of debt securities – even as the growth of credit to banks has slowed. Indeed, whereas claims on non-banks in the euro area rose by 11% year over year in the second quarter, total cross-border claims on the euro area rose by only 3%. Euro-denominated inter-office activity continues to expand at an annual growth rate of approximately 20%, suggesting that credit to unrelated banks accounts for most of the weakness in the growth of total claims on the euro area.

Banks purchase US agency and corporate securities

In the United States, claims on the non-bank private sector increased by 2 percentage points between end-June 2001 and end-June 2002, to 59.2% of consolidated international claims. Banks' purchases of US agency securities and corporate bonds explain much of this increase. Banks' holdings of US Treasury securities and other public sector claims remained more or less stable over this period, at 12% of international claims. US data on international capital flows indicate that, in recent quarters, non-residents' purchases of US agency securities greatly exceeded their purchases of US Treasuries. Non-residents even purchased more corporate securities than Treasuries prior to mid-2002.

In Japan, shifts in the sectoral composition of foreign banks' cross-border or international claims appeared to be offset by shifts in the composition of their local claims. Foreign banks' international claims on the public sector increased by approximately 20% year over year during the second quarter, to 12.3% of outstanding consolidated claims on Japan. Foreign banks also own Japanese government bonds (JGBs) through their local Japanese branches and subsidiaries and, in contrast to banks' cross-border activity, Japanese flow-of-funds data indicate that foreign-owned banks in Japan have reduced their holdings of JGBs over the past year.[4] Indeed, the increase in foreign

[4] Claims on the central government, local governments and public corporations fell to 13% of total assets booked by foreign-owned banks in Japan at end-June 2002, from 23.9% at end-June 2001.

Offsetting shifts in the sectoral composition of cross-border and local claims on Japan

banks' cross-border claims on the public sector seems to have been more than offset by a decline in locally booked claims.

Credit to corporations in Japan appears to have shifted in the opposite direction to public sector claims; foreign banks reduced their cross-border claims on corporations even while increasing their locally booked claims. Credit to the non-bank private sector fell to 20.6% of banks' consolidated international claims at end-June 2002 from 22.4% a year earlier, even as it rose to 51.9% of foreign-owned banks' local assets from 48.5%. Total yen-denominated claims of foreign banks' Japanese offices grew by 10% in the year to end-June 2002, and exceeded foreign banks' consolidated international claims on Japan by more than 60%.

Banks cut back claims on emerging markets with heavy public debt burdens

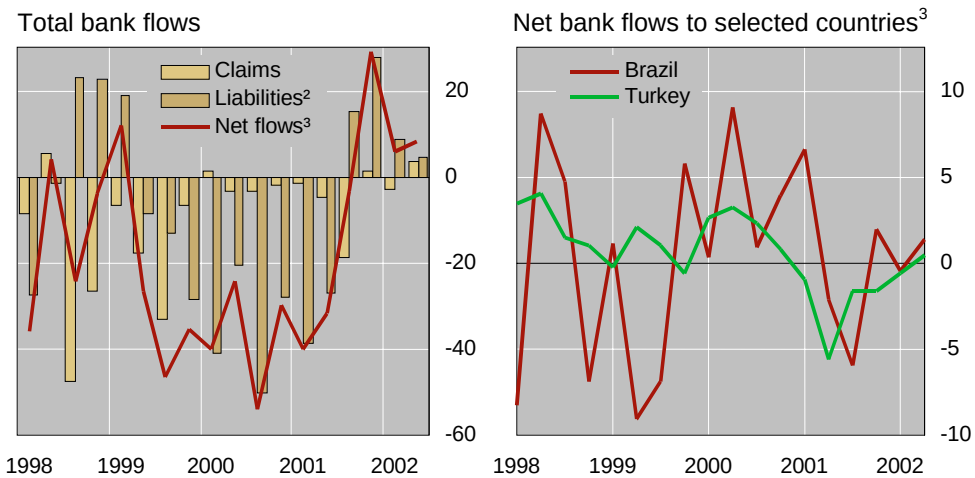
The second quarter of 2002 saw the third consecutive period of net inflows from banks in the BIS reporting area to emerging markets. Net inflows totalled $8 billion, up from $6 billion in the first quarter (Graph 2.4 and Table 2.2). Residents of emerging markets again drew down deposits placed with banks abroad. At the same time, claims increased slightly, with new lending to stronger credits offsetting cutbacks in claims on countries with high public debt burdens.

Claims on Brazil and Turkey contract ...

Brazil saw the largest cutback in cross-border bank credit, as banks reduced their exposure in response to political uncertainty there. Even though Brazilian residents were relatively active in the syndicated loan market in the second quarter, raising $1.7 billion, bank claims on Brazil contracted by $2.4 billion. Credit to non-banks in Brazil accounted for the whole of the

Cross-border bank flows to emerging economies[1]

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



[1] A positive value represents an inflow to emerging economies from banks in the BIS reporting area, and a negative value an outflow from emerging economies. [2] A positive value indicates a decrease in BIS reporting banks' liabilities vis-à-vis emerging economies, and a negative value an increase. [3] Changes in claims minus changes in liabilities. Graph 2.4

Cross-border bank flows to emerging economies

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

	Banks' position[1]	2000	2001	2001			2002		Stocks at end-Jun 2002
		Year	Year	Q2	Q3	Q4	Q1	Q2	
Total[2]	Claims	–7.9	–23.3	–4.7	–18.6	1.4	–2.9	3.4	887.9
	Liabilities	140.1	23.1	26.9	–15.0	–27.6	–8.6	–4.6	1,097.3
Argentina	Claims	1.2	–5.8	1.6	–2.4	–3.3	–4.3	–0.8	36.2
	Liabilities	3.1	–16.7	2.3	–1.9	–11.1	–1.0	0.5	23.3
Brazil	Claims	9.5	0.9	0.1	–1.1	–2.2	1.0	–2.4	95.6
	Liabilities	–4.6	0.4	2.2	4.9	–4.1	1.4	–3.8	45.7
Chile	Claims	0.3	0.2	0.4	–0.9	0.2	–0.3	–0.5	18.3
	Liabilities	–1.5	–1.0	0.2	–0.4	–0.6	0.2	–0.8	14.2
China	Claims	–5.4	–3.5	1.4	–2.6	–0.6	–7.2	0.9	49.7
	Liabilities	35.7	–6.5	3.5	–6.7	–4.0	–7.1	6.6	95.1
Indonesia	Claims	–3.6	–5.4	–1.5	–2.3	–0.8	–1.3	–2.1	33.3
	Liabilities	–1.0	1.1	–0.7	–0.4	0.7	–1.4	–0.3	12.5
Korea	Claims	–4.8	–0.2	–2.4	0.8	–2.0	6.4	1.8	72.4
	Liabilities	–1.7	1.7	–2.2	–2.4	1.7	11.4	–5.6	35.5
Mexico	Claims	–1.0	2.0	–0.2	–3.3	0.6	3.2	1.8	65.6
	Liabilities	6.9	8.8	0.6	4.5	0.6	–14.1	1.3	50.4
Russia	Claims	–6.6	1.3	0.3	0.2	2.1	1.4	0.8	33.1
	Liabilities	7.2	5.2	2.6	–2.8	1.7	3.6	0.0	32.6
Saudi Arabia	Claims	0.1	–2.4	0.1	–1.6	1.0	0.0	0.4	24.9
	Liabilities	10.9	–9.7	–1.4	–5.7	–7.3	–5.4	–0.1	47.2
South Africa	Claims	0.6	–0.4	–0.5	0.8	–1.1	–1.5	0.2	17.2
	Liabilities	0.4	2.1	0.6	1.1	–0.9	0.2	1.4	18.3
Thailand	Claims	–7.8	–3.5	–0.8	–3.1	1.4	–2.2	–0.5	21.2
	Liabilities	1.9	1.3	1.0	–0.5	0.5	–0.7	–1.0	14.2
Turkey	Claims	11.3	–12.0	–5.1	–0.9	–3.7	0.9	–1.5	37.5
	Liabilities	2.3	–2.1	0.4	0.8	–2.1	1.6	–1.9	18.9
Memo:									
EU accession countries[3]	*Claims*	*7.5*	*6.3*	*1.7*	*–0.4*	*4.1*	*1.4*	*1.9*	*81.7*
	Liabilities	*5.5*	*9.9*	*–0.2*	*0.9*	*4.8*	*–0.3*	*0.6*	*66.9*
OPEC members	*Claims*	*–11.5*	*–14.0*	*–2.5*	*–5.2*	*1.1*	*3.0*	*–0.2*	*133.4*
	Liabilities	*37.7*	*–2.8*	*2.1*	*–9.7*	*–8.5*	*–5.5*	*–2.5*	*242.0*

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

decline, with credit to Brazilian banks and foreign banks' Brazilian offices remaining unchanged. At $95.6 billion at end-June 2002, the outstanding stock of cross-border bank claims on Brazil by far exceeded that on any other emerging market. The BIS consolidated statistics provide a better measure of foreign banks' country risk exposures than the locational statistics. According to these statistics, foreign banks' claims on Brazil, including claims booked by their local Brazilian offices and after netting out claims guaranteed by obligors

outside Brazil, totalled $122.6 billion at end-June 2002.[5] By this measure, Brazil is second only to Mexico as the largest emerging market exposure of banks in the BIS reporting area.

... leading Brazilian and Turkish residents to withdraw deposits

Faced with a cutback in cross-border credit, residents of Brazil met their need for dollar liquidity in the second quarter by withdrawing funds from abroad. This resulted in a net inflow of funds to Brazil from banks in the reporting area of $1.4 billion (Graph 2.4). Withdrawals by corporations and other non-banks accounted for nearly half of the $3.8 billion repatriated by Brazilian residents. At end-June 2002, the external assets of Brazilian residents held with banks offshore totalled $45.7 billion.

In Turkey too, a large withdrawal of deposits held abroad led to a net inflow of funds. In fact, in the second quarter bank flows to Turkey turned positive for the first time since the onset of the crisis in 2001. Claims, however, contracted again, by $1.5 billion, following a small increase in the first quarter. Whereas during 2001 interbank credits accounted for much of the contraction in claims on Turkey, in the second quarter of 2002 lending to non-bank borrowers fell the most.

Claims on Argentina, Indonesia and the Philippines fall

Countries in Southeast Asia also saw large cutbacks in claims. Cross-border credit to residents of Indonesia contracted for the 13th consecutive quarter, resulting in net outflows of $1.8 billion. Following several quarters of increases, claims on the Philippines contracted by $1.4 billion. Banks and investors have become concerned about the fiscal situation in the country. Spreads on the government's international bonds began to widen in May, around the same time that Brazilian spreads started to increase, and by the end of September they had increased by more than 125 basis points to approximately 500 basis points. Net bank flows to Malaysia also turned negative after four quarters of inflows. However, in contrast to Indonesia and the Philippines, this mainly reflects weak demand for dollar funding rather than concerns about Malaysian borrowers' creditworthiness.

The contraction in claims on Argentina slowed in the second quarter to $0.8 billion from declines of $2 billion or more during the previous three quarters. Claims on banks and own offices in Argentina increased for the first time since the second quarter of 2001, rising by $1.3 billion. However, claims on non-bank borrowers fell by $2.1 billion as banks in the reporting area continued to cut back or write off their exposures.

In contrast to the situation in most other Latin American countries, claims on residents of Mexico increased by $1.8 billion during the second quarter. The increase was driven by new loans to non-bank borrowers. Mexican corporations raised large sums in the syndicated loan market in the third quarter, suggesting that the pickup in lending to non-banks seen in the first half of 2002 continued in the third quarter (see "International syndicated credits in the third quarter of 2002" on page 26). Inflows to non-banks were mostly offset by outflows from banks, as banks in Mexico channelled dollars into banks

[5] "BIS consolidated banking statistics for the second quarter of 2002", BIS Press Release 25/2002E, 23 October 2002.

abroad. Banks in Mexico remained net creditors to the international banking system even after the central bank's portfolio reallocation in the first quarter: net claims of BIS reporting banks on banks and own offices in Mexico equalled –$15.2 billion at end-June 2002. By contrast, the net debtor position of the non-bank sector in Mexico has increased substantially in recent quarters. The net stock of claims on non-banks in Mexico stood at $30.5 billion at end-June 2002, up from $22.1 billion a year earlier.

Mexican non-banks continue to borrow

Bank flows to EU accession countries remained positive in the second quarter. Poland accounted for most of the $1.3 billion net inflow to the region, as banks and own offices in Poland drew down their placements abroad. A $2 billion increase in total claims on EU accession countries was driven by the Czech Republic. It mainly reflected a Belgian bank's purchase of a local Czech bank and was offset by a roughly equivalent drop in interbank liabilities.

In Northeast Asia, the depreciation of the US dollar and low US interest rates contributed to strong inflows of dollar credit from banks in the reporting area. The largest inflows were to Korea and Taiwan (China), of $7.3 billion and $4.4 billion, respectively. Branches of foreign banks were responsible for approximately half of the inflow to Korea. The consolidated banking statistics suggest that they swapped the funds into Korean won to support an expansion of local currency lending; in won terms, the local currency claims of foreign banks in Korea increased by 19% year over year in the second quarter. In Taiwan, households and businesses exchanged maturing dollar deposits at local banks for local currency, and banks financed the outflow by borrowing from banks abroad.

Large inflows to Korea and Taiwan

In mainland China, corporations reportedly accelerated the repatriation of export proceeds and delayed payments for imports, thereby shifting funds from offshore dollar accounts to onshore renminbi accounts. Delayed payments for imports contributed to a $3.6 billion increase in claims on non-banks in China. Despite this increase, the second quarter saw residents of China again channel large amounts to banks in the reporting area. In particular, Chinese banks transferred over $3 billion to their own offices in banking centres in the Caribbean.

Net bank flows into the Middle East and Africa were positive for the fourth consecutive quarter, although at $0.8 billion they were a fraction of their previous level. Drawdowns of deposits boosted inflows to Israel to $2.1 billion. Residents of South Africa and Syria placed significant amounts abroad, resulting in outflows from those countries of $1.2 billion and $1.1 billion, respectively.

The currency composition of banks' outstanding liabilities to emerging markets continued to shift away from the US dollar and towards the euro in the second quarter of 2002. US dollar-denominated deposits made up 59% of outstanding liabilities vis-à-vis the Middle East and Africa at end-June 2002, down from 64.1% a year earlier. Over the same period, euro-denominated deposits rose to 14.2% of outstanding liabilities from 12.7%. Similarly, in emerging Europe US dollar-denominated liabilities fell to 51.3% of the total at end-June 2002 from 56.6% at end-June 2001, while euro-denominated liabilities rose to 29.9% from 26.4%. Liabilities vis-à-vis the Latin American

Deposits shift away from US dollars and towards euros

region, predominantly denominated in US dollars, also displayed a mild shift. The US dollar share fell to 84.4% at end-June 2002, down from 88.1% a year ago, while the euro-denominated share rose to 5.4% from 4% over this same period. The trend in Asia is harder to determine given that a large proportion of Asia's cross-border deposits are placed with banks in Hong Kong SAR and Singapore, which do not report a detailed currency breakdown.

International syndicated credits in the third quarter of 2002

Blaise Gadanecz

Signings of international syndicated loans in the third quarter of 2002 totalled $320 billion, down only 3% from the same period a year earlier. Refinancing accounted for a large share of activity – 41% in the second quarter compared with 35% a year earlier – suggesting that net new credit was weaker than the gross figures indicate.

Firms from the energy sector were the largest borrowers for the second consecutive quarter. In particular, oil and gas companies and electricity utilities, mainly from the United States, arranged large amounts to refinance maturing loans. A deterioration in the credit quality of many energy firms contributed to a noticeable widening in the drawn spread demanded by banks. The weighted average spread over Libor increased by approximately 15 basis points to 115 basis points between the third quarter of 2001 and the third quarter of 2002.

Telecommunications firms also raised substantial sums in the syndicated loan market in the third quarter, turning to banks for funding as financing conditions in the bond market became more difficult (see "The international debt securities market" on page 27). Telecoms firms signed deals totalling $33 billion, comparable to volumes in the same period a year ago. The largest facilities were arranged by Telecom Italia for €7.5 billion, Deutsche Telekom for €5 billion and AT&T for $4 billion. Automobile manufacturers arranged a record $19 billion in syndicated credits. Volkswagen signed a huge facility for €15 billion and Toyota Motor Credit Corporation a facility for $4.2 billion.

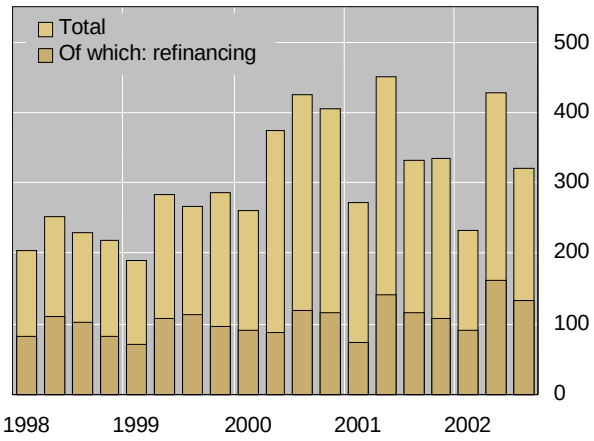
Facilities arranged for emerging market borrowers in the third quarter of 2002 were more or less unchanged compared with the same period a year ago, totalling $26 billion. Borrowers from South Africa secured the largest amount, including a $2 billion dollar loan for South African Breweries to finance an acquisition and a $1 billion facility for the South African Reserve Bank. Tele Invest, a Polish telecoms operator, signed a deal for in excess of $2 billion to refinance maturing loans. Taiwanese corporations were also active in the syndicated loan market, raising $1.5 billion, mainly for working capital.

Signings by Latin American borrowers remained weak at $2.7 billion, a fraction of previous years' volumes. Borrowers from Mexico were the most active, signing $1.3 billion in facilities, predominantly for general corporate purposes and refinancing. Brazilian corporations raised only $0.3 billion, the smallest amount since 1996. Most of these deals were for trade finance, plus a facility for aircraft financing. Chile and Colombia each raised approximately $0.5 billion.

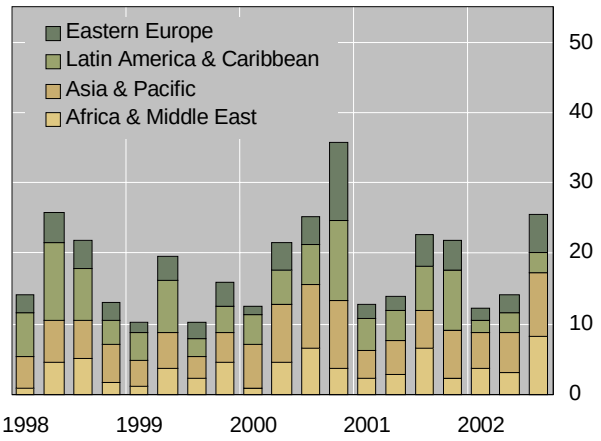
Activity in the international syndicated credit market

In billions of US dollars

Signed facilities



Emerging market borrowers



Sources: Dealogic Loanware; BIS.

Gregory D Sutton

+41 61 280 8421
greg.sutton@bis.org

3. The international debt securities market

The slowdown in the international debt securities market that had begun in June continued into the third quarter of 2002. Net issuance was only $183 billion (Table 3.1), 47% below the previous quarter's amount. It was the

Main features of net issuance in international debt securities markets

In billions of US dollars

	2000	2001	2001		2002			Stocks at end-Sep 2002
	Year	Year	Q3	Q4	Q1	Q2	Q3	
Total net issues	1,237.3	1,348.8	224.8	339.4	309.4	344.5	182.7	8,777.4
Money market instruments[1]	152.1	–78.9	–45.6	–9.3	–7.8	8.3	10.4	433.1
Commercial paper	*55.2*	*26.9*	*–12.0*	*6.5*	*5.5*	*1.8*	*19.2*	*285.2*
Bonds and notes[1]	1,085.2	1,427.6	270.4	348.8	317.3	336.2	172.3	8,344.3
Floating rate issues	*354.6*	*391.6*	*93.8*	*95.9*	*60.4*	*74.5*	*30.9*	*2,097.4*
Straight fixed rate issues	*713.9*	*996.4*	*170.5*	*237.5*	*253.5*	*247.8*	*144.7*	*5,942.0*
Equity-related issues	*16.7*	*39.7*	*6.2*	*15.3*	*3.3*	*13.8*	*–3.3*	*304.9*
Advanced economies	1,156.7	1,260.7	210.3	324.2	285.3	326.5	166.5	7,712.2
United States	*464.5*	*597.6*	*114.3*	*137.3*	*138.1*	*116.7*	*36.9*	*2,670.2*
Euro area	*558.0*	*551.2*	*87.4*	*149.0*	*128.4*	*152.7*	*91.4*	*3,326.7*
Japan	*–25.8*	*–10.1*	*–6.5*	*–1.8*	*–10.1*	*3.2*	*–6.5*	*261.6*
Offshore centres	15.7	26.4	5.4	5.8	4.4	–0.2	1.6	104.3
Emerging economies	42.1	45.4	–2.0	8.2	11.7	11.4	5.1	532.2
International organisations	22.9	16.3	11.1	1.3	8.0	6.8	9.6	428.7
Private sector	968.9	1,009.0	156.0	256.2	192.6	286.9	121.4	6,564.2
Financial institutions[2]	*796.4*	*799.5*	*133.2*	*196.4*	*178.2*	*243.8*	*120.5*	*5,338.3*
Corporate issuers	*172.5*	*209.5*	*22.8*	*59.8*	*14.3*	*43.0*	*0.9*	*1,225.8*
Public sector[3]	245.5	323.5	57.7	82.0	108.9	50.9	51.7	1,784.5
Central government	*52.6*	*60.5*	*–2.3*	*11.6*	*45.1*	*7.6*	*7.5*	*632.4*
State agencies and other	*192.9*	*263.0*	*60.0*	*70.4*	*63.8*	*43.3*	*44.2*	*1,152.1*
Memo: Domestic CP[4]	*256.8*	*–140.0*	*–49.8*	*30.5*	*–71.1*	*–65.1*	*–10.4*	*1,803.0*
of which: US	*208.3*	*–161.2*	*–58.5*	*28.3*	*–63.3*	*–57.0*	*0.2*	*1,320.8*

[1] Excluding notes issued by non-residents in the domestic market. [2] Commercial banks and other financial institutions. [3] Excluding international organisations. [4] Data for the third quarter of 2002 are partly estimated.

Sources: Bank of England; Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; national authorities; BIS.

Table 3.1

Gross issuance in the international bond and note markets

In billions of US dollars

	2000	2001	2001		2002		
	Year	Year	Q3	Q4	Q1	Q2	Q3
Total announced issues	1,703.4	2,306.5	465.8	554.1	606.4	571.2	453.1
Floating rate issues	518.2	643.6	157.1	168.7	141.9	159.7	151.9
Straight fixed rate issues	1,128.7	1,590.7	297.6	359.1	454.8	390.3	296.4
Equity-related issues[1]	56.5	72.2	11.1	26.3	9.6	21.2	4.8
US dollar	791.8	1,131.9	247.0	243.6	310.8	258.4	207.5
Euro	581.7	841.9	145.7	221.3	228.4	229.5	169.1
Yen	128.7	125.3	32.5	26.2	16.4	25.7	23.5
Other currencies	201.2	207.5	40.6	62.9	50.9	57.6	53.0
Private sector	1,319.4	1,683.1	327.0	425.2	416.8	428.6	324.3
Financial institutions[2]	*1,087.2*	*1,335.4*	*276.0*	*325.8*	*353.3*	*353.9*	*289.7*
Corporate issuers	*232.2*	*347.7*	*51.0*	*99.4*	*63.6*	*74.7*	*34.6*
Public sector	314.8	548.6	118.7	114.1	163.6	122.2	107.6
Central government	*92.9*	*130.8*	*13.4*	*17.9*	*59.3*	*29.8*	*13.0*
State agencies and other	*221.9*	*417.9*	*105.3*	*96.3*	*104.3*	*92.4*	*94.7*
International organisations	69.2	74.8	20.1	14.8	26.0	20.5	21.2
Completed issues	1,705.1	2,306.3	478.1	568.4	587.9	579.2	441.6
Memo: Repayments	*620.0*	*878.7*	*207.7*	*219.6*	*270.6*	*243.0*	*269.2*

[1] Convertible bonds and bonds with equity warrants. [2] Commercial banks and other financial institutions.

Sources: Bank of England; Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS. Table 3.2

lowest level since the fourth quarter of 1998, when the Russian financial crisis and the near collapse of LTCM led to a severe reduction of issuance. The decline affected advanced as well as emerging economies, with a particularly sharp fall in net issuance by entities based in the United States. Both a decline in gross issuance and a rise in repayments (Table 3.2) contributed to the reduction in net borrowing.

The decline in net issuance was accompanied by a widening of credit spreads, which suggests that fund-raising fell in part because investors were less willing to supply funds, a situation that was already becoming apparent towards the end of the second quarter. There is evidence that financial institutions in particular had difficulty raising funds. Financial institutions across the globe reduced their presence in the international debt securities market during the third quarter. This raises the question of whether reduced access to debt markets during the third quarter prevented borrowers from obtaining adequate funding, especially following previous difficulties in the commercial paper and bank loan markets.

Private sector issuance falls sharply

Net issuance by borrowers in advanced economies in the international debt securities market fell sharply between the second and third quarters of 2002. In

Largest quarterly declines in private sector net issuance

Since 1994, in billions of US dollars and percentages

Date	In absolute terms	Date	In percentage terms
1998 Q3	–63.6	1994 Q2	–49.57
1999 Q4	–109.0	1997 Q4	–39.06
2001 Q3	–113.3	1998 Q4	–49.76
2002 Q1	–63.6	2001 Q3	–42.06
2002 Q3	–165.4	2002 Q3	–57.67

Sources: Bank of England; Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; national authorities; BIS. Table 3.3

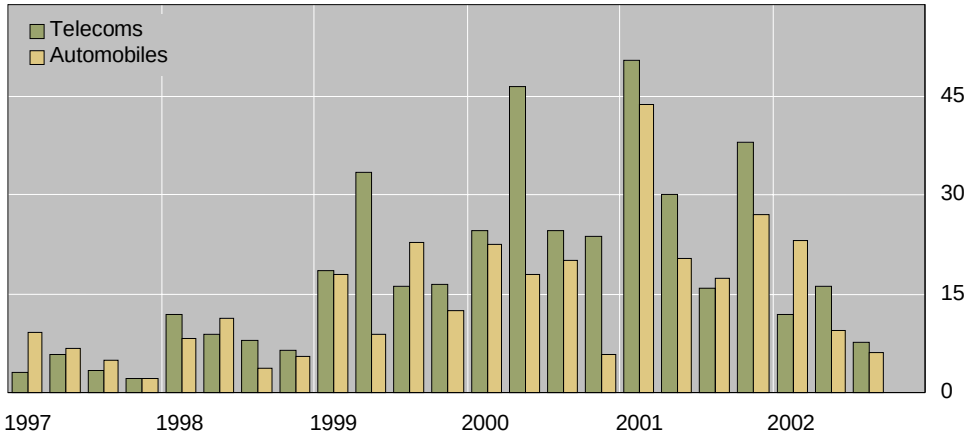
absolute terms, the decline, from $327 billion to $167 billion, was the largest ever recorded. Net issuance by US borrowers fell to $37 billion, 32% of the amount in the second quarter and 27% of that in the first. Net issuance by euro area borrowers also fell sharply between the second and third quarters, down 40% to $91 billion. Repayments by Japanese borrowers actually exceeded issuance over the same period, with net issuance declining from $3.2 billion to –$6.5 billion.

A sharp fall in private sector borrowing ...

The decline in net issuance across the advanced economies can be traced to reduced private sector borrowing in the international debt securities market. For the third quarter, total private sector borrowing amounted to $121 billion, $165 billion less than in the second quarter (Table 3.3). In absolute terms, the decline well exceeded previous contractions in private sector net issuance and stands in sharp contrast to the upsurge in private sector borrowing that occurred between the first and second quarters of this year. Of the most recent decline, 95% is due to reduced private sector borrowing in the advanced economies. Net issuance in the international debt

Announced bond issuance[1] by selected industry sectors

International issuance, in billions of US dollars



[1] Includes bonds issued under EMTN documentation.

Sources: Dealogic; BIS. Graph 3.1

Net issuance of international debt securities by region and currency[1]

In billions of US dollars

Region/currency		2000	2001	2001		2002		
		Year	Year	Q3	Q4	Q1	Q2	Q3
North America	US dollar	377.5	526.4	105.9	121.0	126.3	93.3	37.7
	Euro	44.4	64.7	7.1	21.3	17.7	15.1	7.2
	Yen	17.2	17.5	6.7	1.8	–3.5	1.7	–1.8
	Other currencies	17.3	8.3	–1.0	0.7	3.5	6.2	–1.1
Europe	US dollar	169.8	56.1	–0.5	15.4	6.6	43.7	5.6
	Euro	411.0	520.0	79.2	142.1	138.0	133.9	101.7
	Yen	40.4	–1.4	3.9	–2.6	–13.3	–4.7	–6.9
	Other currencies	88.1	71.2	11.9	28.3	17.0	31.2	23.5
Others	US dollar	62.0	70.3	10.9	7.8	23.0	13.4	4.2
	Euro	15.2	12.7	0.3	2.6	2.9	7.2	5.4
	Yen	–20.3	0.6	–1.9	0.9	–12.1	5.9	1.8
	Other currencies	14.9	2.2	2.4	0.1	3.2	–2.3	5.4
Total	US dollar	609.2	652.8	116.2	144.2	155.9	150.4	47.5
	Euro	470.6	597.5	86.5	166.0	158.7	156.2	114.3
	Yen	37.2	16.7	8.7	0.1	–28.9	2.8	–6.8
	Other currencies	120.2	81.8	13.3	29.1	23.7	35.1	27.8

[1] Based on the nationality of the borrower.

Sources: Bank of England; Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS. Table 3.4

securities market by non-financial corporates came almost to a standstill, falling from $43 billion to $1 billion. Reduced issuance by the automobile and telecoms sectors played a role. Total gross announced issuance by firms in these sectors fell in the third quarter of 2002 to the lowest level since the fourth quarter of 1998 (Graph 3.1).

... due mainly to absence of financial institutions

A sharp fall in net issuance by financial institutions made the largest contribution to the decline in private sector borrowing; such borrowing was halved from $244 billion to $121 billion between the second and third quarters. Net borrowing by US financial institutions fell particularly sharply, from $60 billion to $9 billion, after having also declined in the previous quarter. Net issuance by French and Spanish financial institutions in the international debt securities market also fell between the second and third quarters, from $19 billion and $12 billion, respectively, to $2 billion each.

Unsurprisingly, given the large decline in net issuance by US borrowers, net US dollar issuance fell dramatically between the second and third quarters, down 68% to $48 billion (Table 3.4). Net US dollar issuance by European borrowers also fell over the period, from $44 billion to $6 billion. Nevertheless, the period witnessed a number of large US dollar offerings. In addition to several large issues by the US housing agencies, there was a $3 billion issue by the Italian Republic and a $2.75 billion issue by GE Capital.

Credit conditions remain stringent during the third quarter

The continuing slowdown and worsening of credit conditions ...

The fact that declining net issuance in the international debt securities market was accompanied by an increase in credit spreads suggests that a worsening of credit conditions that had begun in June continued into the third quarter. Consistent with this view, gross issuance of non-investment grade securities, which had begun to wane in May, was also quite low during the third quarter (Graph 3.2), and would have been lower still had it not been for two relatively large issues that accounted for 61% of total announcements during the third quarter, a $750 million offering by the Lebanese Republic and a $300 million offering by the Republic of El Salvador. Gross issuance in the investment grade categories fell from $242 billion in the second quarter to $156 billion in the third. The total dollar value of rated bonds issued, $157 billion, was the lowest since the fourth quarter of 1998.

... lead to a sharp fall in straight fixed rate issuance ...

The decline in private sector borrowing was associated with a sharp downturn in straight fixed rate securities issuance. Net issuance of these securities fell by 42% to $145 billion between the second and third quarters; 78% of the decline can be attributed to reduced issuance by financial institutions. Gross announcements of straight fixed rate issues fell from $390 billion to $296 billion over the same period. Nevertheless, the third quarter witnessed the flotation of several large fixed rate issues, including a €5 billion flotation by the European Investment Bank and a $3 billion issue by the Italian Republic.

... and reduced activity of US finance companies

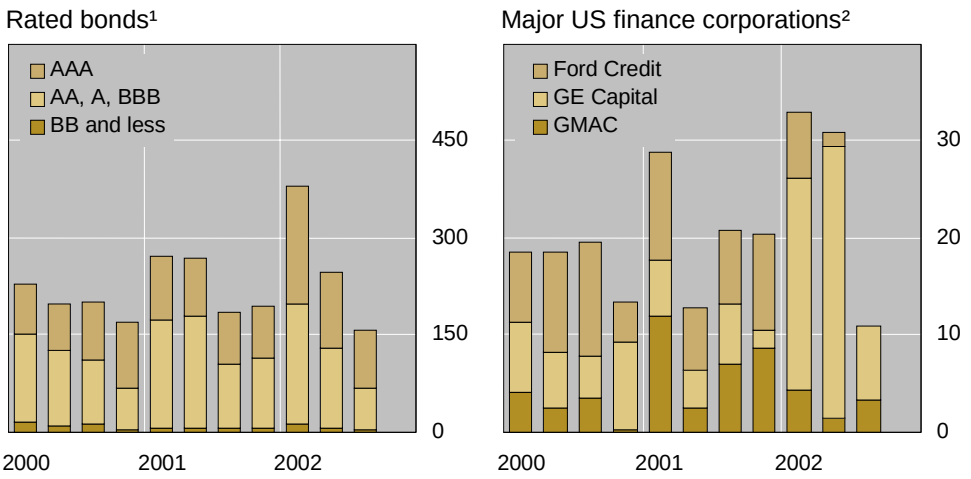
Another potential sign of a worsening of credit conditions, noted in the previous *BIS Quarterly Review*, was the reduced activity of the major US finance companies in the international bond market starting in July 2002. Comprehensive data for the third quarter indicate that this trend continued throughout the period. Gross issuance of bonds and notes by the three major US finance corporations fell to $10.8 billion (Graph 3.2), two thirds of the previous quarter's amount. While this could reflect a reduced desire by these companies to tap the international debt securities market, it is also consistent with the finance companies having greater difficulty raising funds. In some cases, the growing recognition of underfunded pension liabilities may have played a role. Heavy losses on corporate pension plans that had allocated large portions of their portfolios to equity investments led eventually to rating downgrades of some finance companies (see the Overview).

The domestic CP market remains tight

Credit conditions in the domestic commercial paper (CP) market also appear to have remained tight. Between the second and the third quarters of 2002, the stock of domestic CP contracted by $10 billion. This is a much smaller contraction than in previous quarters, but stands in sharp contrast to the generally large positive net issuance of domestic CP in the years preceding the recent market turbulence. For instance, between 1995 and the fourth quarter of 2000, the quarter immediately preceding the beginning of the contraction in the domestic CP market, net quarterly issuance of domestic CP had averaged $55 billion. Negative net issuance by Japanese non-financial corporations accounts for the majority of the most recent contraction in the

Announced issuance by credit rating and issuer

International issuance, in billions of US dollars



[1] Includes bonds issued under EMTN documentation. [2] Bonds and notes.

Sources: Dealogic; Euroclear; Thomson Financial Securities Data; BIS. Graph 3.2

domestic CP market. However, the stock of international CP increased by $19 billion between the second and third quarters.

Emerging market borrowing declines

Reduced borrowing by emerging market countries ...

Net issuance by emerging market borrowers in the international debt securities market fell in the third quarter of 2002. After two quarters above $10 billion, net issuance declined by more than 50% to $5.1 billion, about half the average quarterly net issuance by emerging market borrowers since the onset of the Asian financial crisis. Gross announced issuance fell from $33 billion to $20 billion between the second and third quarters of 2002. The largest emerging market borrower during the third quarter was the United Mexican States, which floated $1.75 billion in new announcements.

... as Taiwanese borrowers withdraw

Emerging Asia was the region with the largest decline in net borrowing. Net issuance by Asia-Pacific borrowers fell from $9.4 billion in the second quarter of 2002 to $5.3 billion in the third, still well in excess of the essentially zero average quarterly net issuance over the period from the fourth quarter of 1997 to the fourth quarter of 2001. More than half of the decline was due to reduced demand from Taiwanese borrowers, whose net issuance fell from a record $3.2 billion to a still relatively strong $0.6 billion.

Even amid political uncertainty ...

Political and economic uncertainty continued to affect some emerging market borrowers (see the Overview). Turkish and Argentine borrowers, for instance, were absent from the international debt securities market during the third quarter of 2002, in spite of the fact that both countries had posted some gross issuance in the second quarter. In the case of Turkey, this may have reflected the desire of borrowers to postpone issuance until political uncertainty had been largely resolved. After the most recent election, the Republic of Turkey floated $750 million in two bond issues. Brazilian borrowers, however,

... Turkey and Brazil float new issues

did tap the international debt securities market for $2.9 billion during the third quarter, although most of the funds were used to repay previously issued obligations. Almost all Brazilian gross issuance during the third quarter can be attributed to a single borrower, a financial company, which floated seven euronotes totalling €2.4 billion.

The fourth quarter sees domestic currency issues

The fourth quarter of 2002 also witnessed international issues in domestic currency by emerging market borrowers. A relatively large issue of this type was that of the Cayman branch of Banco Nacional de Comercio Exterior, a Mexican public bank, which floated a billion peso three-year security. The State Railway of Thailand also floated a local currency international issue, a 1 billion baht six-year security with a coupon of 4.05%.

Argentina's rescheduling has repercussions

The recent failure of Argentina to meet all payment deadlines on a World Bank-guaranteed bond, and the failure of the World Bank to impose expected sanctions, had repercussions in the international debt securities market. Yields rose on other World Bank-backed securities, such as those of Colombia, and Peru reportedly postponed a similarly backed new issue. In addition, the National Power Corporation of Japan reportedly restructured its partially guaranteed bond deal as a larger yen and smaller US dollar bond in response to the greater uncertainty associated with multilateral guarantees.

Serge Jeanneau

+41 61 280 8416
serge.jeanneau@bis.org

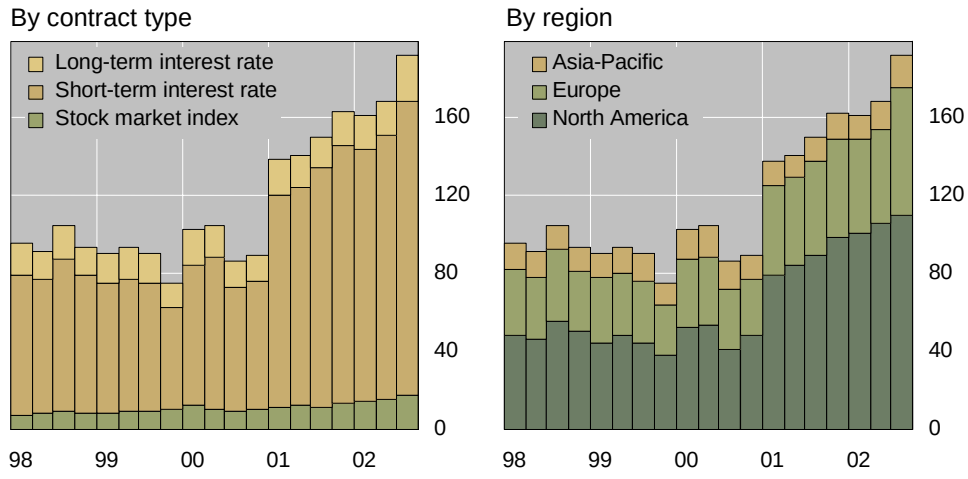
4. Derivatives markets

The aggregate turnover of exchange-traded financial derivatives contracts monitored by the BIS remained high in the third quarter of 2002. The value of trading rose by 14% to $192 trillion (Graph 4.1), following a 4% increase in the previous quarter. While the most robust expansion took place in government bond contracts, activity in money market instruments and stock index contracts was also buoyant. In a departure from the seasonal slowdown usually observed in July, the aggregate volume of transactions in that month nearly matched the record observed in November 2001. This high volume of business reflected a new round of hedging and position-taking as global market uncertainty increased in the wake of further revelations of accounting irregularities, including WorldCom's large restatement of its earnings in late June.

The latest BIS semiannual data on aggregate positions in the global over-the-counter (OTC) derivatives market point to a further acceleration of activity in the first half of 2002. The total estimated notional amount of outstanding OTC contracts stood at almost $128 trillion, a 15% increase over end-December 2001. This compares with an 11% increase in the previous half-year period. Expansion was driven mainly by interest rate instruments, the

Turnover of exchange-traded futures and options

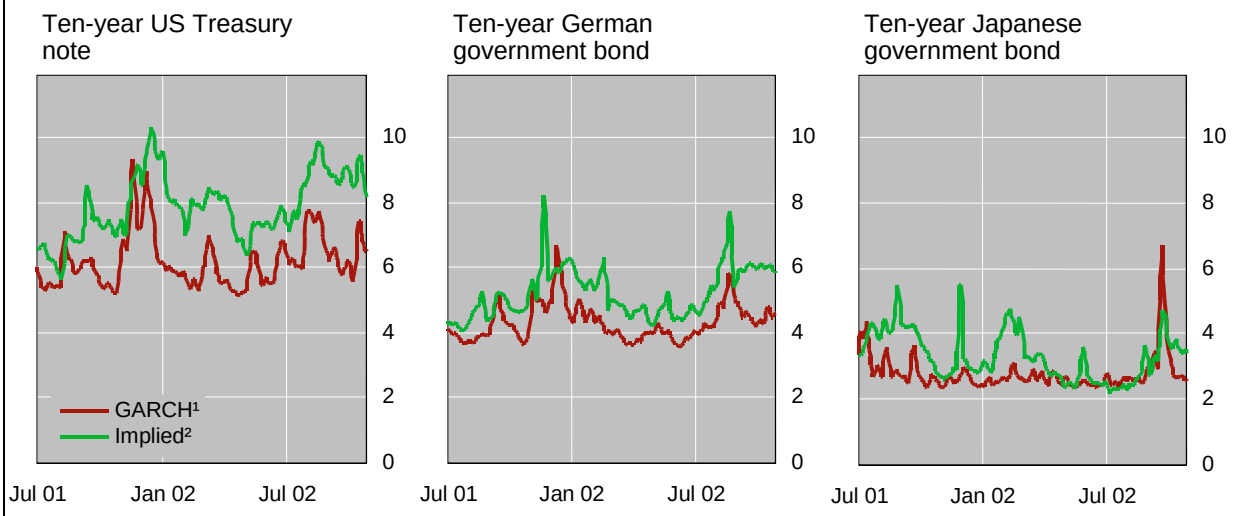
Quarterly data, in trillions of US dollars



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

Volatility of major bond markets

Five-day moving averages



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

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

largest of the broad market risk categories covered by the semiannual BIS survey. These new numbers also show that, in contrast to 2001, OTC business accelerated relative to that on exchanges in the first half of 2002.

Buoyancy of European exchange-traded interest rate products

Sharp increase in government bond business ...

Trading in exchange-traded interest rate contracts expanded by 14% to $174.4 trillion in the third quarter of 2002, compared with an increase of 4% in the second quarter. Contracts on short-term interest rates, including eurodollar, Euribor and euroyen, accounted for much of the absolute increase in activity, with turnover rising by 12% to $151.3 trillion. However, contracts on government bonds, including 10-year US Treasury notes, 10-year German government bonds and 10-year Japanese government bonds, rose at a more rapid pace, with business up by 29% to $23.1 trillion. The growth of business in interest rate contracts in the third quarter appears to have reflected adjustments to derivatives positions as market participants became more pessimistic about the quality of corporate earnings and economic growth prospects.

... on investor pessimism

Corporate irregularities boost turnover

In a departure from the usual slowdown observed in July, turnover grew particularly strongly in that month, reaching $61.4 trillion compared with a previous peak of $64.5 trillion in November 2001. Further revelations of accounting irregularities, including WorldCom's large restatement of its accounts on 25 June, renewed fears of more widespread corporate problems and led to pronounced instability in global financial markets (Graphs 4.2 and 4.4). The ensuing flight to the safety of government bonds created upward pressure on the price and volatility of such bonds, leading some traders in bond futures and options to cover their short positions, and others to position

themselves for a further rally in bond markets. Although conditions in financial markets were somewhat calmer in the first three weeks of August, volatility returned at the end of the month as equity markets resumed their descent. Volatility remained high for much of September, with a flurry of weak macroeconomic announcements and disappointing earnings reports in North America and Europe leading to several new episodes of flight to quality.

Surge in European interest rate activity ...

A notable feature of interest rate activity in the third quarter was the surprisingly sharp increase in trading on European marketplaces. The turnover of interest rate contracts on such markets rose by 39% to $62.3 trillion, compared with an increase of 13% to $11.2 trillion on Asian exchanges and an expansion of 3% to $100.3 trillion on North American exchanges. Transactions in money market instruments rose by 39% to $49.2 trillion, while those in government bond instruments were up by 36% to $13.1 trillion. Trading in options was exceptionally robust, almost doubling to $13 trillion.

... on flight to quality movements

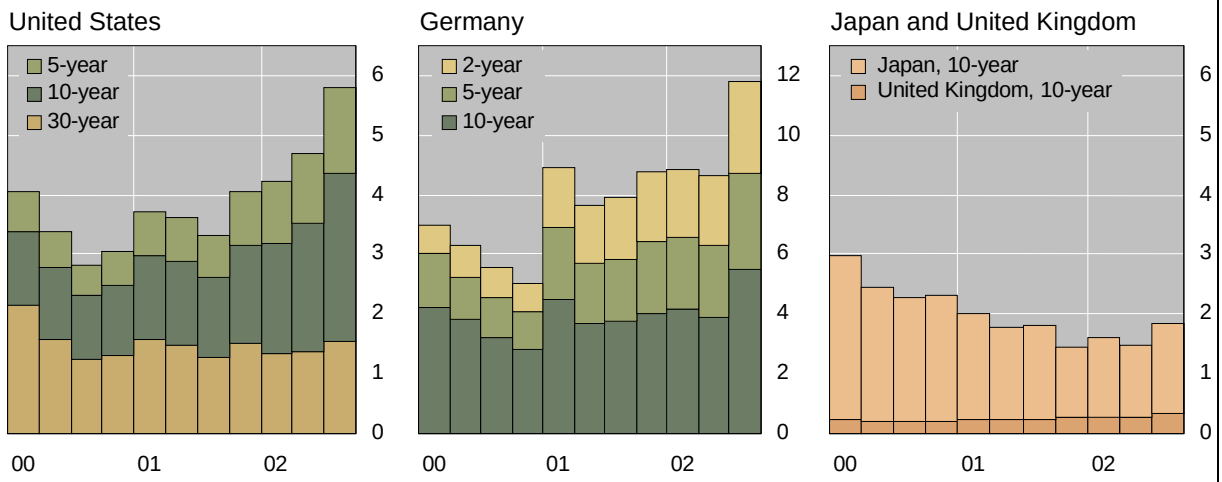
The surge in European contracts appears to have resulted from strong flight to quality movements into fixed income markets as European equity markets faced pronounced downward pressure (see Graph 1.1 in the Overview). Moreover, the emergence of weak macroeconomic data from the end of August, including a larger than expected decline in the closely watched Ifo business climate index on 28 August, dashed hopes of economic recovery in Germany and strengthened expectations of a cut in policy rates.[1] Such changing expectations probably also encouraged a certain amount of speculative trading in German government money market and bond contracts.

Mortgage hedging supports US business

Although aggregate trading on North American exchanges was comparatively subdued, business in government bond contracts was reasonably active, rising by 13% to $1.6 trillion. Trading was reported to have

Turnover in government bond contracts

Quarterly futures contract turnover, in trillions of US dollars

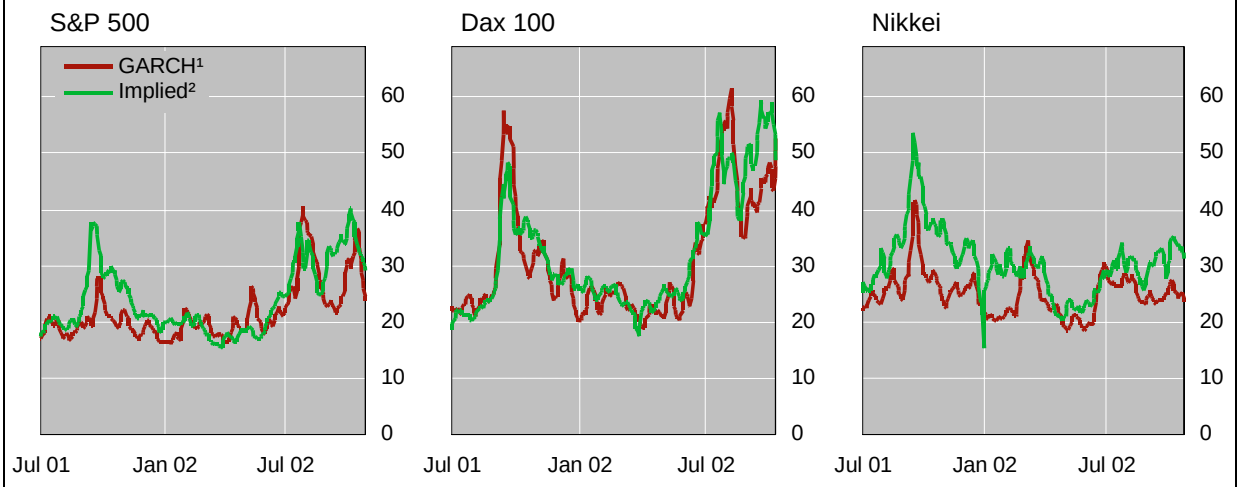


Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 4.3

[1] This pessimism was reflected in the path of three-month Euribor rates implied by futures prices on contracts with delivery dates in late 2002 and early 2003, which declined appreciably in the third quarter.

Volatility of major equity markets

Five-day moving averages



¹ Annualised conditional variance of daily stock returns from a GARCH (1,1) model. ² Volatility implied by the prices of at-the-money call options.

Sources: Bloomberg; national data; BIS calculations. Graph 4.4

been supported by the hedging activity of US government-sponsored enterprises (GSEs). With US mortgage refinancing reaching a new record at the end of the third quarter, a large number of mortgages and mortgage-backed securities (MBSs) were subject to early repayments, leading to an abrupt shortening in the average duration of GSEs' assets.[2] In order to minimise mismatches in the duration of their assets and liabilities, GSEs were reported to have sought to lengthen the duration of their assets by various means, including purchasing government bonds and newly arranged MBSs and taking long positions in government bond futures and interest rate swaps.

Turnover of JGB contracts rises sharply

Trading in interest rate products on Japanese exchanges increased by 6% over the review period to $2.5 trillion. A 23% drop in the turnover of money market instruments was more than offset by a 27% increase in trading in 10-year Japanese government bond (JGB) contracts. Turnover in JGB contracts rose sharply in September as investors reacted to the potential fiscal implications of banking reform (see the Overview).

Stock index contracts active as volatility reaches new highs

Overall activity in exchange-traded equity index contracts expanded further in the third quarter of 2002, with turnover rising by 13% to $17.4 trillion. The revelation of new corporate irregularities at the end of June took its toll on global equity markets, leading in the following weeks to an upsurge in volatility

[2] Investors in US MBSs face significant prepayment (or negative convexity) risks since the holders of the underlying mortgages enjoy certain prepayment privileges, such as the ability to refinance their mortgages on more favourable terms when long-term interest rates decline. Such early repayments in turn lead issuers of MBSs to call their securities.

and a sharp increase in turnover as investors sought to protect the value of their equity holdings.

Investors make heavy use of stock index contracts

Business expanded in most of the major geographical areas, but the European Union witnessed the most rapid increase (16%), followed by North America (14%) and Asia (9%). Such a pattern contrasted with that seen in recent periods, when trading on Asian marketplaces, particularly in Korea, had accounted for much of the growth in stock index activity. Given concerns about the solidity of financial firms, particularly insurance companies, institutional investors were reported to have made heavy use of stock index contracts to adjust their equity weightings. Stock index futures enable traders to cheaply and quickly lock in a price ahead of actual cash market transactions.

Acceleration of OTC market activity in the first half of 2002

Data from the semiannual BIS survey on positions in the global OTC derivatives market at the end of June 2002 pointed to a further acceleration of activity in the first half of the year. The total estimated notional amount of outstanding OTC contracts stood at almost $128 trillion, a 15% increase over end-December 2001. This compares with an 11% rise in the previous half-year period. The most recent numbers also show that OTC business expanded relative to that on exchanges, since open positions in exchange-traded contracts grew by only 1%.[3] It should be noted, however, that part of this recent growth reflected the higher dollar value of contracts denominated in the euro and the yen as those currencies appreciated relative to the US dollar between the two reporting periods.

Market growth driven mainly by interest rate instruments

Market expansion was driven mainly by interest rate instruments, the largest of the broad market risk categories covered by the semiannual BIS survey on OTC derivatives markets, with the notional amount of outstanding contracts rising by 16%. Activity was equally robust in all three main groups of interest rate products, namely forward rate agreements (FRAs), interest rate swaps and interest rate options. By contrast, business in foreign exchange contracts, the second largest broad market risk category, was less buoyant, with outstanding contracts rising by 8%. Currency options were the main exception, with a surge of 39%.

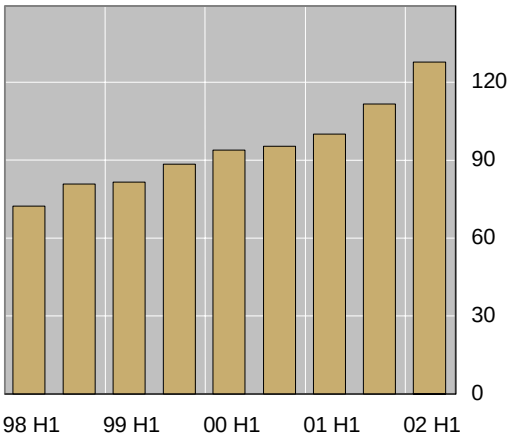
Robust activity in all groups of interest rate products

Equity-linked contracts, where activity had been subdued in recent periods, returned to expansion, with an 18% increase in amounts outstanding.

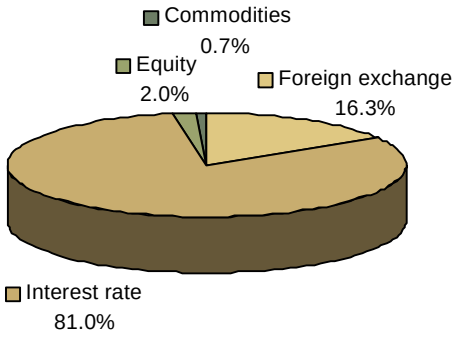
[3] However, activity in the two types of markets cannot be directly compared owing to inherent differences in the characteristics and uses of products. In exchange-traded derivatives markets, the reversal of an initial position leads to a decline in open interest because of the offsetting of contracts through a central counterparty. In OTC derivatives markets, such a reversal involves the writing of new contracts, which leads to a build-up of notional amounts outstanding.

Global OTC derivatives

Total notional amounts outstanding, in trillions of US dollars



Breakdown by broad risk category at end-June 2002



Source: BIS. Graph 4.5

Commodity contracts, the smallest of the broad market risk categories, also returned to growth, with a 30% increase in the value of outstanding contracts.[4]

Buoyancy of the dollar interest rate swap market

Interest rate swaps show a significant increase

Business in interest rate products remained buoyant in the first half of 2002, with a 16% increase in the notional amount of contracts to $90 trillion (Table 4.1). This buoyancy was evident in all three major market segments but the most significant increase in absolute terms took place in interest rate swaps. With $68 trillion in outstanding contracts, they remain by far the largest single group of products in the OTC derivatives market.

Dollar swaps grow steadily on changes in trading practices ...

The US dollar-denominated interest rate swap market continued to grow at a rapid pace, with outstanding contracts rising by 14% to slightly less than $22 trillion. Dollar-denominated swaps have grown steadily in recent years on the back of a shift in hedging and trading practices.[5] A more active use of swaps and swaptions in the hedging of mortgage prepayment risk by mortgage originators and investors was also reported to have boosted business in recent periods. The sharp decline in long-term interest rates between June and early November last year led to a surge of mortgage refinancing and consequently to a shortening of the duration of MBS portfolios. This decline prompted market participants to seek fixed rate payments through swaps and swaptions. Although the stability of long-term interest rates in the first half of 2002 probably reduced investors' demand for hedges against a shortening of

... and mortgage hedging

[4] Credit derivatives, which according to market sources have recently grown rapidly, are not identified separately in the semiannual BIS survey of OTC derivatives market activity.

[5] The factors underlying this long-term shift have been discussed in earlier issues of the *BIS Quarterly Review*, including in an article by Philip D Wooldridge, "The emergence of new benchmark yield curves", December 2001, pp 48–57.

Global over-the-counter (OTC) derivatives markets[1]

Amounts outstanding, in billions of US dollars

	Notional amounts				Gross market values			
	End-Dec 2000	End-Jun 2001	End-Dec 2001	End-Jun 2002	End-Dec 2000	End-Jun 2001	End-Dec 2001	End-Jun 2002
Grand total	95,199	99,755	111,115	127,564	3,183	3,045	3,778	4,450
A. Foreign exchange contracts	15,666	16,910	16,748	18,075	849	773	779	1,052
Outright forwards and forex swaps	10,134	10,582	10,336	10,427	469	395	374	615
Currency swaps	3,194	3,832	3,942	4,220	313	314	335	340
Options	2,338	2,496	2,470	3,427	67	63	70	97
B. Interest rate contracts[2]	64,668	67,465	77,513	89,995	1,426	1,573	2,210	2,468
FRAs	6,423	6,537	7,737	9,146	12	15	19	19
Swaps	48,768	51,407	58,897	68,274	1,260	1,404	1,969	2,214
Options	9,476	9,521	10,879	12,575	154	154	222	235
C. Equity-linked contracts	1,891	1,884	1,881	2,214	289	199	205	243
Forwards and swaps	335	329	320	386	61	49	58	62
Options	1,555	1,556	1,561	1,828	229	150	147	181
D. Commodity contracts[3]	662	590	598	777	133	83	75	78
Gold	218	203	231	279	17	21	20	28
Other	445	387	367	498	116	62	55	51
Forwards and swaps	248	229	217	290	...	...	...	...
Options	196	158	150	208	...	...	...	...
E. Other[4]	12,313	12,906	14,375	16,503	485	417	519	609
Gross credit exposure[5]	.	.	.	.	1,080	1,019	1,171	1,316

[1] All figures are adjusted for double-counting. Notional amounts outstanding have been adjusted by halving positions vis-à-vis other reporting dealers. Gross market values have been calculated as the sum of the total gross positive market value of contracts and the gross negative market value of contracts with non-reporting counterparties. [2] Single currency contracts only. [3] Adjustments for double-counting estimated. [4] Estimated positions of non-regular reporting institutions. [5] Gross market values after taking into account legally enforceable bilateral netting agreements. Table 4.1

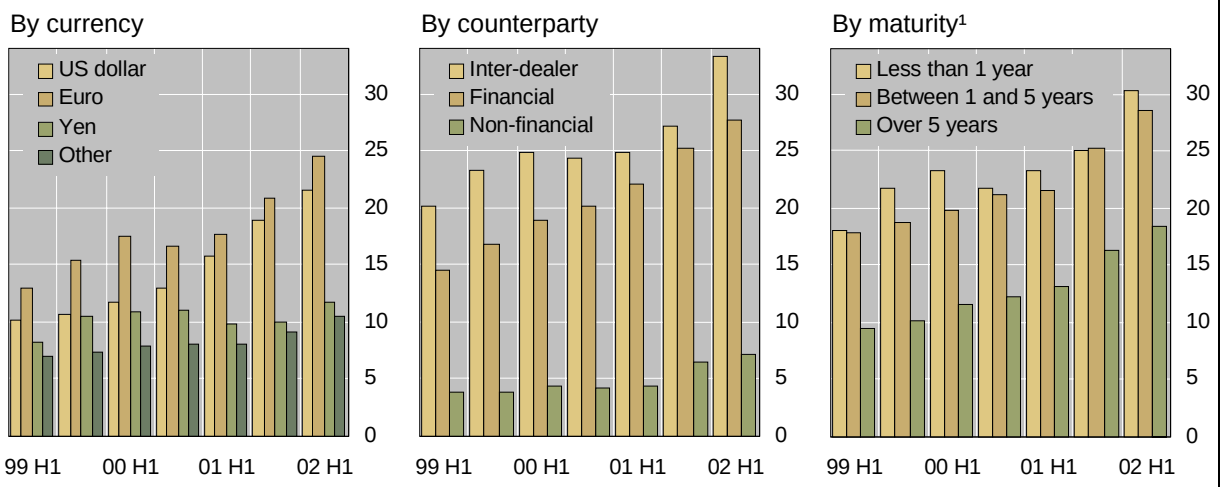
mortgage duration, market participants may have sought additional protection against a possible rebound of interest rates and the opposite risk of duration extension.

Other swap markets are less buoyant

Activity in the other major interest rate swap markets was less buoyant. The notional amount of euro-denominated swaps expanded by 18% in US dollar terms (the currency of reference of the BIS semiannual survey) to slightly less than $25 trillion, but much of that increase resulted from a 13% appreciation of the euro relative to the US dollar between end-December 2001 and end-June 2002. A similar currency effect was at play in the market for yen-denominated swaps. The US dollar value of yen swaps rose by 16% to almost $12 trillion, with most of the increase resulting from a 10% appreciation of the yen relative to the dollar over the two reporting periods.

Interest rate swaps

Notional amounts outstanding, in trillions of US dollars



[1] Includes FRAs, which in June 2002 accounted for approximately 12% of the total notional amount outstanding.

Source: BIS. Graph 4.6

Surge in currency options

Higher currency volatility fuels currency options

The pace of activity in foreign exchange contracts was somewhat lacklustre relative to that in interest rate instruments, with the stock of contracts rising by 8% to $18 trillion. However, business in currency options was an exception to this overall pattern. The notional value of such contracts rose by 39% to $3.4 trillion, with activity picking up in most currency sectors. Contracts involving the US dollar expanded by 28%, those involving the euro by 66%, and those involving the yen by 14%. Market sources attributed the market's buoyancy to a rise in the volatility of major currency pairs (euro/dollar in particular) in the second quarter of the year.

Rise in gross market values

The estimated gross market value of positions in the OTC market increased by 18% to $4.5 trillion, following a 24% rise in the second half of 2001. Much of the increase took place in foreign exchange contracts, reflecting significant movements in the major exchange rates in the first half of 2002 and an upturn in currency volatility in the second quarter.[6] The overall ratio of gross market values to notional amounts was stable at 3.5% but, in the case of foreign exchange instruments, the ratio rose appreciably to 5.8% from 4.7%.

[6] A movement in exchange rates leads to an increase in the value of forward-type contracts for some counterparties and a symmetrical loss for others. In the case of option-type contracts, a change in the implied volatility of exchange rates is accompanied by a corresponding change in the value of contracts.

Claudio Borio
+41 61 280 8436
claudio.borio@bis.org

Philip Lowe
+61 2 9551 8300
lowep@rba.gov.au

Assessing the risk of banking crises[1]

Over the last two decades, banking crises have become more frequent and severe in both emerging market and industrial countries.[2] Their cost in terms of output lost has been high, typically double digit percentages of GDP. For this reason, considerable efforts have been made recently to develop "early warning indicators" of crises that could allow policymakers to take remedial action in a more timely fashion.

This special feature proposes a set of forward-looking indicators of banking distress. As in Borio and Lowe (2002) we argue that it may be possible recognise the build-up of one set of vulnerabilities that foreshadows banking distress with a reasonable degree of confidence, although the exact timing of the crises remains unpredictable. The corresponding indicators draw exclusively on ex ante information, are based on the interaction among a small set of variables, focus on the cumulative processes giving rise to distress and allow for variable horizons. Here we extend our previous work, which had mainly considered credit aggregate and asset prices, by examining the information contained in real exchange rate appreciations and the relative performance of indicators in industrial and emerging market countries.

In the first section of this article we briefly discuss the origins of banking crises. In the second we motivate the choice of indicators and assess their performance. In the concluding section we note some caveats to the analysis and suggest areas for future work.

The origin of banking crises[3]

Typical features of banking crises:

Views about the origin of banking crises influence the strategy to be followed in developing forward-looking indicators of distress and judgments about their usefulness. The view that underlies the specific indicators formulated here draws on four observations.

---

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS. We would like to thank Philippe Hainaut for excellent research assistance.

[2] See Bordo et al (2001) and, for focus on the cost of crises, Hoggarth and Saporta (2001), among others.

[3] For a further elaboration on some of the arguments presented in this section, see Borio (2002).

First, banking crises tend to arise primarily from deteriorating economic fundamentals, notably declines in asset quality. This view plays down the role of arbitrary changes in investor or depositor sentiment, domestic or foreign, stressed by some observers.[4] It thereby also provides a rationale for expecting that crises can be, at least to some extent, predictable, based on forward-looking proxies for deteriorating fundamentals.

deteriorating economic fundamentals ...

Second, a banking crisis with significant economic costs in terms of overall output often arises from exposure of several institutions to common risks ("common risk factors").[5] Typical examples include exposures to broad asset classes such as real estate or equity, to the fortunes of large economic sectors and to the sustainability of an economic boom. For this reason, severe banking crises tend to reflect, and in turn exacerbate, overall fluctuations in GDP.

... similar exposures across financial institutions ...

Third, vulnerabilities tend to build up over time, reflecting the mutually reinforcing interaction between the financial sector and the real economy. A highly stylised description of the process could be the following. As the economy expands, asset prices increase, risk is perceived to decline and external financing becomes cheaper and more plentiful. These developments fuel the expansion and, if they go too far, allow financial imbalances to be masked by benign economic conditions. The imbalances sustain distortions in the real economy, often in the form of excessive investment in the sectors most affected by the favourable conditions. The unbalanced boom sows the seeds of the subsequent contraction. At some point, the process goes into reverse. Unless the financial system has built up sufficient defences during the boom, the subsequent contraction can lead to widespread instability. Ex post, a financial cycle is evident.[6]

... vulnerabilities that build up over time linked to a financial cycle ...

---

[4] By contrast, a common alternative perspective stresses multiple equilibria and self-fulfilling runs, made possible by the inevitable mismatch between the liquidity of assets and liabilities, be it in domestic or, in an international context, foreign currency. This view goes back to the seminal paper by Diamond and Dybvig (1983) and has been extended to the open economy context by Chang and Velasco (1998). An account of the East Asian crises sympathetic to this view can be found in Radelet and Sachs (1998).

[5] To be sure, the risk of more generalised systemic problems can originate in the failure of an individual institution caused mainly by idiosyncratic factors, such as mismanagement. In this case, the failure would spread through the system via various domino or contagion mechanisms arising from cross-exposures and, possibly, the indiscriminate reaction of market participants. However, while well known examples such as the failure of Bankhaus Herstatt and the near collapse of LTCM had some ripple effects, their economic costs pale in comparison with those of episodes that reflect widespread overextension in the financial system.

[6] The importance of lending booms has been emphasised by many observers; recent examples include Gavin and Hausmann (1996), Gourinchas et al (1999) and Eichengreen and Arteta (2000). Views differ, however, on the factors that may lie behind such boom-bust episodes. Some commentators (eg Corsetti et al (1999)) stress learning difficulties following liberalisation and moral hazard. While not denying the relevance of these factors, we tend to see these phenomena as reflecting (a) more general difficulties in assessing how risk, especially system-wide risk, evolves over time and (b) incentives that result in reasonable actions at the level of individual agents but can have undesirable aggregate outcomes. These mechanisms can lead to excessive "procyclicality" in the financial system, sowing the seeds of financial instability. For an elaboration of this view, see eg Borio et al (2001), Lowe (2002) and BIS (2001).

... and unpredictable timing

Finally, while the timing of the crisis may be unpredictable, it should be possible to detect the symptoms of the build-up of financial imbalances. The previous stylised description suggests that unusually sustained and rapid growth in credit and in asset prices would figure prominently in any set of indicators. For some small open economies, the cumulative appreciation of the real exchange rate might also be helpful. It could capture the pressure associated with capital inflows as well as the potential build-up of concomitant foreign exchange mismatches. And, if available, real-side measures of any excess build-up in the capital stock, either at a sectoral or aggregate level, might also contain useful information.

On the face of it, several banking crises since the 1980s bear a more than passing resemblance to the stylised characterisation of financial distress just outlined. Among industrial countries, the most notable instances include the crises in the Nordic countries and Japan. Likewise, while far less disruptive, the serious financial strains experienced in a number of English-speaking countries at the beginning of the 1990s, including the United States, the United Kingdom and Australia, also exhibit similar features. Among emerging market countries, cases in point include the experience of several Latin American economies in the late 1970s–early 1980s, especially in the Southern Cone, Mexico in the mid-1990s and, more recently, the crises in East Asia. These banking crises have been especially disruptive when occurring alongside currency crises.

Looking further back in history, crises of this type were not uncommon in the pre-World War II environment, the previous historical phase in which financial markets were largely liberalised, both within and across national borders.[7] More generally, the literature on financial crises brims with references to rapid credit expansion and major medium-term swings in asset prices.[8]

Empirical evidence

The above analysis is highly suggestive of the kind of processes that might underlie financial instability. But while these processes may be identifiable with the benefit of hindsight, detecting them on the basis of ex ante information alone, as policymakers need to, is bound to be harder. In other words, can the build-up of vulnerabilities be spotted in time to take preventive action?

The approach

Properties of indicators:

To begin to answer this question, we construct a set of indicators and assess statistically their predictive performance for banking crises.[9] The stylised view

[7] See, for example, Goodhart and de Largy (1999) and, for a detailed account of the Australian experience, Kent and D'Arcy (2001).

[8] Kindleberger (1996) is the classic reference here.

[9] For reviews of this literature, see IMF (2002), Bell and Pain (2000), Eichengreen and Arteta (2000) and Hawkins and Klau (2000).

of financial instability just outlined provides useful clues as to how leading indicators of banking crises may be constructed.

a small set of variables ...

To start with, a combination of a small set of variables should be sufficient to capture the build-up of vulnerabilities. Moreover, focusing on only a few variables should improve the reliability of the corresponding indicators. As discussed, the behaviour of credit, asset prices and, possibly, the exchange rate should contain useful information about the development of financial imbalances. We thus consider three core variables: the ratio of (private sector) credit to GDP; equity prices (deflated by the price level); and the real effective exchange rate. Unfortunately, owing to data limitations, we cannot examine the performance of property prices, despite the fact that they have arguably played a significantly larger role in banking crises than equity prices. Up to a point, the behaviour of equity prices and the exchange rate could act as a proxy, since experience indicates that they tend to move in tandem with property prices, although with certain leads and lags.

... measured as cumulative deviations from trend ("gaps") ...

Next, we need somehow to capture the cumulative processes that in the boom phase sow the seeds of the subsequent distress. We do so by employing deviations of the core variables, measured in levels, from a trend ("gaps").[10] The expectation is that if the credit/GDP ratio, real equity prices and/or the real effective exchange rate move "sufficiently above" their trend (ie exceed some critical threshold), then financial imbalances are emerging, signalling the risk of subsequent financial distress.[11] Moreover, we have to ensure that the trend is measured only on the basis of information that is available at the time policy decisions are made. Thus, for the assessment of vulnerabilities made at time *t*, the gaps are calculated using data only up to time *t*, and not data that would become available in subsequent periods.[12]

... and treated jointly ...

Since we are interested in a combination of variables, we consider composite indicators, where a signal of pending distress is said to be "on" if, and only if, the thresholds for the corresponding variables are simultaneously exceeded. Based on the stylised description of the origin of banking crises, we explore four combinations: (a) credit and asset prices; (b) credit and the exchange rate; (c) credit and either asset prices or the exchange rate; and (d) credit and asset prices and the exchange rate. In case (c), a signal is turned on if either the credit and asset price gaps or the credit and exchange rate gaps are simultaneously exceeded. The reason is that either of the two

---

[10] The trend is estimated through a Hodrick-Prescott filter. The value of lambda is set at 1,600. The gaps are defined in percentage points for credit and as a percentage of the trend level for real equity prices and the real exchange rate.

[11] We also examined the extent to which the output gap could substitute for some of the information contained in financial variables. This variable, however, turned out not to have additional information content and to be inferior to the measures of financial imbalances. While, owing to space limitations, this evidence is not presented here, the interested reader can find it in Borio et al (2002).

[12] In practice, some information lags exist with respect to the credit/GDP ratio. These are not taken into account in what follows. Strictly speaking, given the lags, the predicted value for GDP based on available information would need to be used instead. Since, however, our analysis is performed at annual frequency, this issue is unlikely to be significant.

combinations, on its own, might be sufficient to foreshadow a crisis. By contrast, in case (d), a signal is turned on only if all three gaps are exceeded simultaneously, a more selective criterion.

... allowing for variable forecasting horizons

Finally, recognising the difficulty of predicting the exact timing of the crises, we examine the performance of the indicators over multiple horizons. The basic idea is that, as long as the vulnerabilities can be identified, then at some point in the (not too distant) future a crisis might emerge. If so, as the horizon is lengthened, the performance of the indicators might be expected to improve. If a signal is turned on, it is said to be correct if a crisis occurs in any one of the years included in the horizon.[13]

On the basis of what criterion are the critical thresholds of the indicators chosen and their performance assessed? A good indicator would have two properties. First, it would predict a high fraction of the crises that do occur. Second, it would not turn on too often, ie signal crises that, in fact, do not materialise. In technical terms, such an indicator would have a low "noise-to signal" ratio.[14] Rather than minimising this ratio per se, however, we judgmentally give somewhat more weight to the percentage of crises correctly predicted. This reflects the view that the cost of failing to predict a crisis is larger than that of predicting one that does not materialise.[15] Based on this criterion, the calibration of the thresholds is done jointly.[16] In other words, for each indicator we search through various combinations of thresholds for the one that yields the best results.[17]

Our sample includes 34 countries (21 industrial and 13 emerging market economies), selected to be relatively homogeneous in terms of economic development.[18] The data are yearly and cover the period 1960–99. We take a

---

[13] If the signal is issued in the same year as the crisis occurs, we also consider it correct, given the difficulties in assigning specific dates to financial distress and the coarseness of the observation intervals (a whole year). In the tables, these cases are combined under year 1, which thus includes the current and following year.

[14] More precisely, the numerator of the noise-to-signal ratio is the ratio of crises incorrectly predicted to all non-crisis episodes (the maximum number of such mistakes). Its denominator is the ratio of the number of crises correctly predicted to all crisis episodes (the maximum number of correct crisis calls). Thus, the statistic is the ratio of type II error to one minus type I error.

[15] Moreover, in a number of cases the noise-to-signal ratio could be made arbitrarily small by tightening the selectivity of the threshold. This underscores the risk of basing conclusions exclusively on minimisation of this ratio. Of course, the choice of threshold could be carried out more formally by assigning specific weights to the costs of type I and type II errors. For a much more detailed presentation of individual threshold results for some of the indicators discussed here, see Borio and Lowe (2002).

[16] Considering composite indicators and calibrating signals jointly is equivalent to "interacting" variables in regression analysis. For instance, this means that the relevance of credit expansion differs depending on whether or not it is accompanied by rapid asset price increases. The importance of interacting variables had already been noted by McFadden et al (1985), but has since then strangely fallen into disuse.

[17] Thus, methodologically, our approach differs from that of Kaminsky and Reinhart (1999) in several respects: it uses ex ante information only; it focuses on a small set of variables; it develops composite indicators, based on joint calibration of signals; it emphasises cumulative processes; and it pays particular attention to multiple horizons.

[18] See Borio and Lowe (2002) for details on the sample.

standard definition of banking crisis employed in previous research.[19] On this basis, the sample includes 40 crises spread over 27 of the 34 countries, with 16 such episodes occurring in industrial countries and 24 in emerging market economies.

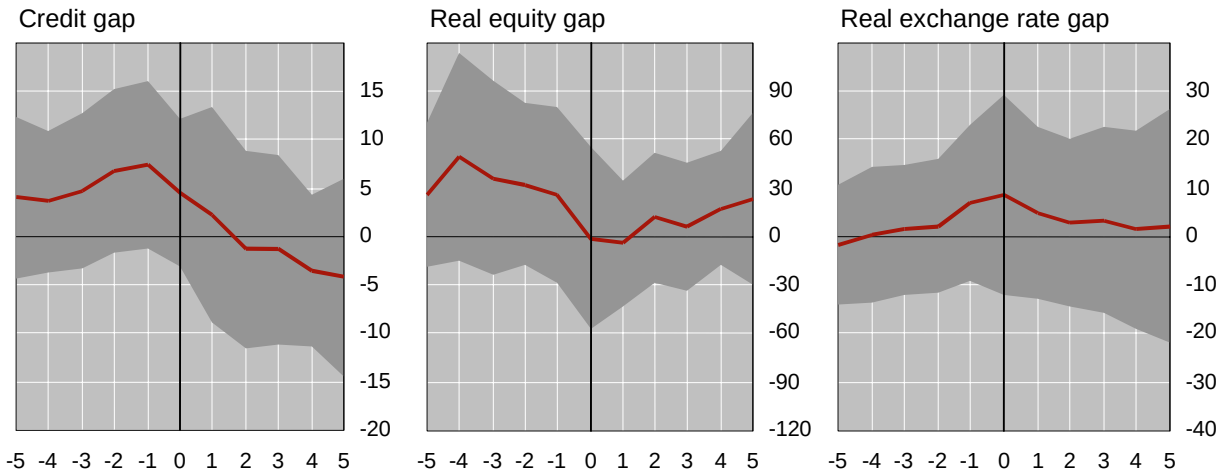
We examine the behaviour of the indicators, pooling all countries together as well as separately for industrial and emerging market economies. This could help to shed light on the extent to which the indicators need to be calibrated differently in order to take into account country-specific characteristics. One might expect the significance of the variables to differ between the two groups of countries. For instance, the exchange rate gap might play a bigger role in emerging market economies. These tend to rely more on external finance and to be more sensitive to exchange rate changes. More generally, the critical thresholds may also vary across the two groups of countries owing to factors such as the soundness of the financial infrastructure.

The results

Promising behaviour of gaps around crises

Before turning to the detailed statistical results, it may be useful to see how the various gaps behave around banking crises. Graph 1 plots the average movement in the gaps over an 11-year period centred on the crisis years. Also shown, as a shaded area, is the standard deviation across episodes, a measure of the dispersion of the behaviour of the gaps. The graph indicates that credit and exchange rate gaps tend on average to rise one period before and to peak in the crisis year, respectively. The equity price gap is consistently

Behaviour of the indicators around banking crises (all countries)



Note: The shaded area represents ±1 standard deviation around the mean. The x-axis shows a period five years either side of each crisis.

Source: Authors' calculations. Graph 1

[19] This is the one used in Bordo et al (2001), who kindly provided the underlying data. The only exception is that, in contrast to our previous work (Borio and Lowe (2002)), we add two financial stress episodes, namely one in the United States and one in the United Kingdom in the early 1990s. These are intended to capture the severe financial strains felt in these economies at the time. In fact, in the United Kingdom a number of (small) banks experienced a full-blown crisis.

Composite indicators, all countries

Horizon (years)[1]	Credit (4) and asset price (40)[2]		Credit (4) and exchange rate (7)[2]		Credit (4) and (asset price (40) or exchange rate (9))[2]		Credit (4) and asset price (40) and exchange rate (4)[2]	
	Noise/ signal	% crises predicted	Noise/ signal	% crises predicted	Noise/ signal	% crises predicted	Noise/ signal	% crises predicted
1	0.14	43	0.10	43	0.13	63	0.08	25
2	0.08	55	0.09	43	0.10	68	0.05	30
3	0.06	60	0.08	43	0.08	70	0.03	33

[1] A signal is correct if a crisis takes place in any one of the years included in the horizon ahead. Noise is identified as mistaken predictions within the same horizon. Given the data frequency and difficulties in assigning crises to a specific date, year one includes, in addition, the current year; the size of the threshold is shown in brackets. [2] All variables are measured as gaps, ie as a percentage point or percentage deviation from an ex ante, recursively calculated Hodrick-Prescott trend. The size of the threshold is shown in brackets. Credit is measured as the ratio of private sector credit to GDP; the asset price is a real equity price index; the exchange rate is a real effective exchange rate. Table 1

positive until the crisis year, but peaks well before. This is consistent with the fact that equity prices tend to fall in the years immediately preceding distress. Thus, in order to better capture the boom phase, the equity gap included in the indicator at time *t* is the one ruling two years previously. Treating equity prices this way may also help to make them better proxies for property prices, which typically peak a couple of years later (Borio and Lowe (2002)).

While this graphical evidence suggests that the variables may contain useful leading information about banking crises, their performance is assessed more formally in Tables 1 to 3. For each combination of variables and critical threshold, the tables indicate the percentage of crises correctly predicted at different horizons and the associated noise-to-signal ratio. Only the preferred threshold is shown, based on our judgment of a sensible trade-off between a low noise-to-signal ratio and a high percentage of crises correctly predicted.

Looking first at the performance of each composite indicator pooling all countries together, the following results stand out (Table 1):

Composite indicators do well

The *composite indicators tend to yield comparatively low noise-to-signal ratios* by the standards of existing work in this field. As shown in Borio and Lowe (2002), this gain in efficiency results primarily from the focus on cumulative processes and on the combination of variables. In essence, this approach reduces the frequency with which the indicators predict crises that, in the event, do not materialise.

Lengthening the horizon helps

Lengthening the horizon tends to improve the results. It often increases the percentage of crises predicted and, as would be expected, improves the noise-to-signal ratio. The improvement in performance varies across composite indicators. For instance, in the case of the credit/asset price composite indicator, moving from a one- to a three-year horizon increases the percentage of crises predicted by close to 50% and more than halves the noise-to-signal ratio. At the other end of the spectrum, in the case of the credit/exchange rate combination, there is only an improvement in the noise-to-signal ratio.

Among two-variable composite indicators, *the credit/asset price combination is superior to the credit/exchange rate alternative*, especially as the horizon is lengthened. It predicts a higher percentage of crises and exhibits a lower noise-to-signal ratio. In particular, at a three-year horizon, when the

credit gap is at least 4 percentage points and the asset gap 40%, as many as 60% of the crises are predicted, with a noise-to-signal ratio equal to just 0.06. This indicates that only roughly one in 20 observations is incorrectly classified as a crisis or non-crisis.

Credit, equity price and exchange rate gaps contain useful joint information

The assessment of the *three-variable composite indicators* depends in part on trade-offs between the types of errors made and on horizons. In particular, by comparison with the credit/asset price indicator, the indicator that combines credit with either asset prices or the exchange rate is superior at the one-year horizon. However, over a three-year horizon it predicts more crises (70%) at the cost of a somewhat higher noise-to-signal ratio (0.08), with about one incorrect classification in every 15.[20] The indicator that requires all three signals to be on simultaneously has by far the lowest noise-to-signal ratio (0.03), with about one observation incorrectly classified in every 26, but it predicts only one third of crises. This selective indicator would be relatively more useful when the authorities set the bar quite high before being prepared to take action.

Tables 2 and 3 highlight the main results for industrial and emerging market countries separately. Only a selection of composite indicators is shown. A number of points emerge:

The size of the critical thresholds is remarkably similar across the two groups of countries. This suggests that, despite structural differences, the cross-country experience may to some extent be used as a basis for calibration of indicators in individual countries with some degree of confidence. This piece of evidence is important since, as crises are inevitably infrequent events, relying on cross-country experience for calibration is very hard to avoid.

At the same time, as might be expected, *equity prices appear to perform relatively better for industrial countries and the exchange rate relatively better for emerging market countries*. This is consistent with the greater role that the exchange rate tends to play in the latter group. In fact, for industrial countries, once the equity price gap is included, the exchange rate does not seem to add

Composite indicators, industrial countries

Horizon (years)	Credit (4) and asset price (40)		Credit (4) and exchange rate (4)		Credit (4) and (asset price (40) or exchange rate (20)[1])	
	Noise/ signal	% crises predicted	Noise/ signal	% crises predicted	Noise/ signal	% crises predicted
1	0.09	50	0.11	44	0.09	50
2	0.06	56	0.10	44	0.06	56
3	0.04	63	0.10	44	0.04	63

[1] Or higher. Table 2

[20] The increase in crises predicted indicates that the episodes of distress captured by the indicators combining credit with only one of the two other gaps only partly overlap.

Composite indicators, emerging market countries

Horizon (years)	Credit (4) and asset price (40)		Credit (4) and exchange rate (5)		Credit (4) and (asset price (40) or exchange rate (13))	
	Noise/ signal	% crises predicted	Noise/ signal	% crises predicted	Noise/ signal	% crises predicted
1	0.23	38	0.15	58	0.16	67
2	0.12	54	0.11	58	0.12	71
3	0.08	58	0.10	58	0.09	75

Table 3

Some differences between industrial and emerging market economies

any useful information. Even so, the superiority of the exchange rate gap over the equity price gap in emerging market economies tends to disappear as the horizon is lengthened.

For industrial countries, the best composite indicator combines the credit with the equity price gap. It now predicts over 60% of crises at the three-year horizon, with a further sizeable reduction in the noise-to-signal ratio compared with the results for all countries taken together, from 0.06 to 0.04 (one observation in every 28 incorrectly classified).[21]

For emerging market countries, the best composite indicator combines the credit gap with either the asset price or the exchange rate gap. In this case, at a three-year horizon, 75% of crises are successfully predicted, with one wrong classification in every 13.

Overall, disaggregation into the two groups *does not yield gains in the number of crises predicted*, although it leads to *some improvement in the noise-to-signal ratio*. At the three-year horizon, the noise-to-signal ratio for the aggregate set of observations falls from 0.08 to 0.06. This results from dropping the exchange rate for industrial countries and increasing the threshold of the exchange rate gap for emerging market economies.

Which crises are actually predicted and which ones are missed? The indicators capture almost all the crises mentioned in the first section of this study. The only exceptions are South Korea and Taiwan, China in the late 1990s. In the case of Korea, this is because the credit and exchange rate gap indicators do not signal a crisis simultaneously, but just one year apart. Either of the two, taken in isolation, would have signalled danger. For Taiwan, China the horizon is one year too short: the crisis would have been captured at a four-year horizon. In both cases, real estate prices might have helped considerably.[22]

[21] Note that even if only one prediction in every 28 is wrong it does not follow that crying wolf too often is entirely avoided. This is because of the large number of observations when the signal is "off" correctly. For instance, in this case, the signal is "on" incorrectly (ie predicts crises that do not materialise) 60% of the time. Only some of these "false positives" could be avoided by a slight further extension of the horizon. In the case of the most conservative indicator (all gaps "on" simultaneously), this percentage drops to less than 40%.

[22] This is also clearly true for another episode that is missed, namely the so-called secondary banking crisis in the United Kingdom in the early 1970s. The crisis is picked up by credit alone, but not once the equity price gap is added. This is because equity prices were not

Conclusion

Our analysis suggests that it is possible to construct simple composite indicators of banking crises that can be useful in assessing the risk of future financial distress with a reasonable degree of confidence. Obviously, such indicators of financial imbalances should at best be used as one element in a more thorough assessment of vulnerabilities, and never as substitutes for it.

There are a number of caveats to our findings. First, while the performance of the indicators over the period examined is very good, the procedure employed does not permit us to make statements about the statistical precision with which the specific thresholds are identified. Second, crises are by their very nature rare events. Inevitably, therefore, calibration for individual countries can only be based on the assumption that the experience of other countries can be relied upon to make inferences. Finally, we have not tested the indicators out of sample. As always, the past need not be a reliable guide for the future. For example, the major efforts made in recent years to improve the infrastructure of financial systems might reduce the likelihood of distress for any given threshold level.

Despite these caveats, on balance the results are encouraging. The historiography of financial crises suggests that the core regularities on which the indicators are based have been so common in the past that they may indeed prove comparatively robust in the future. Moreover, research in this area is very much in its infancy; more work could provide the basis for more reliable judgments. Several directions spring to mind. More and better data should help to construct better indicators; real estate prices are critical here. It might be fruitful to perform "out of sample" exercises by testing these indicators back in time. In particular, one could look at the pre-World War II period, when banking crises were more common. If successful, this could instil greater confidence in the reliability of the indicators. Finally, following similar principles, further indicators could be developed, tailored to types of banking crises other than those considered here.

References

Bank for International Settlements (2001): "Cycles and the financial system", *BIS 71st Annual Report*, Chapter VII, pp 123–41, June.

Bell, J and D Pain (2000): "Leading indicator models of banking crises – a critical review", *Financial Stability Review*, Bank of England, issue 9, article 3, pp 113–29, December.

Bordo, M D, B Eichengreen, D Klingebiel and M S Martinez-Peria (2001): "Financial crises: lessons from the last 120 years", *Economic Policy*, April.

Borio, C (2002): "Towards a macroprudential framework for financial supervision and regulation?", lecture delivered at the CESifo Summer Institute

particularly buoyant in real terms during the inflationary period. The crisis was caused by heavy lending to the commercial real estate sector.

2002 Workshop on banking regulation and financial stability, Venice, pp 17–18, July, *BIS Working Papers*, forthcoming.

Borio, C and P Lowe (2002): "Asset prices, financial and monetary stability: exploring the nexus", *BIS Working Papers*, no 114, Basel, July.

Borio, C, C Furfine and P Lowe (2001): "Procyclicality of the financial system and financial stability: issues and policy options", in *BIS Papers*, no 1, pp 1-57.

Borio, C, B English and A Filardo (2002): "A tale of two perspectives: new or old challenges for monetary policy?", *BIS Working Papers*, forthcoming.

Chang R and A Velasco (1998): "Financial crises in emerging markets: a canonical model", *NBER Working Paper*, no 6606, Boston, MA.

Corsetti, G, P Pesenti and N Roubini (1999): "What caused the Asian currency and financial crisis?", *Japan and the World Economy*, vol 11(3), pp 305–73, October.

Diamond, D W and P H Dybvig (1983): "Bank runs, deposit insurance and liquidity", *Journal of Political Economy*, 91(3), pp 401–19.

Eichengreen, B and C Arteta (2000): "Banking crises in emerging markets: presumptions and evidence", *Center for International and Development Economics Research Working Paper*, C00-115, August.

Gavin, M and R Hausmann (1996): "The roots of banking crises: the macroeconomic context", in R Hausmann and L Rojas-Suarez (eds), Banking Crises in Latin America, Baltimore, *Johns Hopkins University Press*, pp 27–63.

Goodhart, C and P J R De Largy (1999): "Financial crises: plus ça change, plus c'est la même chose", *LSE Financial Markets Group Special Paper*, no 108.

Gourinchas, P-O, R Valdes and O Landerretsche (1999): "Lending booms: some stylized facts", unpublished manuscript, Princeton University and Central Bank of Chile, August.

Hawkins, J and M Klau (2000): "Measuring potential vulnerabilities in emerging market economies", *BIS Working Papers*, no 91, October.

Hoggarth, G and V Saporta (2001): "Costs of banking system instability: some empirical evidence", *Financial Stability Review*, Bank of England, issue 10, article 5, June.

International Monetary Fund (2002): *Global Financial Stability Report*, 13 March.

Kaminsky, G and C Reinhart (1999): "The twin crises: the causes of banking and balance-of-payments problems", *American Economic Review*, vol 89, no 3, pp 473–500, June.

Kent, C and P D'Arcy (2001): "Cyclical prudence and credit cycles in Australia", in *BIS Papers*, no 1, Basel, pp 58–90, March.

Kindleberger, C (1996): "Manias, panics and crashes", *Cambridge University Press*, Cambridge, 3rd edition.

Lowe, P (2002): "Credit risk measurement and procyclicality", *BIS Working Papers*, no 116, Basel, September.

McFadden, D F, R Eckaus, G Feder, V Hajivassiliou and S O'Connell (1985): "Is there life after debt? An econometric analysis of the creditworthiness of developing countries", in J Cuddington and G Smith (eds), *International debt and the development countries*, International Bank for Reconstruction and Development/World Bank, Washington DC.

Radelet, S and J D Sachs (1998): "The East Asian financial crisis: diagnosis, remedies, prospects", *Brookings Papers on Economic Activity*, vol 28, no 1, pp 1–74.

Gabriele Galati

+41 61 280 8923
gabriele.galati@bis.org

Settlement risk in foreign exchange markets and CLS Bank[1]

Introduction

In September 2002, CLS Bank, a new financial institution set up to reduce the risk involved in settling foreign exchange transactions, began operation. This article describes how settlement risk arises, and how central banks and market participants have tried to reduce it. After reviewing the initiatives taken over the last two decades, the article discusses the background to the formation of CLS Bank and its likely effect on relevant risks.

Herstatt

The collapse of Bankhaus Herstatt ...

On 26 June 1974, at 15:30 CET, the German authorities closed Bankhaus Herstatt, a medium-sized bank that was very active in foreign exchange markets.[2] On that day, some of Herstatt's counterparties had irrevocably paid large amounts of Deutsche marks to the bank but not yet received dollars in exchange, as the US financial markets had just opened for the day.[3] Herstatt's closure started a chain reaction that disrupted payment and settlement systems. Its New York correspondent bank suspended all US dollar payments from the German bank's account. Banks that had paid Deutsche marks to Herstatt earlier that day therefore became fully exposed to the value of those transactions. Other banks in New York refused to make payments on their own account or for their customers until they received confirmation that their countervalue had been received. These disruptions were propagated further through the multilateral net settlement system used in New York. Over the next three days, the amount of gross funds transferred by this system declined by an estimated 60%.

... and other disruptions to settlement systems

[1] The views expressed in this article are those of the author and do not necessarily reflect those of the BIS. Michela Scatigna and Stephan Arthur provided excellent research assistance.

[2] For a discussion of Herstatt Bank's role in foreign exchange markets, see Remolona et al (1990).

[3] The value of transactions to be settled for Bankhaus Herstatt was estimated at $200 million. Some banks had also entered into forward trades with Herstatt. These trades were not yet due to be settled when the bank was closed and had to be replaced.

Bankhaus Herstatt's closure was the first and most dramatic case of a bank failure where incomplete settlement of foreign exchange transactions caused severe problems in payment and settlement systems. Several other episodes occurred in the 1990s but they were less disruptive.[4] In February 1990, problems were created by the failure of Drexel Burnham Lambert Group, whose London subsidiary, Drexel Burnham Lambert Trading, was active in foreign exchange and gold markets. In July 1991, the liquidation of BCCI caused losses to its UK and Japanese foreign exchange counterparties. At the time of the attempted coup in the Soviet Union in August 1991, settlement systems were affected by uncertainty about some financial institutions that were either operating in the Soviet Union or owned by institutions based there. The collapse of Baring Brothers in February 1995 caused problems in the ECU clearing arrangements.

Settlement risk

The origin of the problem

The collapse of Herstatt highlighted the fact that major disruptions can arise out of the risk exposures involved in the traditional method of settling foreign exchange. These exposures come about because settlement typically takes place in the countries of issue of each currency, so that the separate legs of a foreign exchange transaction are settled independently and in many cases at significantly different times.

A market survey conducted by central banks in 1995 found that there was commonly a lag of at least one or two business days between the time when a party to a foreign exchange transaction can no longer cancel unilaterally a payment instruction for the currency it sells and the time when the currency purchased has been received with finality (CPSS (1996)). In addition, the survey found that it could take a further one or two business days for a bank to establish with certainty whether it had received payment. Hence, more than three days – plus any intervening holidays and weekends – could elapse before the bank knew with certainty that it had received the currency it had bought.

One key problem was that the major payment systems used to transfer large-value funds between banks did not operate to a daily timetable that permitted simultaneous or near simultaneous settlement of the currencies. There was limited overlap in the operating hours between time zones.[5] Moreover, many of these payment systems were designed in such a way that final settlement of each day's payments took place at a single point in time, namely the end of the system's operating day.

---

[4] CPSS (1996) provides a detailed account of these episodes.

[5] For example, delivery of dollars to a bank in Japan by a US bank in New York would occur during New York business hours, while the corresponding delivery of yen by the Japanese bank to its US counterparty would occur during Tokyo business hours. The bank delivering yen could have to wait up to 12 hours before receiving dollars (see Graph 1).

Foreign exchange settlement risk ...

The risk that one party in a foreign exchange trade pays out the currency it sold but does not receive the currency it bought is called foreign exchange settlement risk or "Herstatt" risk. The exposure to a single counterparty, even if short-lived, can be very large relative to the capital of the participants in a transaction. In fact, it can be a multiple of a bank's capital in certain conditions (CPSS (1996)).

... has two main aspects

Settlement risk has two main aspects: credit risk and liquidity risk. The reason why credit and liquidity problems arise is that in foreign exchange markets, the full notional value of each currency is exchanged. Credit risk arises because after a bank commits irrevocably to pay its currency, its counterparty may fail to meet its obligation for full value when due or at any time thereafter. In the extreme case of counterparty failure, such as that of Bankhaus Herstatt, the bank which paid does not receive the full countervalue, but rather ends up with an unsecured claim in the insolvency procedure. The ultimate countervalue recovered after a potentially long delay could be significantly less than the amount originally paid in the selling currency. Liquidity risk exists since a counterparty may not be able to settle for full value at the due date but could do so at some unspecified time thereafter. Liquidity exposure increases with the size of the transaction, and the potential seriousness of the risk increases if the markets that have to be accessed at short notice to obtain alternative sources of funds are unavailable or lack depth

Payment and settlement activity

Daily averages

	Number of transactions[1]		Value of transactions[2]		Value of transactions[3]
	1999	2000	1999	2000	2000
Canada					
LVTS	12	14	61	69	6.35
Japan					
FXYCS	40	37	248	230	5.05
BOJ-NET	19	19	1,202	1,303	28.59
Switzerland					
SIC	562	593	109	105	43.69
United Kingdom					
CHAPS Sterling	79	86	287	295	31.04
CHAPS Euro	10	13	142	152	15.99
United States					
Fedwire	408	430	1,363	1,507	15.14
CHIPS	227	237	1,182	1,159	11.64
European Union					
EURO1	70	98	175	197	3.35
TARGET	168	190	950	1,045	17.78

[1] In thousands. [2] In billions of US dollars. [3] As a percentage of GDP.

Source: CPSS (2002). Table 1

at the time of day they may be called on. One important source of liquidity risk is operational risk. The payment process is subject to this type of risk to the extent that a payment may be misdirected or may not be carried out on time owing to a technical failure or human error.

Systemic implications

The dynamics of the collapse of Herstatt showed that settlement risk can have systemic implications when the failure of a bank to meet its payment obligations affects the ability of other market participants to fulfil theirs. Not least because of the magnitude of foreign exchange settlement flows, payment systems can be an important channel for the propagation of systemic strains. To give an idea of the relative size of overall exposures, the daily flows through UK payment and settlement systems are equivalent to 47% of annual UK GDP (Table 1).

Foreign exchange markets particularly vulnerable

Settlement risk in foreign exchange markets is likely to have systemic implications for several reasons. First, foreign exchange activity has an international dimension, since currencies are cleared in their home country. Since the working hours of payment systems in the biggest foreign exchange centres – London, New York and Tokyo – do not overlap completely, a large proportion of foreign exchange activity is settled outside the business hours of one of the counterparties. Second, trading in foreign exchange markets has grown very rapidly and is very large compared to activity in other financial markets. In April 2001, average daily trading in the euro/dollar pair, the biggest foreign exchange market segment, was $354 billion, well above the $298 billion turnover in the largest bond market (US Treasuries) and the $42.3 billion traded on average each day on the world's most active stock market (the New York Stock Exchange).[6] Third, trading between banks accounts for the largest share of foreign exchange market activity. According to the 2001 Central Bank Survey of Foreign Exchange and Derivatives Market Activity, inter-dealer trading captured about 60% of total turnover (Table 2). Finally, activity in foreign exchange markets is increasingly concentrated in the hands of relatively few banks.

Reported foreign exchange market turnover by counterparty[1]

Daily averages in April, in billions of US dollars

	1992	1995	1998	2001
Total	776	1,137	1,429	1,173
With reporting dealers	540	729	908	689
With other financial institutions	97	230	279	329
With non-financial customers	137	178	242	156
Local	317	526	657	499
Cross-border	392	611	772	674

[1] Adjusted for local and cross-border double-counting. Excludes estimated gaps in reporting.

Source: BIS (2002). Table 2

[6] Sources: BIS (2002); Federal Reserve Bank of New York (cited by the Bond Market Association); NYSE.

Initiatives to reduce settlement risk

In 1996, the G10 central banks set out a three-track strategy to reduce the systemic risk associated with foreign exchange settlement. The strategy comprised action by individual banks to control their foreign exchange settlement exposures, action by industry groups to provide risk-reducing multicurrency services and action by central banks to induce rapid private sector progress (CPSS (1996)).[7]

Reduction in the delay between two legs of a transaction ...

Subsequently, two complementary approaches were followed to reduce settlement risk.[8] The first approach aimed to shorten the duration of settlement exposures. One way in which this was achieved was through improved measurement and management of exposures by individual banks. In addition, improvements in high-value payment systems increased the potential for a closer alignment of settlement timings. Intraday final settlement was introduced more widely, through the adoption of real-time gross settlement (RTGS) systems. RTGS systems process and settle payments on an item by item basis in real time during the system's operating hours. These operating hours were extended in the 1990s, increasing the overlap between time zones (Graph 1).

... and in the number and size of payments requiring settlement

The second approach focused on reducing the settlement flows between counterparties associated with the original trades. This was achieved mainly by private sector initiatives to develop bilateral and multilateral arrangements for the netting of foreign exchange transactions accompanied by legislative changes to recognise netting arrangements. In bilateral netting arrangements, such as FXNET, trades are netted by counterparty pair each day, resulting in one payment per currency for each of the two counterparties. A multilateral netting arrangement, ECHO, also operated for a few years in the 1990s. Amounts owed among ECHO members were netted each day through a clearing house, resulting in one payment per member per currency to or from the clearing house. Multilateral netting reduced the settlement flows to which it was applied by an estimated 70%, compared with 50% for bilateral netting (CPSS (1998)).

But settlement risk remained important

While these various measures reduced either the size or the duration of settlement exposures and certainly reduced liquidity pressures, they did not achieve simultaneous finality of received payments. Hence, all these initiatives contributed to a decrease in settlement risk but did not eliminate it.

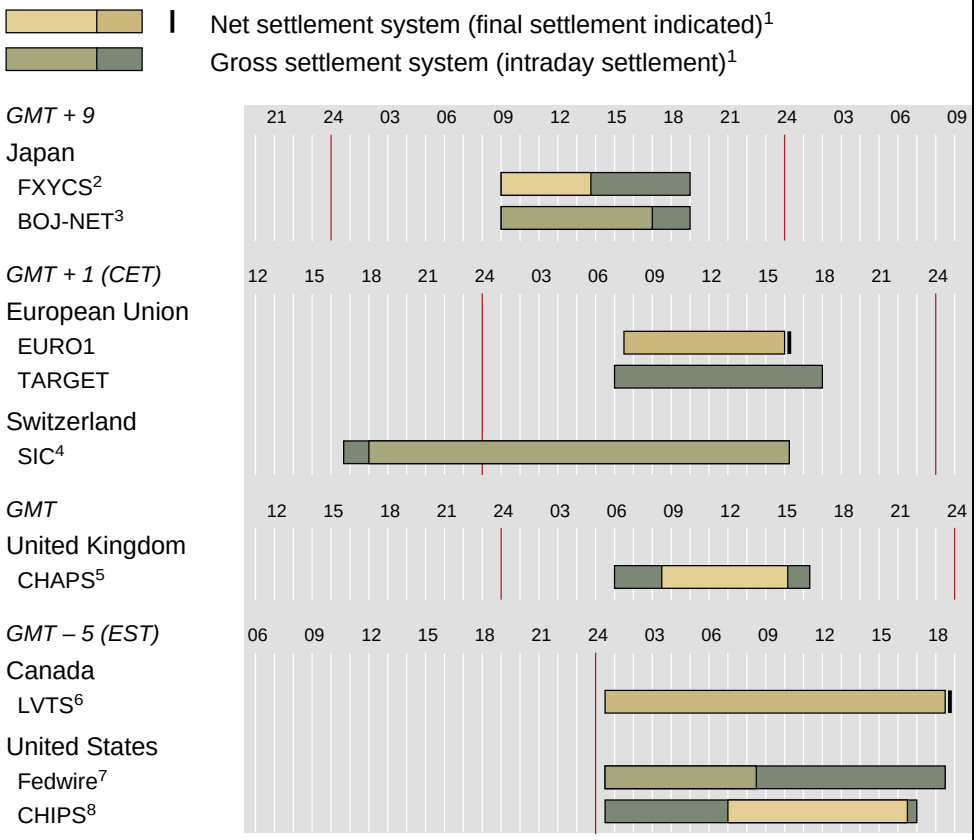
---

[7] See CPSS (1993, 1996, 1998) for a detailed analysis of the issues involved in settlement risk.

[8] Neither of these approaches aimed at changing the market convention for spot deals that settlement would take place two days after the agreement to trade, which does not affect settlement risk.

Operating hours of selected large-value interbank transfer systems

For same value day



[1] The lighter shading represents operating hours in 1993, while the full extent of both shaded areas represents operating hours in November 2002. A net settlement system was in operation in 1993 for FXYCS, CHAPS and CHIPS, but they have since moved to a gross settlement system (FXYCS to a system with both DNS mode and RTGS mode, see footnote 2 below, CHIPS to a hybrid system, see footnote 8 below). [2] Although in 1998 FXYCS introduced RTGS mode operation from 09:00 to 17:00, almost all payments are still processed in DNS mode. Since May 2002, the closing time for RTGS mode operation has been extended from 17:00 to 19:00 for participants who have applied for access to the system until that time; this can be extended to 20:00 if necessary. [3] Since May 2002, the closing time of the system has been extended from 17:00 to 19:00 for participants who have applied for access to the system until that time; this can be extended to 20:00 if necessary. [4] Operating hours were extended in 2002. [5] Operating hours were extended at the beginning of 1999. [6] The initialisation period, for collateral pledging/valuation, setting of bilateral limits, etc, begins at 00:30; payment message exchange begins at 01:00. [7] Operating hours were extended in 1997. [8] A substantial proportion of the day's payments (by value) is effectively offset by bilateral or, in some cases, multilateral netting of payments prior to settlement. However, the majority of payments (by number) are settled on a gross basis. Settlement is final intraday.

Source: National data. Graph 1

CLS Bank

The payment-versus-payment approach

In the mid-1990s, efforts to tackle the problem of settlement risk led a group of major foreign exchange market participants, known as the G20 banks, to work on a solution based on the payment-versus-payment principle. According to this principle, the two legs of a transaction are settled simultaneously, and in such a way that the one cannot occur without the other. In 1997, the G20 banks set up a limited purpose financial institution, CLS Bank International, to develop their chosen solution.

CLS Bank went live in September 2002

In September 2002, CLS Bank went into operation, settling transactions involving seven currencies: the US dollar, euro, yen, pound sterling, Swiss franc, Canadian dollar and Australian dollar.[9] In mid-November 2002, CLS had 67 shareholders, mainly large international banks. In the first two months of its operations, the volume of transactions settled through CLS Bank increased rapidly (Graph 2).

Different types of membership

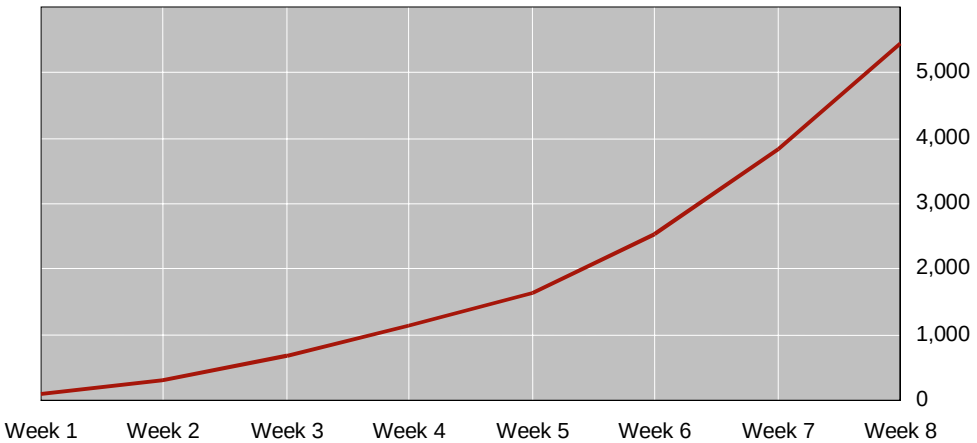
Market participants can make use of the CLS system in different ways, depending on whether they are settlement members or third parties. Settlement members hold multicurrency settlement accounts at CLS Bank and can submit directly to CLS Bank the details of transactions, either on their own behalf or for their customers. They are responsible for providing the funding for the amounts to be settled. Settlement members must be CLS shareholders. Settlement members may also offer third-party services whereby they act as principal but submit details of transactions to be settled on behalf of their respective customers. CLS Bank itself is not involved in any relationship with third parties, which means that if a third party fails to meet its obligation vis-à-vis a settlement member, CLS Bank is not directly affected.

Settlement in different phases

Settlement through the CLS system takes place in phases.[10] At the beginning of the process, members submit details of transactions to be settled, normally by 00:00 CET on the settlement day. Based on all the instructions, CLS Bank then calculates each settlement member's net total pay-in/payout position for each currency and at 06:30 CET issues a pay-in schedule for each member. Payments to CLS Bank are executed between 07:00 and 12:00 CET,

Cumulative gross value of payment instructions settled in CLS bank

In billions of US dollars



Source: CLS Group. Graph 2

[9] The Swedish krona, Norwegian krone and Danish krone, and the Hong Kong, New Zealand and Singapore dollars are expected to be the next currencies to be added to the system.

[10] In this article, the description of the CLS mechanism is confined to settlement members. For a detailed description of settlement under the CLS system, see also Bronner (2002).

subject to strict hourly deadlines. At least part of this time is within the operating hours of six of the seven RTGS systems used to make payments to and from CLS Bank. In Australia, CLS payments are made during a special evening session of the payment system. Each settlement member holds a single multicurrency account, with sub-accounts for each of the seven currencies. CLS Bank settles each trade over these accounts by simultaneously crediting the buyer's account in the currency that is bought and debiting the seller's account in the currency that is sold. Payments between settlement members and CLS Bank are made through the local payment system using the account that, for each currency, CLS Bank holds at the respective central bank.

In the CLS system, there is a clear distinction between the settlement of transactions and funding, ie the transfer of currency between settlement members and CLS Bank. Trades are settled between members on a *gross* basis on CLS Bank's books. By contrast, member banks have to fund only their *net* positions on CLS Bank's central bank accounts.

The impact of CLS on foreign exchange markets

The CLS system is likely to have a significant impact on banks that are active in foreign exchange markets. Its design, and in particular the funding arrangements, imply high potential efficiency gains. According to simulation exercises conducted by CLS Bank, in normal times about 90% of all foreign exchange market transactions could be settled in less than one hour. These advantages of CLS will come at the cost of increased demands on banks' liquidity management because of the tightness of the schedule of timed payments and the fact that a large number of transactions will be settled outside normal business hours, particularly in some currencies.

Does CLS eliminate settlement risk?

A key issue is the effect of CLS on the risks involved in foreign exchange settlement. To understand this effect, it is useful to look at its possible impact on the two components of settlement risk, ie credit risk and liquidity risk.

Credit risk is eliminated ...

CLS eliminates credit risk in all but very extreme circumstances. Settlement members generally do not lose principal if their counterparty fails. The mechanism that the CLS system uses to achieve this is based on the payment-versus-payment principle and the positive account balance rule. The positive account balance rule requires settlement members to hold a non-negative overall balance (ie taking all currencies together) on their CLS Bank accounts at all times.[11] The idea is that if a settlement member defaults, CLS Bank will not be owed money by this member and will have sufficient funds to pay the other settlement members.

CLS Bank uses two mechanisms to prevent overall balances from turning negative because of adverse exchange rate movements during the settlement process. First, it applies "haircuts" to the exchange rates used to compute each

[11] This is equivalent to saying that settlement members cannot have intraday overdrafts overall. At the end of each day, they will always hold a zero balance on their CLS Bank accounts.

member's overall balance.[12] Haircuts reduce the positive value of settlement members' long positions and increase the negative value of their short positions. Second, limits are imposed on the extent of any negative balance in individual currencies. These limits are specific to each currency.[13]

... except in some very extreme circumstances

However, some residual credit risk remains in the CLS system, to the extent that there is a possibility of CLS Bank having a credit exposure to a member that fails and of surviving members becoming liable under a loss-sharing agreement. This could only occur in exceptional circumstances, where there is a pay-in failure by a member, the size of whose negative balance in one or more currencies combines with an intraday movement in the relevant exchange rate(s) so great that the haircuts are not enough to prevent the overall balance of the failing bank from turning negative. In this extreme case, the amount that CLS Bank owes its settlement members may exceed the aggregate amount of currencies that CLS Bank holds. To protect itself against these extreme circumstances, CLS Bank has in place provisions for loss-sharing among surviving members.[14] The idea is that CLS Bank should find the necessary resources itself rather than having to turn to external support.

Facilities in place to reduce liquidity risk ...

The effect on liquidity risk is more complex. In the first place, in respect of transactions already settled over the books of CLS Bank, particular arrangements are in place to enable the company to complete its payouts in the event that a member fails to pay in. The positive account balance rule ensures that there is value on that member's account. However, the rule applies to all currencies taken together, rather than to each currency. Hence, CLS Bank is not automatically able to pay out to other members in the currencies due. To enable it to complete its payouts in the relevant currencies, CLS Bank has in place liquidity facilities with major private sector market players, under which it can swap one currency for another in these circumstances.

... but not sufficient to eliminate it

However, while the CLS system reduces liquidity risk significantly, the liquidity facilities in place are not sufficient to eliminate liquidity risk on settled transactions for several reasons. First, these facilities are finite. Their amounts are related to the limits on negative balances in individual currencies in such a way that this mechanism can cope at least with the default of one member and one liquidity provider. However, they are not necessarily sufficient to cope with multiple defaults that occur on the same day. In such extreme circumstances, CLS Bank might have to make payouts to some members in the wrong currencies. This problem could potentially be exacerbated by the fact that key players in foreign exchange markets are likely to be at the same time

---

[12] A haircut is the difference between the market value of a security and its collateral value (CPSS (2001)).

[13] These are called short position limits. CLS Bank also imposes aggregate short position limits on settlement members, which represent the maximum total of short positions that they may incur. These aggregate limits are specific to the settlement member.

[14] Settlement members will also retain some credit exposure to their third parties. This issue is not treated in this article (see footnote 11).

settlement members *and* liquidity providers in some currencies. To address this problem, CLS has the resources to deal with the failure of the largest settlement member obligor to CLS, even if that failing settlement member is also the largest liquidity provider in each currency.

CLS does not guarantee that it will be able to settle all transactions submitted to it, if a settlement member fails to pay in accordance with its schedule. Under such circumstances, some transactions may remain unsettled that day and the calculation of pay-in and payout amounts for other members will be revised accordingly. This possibility of short-notice alterations to pay-in schedules calls for a high degree of sophistication on the part of settlement members in their liquidity management.

To facilitate liquidity management by reducing expected pay-in amounts, settlement members can make use of a tool called the in/out swap. Using this tool, a settlement member with a large pay-in to make to CLS Bank in one currency and a large payout due in another currency is matched with another settlement member in the opposite position. In/out swaps facilitate the task of liquidity management, but they reintroduce an element of risk, in that the "out" legs of the swaps are settled using traditional means of settlement and are subject to traditional settlement risks.

Implications for operational risk

While the CLS system virtually eliminates credit risk and greatly reduces liquidity risk, it imposes highly sophisticated technical requirements on the system, as well as on settlement members. This is particularly true given the tight time schedule for pay-ins. Operational problems at one member bank or in one national payment system could have important repercussions. Hence, the introduction of CLS changes the nature of the potential sources, as well as the channels for the potential impact, of operational problems. Moreover, it is unclear what impact large time-sensitive payment requirements will have on each currency's national RTGS system and hence on the banking system as a whole.

Conclusions

The payment system disruptions created by the collapse of Bankhaus Herstatt in 1974 and the growth of foreign exchange markets have highlighted the systemic implications of settlement risk. In the last two decades, steps have been taken to improve the banking system's ability to contain settlement risk, mainly by reducing the delay between the two legs of a transaction and by devising mechanisms to reduce the settlement flows between counterparties. Significant progress has been achieved more recently by the implementation of CLS, a service set up by private sector market participants to settle both legs of foreign exchange transactions simultaneously for its members over its own books.

CLS could potentially have a major impact on foreign exchange settlement. It is designed to reduce credit and liquidity risk significantly and increase the efficiency of settlement operations. However, part of this risk may not be eliminated from the banking system as a whole. In particular, because of the tightness of its time schedule, the time sensitivity of payments and the fact

that it relies on RTGS systems in different time zones around the world, the CLS system may put a premium on managing operational risk efficiently and make liquidity management an increasingly demanding task for major banks, as well as the banking system as a whole.

References

Bank for International Settlements (2002): *Triennial central bank survey of foreign exchange and derivatives market activity 2001*, March.

Bronner, M (2002): "The CLS^{TM} system: reducing settlement risk in foreign exchange transactions", *Financial Stability Review*, Bank of France, November.

Committee on Payment and Settlement Systems (1993): *Central bank payment and settlement services with respect to cross-border and multi-currency transactions*, Bank for International Settlements, Basel, September.

——— (1996): *Settlement risk in foreign exchange transactions*, Bank for International Settlements, Basel, March.

——— (1998): *Reducing foreign exchange settlement risk: a progress report*, Bank for International Settlements, Basel, July.

——— (2001): *A glossary of terms used in payments and settlement systems*, Bank for International Settlements, Basel, July.

——— (2002): *Statistics on payment and settlement systems in selected countries*, Bank for International Settlements, Basel, July.

Remolona, E, R Cantor, M Gaske, L Hargraves, L Schwartz and V Stein (1990): "How safety nets work", *Central Banking*, Summer.

William B English

+41 61 280 8514
bill.english@bis.org

Interest rate risk and bank net interest margins[1]

Banks and their supervisors have spent considerable time and effort in recent years developing systems for monitoring and managing interest rate risk.[2] This special feature examines that specific component of interest rate risk arising from the possible effects of changes in market interest rates on bank net interest margins.

Such effects can be very large if interest rate risk is not managed carefully. For example, the secondary banking crisis in the United Kingdom in the 1970s reflected, at least in part, the funding of longer-term assets with short-term liabilities.[3] Similarly, funding of long-term, fixed rate mortgages with savings deposits led to a very sharp drop in net interest margins at US thrift institutions in the early 1980s when interest rates rose to historic highs and the yield curve inverted. The result was actually *negative* net interest income for two years at US thrifts, after net interest margins had averaged nearly 1.5% over the preceding decade (FHLBB (1984)).

By contrast, the results presented here suggest that commercial banks in the 10 industrial countries considered have generally managed their exposures to volatility in the yield curve in ways that have limited effects on their net interest margins. Thus, while fluctuations in net interest margins could be an important source of uncertainty in bank profitability – and could surely have adverse effects for particular institutions – changes in interest rates seem unlikely to undermine sharply the health of the banking sector through their effects on net interest income.

The next section provides background on interest rate risk at banks, and discusses methods for assessing it. Given data limitations, the approach taken here focuses on the effects of market interest rates on the average yields on bank assets and liabilities and also on bank net interest margins. The subsequent section reports on the empirical findings. A final section provides some concluding remarks and caveats.

---

[1] The views expressed in this article are those of the author and do not necessarily reflect those of the BIS. Gert Schnabel provided invaluable assistance with the data.

[2] For a detailed discussion of interest rate risk, see BCBS (2001). For a broader perspective on bank supervision, see BCBS (1997).

[3] For a discussion of this crisis, see Remolona et al (1990).

Assessing interest rate risk

Assessing banks' interest rate risk directly ...

A bank's interest rate risk reflects the extent to which its financial condition is affected by changes in market interest rates. There are two different ways of thinking about such effects. The first approach focuses on the impact of changes in market interest rates on the *value* of bank assets, liabilities and off-balance sheet positions (potentially including those that are not marked to market for reporting purposes), and so arrives at an overall assessment of the impact of changes in market interest rates on the economic value of the bank. The second approach focuses on the implications of movements in market rates for the future *cash flows* that the bank will obtain. Since the present discounted value of the bank's cash flows must equal the economic value of the bank, these two approaches are consistent and both can be useful. For example, a focus on flows may suggest impending liquidity problems as cash flow dwindles. Alternatively, a sharp decline in economic value may imply that the bank is insolvent, even if operations continue to provide cash in the near term. In either case, action on the part of both bank managers and national authorities would seem appropriate.

... can require a great deal of information ...

To assess directly the extent of a bank's interest rate risk following either of these two perspectives would require detailed information about a number of possible sources of interest rate risk (see the discussion in the box "Sources of interest rate risk" on page 69). Clearly, one would need information on the pricing of the bank's assets and liabilities, including repricing periods and base rates. Moreover, this data would need to be supplemented by information on the adjustments that the bank is likely to make to the rates on assets and liabilities that it can reprice at its discretion following changes in market rates. One would also require information on the likelihood that bank customers would choose to repay loans or withdraw funds early as a result of changes in market rates. Finally, one would need information sufficient to allow an evaluation of other potential sources of interest rate risk, including the interest sensitivity of fee income and off-balance sheet exposures.

... which researchers may find hard to obtain

In addition to its inherent complexity, such a direct approach is difficult for the researcher to implement because the necessary information is lacking. There is a paucity of data on the repricing intervals of banks' assets and liabilities in many countries. In addition, while there has been considerable study of the pricing of some types of deposits and loans, such information is hardly complete.[4] Finally, the extent to which bank customers take advantage of the options embedded in some bank contracts is generally hard to assess because of a lack of data on such behaviour.[5]

---

[4] For recent results, see Banking Supervision Committee (2000).

[5] There has been considerable work on the prepayment behaviour of US residential mortgage borrowers, but even here the effects for a particular bank are likely to depend considerably on the specifics of the pool of mortgages held. See, for example, Stanton (1996).

Sources of interest rate risk

Interest rate risk can come in a variety of forms, including repricing risk, yield curve risk and basis risk. A bank will face repricing risk if either the average yield on its assets or that on its liabilities is more sensitive to changes in market interest rates. Such a difference in sensitivity could reflect a number of possible mismatches in the characteristics of assets and liabilities. First, fixed rate assets and liabilities could have different maturities. Second, floating rate assets and liabilities could have different repricing periods, with base rates that have maturities similar to their respective repricing periods (assets that reprice annually based on a one-year rate and liabilities that reprice quarterly based on a three-month rate, for example). Third, floating rate assets and liabilities could have base rates of different maturities (assets that reprice annually based on a long-term rate along with liabilities that reprice annually based on a one-year rate, for example). Fourth, in many countries there are assets and liabilities for which banks can adjust pricing at will (eg savings deposits and some types of retail loans) and the rate-setting policies that banks follow determine the effective repricing behaviour of such instruments. The pricing decisions in these cases will presumably depend on a variety of factors in addition to market interest rates, including the expected behaviour of bank customers and the extent of competition in the markets concerned. Finally, in some cases, bank customers have the option either to repay loans or withdraw their deposits at low (or no) cost, and the decisions of such customers will influence the response of the average pricing of such assets and liabilities to changes in market interest rates.[①]

Even if the yields on a bank's assets and liabilities adjust to changes in market rates to the same extent on average, a bank may still be subject to yield curve risk. Yield curve risk reflects the possibility that changes in the shape of the yield curve could have differential effects on the bank's assets and liabilities. For example, if a bank's assets and liabilities reprice annually, it might balance a medium-term base rate for its assets with a mixture of short-term and long-term base rates for its liabilities. In that case, increased curvature of the yield curve would, by boosting medium-term yields relative to short- and long-term yields, raise the rate on the bank's assets relative to the average cost of its liabilities.

Floating rate assets and liabilities that reprice at similar times and have base rates of similar maturity still may involve interest rate risk. If the instruments have different base rates, the bank will be subject to basis risk reflecting the possibility that the two base rates will diverge unexpectedly owing to differing credit risk or liquidity characteristics. For example, yields on a bank's floating rate assets could be tied to government security yields, while those on its floating rate liabilities could be tied to an interbank rate (eg Libor). In that case, a shock that boosted investors' demand for safety and liquidity might increase private yields relative to government yields, raising the cost of the bank's liabilities relative to the yield on its assets.

Banks may also be subject to interest rate risk through interest sensitivity of their non-interest income. For example, lower mortgage interest rates could lead to prepayments that deplete the pool of mortgages serviced by a bank, thereby trimming its fee income.[②] Perhaps more importantly, at least for large institutions, banks may have significant interest rate exposures embedded in their off-balance sheet positions, either as a hedge of their on-balance sheet interest rate exposures or as a result of trading activity in derivatives markets.

In practice, banks will generally have a mix of all of these types of interest rate risk, with the effects potentially offsetting or reinforcing one another. It is the complexity of the resulting combination of factors that makes interest rate risk difficult to manage.

---

① A prominent example is the relatively low-cost refinancing of home mortgages in the United States. See Deep and Domanski (2002) for a discussion of the causes and consequences of mortgage refinancing in the United States. ② In some cases, however, fees associated with lending activity are amortised over the life of the credit and are included in interest income.

However, one can use data on banks' interest income and expense ...

As a result of these difficulties, a simpler approach is taken in this paper, focusing on the empirical relationships between market interest rates and banks' flows of interest income and expense.[6] By looking at the actual behaviour of interest income and expense, as well as net interest margins, one can see whether sharp movements in market rates or atypical configurations of long- and short-term interest rates have had large effects on banks' net interest income. Moreover, this evaluation implicitly takes account of the way that banks have chosen to adjust the pricing of their assets and liabilities, as well as the actual behaviour of bank customers with regard to prepayments and early withdrawals.

This approach leaves aside other possible sources of interest rate risk, including effects of interest rates on fee income, trading income and off-balance sheet exposures. In particular, to the extent that banks hedge the interest rate risk associated with their net interest income using derivatives such as swaps, the effects of their hedging may be missed. Nonetheless, it seems likely that much of banks' interest rate risk reflects mismatches on their balance sheet, and understanding this portion of banks' interest rate risk is a useful first step towards a broader assessment.

This approach is implemented in two steps. First, the empirical relationships between the average yield on bank assets and the average cost of bank liabilities, on the one hand, and short-term and long-term market rates, on the other, are estimated.[7] In particular, these relationships are examined to see if they are consistent with significant differences in the average repricing intervals of bank assets and liabilities. Then the slope of the yield curve and changes in market rates are tested to see if they appear to be related to banks' net interest margins.

... to see if market rates affect banks' net interest margins

International evidence on the effect of market interest rates on bank net interest margins

The conventional view among financial market observers, including academics and journalists, appears to be that interest rate changes and the slope of the yield curve have significant effects on banks' net interest income. In this view, returns on bank liabilities are thought to be relatively closely tied to short-term rates, and to adjust to changes in short-term rates relatively quickly. By contrast, returns on bank assets are seen as more closely tied to longer-term

[6] While the flows of interest income and expense are not, strictly speaking, cash flows (because of the effects of accrual accounting), they should nonetheless provide an effective benchmark for considering interest rate risk.

[7] Annual data on bank interest income, interest expense, assets and capital for 10 industrial countries are from OECD (2001). Where possible, the market interest rates used are those on government securities, so that the effects of changes in risk-free rates can be separated from the effects of changes in risk spreads. If available, the short-term market interest rate is the secondary market yield on three-month government bills, and the long-term market rate is the yield on 10-year government securities. Bill rates have been converted to a bond-equivalent basis. For Japan, the short-term rate is that on two-month bills. A three-month interbank or other private yield is used in some other countries. In several countries, the 10-year government bond yield is not available, and other maturities have been used. See the box on page 80 for a discussion of data issues.

Many observers believe that banks' have longer-term assets than liabilities ...

rates and slower to adjust to changes in market rates.[8] As a result, bank net interest margins are expected to be higher when the yield curve is steeper for a sustained period because, once assets and liabilities have repriced, a steeper yield curve implies higher rates on assets relative to those on liabilities. In addition, for a given yield curve slope, an increase in both short-term and long-term interest rates is expected to temporarily reduce net interest income, reflecting the more rapid adjustment of yields on liabilities than yields on assets.[9]

... so that a steeper yield curve boosts net interest margins

The behaviour of average rates on bank assets and liabilities

The relationships between the average yields on bank assets and liabilities and market interest rates are shown in Tables 1 and 2. Table 1 shows the long-run relationships between the levels of the yields and market rates, while Table 2 shows the short-run dynamic effects on the average yields of deviations from the long-run relationships and changes in market rates.[10]

For most countries, the long-run behaviour of the average yield earned on bank assets appears to reflect a weighted average of the short-term and long-term rates, with each of the weights less than one – and the sum of the weights

[8] Other factors could also result in changes in market rates influencing banks' net interest margins. For example, government regulation of loan or deposit pricing may, at times, have limited the extent to which changes in market interest rates were passed through to the pricing of bank assets and liabilities. However, deregulation is likely to have limited the importance of interest rate ceilings over the periods considered here. Alternatively, since nominal interest rates cannot fall below zero, banks may not be able to cut deposit interest rates in response to further declines in market rates once interest rates reach very low levels. As a result, lower rates may lead to narrower net interest margins (Banking Supervision Committee (2000), Silverman et al (2002)). Since the zero lower bound has been a significant issue primarily in Japan, where the low level of rates does not appear to have affected net interest margins (Oyama and Shiratori (2001)), this possibility is not examined here. Nonetheless, interest rates have fallen substantially in recent years in some countries, suggesting that this factor may be more important going forward.

[9] For examples of this view in the United States, see Tomasula (1994), Wiggins (2002) and Akella and Greenbaum (1992). A similar claim for European banks is made in Banking Supervision Committee (2000). By contrast, Oyama and Shiratori (2001) suggest that net interest margins in Japan have not been greatly affected by changes in interest rates or other factors. The assumed mismatch between the maturities of bank assets and liabilities plays a crucial role in models of bank runs (Diamond and Dybvig (1983)). It has also been argued that the very low levels of short-term rates in the early 1990s, and the consequent steep yield curve, boosted bank profitability in the United States (Boyd and Gertler (1993)). For a discussion, see English and Nelson (1998).

[10] Interest rates are commonly thought to be integrated, and augmented Dickey-Fuller tests reject the null hypothesis of a unit root in relatively few of the 40 yield and interest rate series employed here. As a result, the econometric approach follows the two-step procedure suggested by Engle and Granger (1991). The long-run, or cointegrating, relationships are shown in Table 1, while the short-run, or error correction, relationships are shown in Table 2. Given the short samples of annual data available, it is not possible to consider potential changes in the behaviour of banks over time, or to examine the short-run dynamics as closely as one might like. In particular, it seems likely that there could be asymmetric adjustment of asset and liability yields in response to increases and decreases in market rates (see Mojon (2000)).

Long-run relationship between average asset and liability yields and market interest rates

Annual data

Country	Asset yield		Liability yield	
	Short-term rate	Long-term rate	Short-term rate	Long-term rate
Australia	0.13	0.64	0.23	0.41
Canada	0.48	0.37	0.47	0.34
Germany	0.23	0.56	0.38	0.20
Italy	0.55	0.03	0.44	–0.00
Japan	0.25	0.44	0.17	0.54
Norway	0.61	0.06	0.62	–0.05
Sweden	0.50	0.19	0.61	–0.00
Switzerland	0.58	–0.04	0.65	–0.27
United Kingdom	0.66	0.36	0.72	0.08
United States	0.12	0.44	0.29	0.36

Table 1

The average yield on assets ...

generally less than one as well.[11] These regression results are broadly consistent with intermediate asset repricing periods. In almost all of the countries, there is a statistically significant adjustment towards this long-run relationship, judging by the error correction terms reported in Table 2, but the speed of the adjustment varies widely.

... appears to be relatively long-term in some countries

The relative importance of short- and long-term rates for the yield on assets differs considerably across the countries considered. In four of them – Australia, Germany, Japan and the United States – the rate earned on assets appears to carry a higher weight on the long-term rate than on the short-term rate, suggesting a longer average repricing period or base rate in those countries. For the same countries, the short-run dynamics also suggest a relatively large share of assets carrying longer-term rates, as evidenced by the relatively large and statistically significant coefficients on the change in the long-term rate in the error correction equation.

A comparison of these results with direct estimates of the maturity and repricing periods of bank assets shows both similarities and differences. Based on data for 1993 – about the midpoint of the samples used in this paper – Borio (1995) found relatively long repricing intervals for Germany, Japan and the United States, consistent with the results found here. However, he also noted relatively short repricing intervals for Australia, which is not consistent. In the

[11] That the sum of the coefficients is less than one is not that surprising once one remembers that some assets (eg buildings, equities, goodwill and the mark-to-market value of certain off-balance sheet contracts with positive net value) do not involve interest payments. On the liability side, some deposits carry below market rates because they offer liquidity services not provided by market instruments. Moreover, some liabilities (eg demand deposits in some countries and the mark-to-market value of off-balance sheet contracts with negative net value) do not pay interest. Note that in a few cases, most notably Switzerland, the coefficient on the long-term rate is negative. These anomalous results may be due to the relatively small data samples used, combined with particular shocks that arose in the affected countries (see below).

Short-run relationship between changes in average asset and liability yields and changes in market interest rates

Annual data

Country	Asset yield			Liability yield		
	Error correction term	Change in short-term rate	Change in long-term rate	Error correction term	Change in short-term rate	Change in long-term rate
Australia	–0.98**	0.04	0.39*	–1.14**	–0.00	0.29
Canada	–0.97**	0.43**	0.14	–0.69**	0.47**	0.09
Germany	–0.62**	0.25**	0.27*	–0.55*	0.36**	0.15
Italy	–0.52**	0.23*	0.08	–0.73**	0.21*	0.01
Japan	–0.80**	0.23	0.48*	–0.63*	0.25	0.52*
Norway	–0.60**	0.47**	–0.22	–0.46*	0.53**	–0.23
Sweden	–1.02**	0.33**	0.28*	–0.65*	0.50**	0.03
Switzerland	–0.55**	0.35**	0.14	–0.45*	0.36**	0.20
United Kingdom	–0.78*	0.51**	0.34	–0.53	0.64**	0.02
United States	–0.36	0.28**	0.23*	–0.42*	0.36**	0.18

Note: The error correction term is the lagged deviation from the long-term relationship shown in Table 1.

* = significant at the 5% level. ** = significant at the 1% level. Table 2

case of Switzerland, most assets were either short-term or repriced fairly often (at least once a year), findings consistent with the coefficients reported in Table 1. However, Borio also reported that many floating rate assets repriced relative to a rate that was itself fairly long-term, which would seem to imply a greater role for long-term rates than the one found here.[12]

The average yield on liabilities is generally similar to that on assets ...

Empirical results for the average rate paid on liabilities are broadly similar to those for the yield on assets. Again, long-term rates seem to play a larger role in Australia, Japan and the United States, though not, in this case, in Germany. Looking across countries, there appears to be a reasonably good match between the pricing of assets and liabilities in many cases, at least judging by the similarity of the coefficients on the assets and liabilities sides of the balance sheet. Nonetheless, in several of the countries – including Australia, Germany, Sweden, the United Kingdom and the United States – the rate earned on assets appears to carry a higher weight on the long-term rate and a lower weight on the short-term rate than does the rate paid on liabilities, providing some support for the conventional view.

... but some countries may have mismatches ...

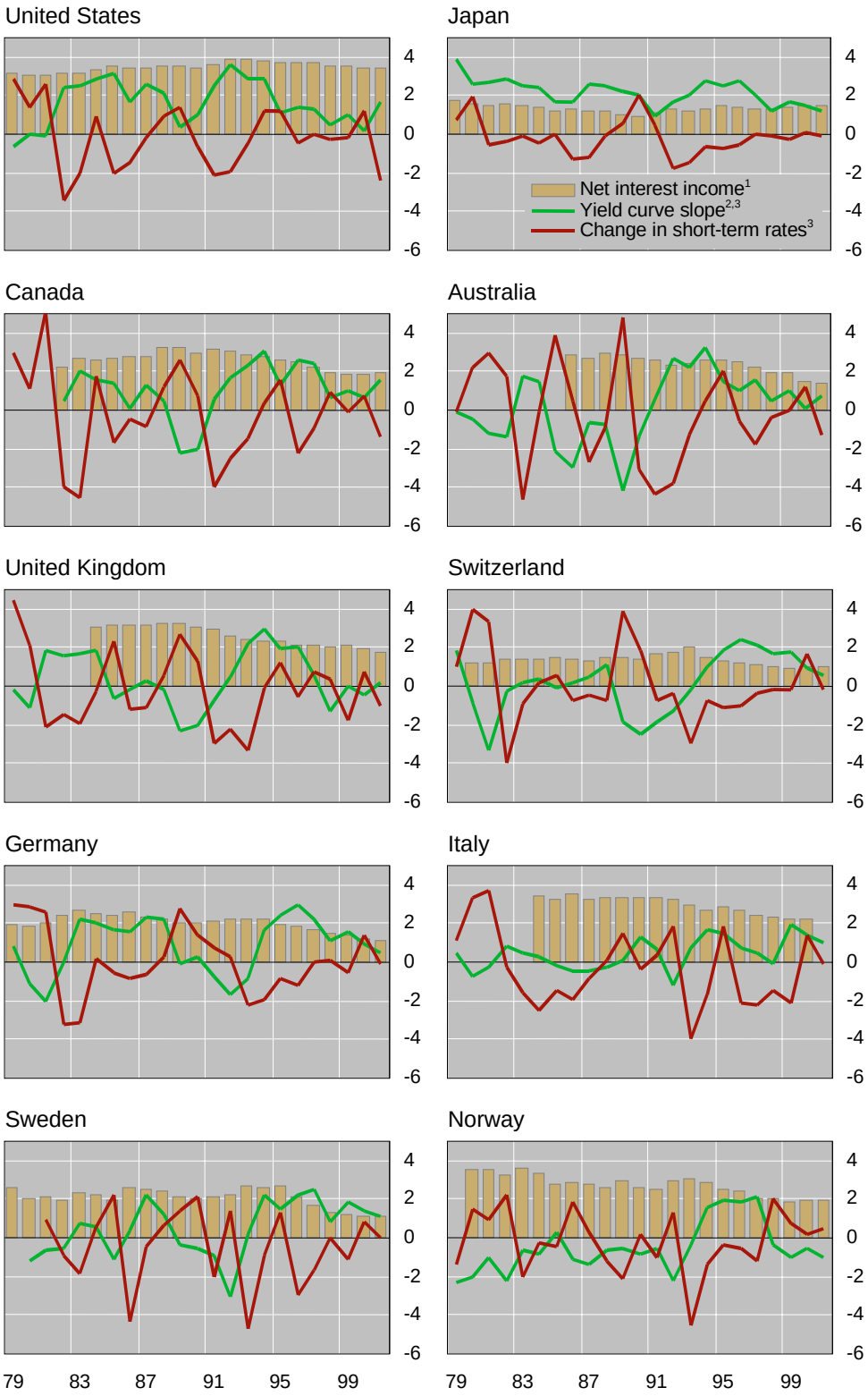
The behaviour of net interest margins

... suggesting that market rates could affect margins

The results in the previous section suggest that the configuration of market interest rates should influence bank net interest margins in a number of the countries examined. To the extent that the average yield on bank assets is more closely related to long-term rates than the average yield on liabilities, a steep yield curve should be associated with higher net interest margins. In

[12] In part, differences relative to Borio (1995) may reflect the broader set of intermediaries included in that analysis.

Net interest income, yield curve slope and short-term rate change



[1] As a percentage of average assets. [2] Long-term rate less short-term rate. [3] In percentage points.

Sources: OECD; national data. Graph 1

addition, as mentioned earlier, the speed with which changes in market interest rates are incorporated into the yields on bank assets and liabilities may differ, and so such changes may temporarily affect net interest margins.

To examine these hypotheses, Graph 1 shows net interest margins for the 10 countries along with the slope of the yield curve (the long-term rate less the short-term rate) and the change in the short-term rate for each country.[13] The graph does not suggest a strong relationship among the variables in most of the countries.[14]

Empirical results for net interest margins are mixed ...

Regression tests, shown in Table 3, provide mixed results. In five of the countries – including Australia and the United Kingdom, where the earlier results suggested some possible mismatch in the pricing of assets and liabilities – there is no evidence that the slope of the yield curve or changes in the levels of short-term and long-term rates influence bank net interest margins.[15] Thus, in these countries banks appear to have avoided significant exposures to market interest rates, at least in the aggregate, over the period considered. Only in the case of the United States does the slope of the yield curve enter significantly with the positive sign that the conventional view would suggest. Somewhat surprisingly, given the earlier results, the slope of the yield curve enters significantly but with a negative sign in Germany and Sweden, as well as in Norway and Switzerland. Thus, while increases in short-term rates in

Relationship between net interest margin and market interest rates

Annual data

Country	Own lag	Yield curve slope	Change in short-term rate	Change in long-term rate
Australia	1.10**	0.04	0.01	0.03
Canada	0.91**	–0.05	-0.05	–0.00
Germany	1.02**	–0.09**	-0.08**	0.05
Italy	0.91**	–0.05	0.01	0.05
Japan	0.81**	–0.05	-0.05	0.00
Norway	0.84**	–0.12*	-0.06	–0.02
Sweden	0.86**	–0.11**	-0.14**	0.13*
Switzerland	0.67**	–0.08**	-0.02	–0.10
United Kingdom	1.06**	0.01	0.04	–0.06
United States	0.82**	0.07**	-0.00	0.02

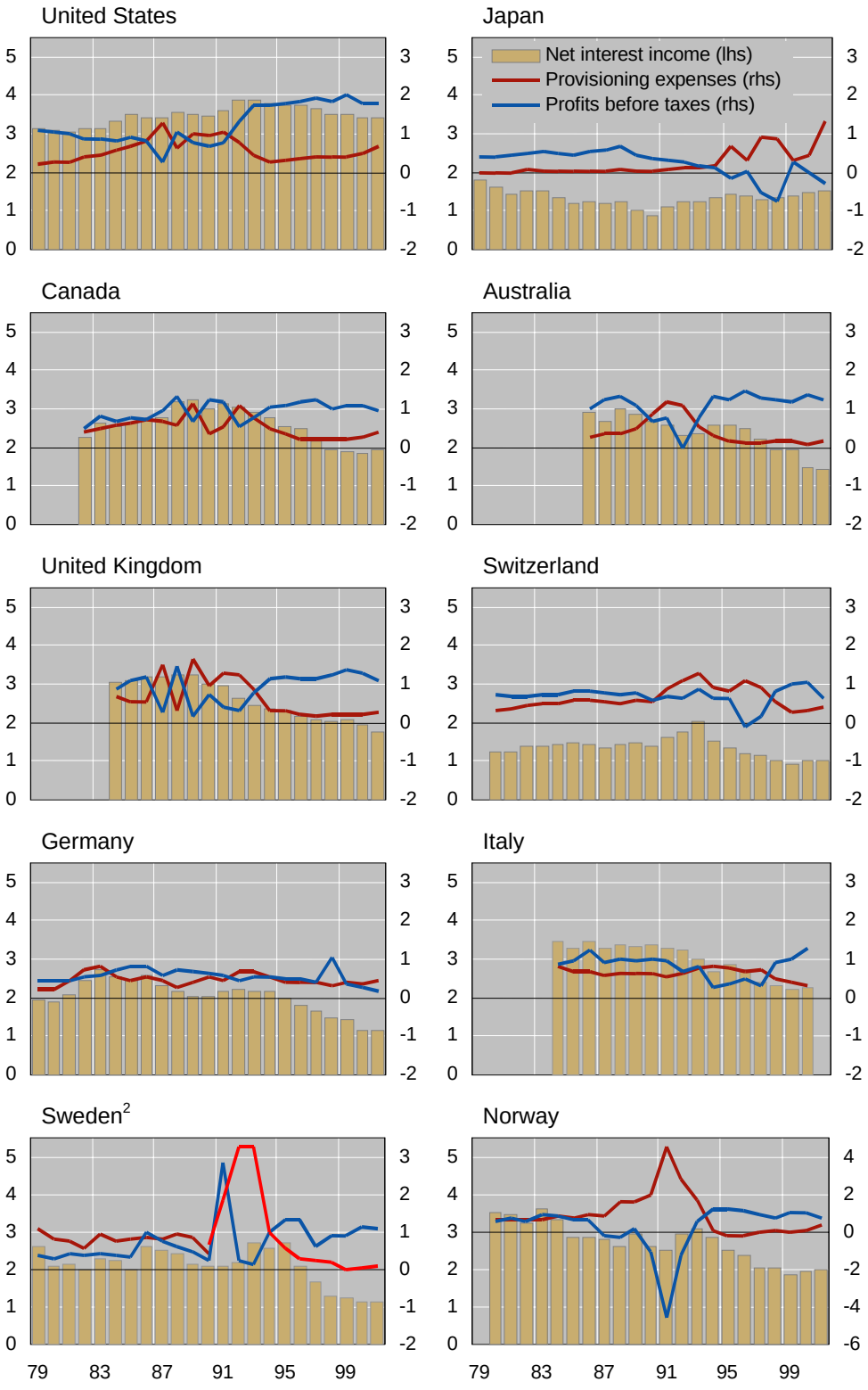
* = significant at the 5% level. ** = significant at the 1% level. Table 3

[13] The net interest margin is defined to be net interest income as a percentage of average assets. See the box on page 80 for a discussion of measurement issues.

[14] As discussed below, effects of changes in the long-term rate are even harder to identify, perhaps because they are slow to accumulate. In order to avoid cluttering the graph, those changes are not shown.

[15] In the case of Italy, if only the short-term rate is included in the regression, then it is significant (although the yield curve slope remains insignificant). It may be that the co-movements of long- and short-term interest rates are sufficiently close to make the effects hard to identify if both variables are included in the regression because of multicollinearity. Such multicollinearity does not appear to be a general problem, however, since neither the short-term nor the long-term rate entered alone is significant for any of the other countries.

Net interest income, provisioning expenses and profits[1]



[1] As a percentage of average assets. [2] A change in the tax system in 1991 led to the dissolution of a substantial volume of untaxed reserves over that and the subsequent few years. To avoid the effects of this accounting change, the graph shows provisions for the period 1979–90 and loan losses (a component of non-interest expense) for 1990–2001. Note that bank income in the early 1990s was boosted substantially by the unwinding of the reserves.

Sources: OECD; national data. Graph 2

these countries are associated with lower net interest margins, consistent with the conventional view (though the effect is not always statistically significant), a steep yield curve has an unexpected negative effect.

... perhaps reflecting the short time series available

These mixed results may be due to the relatively short samples used. For example, in many European countries during the second half of the 1990s, the yield curve was relatively steep at the same time that net interest margins narrowed. However, the narrowing of margins may well have been the result of increased competition, owing to changes in technology and regulation, rather than the shape of the yield curve.[16] The results found for these countries might also suggest more subtle influences, perhaps including hedging activity by banks.

While large and persistent moves in interest rates may affect margins ...

The generally large coefficients on the lagged net interest margin in these regressions suggest that adjustments to changes in market rates and the slope of the yield curve, if any, take place fairly gradually.[17] As a result, even given the relatively small size of the estimated coefficients on the changes in market rates and the slope of the yield curve, a long period with rising or falling rates or with a very steep or flat yield curve could result in a substantial cumulative effect on the net interest margin. For example, the large and sustained swing in the slope of the yield curve in the United States in the early 1990s can explain about two thirds of the 44 basis point rise in the net interest margin between 1990 and 1993.

... such moves are not very common

However, as shown in Graph 1, such large moves in the yield curve or in the short-term market rate are not very common. Thus, these econometric results suggest that major fluctuations in net interest margins caused by movements in the yield curve are likely to be fairly rare. Indeed, as shown in Graph 2, year-to-year movements in net interest margins have generally been quite small compared to the very large fluctuations in loan loss provisions and overall profits in the banking sector.

Conclusions and caveats

These results suggest that banks in the countries examined have been fairly successful in limiting the exposure of their net interest margins to market interest rates over the past 20 years or so. The relatively stable outcomes found here probably reflect, in part, the shorter-term focus of commercial banks' business mix in many countries (relative to that of building societies, thrifts and other similar institutions). The results are also consistent with banks having made efforts to limit their interest rate risk through the selection of assets and liabilities, the setting of rates on core deposits and retail loans, and hedging activities.

---

[16] See Banking Supervisory Committee (2000) for a discussion of reasons for the narrowing of margins.

[17] In a few cases (Australia, Germany and the United Kingdom), the coefficient on the lagged term is greater than one, suggesting explosive dynamics. However, in none of these cases is the coefficient statistically significantly greater than one.

It is possible that some effects of maturity and repricing period mismatches may have been missed in this analysis. To the extent that banks in a given country have assets and liabilities denominated in other currencies, interest rates in those other currencies could also affect net interest margins. At the same time, the effects of interest rates in the domestic currency would be diminished, making them harder to observe in the regression tests employed here. Without longer time series and data on the currency distributions of assets and liabilities of banks in the various countries, however, these possible effects are difficult to evaluate.[18]

A more fundamental qualification arises from the fact that macroeconomic shocks could influence both market interest rates and banks' desired net interest margins. One might expect, for example, that banks would raise their desired margins in periods of slow growth, reflecting higher expected loan risk.[19] At those times, however, central banks might well ease policy in order to support aggregate demand, thereby steepening the yield curve. The resulting correlation between bank margins and the slope of the yield curve would then suggest that bank liabilities either reprice more rapidly than bank assets or have base rates of shorter maturity, even if this is not the case. Addressing this issue completely would require both modelling of banks' desired margins and development of macroeconomic models of the countries covered to extract measures of macroeconomic shocks. Such a large task could not be attempted here.

The analysis of net interest margins presented here has left aside two potentially important issues. First, there has been no effort to evaluate whether the net interest margins earned by banks are appropriate given the expected riskiness of bank assets. Differences in the expected riskiness of bank assets over time or across countries would be expected to influence net interest margins. In addition to possible cyclical changes in risk spreads on bank loans, one might also expect secular changes reflecting developments in the banking industry. For example, over the past three or four decades, as banks in the United States have shifted their assets toward riskier activities, including loans to households and riskier firms, the levels of both provisioning and net interest margins have trended higher (FDIC (2001)). By contrast, net interest margins in Japan do not appear to have responded to the much higher loss rates of the past decade.[20] The second important issue not pursued here is the extent to

---

[18] Banks in some countries, notably Canada, are likely to have considerable US dollar assets and liabilities. If US interest rate measures are added to the net interest margin regressions shown in Table 3, at least one of the US variables is statistically significant in four countries, including Canada. However, the results vary considerably across countries, and some of the coefficients are difficult to interpret. Moreover, it is hard to have much confidence in these results because of the small number of degrees of freedom in the regressions and the possibility that the US interest rates are serving as proxies for more general global macroeconomic shocks. Nonetheless, such cross-currency effects would be a useful topic for future research.

[19] This need not, however, be true. Banks could pull back from risk-taking in such situations, choosing to increase holdings of safer loans and government securities. In that case, their intended net interest margin would decline.

[20] See Oyama and Shiratori (2001) for a discussion of possible reasons for the lack of adjustment in Japan.

which the approach employed masks important differences either among banks or over time. Even if the banks in a country avoid mismatches in the pricing of their assets and liabilities on average, particular institutions, or even the industry as a whole, could have significant interest rate exposures on occasion. Some banks will presumably make mistakes, while others may choose to mismatch maturities at times in order to profit from forecast movements in interest rates. More broadly, the net interest margin of the banking sector could be exposed to interest rate changes for a period if a large number of banks, presumably responding to the same or similar market signals, choose to take on similar exposures. Moreover, even if banks avoid interest rate risk associated with their net interest income, there are other possible sources of interest rate risk. As a result, banks and supervisors need to remain alert to developments that could lead to excessive exposure to changes in market interest rates.

Data and measurement issues

Measuring net interest margins and average yields on assets and liabilities on a consistent basis across countries is difficult. Differences in accounting rules – for example, with regard to loan loss reserves, netting or market value accounting – can affect the measures, as can differences in the activities of banks across countries. To minimise the effects of accounting differences, annual data from the OECD are used; these data reflect an effort to put balance sheet and income information for OECD countries on a comparable basis. In many cases, the OECD provides banking data for more than one group of depository institutions, and data for "commercial banks" have been selected where such a category is available. Despite these efforts, however, important differences in coverage and accounting may remain, and so comparisons of net interest margins across countries should be made with care.

The net interest margin employed here is calculated as net interest income for a year as a percentage of average assets for that year. Average assets are a simple average of assets at the start and end of the year. It might be preferable to use interest-earning assets as the denominator, but information on interest-earning assets is not available from the OECD.

The average yield on assets is calculated as gross interest income divided by average assets. The average yield on liabilities is calculated as gross interest expense divided by average assets less average capital and reserves. This is the only capital measure available from the OECD.

Because there is no interest expense associated with bank capital, the measure of net interest margin used here will exceed an alternative measure calculated as the difference between the average yield on assets and the average cost of liabilities (Banking Supervision Committee (2000)). The wedge that capital drives between these two measures will fluctuate over time, reflecting changes in the ratio of capital to assets and in the average cost of liabilities. In particular, changes in capital regulation could affect reported margins by causing changes in actual capital ratios. However, the empirical results reported here are not importantly affected if the difference between the average return on assets and the average return on liabilities is employed rather than the net interest margin.

Changes in accounting rules in a given country can impair the comparability of the yield and margin measures over time. Indeed, in many cases, the OECD volume provides only a relatively short time series, presumably reflecting the difficulties national authorities faced in constructing comparable data for a longer period. Given the statistical exercises employed in this article, the sample has been limited to countries with at least 15 years of data.[①]

The short-term and long-term interest rates are annual averages of daily or month-end data, depending on availability.

[①] Where possible, the OECD data begin in 1979, and the published data generally end in 1998 or 1999. However, in most cases, we have been able to get comparable data up to 2001 from national authorities. Short samples make it impossible to include a number of countries that would be of considerable interest, notably France. In addition, lack of a sufficiently long time series for either the short-term or long-term interest rate led to the exclusion of some countries. For example, there was no consistent long-term benchmark interest rate series for Spain before the late 1980s.

References

Akella, S and S Greenbaum (1992): "Innovations in interest rates, duration transformation, and bank stock returns", *Journal of Money, Credit, and Banking*, 24(1), February, pp 27–42.

Banking Supervision Committee (2000): *EU banks' margins and credit standards*, European Central Bank, Frankfurt, December.

Basel Committee on Banking Supervision (1997): *Core principles for effective banking supervision*, Bank for International Settlements, Basel, September.

——— 2001: *Principles for the management and supervision of interest rate risk*, Bank for International Settlements, Basel, January.

Borio, C (1995): "The structure of credit to the non-government sector and the transmission mechanism of monetary policy: a cross-country comparison", in *Financial structure and the monetary policy transmission mechanism*, Bank for International Settlements, Basel, March, pp 59–105.

Boyd, J and M Gertler (1993): "US commercial banking: trends, cycles, and policy", in O Blanchard and S Fischer (eds), *NBER Macroeconomics Annual*, pp 319–68.

Deep, A and D Domanski (2002): "Housing markets and economic growth: lessons from the US refinancing boom", *BIS Quarterly Review*, September, pp 37–45.

Diamond, D and P Dybvig (1983): "Bank runs, deposit insurance and liquidity", *Journal of Political Economy*, June, pp 401–19.

Engle R and C Granger (1991): "Cointegration and error correction: representation, estimation, and testing", in R Engle and C Granger (eds), *Long-run economic relationships*, Oxford University Press, pp 81–111.

English, W and W Nelson (1998): "Profits and balance sheet developments at US commercial banks in 1997", *Federal Reserve Bulletin*, June, pp 391–419.

Federal Deposit Insurance Corporation (2001): *Historical statistics on banking*, Washington, DC.

Federal Home Loan Bank Board (1984): *Combined financial statements: FSLIC insured institutions*, Washington, DC.

Mojon, B (2000): "Financial structure and the interest rate channel of ECB monetary policy", European Central Bank, *Working Paper No 40*, November.

Organisation for Economic Co-operation and Development (2001): *Bank profitability: financial statements of banks*, Paris.

Oyama, T and T Shiratori (2001): "Insights into the low profitability of Japanese banks: some lessons from the analysis of trends in banks' margins", Bank of Japan, Bank Examination and Surveillance Department, *Discussion Paper Series*, no 01-E-1, November.

Remolona, E, R Cantor, M Gaske, L Hargraves, L Schwartz and V Stein (1990): "How safety nets work", *Central Banking*, Summer, pp 52–63.

Silverman, G, J Wiggins and J Earle (2002): "US bank stocks fall on fears over Fed's interest cut", *Financial Times*, 8 November, p 8.

Stanton, R (1996): "Unobservable heterogeneity and rational learning: pool-specific versus generic mortgage-backed security prices", *Journal of Real Estate Finance and Economics*, 12(3), May, pp 243–63.

Tomasula, D (1994): "Outlook bleak for bank stocks after pounding by rate hike", *American Banker*, 21 November, p 1.

Wiggins, J (2002): "Banks hit by flattening yield curve", *Financial Times*, 11 November, p 18.

Robert N McCauley
+852 2878 7106
robert.mccauley@bis.org

San-Sau Fung
+44 20 7685 3088
s.fung@ucl.ac.uk

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

Integrating the finances of East Asia[1]

Some observers have recently lamented that East Asia suffers from a lack of financial integration. While financial transactions between economies in East Asia and the rest of the world have increased over time, it is argued that capital is channelled between East Asia, on the one hand, and London or New York, on the other, rather than between East Asian economies themselves.[2] Given the memory of the abrupt withdrawal of funds from the region five years ago, the perception of such a pattern of capital flows contributes to a sense of financial vulnerability. For some observers, the official efforts to further financial cooperation, as exemplified by the network of swaps agreed among the ASEAN Plus Three countries,[3] represent an attempt to lessen such vulnerability.

This special feature seeks to assess financial integration in East Asia in the international bond market and the international syndicated loan market. On this basis, East Asia's finances are more integrated than is often appreciated. While firms headquartered outside the region figure prominently in the roles of bookrunners and loan arrangers, regional funds and banks are very well represented among the underlying investors, in the case of bonds, and among syndicate members, in the case of loans.

Demand for international bonds of East Asian issuers

The easiest evidence to obtain regarding the who's who of those involved in Asian bonds sold on international markets is information on the underwriters. On this evidence, major global banks and securities firms headquartered outside the region predominate among lead managers of international bonds

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS. We wish to thank Denis Pêtre for helping with the bonds data.

[2] For example, "East Asian countries have developed stronger financial ties with advanced countries than with one another in the process of financial opening" (Park and Bae (2002)).

[3] Including the original ASEAN nations of Indonesia, Malaysia, the Philippines, Singapore and Thailand, subsequent additions (Brunei, Cambodia, Laos, Myanmar and Vietnam), and the Three: China, Japan and Korea. For a review of progress in concluding the swap agreements, see Wang (2002).

issued by East Asian governments, banks and firms.[4] A bond's underwriters, that is, the financial firms that guarantee a price to the issuer and organise the initial distribution, can be readily ascertained. For international bonds issued by East Asian borrowers between April 1999 and August 2002, the shares of bookrunners headquartered in North America and Europe are respectively 54% and 29%, while the share from Asia is 17%.[5, 6] This is not surprising in view of the role that US firms alone play among underwriters of dollar bonds worldwide. For instance, in 1996, three years before the introduction of the euro, US firms led the underwriters for an identical 54% of international dollar issues by non-US borrowers (McCauley and White (1997, p 340)).

While US and European banks dominate as bookrunners of Asian bonds ...

The inference regarding financial integration in East Asia is not so evident. It must be recalled that all the underwriters share a fee that is generally half of 1% or less for such issues. To address the question of regional financial integration with regard to international bonds, therefore, it would be useful to know the nationality of the bonds' holders. Any analysis of the market for international bonds, however, faces limits on what can be known about the source of credit. There is some market information on the initial distribution of international bonds, which is laborious but possible to gather. More interesting perhaps is the distribution of holders at some point in time, but this is impossible to know since it would require access to numerous layers of custodial records.

We rely on the commentary about new bond issues in the trade periodicals *FinanceAsia*, *Asiamoney* and *International Financing Review* to measure the Asian share of the initial allocations of bonds issued by Asian borrowers from April 1999 onwards. Borrowers from China, Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore and Taiwan (China)[7] are included in our sample. A limitation of this approach is that we rely solely on second-hand reports from underwriters that are at best approximations. Moreover, the coverage is incomplete, since it is not possible to obtain details on every bond issue. For the issues covered by the trade press, the share-by-

---

[4] Park and Bae (2002) analyse the nationality of the firms that underwrote bonds by East Asian issuers in the years 1998–2001 and find that US and European firms run the books for 74% of the issues, and Japanese firms 6%. They conclude that "Western investment banks, in particular American and European ones, have established a monopoly position in ... underwriting in the primary market [for international securities and loans]".

[5] We treat HSBC and Standard Chartered as Hong Kong banks. Between 1999 and 2002, these two groups' combined share as bookrunners was 10% of bond issues.

[6] Before the Asian crisis, a home-grown securities firm headquartered in Hong Kong SAR, Peregrine, had "leapfrogged Jardine Fleming Securities to become Asia's largest independent investment bank" that challenged the major international underwriters in bringing Asian credits to market. The bank was caught during the crisis with a bridge loan to an Indonesian taxi company (Steady Safe) and failed in 1998 as a result (Clifford and Engardio (2000, pp 77 and 211)). Creditors of the largest Peregrine unit have received 35 cents on the dollar from liquidators as of late 2002. There is a parallel to Drexel Burnham Lambert, which underwrote a large share of junk bond issues in the US corporate market in the late 1980s, only to collapse under the weight of its holdings of such bonds and bridge loans when the junk bond market entered a crisis in 1989.

[7] Hereinafter referred to as Taiwan.

region figures give a broad geographical split into three regions, namely the United States, Europe and Asia, where "Asia" generally refers to East Asia including Japan. Bear in mind that our sources provide an indication of only the primary market allocations; discussion with market participants suggests that subsequent trading in the secondary market is likely to move more paper into regional portfolios.

Our sample is fairly broad when judged against a popular benchmark. The aggregate value of the bonds in our sample is $41.2 billion (Table 1), as compared with the $60.2 billion of the JP Morgan Asia Credit Index (JACI). Since our sample includes only bonds issued after 1999, it is not surprising that we do not match the JACI portfolio, which includes, for instance, the last Kingdom of Thailand bond, issued in 1996.

... almost half of these bonds are purchased by Asian investors

Analysis of 71 bonds finds that the average Asian share of the primary market distribution is 46%, while the average weighted share is slightly lower at 44%. The Asian shares range from 36% in the case of Singaporean and Korean issuers to 78% for Indonesian issuers (Graph 1). It is not unusual for the primary market to feature the following succession of events. An Asian issuer chooses an affiliate of a North American or European firm as bookrunner, the latter takes the issuer on a roadshow and assembles a syndicate of underwriters, and the underwriters sell about half of the paper to Asian accounts. There are elements of hub and spokes in this scenario, with the funds typically clearing through New York (or in Europe in the case of the euro issues). But at the end of the day, most of the Asian IOUs have finished up in Asian portfolios.

Country and issuer weights of bonds in JACI index and our sample

In percentages

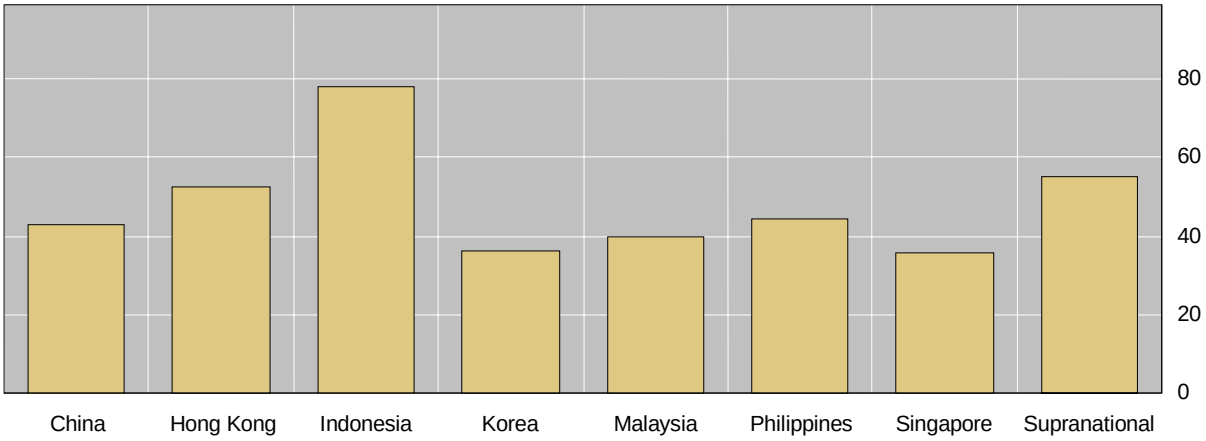
	JACI	Our sample
Country		
China	9.9	8.5
Hong Kong SAR	19.4	18.0
India	1.9	0.0
Indonesia	0.7	1.6
Korea	20.5	12.5
Malaysia	17.7	21.1
Philippines	15.4	13.4
Singapore	12.3	15.3
Thailand	2.2	0.0
Supranational[1]	0.0	9.7
Type of issuer		
Bank	11.6	18.2
Non-bank corporate	28.9	31.0
Supranational	0.0	9.7
Sovereign/quasi-sovereign	59.5	41.1
Memo: Total size[2] (in billions of USD)	*60.2*	*41.2*

[1] Asian Development Bank. [2] Issue size.

Source: JP Morgan Asian Credit Research as of 5 September 2002 (see Li (2002)). Table 1

Regional purchases of international bonds issued by East Asian borrowers, April 1999 to August 2002

Issuer residence along x-axis; shares purchased by Asian investors, in percentages of amounts issued, along y-axis



Sources: *Asiamoney*; *FinanceAsia*; *International Financing Review*; Dealogic; authors' estimates. Graph 1

What are the characteristics of bonds that lead to a larger or smaller initial regional distribution? We regress the Asian share on bond rating, size and maturity, and on dummies for currency and sovereign issuer. While the data convey the suggestion that lower-quality issues attract more Asian demand, the effect of issue size appears more significant. In particular, larger issues are placed outside the region to a larger extent. Longer maturities likewise result in larger placement outside the region. This maturity effect is consistent with the stronger US demand for bonds of 10-year maturity or more, reflecting the importance of pension funds and insurance companies with long-duration liabilities; the maturity effect is also consistent with the importance among buyers of dollar bonds in Asia of commercial banks and central banks, with their preference for intermediate-term issues. Almost 20% more of euro-denominated issues than dollar-denominated issues are placed outside the region in Europe, reflecting the limited appetite of central banks for relatively illiquid euro-denominated bonds and the limited penetration of the euro in foreign currency bank deposits in the region. The weak effect of sovereign status on the locus of placement is consistent with the finding for the effect of rating. The overall goodness of fit is respectable for a cross-sectional analysis.

The initial placement by region of international bonds of Asian issuers varies with bond characteristics ...

A view widely held among market participants, but impossible to verify, is that subsequent trading in bonds of East Asian issuers tends over time to move a larger share of outstanding bonds into Asian portfolios. Two strands of evidence make this view plausible. First, dollar assets of commercial and central banks in the region have grown rapidly since the Asian crisis.[8] Second, in some countries, notably Korea, long-term currency swap markets have

[8] The decline in the loan-to-deposit ratio for most banking systems is often cited (see, for example, Fernandez and Li (2002)), but ample domestic currency liquidity can generally only serve to fund a foreign currency asset with the addition of a currency swap. Thus, the build-up of foreign currency liquidity may be of more immediate relevance. For analyses of the increase of foreign currency deposits in Taiwan and China, see Fung and McCauley (2001) and Ma and McCauley (2002).

developed which permit dollar bonds to be asset-swapped into synthetic local currency paper suitable for life insurance companies and other institutional investors.[9] Offshore issues swapped into local currency sometimes offer duration unavailable locally, and offshore issues of comparable maturity to local issues sometimes offer higher yields.

... such as size, rating and maturity

Syndication of loans for East Asian borrowers

Ideally, one would like to have bilateral consolidated banking data for the East Asian economies in order to ascertain the origin of funds and thus the extent of integration of banking markets in the region. Is it true, as has been claimed, that despite large and growing intraregional trade, there is no correspondingly large and rapidly growing stock of bank claims, including that associated with the financing of international trade? Unfortunately, the data are not available to the BIS at this point to answer this question across the board in East Asia.[10] So our approach is to examine the participation in internationally syndicated loan facilities. In such facilities, banks contractually commit themselves to lend but the borrowers do not always draw down the funds immediately or fully. Under normal circumstances, syndicated loans represent much the same thing as the flows that roughly correspond to changes in the underlying stocks of bank loans (Gadanecz and von Kleist (2002)). Thus, as with bonds above, our analysis of loans relies on the initial distribution in the primary market. However, with the advent of secondary trading with contractual standards set by bodies such as the Asia Pacific Loan Market Association, subsequent trading in the secondary market after initial syndication of loans may move more claims onto regional banks' balance sheets or into regional portfolios.

As with bonds, one must distinguish between the financial firm that puts the deal together and the initial groups of buyers. The arranger of a syndicated loan receives a fee on the entire loan amount to take the responsibility for negotiating the terms, marketing the credit and allocating it to all the participants, including itself.

Arranger league tables obtained from Dealogic Loanware indicate that between 1999 and 2002, 63% of syndicated credit facilities signed by borrowers in East Asia[11] were arranged by East Asian and Japanese banks.

---

[9] The BIS (2002, pp 79–81) reports daily activity in currency swaps in April 2001 of $285 million for Hong Kong dollars, $46 million for Korean won, $21 million for New Taiwan dollars, $18 million for Singapore dollars, $13 million for Indonesian rupiahs, and $11 million for Thai baht.

[10] The BIS consolidated banking statistics reported at the time of writing by central banks of the East Asian region show that as of end-June 2002, about a fifth of Hong Kong, Singaporean and Taiwanese banks' consolidated international claims were on borrowers residing in emerging countries of the Asia-Pacific region and in Hong Kong SAR and Singapore. Claims of these banks vis-à-vis industrialised countries represented 74% of their total consolidated claims. The percentages for claims of Japanese banks were respectively 9% and 77%. Euro area banks' cross-border claims on the euro area were higher than the Asian shares mentioned above, at 45%.

[11] China, Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand.

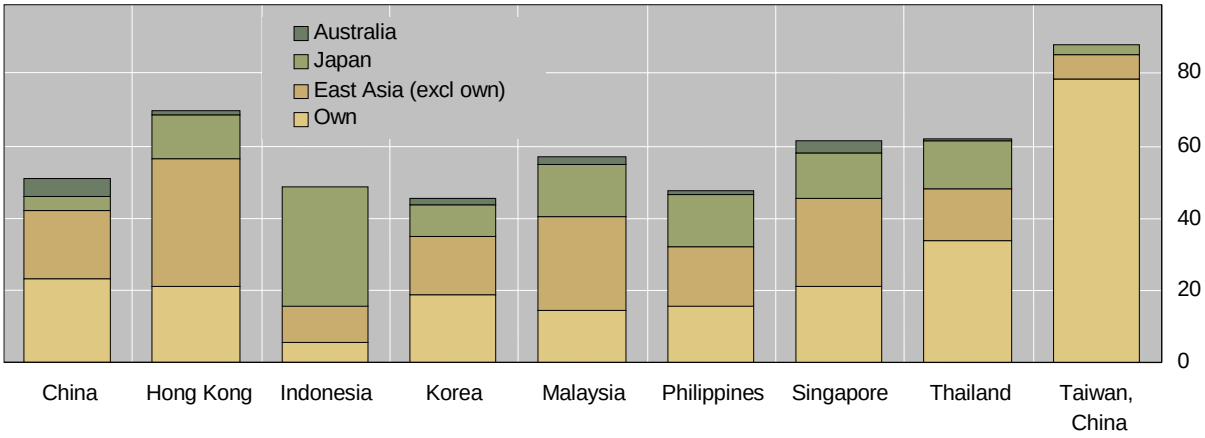
US banks arranged another 12% and European banks 23%. In the internationally syndicated loan market, unlike the international bond market, Asian financial firms take the lead in putting deals together.

Asian banks arrange and fund high percentages of Asian loans ...

Broadening our focus to the participants in syndicates, banks from the East Asia-Pacific region initially provided approximately 40–80% of funds in internationally syndicated loans to borrowers in East Asia (Graph 2).[12, 13] Banks of the same nationality as the borrower have typically provided around 20% of the facility nominal amounts, with the notable exceptions of Indonesia (5% of own nationality banks only because of high Japanese participation)[14] and Taiwan (79%). We surmise that the fragmentation of Taiwan's banking system – only one bank enjoys a market share of over 10%

Regional participation in internationally syndicated loans for East Asian borrowers, January 1999 to August 2002

Borrower residence along x-axis; supply of funds by nationality of banks in percentages along y-axis



Note: Nationality breakdown by ultimate ownership of banks. HSBC and Standard Chartered were considered Hong Kong groups for this exercise. Deals where banks of only one nationality provided funds were excluded from the sample.

Sources: Dealogic Loanware; authors' estimates. Graph 2

[12] This compares with an estimated 55% of funds supplied by US banks during the same period to borrowers issuing international syndicated loans in the United States and about 64% of funds provided by euro area banks to borrowers in the euro area.

[13] The exact amount eventually provided by each bank is only available for a small number of deals, so our best approximation for further analysis of who subsequently provided the funds in the syndicated loans concerned is to allocate the total amount of the facilities equally between participating institutions. A comparison with Loanware league tables of institutions providing funds partially based on actual participation amounts where those are known shows that, at an aggregate level, our estimate of the nationality distribution of funds is close to what happens in practice. The absolute value of the difference ranges from 1 to 9 percentage points for all Asian borrower countries except China, where the equal share approach underestimates the share of East Asian banks by 20 percentage points. This possibly reflects the large allocations obtained by the Bank of China in such loans. Unlike in bonds, regional participation in syndicated loans is not much different from the regional share of the arrangers.

[14] Several large syndicated loans signed in Indonesia were either granted to subsidiaries of Japanese firms or guaranteed by Japanese export credit agencies, which could explain the high shares of Japanese banks in those facilities.

of the market – results in a large number of small banks obtaining allocations (McCauley and Hobson (2002)). East Asian banks from countries other than the borrower's own country usually provided another 20% of funds. This percentage is much higher in the case of Hong Kong borrowers – 35% – suggesting that they benefit from the presence of so many foreign banks in that financial centre. Japanese banks signed up for another 13% of funds on average.

What are the characteristics of loans that lead to larger or smaller regional syndication? We regress the Asian share on size, maturity, currency, loan purpose, borrower rating,[15] sector and residence[16] and arranger nationality. In order to test the effect of the denomination of a loan in local currency, we included dummies for the four most widely used East Asian currencies (Table 2): the Hong Kong dollar, New Taiwan dollar, Singapore dollar and Korean won. Senior banks such as mandated arrangers or agents play an important role in determining syndicate composition and the identity of institutions providing funds in each syndicate; we hypothesise that local arrangers draw local participants.

... with variations by currency ...

We consider a sample of 1,195 syndicated loan facilities arranged between January 1999 and August 2002 by borrowers in Asia, where banks of at least two different nationalities were committing funds. The distribution of the sample by borrower nationality and type as well as currency of the facility is given in Table 2. The share of loans contracted in US dollars is over 70% for borrowers in China, Korea, Malaysia and the Philippines. In Hong Kong SAR, Singapore, Taiwan and Thailand, 40–80% of international syndicated loan facilities are in local currency.[17]

We find that for larger syndicated loan facilities, the share of Asian banks is significantly lower, suggesting that more participation by non-Asian institutions is required to share more risk, as is the case for bonds. Our findings on the effects of maturity on syndicate composition are mixed. Regarding borrower sector and loan purpose, Asian banks appear to have participated more heavily in loans granted to the construction and property, high-tech, non-bank financial and population-related services sectors, and less so in project,

[15] Insofar as it is less of a requirement for a borrower arranging a syndicated loan to be rated than for an entity issuing a bond, we do not consider the effects on syndicate composition of the full ratings scale here. Only the effect of an investment grade rating for the borrower is analysed.

[16] This follows standard practice in the empirical literature on syndicated credits (eg Kleimeier and Megginson (2000)).

[17] For a discussion of the importance of domestic currency lending by BIS reporting banks, see McCauley et al (2002).

Distribution of countries, borrower types and currencies in syndicated loans sample

In percentages of US dollar facility amounts

Country and local currency	Country weights in total sample	Share of local currency facilities in country total
China	4.0	1.4
Hong Kong SAR	39.4	78.9
Indonesia	1.2	0.2
Korea	15.4	21.1
Malaysia	8.0	20.3
Philippines	6.1	5.9
Singapore	8.7	39.5
Taiwan, China	14.0	81.9
Thailand	3.1	50.0
	Borrower type and currency distribution in total sample	
Type of borrower		
Bank	11.4	
Non-bank financial institution	21.3	
Non-financial corporate	63.6	
Supranational	0.0	
Sovereign/quasi-sovereign	3.6	
Currency		
US dollar	43.0	
Hong Kong dollar	31.9	
New Taiwan dollar	11.4	
Singapore dollar	3.5	
Korean won	3.3	
Japanese yen	1.7	
Australian dollar	1.2	
Euro	0.2	
Pound sterling	0.1	
Other East Asian currencies	3.6	
Memo: Total amount (in billions of USD)	*147.5*	

Source: Dealogic Loanware. Table 2

shipping and aircraft finance deals. This difference seems broadly consistent with the non-traded versus traded goods sectors, with extraregional banks playing a larger role in the latter. The presence of an investment grade rating for the borrower tends to lower the share of Asian banks, indicating that better-rated borrowers are able to attract more funding commitments from non-Asian lenders. Facilities in Hong Kong dollars, New Taiwan dollars and Korean won, like deals in the borrower's own currency, attract significantly higher Asian participation, suggesting that a shift away from financing in US dollars stimulates regional financial integration. When the borrower and at least one of the senior banks in the syndicate are from the same country, the share of Asian banks is higher, indicating that local senior banks are able to attract more

... size, sector, purpose and rating

Asian banks into Asian loans. This may stem from better knowledge of regional banks.

Conclusion

Analysis of bonds underwritten and loans syndicated for borrowers in East Asia since 1999 suggests that East Asian investors and banks have on average committed half of the funds involved. By this measure, the finances of East Asia appear more integrated than recent commentary has suggested. East Asia may therefore be less exposed than is often imagined to sudden and large-scale cessations of the capital flows between the region on the one hand and Europe and the United States on the other. The finding that a higher proportion of better-rated bond issues and loans are sold to non-Asian investors in the first place might also lessen the danger of sudden withdrawals of funds, although the memory of rapid ratings downgrades in 1997–98 makes it hard to push this argument too far. Besides, a better appreciation of the effects of trading of loans and bonds on secondary markets and of other risk transfer mechanisms is needed to better gauge the extent to which East Asian risk ultimately ends up in Asian investors' and banks' portfolios.

Asian banks' relative participation in syndicated loans arranged for East Asian borrowers appears higher than the share of Asian bonds initially purchased by Asian investors. This points to the greater development of bond markets outside Asia and to the predominance of banks in Asia's finances.

Based on these findings, one can entertain another interpretation of the recent moves toward financial cooperation in the region. A widely held view is that they can help lower the vulnerability of the region's finances to decisions made in Europe and North America. But another interpretation is that official financial cooperation is catching up with the considerable integration already evident in private markets.

Asian buyers' share of bonds issued by Asian borrowers

Some empirical results

We ran an ordinary least squares regression on our sample of 71 bonds. We regressed the Asian share of the initial bond allocation on issue size, maturity, credit rating, a dummy for euro-denominated bonds and dummies for the type of issuer. For euro-denominated bonds, the size is converted to US dollars using the contemporaneous exchange rate. Credit ratings are converted into an ordinal scale of 1–19 (S&P: AAA = 19, CCC– = 1; Moody's: Aaa = 19, Caa3 = 1; in cases of inconsistency S&P's rating is used). Unrated issues were excluded.

Empirical results suggest that Asian buyers tend to take a larger share of issues that are smaller in size and shorter in maturity, while their share does not vary significantly by type of issuer, whether it is a bank, non-bank corporate, sovereign or supranational organisation. European shares tend to be higher in euro-denominated issues and accordingly the Asian shares are significantly lower for bonds so denominated. See below for more results.

No of observations: 71, of which 7 are euro-denominated bonds
Average Asian share (unweighted): 46.3%
Average Asian share (size-weighted): 43.9%

The table below shows the variations when we include different variables.

Dependent variable: *AS*

	Constant	*rating*	Ln *size*	*mat*	d_{eur}	d_{sov}	R^2
(1)	76.6	–1.2		–1.7	–18.6	–4.8	0.22
	(8.7)	(–1.9)		(–3.2)	(–2.4)	(–1.0)	
(2)	109.4		–7.9	–1.4	–19.2	–1.8	0.23
	(5.0)		(–2.1)	(–2.6)	(–2.5)	(–0.3)	
(3)	105.1	–0.7	–5.9	–1.5	–19.0	–2.6	0.24
	(4.6)	(–0.9)	(–1.4)	(–2.7)	(–2.4)	(–0.5)	

where

AS = Asian share of initial bond allocation (in percentages)
rating = Credit rating (1–19)
size = Bond size in millions of US dollars
mat = Maturity in years
d_{eur} = Dummy (=1) for euro-denominated issue
d_{sov} = Dummy (=1) for sovereign issuer

Note: 1. t-statistics in parentheses. 2. We include only d_{sov} in this regression; none of the other dummies for bank, non-bank corporate and supranational has a significant impact on *AS* individually.

An F-test shows that the coefficients of *rating* and Ln *size* are not jointly significant (F-statistic = 2.68, probability = 0.076).

Asian banks' share of syndicated loans arranged by Asian borrowers

Some empirical results

Parallel to our analysis of bonds, we ran a similar regression on the syndicated loans sample, for a similar period. Since the breakdown of each bank's share in each loan is unavailable to us, we make the assumption that each participant bank contributes an equal share in each loan. Thus the "Asian share" for each loan is estimated as the number of Asian banks divided by the total number of participants. We classify HSBC and Standard Chartered as Hong Kong banks – these two groups have provided approximately 8% of funds in loans syndicated by borrowers in Asia since 1999. In addition, loans with single-nationality participants are excluded from the sample.

We include borrowers originating in China, Hong Kong SAR, Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand. Japanese borrowers are excluded but Japanese buyers are included in the Asian share, as for bonds.

Regression results (see next page) suggest that the Asian share tends to decrease with loan size (as for bonds). We find mixed effects for maturity. An investment grade rating for the borrower significantly lowers the Asian share in two model specifications out of five. Whenever the arranger bank is of the same nationality as the borrower, or whenever the facility is in Hong Kong dollars, New Taiwan dollars or Korean won, this systematically raises the Asian share.

Model specifications as follows:

Dependent variables:

ASISHR	=	East Asian share of loan allocation (estimated, in %)
ASIJPSHR	=	East Asian and Japanese share of loan allocation (estimated, in %)

Independent variables:

size	=	Facility size in millions of US dollars
mat	=	Maturity in years
invgrade	=	Dummy (= 1) if the borrower has an investment grade rating from Standard & Poor's at the time of signing

Sectoral dummies (= 1) for construction and property (*constrpty*), financial services – banks (*finservbk*), financial services – non-banks (*finservnb*), high-tech industry (*hightech*), utilities firms (*utilities*), population-related services (*popserv*), government/state services (*state*), traditional industry (*tradind*), transport services (*transport*). The dummy for infrastructure companies was left out of the model as the case by default.

Purpose dummies (= 1) for acquisitions and recapitalisations (*acqrecap*), project finance (*project*), aircraft and shipping finance (*airshp*), standby/backup lines (*backup*), property and mortgage finance (*pty*). The dummies for other loan purposes were left out as the case by default.

Borrower nationality dummies (= 1) for China (*CN*), Hong Kong SAR (*HK*), Indonesia (*ID*), Korea (*KR*), Malaysia (*MY*), the Philippines (*PH*), Taiwan (*TW*) and Thailand (*TH*).

Currency dummies (= 1) for Hong Kong dollars (*HKD*), New Taiwan dollars (*TWD*), Singapore dollars (*SGD*), Korean won (*KRW*) and borrower's home currency (*OWNCUR*).

grpnatmatch	=	Dummy (= 1) if the borrower has its residence where at least one of the senior arranger banks has its ultimate ownership.

Determinants of Asian banks' participation in Asian loans

	ASISHR	*ASIJPSHR*	*ASIJPSHR*		*ASISHR*	*ASIJPSHR*
Constant	53.2	55.5	51.6	Constant	36.8	45.2
	(8.8)	(9.9)	(10.0)		(9.4)	(12.0)
Ln *size*	–5.2	–3.8	–2.3	Ln *size*	– 2.0	–1.0
	(–6.7)	(–5.5)	(–3.4)		(–2.9)	(–1.5)
mat	0.8	0.9	0.3	*mat*	–1.1	–0.7
	(2.5)	(2.8)	(1.0)		(–4.7)	(–2.9)
invgrade	–7.2	–3.7	–1.5	*invgrade*	–8.6	–3.9
	(–1.7)	(–0.8)	(–0.3)		(–2.0)	(–0.8)
constrpty	16.9	21.3	18.4	*CN*	12.5	1.9
	(3.3)	(4.4)	(4.0)		(2.9)	(0.5)
finservbk	–1.5	–1.0	–4.8	*HK*	5.7	4.0
	(–0.3)	(–0.2)	(–1.0)		(2.0)	(1.5)
finservnb	12.9	15.0	9.5	*ID*	–3.8	20.6
	(2.5)	(3.0)	(2.1)		(–0.7)	(3.9)
hightech	9.9	12.1	2.5	*KR*	–2.7	–5.2
	(2.0)	(2.6)	(0.6)		(–0.9)	(–1.8)
utilities	–0.6	4.0	0.7	*MY*	8.3	8.2
	(–0.1)	(0.8)	(0.1)		(2.2)	(2.1)
popserv	12.2	13.0	7.4	*PH*	2.3	1.8
	(2.1)	(2.3)	(1.4)		(0.7)	(0.6)
state	–5.6	6.1	5.0	*TH*	0.9	–0.5
	(–0.9)	(1.0)	(0.8)		(0.2)	(–0.1)
tradind	5.6	10.0	6.2	*TW*	30.4	23.5
	(1.1)	(2.0)	(1.3)		(11.2)	(9.4)
transport	8.7	13.1	10.4	*grpnatmatch*	22.1	19.8
	(1.5)	(2.5)	(2.1)		(14.0)	(13.3)
acqrecap	–5.0	–8.0	–7.5	*OWNCUR*	20.7	17.1
	(–1.1)	(–2.2)	(–2.5)		(10.3)	(9.7)
project	–18.7	–15.3	–12.4	R^2	0.52	0.44
	(–4.4)	(–3.6)	(–3.3)			
airshp	–33.3	–39.3	–33.2			
	(–7.6)	(–9.2)	(–8.2)			
backup	–3.0	–5.8	–8.0			
	(–0.5)	(–1.0)	(–1.7)			
pty	5.0	4.4	3.9			
	(1.1)	(1.0)	(0.9)			
grpnatmatch	28.7	24.1	20.4			
	(16.2)	(14.8)	(13.7)			
HKD			4.0			
			(1.8)			
TWD			32.6			
			(21.0)			
SGD			–1.5			
			(–0.5)			
KRW			7.4			
			(1.9)			
R^2	0.35	0.34	0.47			

Number of observations: 1,195. Total size: $147.5 billion. Average Asian and Japanese share: 61.9% (unweighted). Average Asian and Japanese share: 62.6% (size-weighted). Note: White heteroskedasticity-consistent t-statistics in parentheses.

References

Bank for International Settlements (2002): *Triennial central bank survey of foreign exchange and derivatives market activity 2001*, March.

Clifford, M L and P Engardio (2000): *Meltdown: Asia's boom, bust, and beyond*, Prentice Hall Press, Paramus, NJ.

Fernandez, D G and A Li (2002): "Asian dollar bonds: in a class by themselves", *Asian credit markets research: Asia markets outlook and strategy*, JP Morgan Chase, 19 September, pp 3–6.

Fung, B S C and R N McCauley (2001): "Analysing the growth of Taiwanese deposits in foreign currency", *BIS Quarterly Review*, September, pp 49–56.

Gadanecz, B and K von Kleist (2002): "Do syndicated credits anticipate BIS consolidated banking data?", *BIS Quarterly Review*, March, pp 65–74.

Li, A (2002): "Introducing the JACI model portfolio", *Asian Credit Research*, JP Morgan Chase, 2 May.

Kleimeier, S and W Megginson (2000): "Are project finance loans different from other syndicated credits?", *Journal of Applied Corporate Finance*, vol 13, part 1, pp 75–87.

Ma, G and R N McCauley (2002): "Rising foreign currency liquidity of banks in China", *BIS Quarterly Review*, September, pp 67–73.

McCauley, R N and J Hobson (2002): "The future of banking in Asia", forthcoming.

McCauley, R N, J S Ruud and P D Wooldridge (2002): "Globalising international banking", *BIS Quarterly Review*, March, pp 41–51.

McCauley, R N and W R White (1997): "The euro and European financial markets", in P R Masson et al (eds), *EMU and the international monetary system*, IMF, Washington, pp 324–88.

Park, Y C and K-H Bae (2002): "Financial liberalization and economic integration in East Asia", paper presented to PECC Finance Forum Conference, "Issues and prospects for regional cooperation for financial stability and development", Honolulu, 11–13 August.

Wang, Y (2002): "Korea's perspective on regional financial cooperation", paper presented to PECC Finance Forum Conference, "Issues and prospects for regional cooperation for financial stability and development", Honolulu, 11–13 August.

Serge Jeanneau

+41 61 280 8416
serge.jeanneau@bis.org

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

Basel Committee on Banking Supervision (BCBS)

The BCBS agrees on issues concerning the New Accord ...

In July, members of the BCBS reached agreement on a number of important issues concerning the New Basel Capital Accord that the Committee had been exploring since the release of its second consultative paper in January 2001.[1] The Committee considered a range of issues related to both the standardised and internal ratings-based (IRB) approaches to credit risk, and agreed to make a number of amendments to the proposals contained in its second consultative document. It also confirmed its intent to finalise the New Basel Capital Accord in the fourth quarter of 2003, allowing for implementation of the new framework in each country at year-end 2006.

... and announces a third and final quantitative impact study

In the same month, the BCBS also announced that it would be conducting a third and final Quantitative Impact Study (QIS 3).[2] The new study will be a comprehensive exercise, allowing the Committee to assess the impact of various proposals before a third consultative paper on the New Basel Accord is published in 2003. The survey will involve banks in G10 and non-G10 countries and include both large, internationally active, diversified institutions and smaller banks. It will encompass results on all three new approaches proposed by the BCBS (standardised, foundation IRB and advanced IRB) and will analyse the effects of the new proposals on all portfolios. The survey forms were released in early October, including an information package with detailed instructions and spreadsheets with embedded risk weights. Financial institutions have been asked to return their submissions by year-end 2002. The Committee will assess the results of the survey to determine whether any adjustments need to be made prior to the release of an updated revision of its proposals for public comment in the second quarter of 2003.

[1] See *Basel Committee reaches agreement on New Capital Accord issues*, BCBS, Basel, July 2002, at www.bis.org.

[2] See *Results of Quantitative Impact Study 2.5*, BCBS, Basel, July 2002, at www.bis.org.

Also in July, the BCBS published a new draft of a consultative paper originally published in December 2001 on the development of sound practices for the management and supervision of operational risk.[3] The paper outlines a set of principles that provide a framework for the effective management and supervision of operational risk, for use by banks and supervisory authorities when evaluating operational risk management policies and practices. The Committee recognises that the exact approach for operational risk management at individual banks will depend on a range of factors, including their size, sophistication and the nature of their activities. However, despite these differences, clear strategies and oversight by the board of directors and senior management, a strong internal control culture, appropriate internal reporting, and contingency planning are all crucial elements of an effective operational risk management framework for all banks. Given the number of important changes, the Committee decided to release the paper for a second, short period of consultation before finalising it.

The BCBS puts out a consultative paper on operational risk ...

In August, the BCBS published the results of a survey of internal audit issues in banks in 13 countries, which utilised the framework contained in the Committee's best practice paper issued in August 2001.[4] The information about banks was gathered from national supervisory authorities and supplemented by interviews with internal auditors and other related parties. The survey found widespread endorsement of the key internal audit principles identified by the BCBS as reflecting best practice within the banking industry. In particular, there was broad recognition of the importance of independent and competently staffed internal audit functions. Responses further indicated that boards of directors and audit committees were devoting time and effort to ensuring that their banks maintained appropriate internal controls and risk management protocols and complied with laws and regulations. Almost all banks surveyed already have an audit charter in place or are currently drafting one.

... and releases the results of a survey on internal audit issues

In September, regulators representing nearly 120 countries attended the International Conference of Banking Supervisors (ICBS) in Cape Town.[5] They announced their commitment to fight the funding of terrorist activities and the laundering of funds related to these activities by strengthening the enforcement of measures that make it harder to disguise the ownership of bank accounts. Regulators also pledged to support the standards set out in the BCBS's report on customer due diligence for banks, and endorsed the adoption of know-your-customer procedures within individual jurisdictions and the sharing of

ICBS is held in Cape Town

---

[3] See *Sound practices for the management and supervision of operational risk*, BCBS, Basel, July 2002, at www.bis.org.

[4] See *Internal audit in banks and the supervisor's relationship with auditors*, BCBS, Basel, August 2001 and *Internal audit in banks and the supervisor's relationship with auditors: a survey*, BCBS, Basel, August 2002, at www.bis.org.

[5] The ICBS is a biennial event, held since 1979, which is attended by senior representatives of supervisory authorities worldwide. Its aim is to promote cooperation among national authorities in the supervision of international banking and to facilitate exchanges of views on a range of issues of common concern.

information related to terrorist financing and money laundering with other supervisors and law enforcement agencies.[6]

Committee on Payment and Settlement Systems (CPSS)

The CPSS issues a consultative paper on retail payment systems

In September, the CPSS issued a consultative report on central bank policy issues in the area of retail payments.[7] The report, which invites public comments by 13 December 2002, identifies current trends in the markets for consumer and lower-value commercial payments and explores related policy issues for central banks. It describes the varied ways in which central banks are involved in retail payments, and discusses differences in their policy mandates and their respective interaction with the private sector. The report puts forward public policy goals for maintaining and promoting efficiency and safety in these markets and considers the contribution of central banks towards furthering these goals. It identifies a range of possible actions, some of which are recommended as minimum steps for all central banks. Beyond the minimum, other options are identified which may be appropriate in certain circumstances. The recommended minimum actions emphasise the importance of market monitoring and of a cooperative and advisory approach by central banks towards both the private and public sectors.

Financial Stability Forum (FSF)

The FSF addresses vulnerabilities in the global financial system

At its meeting in Toronto in September, the FSF addressed potential vulnerabilities in the global financial system. Although it accepted that the baseline scenario of moderate growth in major industrial countries was still the most likely outcome, it also expressed concerns about the materialisation of downside risks and/or intensification of risk aversion. It was felt that uncertainty was the predominant feature of the current juncture.

Financial institutions have shown resilience, but cushions of comfort are thinning

The Forum concluded that financial institutions had continued to show remarkable resilience, attesting to the benefits of considerable investment in risk management. However, further equity price declines and credit deterioration had meant that cushions of comfort were thinning, making the system more susceptible should new shocks occur. Material losses had been sustained by non-bank entities supporting the credit intermediation process, the full effect of which on credit supply was unclear. Equity price declines had made it harder for insurance companies to deal with negative margin problems.

The FSF also reviews corporate governance ...

The FSF also reviewed work under way to address weaknesses in market foundations revealed by recent corporate failures, including national and international initiatives to strengthen corporate governance, auditing quality, accounting standards and public disclosure practices. The Forum emphasised the importance of seizing the current opportunity to pursue implementation of

---

[6] See *Customer due diligence for banks*, BCBS, Basel, October 2001, at www.bis.org.

[7] See *Policy issues for central banks in retail payments*, CPSS, Basel, September 2002, at www.bis.org.

needed reforms and to bring about greater international coherence, based on high-level principles. The FSF will continue to promote coordination and coherence across countries and sectors and monitor developments closely. It will also study the role of credit rating agencies, based on a large-scale review now being conducted by the US Securities and Exchange Commission.

... and promotes international coherence on the issue

The FSF also examined the state of the reinsurance industry. Although there were no suspicions that major reinsurance companies faced serious difficulties, it was agreed that more information on the global reinsurance market, individual reinsurers and the rating process was needed to assess systemic concerns and risk management capacity at individual institutions. The FSF asked the key regulators in the jurisdictions in which the major reinsurers were located to take a leading role in the International Association of Insurance Supervisors' (IAIS) initiative to improve transparency in the global reinsurance market and enhance risk disclosure by individual reinsurance companies. The Forum also supported the work of the IAIS to develop an improved and comprehensive framework for the regulation of the global reinsurance industry and the effort by the International Accounting Standards Board to develop principles for insurance and reinsurance accounting.

Moreover, the FSF examines the reinsurance industry

With regard to previous concerns, the FSF supported periodic reviews by the IMF and the BIS of the highly leveraged institution (HLI) industry, based on data that is commercially, and anecdotally, available, which could provide early warning of increases in leverage. The FSF also reviewed the progress made in the IMF's assessments of offshore financial centres (OFCs). OFCs are expected to complete assessments of their observance of international standards, along with action plans to address any shortcomings, by 2003.

The FSF also discusses issues related to HLIs and OFCs