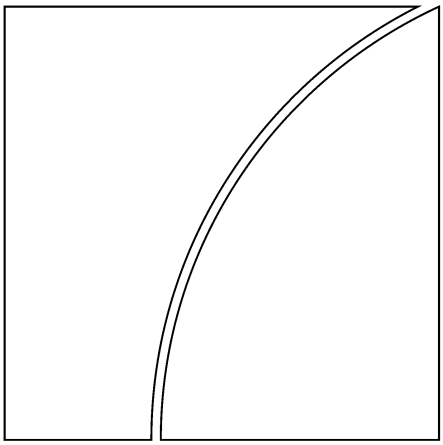
BANK FOR INTERNATIONAL SETTLEMENTS

BIS Quarterly Review

March 2003



International banking and financial market developments

BIS Quarterly Review
Monetary and Economic Department

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Notations used in this Review

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

Differences in totals are due to rounding

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1. Overview: uncertainty spoils the optimism

The continuing threat of war in Iraq tended to overshadow news about the course of the global economy in recent months. A mood of investor optimism in October and November 2002 had buoyed equity and corporate bond markets and made yield curves steeper. Starting in December, however, uncertainty about the economic consequences of a possible war began to weigh more heavily on the markets. Once their optimism had dissipated, investors seemed to attach little significance to major economic news. By the second week of February, the war premium had taken back most of the late 2002 gains in equity markets. Yield curves had become somewhat flatter than in late November but continued to price in an economic recovery, albeit a more modest one.

International bond markets offered more favourable borrowing terms but still failed to attract much in the way of net new issuance. This lacklustre demand for funds to some extent reflected a reluctance on the part of firms to increase their leverage in the face of uncertain economic prospects. The need to reduce debt was especially pressing for companies whose credit ratings had been downgraded. Restructuring plans that favoured existing creditors over equity holders allowed the corporate bond market to stand apart from the equity markets in early 2003, with credit spreads remaining stable even as stock prices fell.

The hospitality of capital markets towards the close of the year also extended to borrowers from emerging markets. In the wake of the presidential elections, Brazil enjoyed a dramatic improvement in investor sentiment. Although sovereign debt spreads remained wide, Brazilian borrowers were quick to return to international markets to refinance maturing debt. Venezuela suffered the opposite fate as a nationwide strike against the government dragged on. Coupled with the prospect of war in Iraq, the strike led to a sharp rise in oil prices, further undermining expectations about the strength of the economic recovery.

Risk of war weighs on equities

In October and November 2002, positive earnings and analyst reports for a few bellwether companies had led to a seven-week rally in US and European stock markets. Investor optimism had risen in spite of weak macroeconomic data.

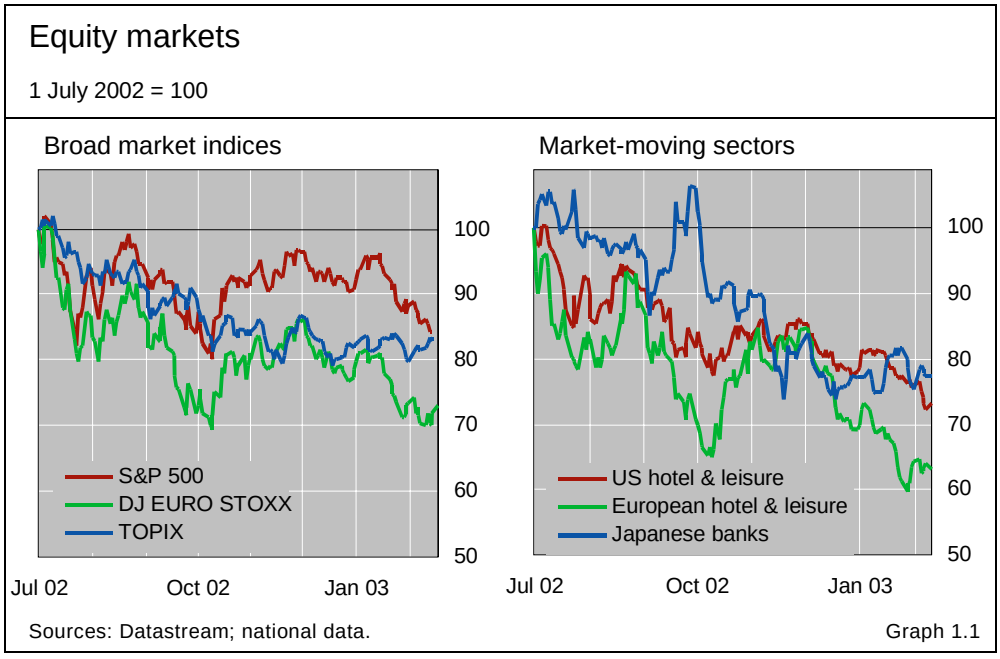
Even news about Iraq had seemed positive. On 14 November, the announcement that Iraq had accepted a UN resolution on disarmament had been greeted by significant increases in US and European equity prices. Between 9 October and 22 November, the wave of optimism had lifted the S&P 500 by 20% and the DJ EURO STOXX by 22% (Graph 1.1). In the event, closely watched economic news in December and early January (Graph 1.2) largely failed to validate the optimism, thus undermining the previous gains.

Blows to confidence in January and February

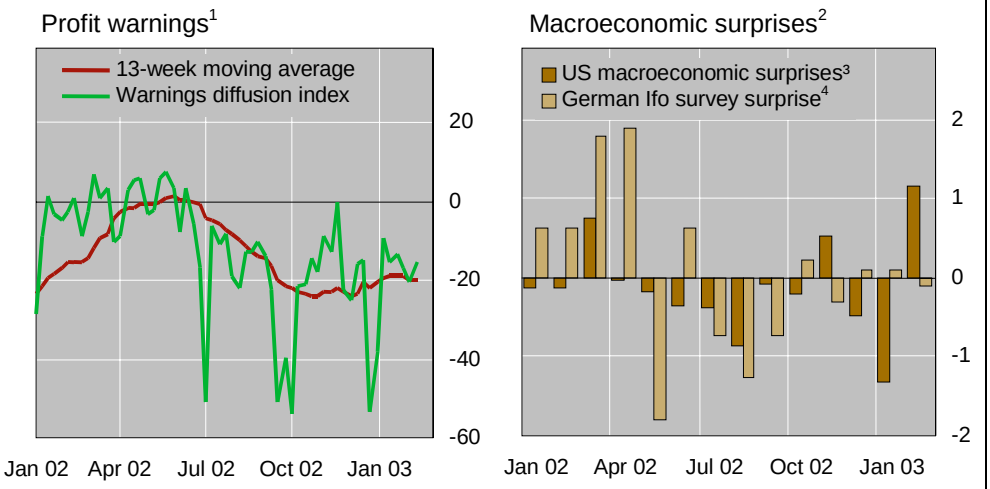
Starting in December, events related to Iraq seemed to chip away at investor confidence, with the blows becoming especially damaging from mid-January on. There was little ambiguity about the immediate market impact of significant news about Iraq: asset prices often moved sharply in one direction for a short period after an event was first reported. On 16 January, for example, within 30 minutes of the announcement that the UN inspectors had found empty Iraqi warheads, the S&P 500 fell by 0.5% and the DJ EURO STOXX by 1.7%, while the Swiss franc gained about half a cent against the dollar, unusually large movements for such a brief time span. While the general effect of uncertainty may have been more important than the immediate impact of news, it was also more difficult to disentangle from the effects of other events. Nevertheless, there was an apparent change in the way investors reacted to economic announcements. On 7 February, for example, the release of the US employment report showed a surprising surge in non-farm payroll jobs, which would ordinarily have boosted prices in the stock market. Instead, the S&P 500 declined by 1% that day.

A change in reactions to economic news

The threat of war apparently led both to downward revisions in expected corporate earnings and to the emergence of a risk premium associated with uncertainty about the war's economic consequences. Differences in market performance between industry sectors indicated revisions in earnings prospects. In particular, the hotel and leisure sectors in both the US and European markets were among the worst hit (Graph 1.1). The emergence of a



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

market-wide risk premium was evident in the volatilities implied by the prices of equity index options. These volatilities began to rise again in January, although they stayed below the elevated levels of September 2002 (Graph 1.3). Possibly contributing to the uncertainty was the fact that several bellwether companies refrained from providing their usual outlook for future earnings, citing the difficulty of anticipating the effects of a war. As a consequence of both revisions in earnings expectations and the war premium, the five weeks leading up to 13 February saw the US equity market lose 12% of its value in local currency terms and the European market 14%. A depreciation of the US dollar against the euro during the same period meant that the two markets performed equally poorly in common currency terms.

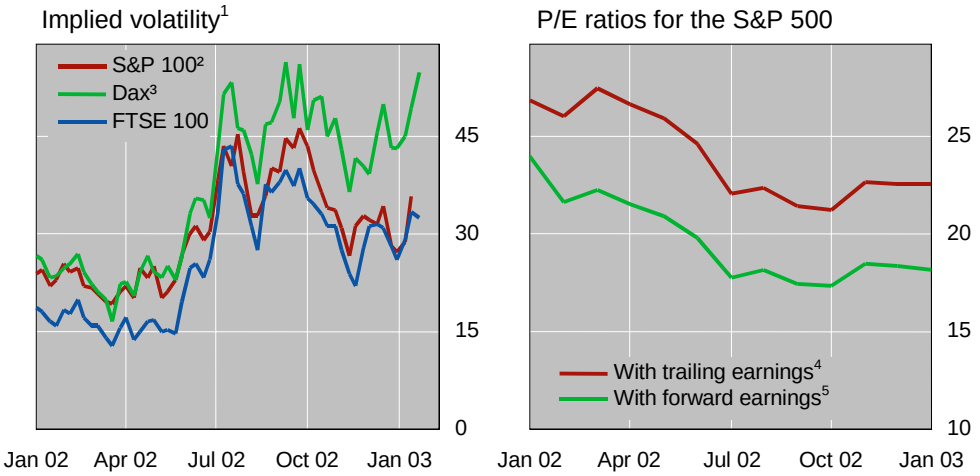
The war premium depresses equity prices ...

In spite of the war premium, broad market valuations in terms of price/earnings ratios remained above historical norms. It is true that if these ratios were calculated in terms of earnings estimates for the year ahead, the valuations would be lower (Graph 1.3). However, such earnings estimates have systematically exceeded realised earnings, and the current estimates would be overly optimistic if a strong economic recovery failed to materialise. To smooth out the effects of the business cycle, the price/earnings multiple could be calculated in terms of the five-year moving average of trailing earnings. Calculated in this way, unusually high price/earnings ratios in the past have tended to be followed by price declines over the ensuing five-year period. In the case of the S&P 500, the price/earnings multiple based on such a moving average was about 23 in January 2003, still above the 1961–95 average of 17.

... but valuations still assume a strong recovery

The Tokyo market tended to be less subject to war jitters. While the market often moved in tandem with its US and European counterparts in

Volatility and valuations



[1] End-week data. [2] Based on implied volatility of S&P 100 (VIX) options. [3] Based on implied volatility of index call options. [4] Based on a five-year moving average. [5] Estimated earnings for one year ahead.

Sources: Chicago Board Options Exchange; Bloomberg; national data. Graph 1.3

December, it began to follow its own course in January. At a time when the major markets abroad were declining sharply, equity investors in Japan turned their attention to the country's large banks. These banks seemed to be making an effort to shore up capital ahead of inspections by the Japanese Financial Services Authority before the end of the fiscal year in March. On 14 January, Goldman Sachs announced that it would purchase ¥150 billion in convertible preferred shares from Sumitomo Mitsui. The bank's shares rose 8% on the news, while the broad market edged up by 1%. Mizuho followed suit on 21 January by announcing a write-off of ¥2 trillion in bad debt, or 2.5% of its loan book. In spite of the write-off, the bank's shares jumped by 4% and the TOPIX by 2%. Despite these efforts, Fitch downgraded the credit ratings of the four largest banks on 30 January. Nevertheless, the period from mid-January to mid-February saw the Tokyo market eke out a 1.4% gain, thus outperforming the US and European markets.

Japanese banks try to shore up capital

Fixed income markets still price in a recovery

Cuts in policy rates by major central banks seemed to exert a calming influence on participants in fixed income markets. Yield curves in the United States and Europe became flatter to reflect perceptions of a weaker economic recovery. Nevertheless, the curves remained remarkably steep, indicating expectations that were somewhat more optimistic than consensus growth forecasts. The policy rate cuts may have helped by conveying the message that the central banks were again entering an easing phase after a long hiatus during which policy rates had remained unchanged. Indeed, the US Federal Reserve, ECB and Bank of England cut their rates by turns in November, December and January (Graph 1.4). With these cuts at the short end in place, the period from

A message that central banks are willing to act

mid-January to mid-February saw relatively modest declines in US and European long-term interest rates even as equity prices were plunging.

The Fed could use other policy tools

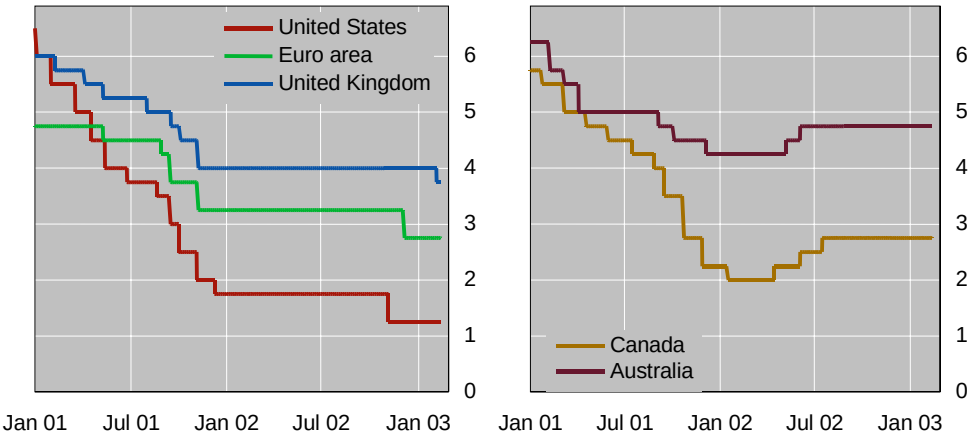
The signal sent by the US central bank was a case in point. On 6 November, the Fed cut its policy rate by 50 basis points after 11 months of no policy rate action. The surprisingly aggressive move was a signal that the central bank was willing to take action when its goals were at risk even with the target rate already at 1.75%. In a speech on 21 November, a member of the Board of Governors suggested that the Fed would not hesitate to use alternative tools at its disposal to stimulate the economy if the policy rate became ineffective. The Fed's aggressive easing contrasted with the actions of other central banks. The Bank of England's rate cut was smaller and came later, apparently because of concern about undue strength in the UK housing sector. Indeed, similar concerns seem to have influenced the decision by the Reserve Bank of Australia to raise its policy rate earlier in 2002 (Graph 1.4). The Bank of Canada was an outlier in this regard: it also increased rates then, but the reason was to moderate an economic recovery that appeared to be too vigorous.

Swap curves flatten only modestly

Participants in fixed income markets did appear to hold on to their optimism to a greater extent than their counterparts in equity markets. In recent months, the swap markets have been more informative than government securities markets about growth expectations, because swaps are less subject to safe haven flows and to concerns about fiscal deficits than government bonds are. During the seven-week equity market rally in October and November, the differential between 10-year and three-month yields in the US dollar swap market had widened by about 75 basis points (Graph 1.5), or an average of 3.8 basis points for every percentage point gain in the S&P 500. By contrast, when the equity markets were sinking from mid-January to

Central bank policy rates[1]

In percentages



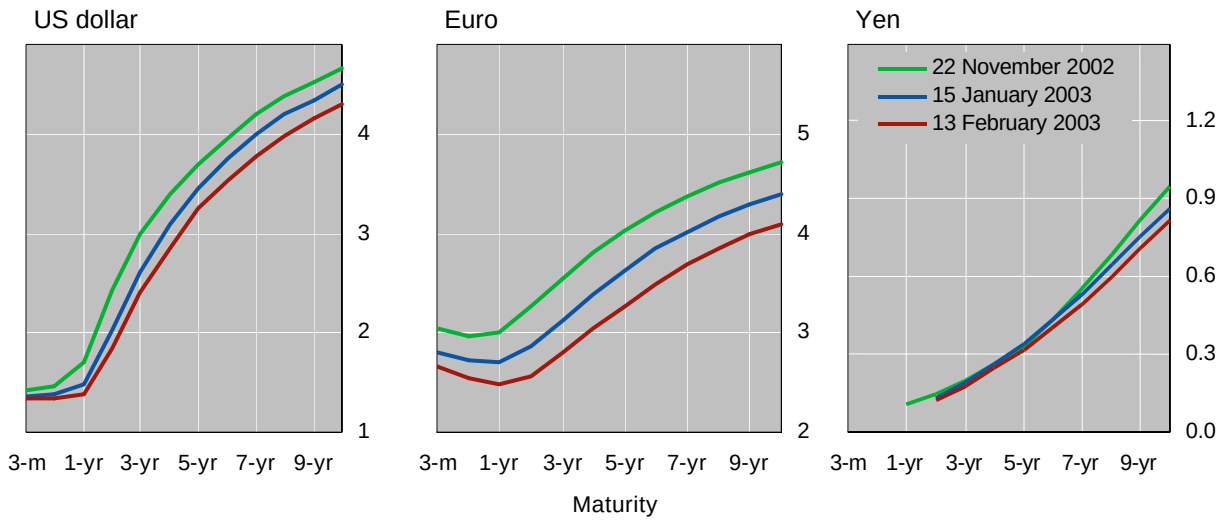
[1] For the United States, federal funds target rate; for the euro area, ECB minimum bid two-week refinancing rate; for the United Kingdom, repo rate; for Canada, overnight lending rate; for Australia, cash target rate.

Source: Bloomberg.

Graph 1.4

Yield curves for interest rate swaps

In percentages



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

Source: Bloomberg. Graph 1.5

mid-February, the US swap curve flattened by only 17 basis points, or an average of 1.2 basis points for every percentage point loss in the S&P 500. Hence, while the flatter swap curve at the end of the period suggested expectations of a more modest US recovery, the downward revision did not offset most of the earlier optimism. In the euro market, the corresponding slope differential narrowed by even less during the January–February equity market decline, indicating continued expectations of a recovery in Europe, albeit a weak one.

Corporate borrowers begin to deleverage

Credit and equity markets decoupled in early 2003 ...

The risk aversion apparent in equity markets in the early part of 2003 seemed not to spill over into the corporate bond market. Credit markets had rallied together with equity markets in late 2002, as investors gained new confidence in the global economy's near-term prospects. By the end of the year, the spread of seven- to 10-year triple-B US corporate bonds over corresponding Treasuries had fallen by 110 basis points from its early October peak, to about 240 basis points (Graph 1.6). Then, beginning in mid-January, credit spreads showed signs of decoupling from equity prices. Even as equity markets tumbled in late January, investment grade and high-yield spreads remained more or less unchanged.

Notwithstanding the general improvement in credit conditions, concerns about underfunded pension liabilities spread from the United States to Europe in the early part of 2003 and raised financing costs for some prominent European firms. In October 2002, Standard & Poor's had downgraded the credit ratings of several US companies in part because of the size of the shortfall in their pension plans. Those affected included several of the largest

US issuers of corporate debt securities, most notably Ford, General Motors and their finance company subsidiaries. In February 2003, the same rating agency warned that several European firms faced similar shortfalls and could also be downgraded. Immediately following the announcement, bond spreads over swaps widened by as much as 60 basis points for German steel and engineering concern ThyssenKrupp and by somewhat less for the other affected firms.

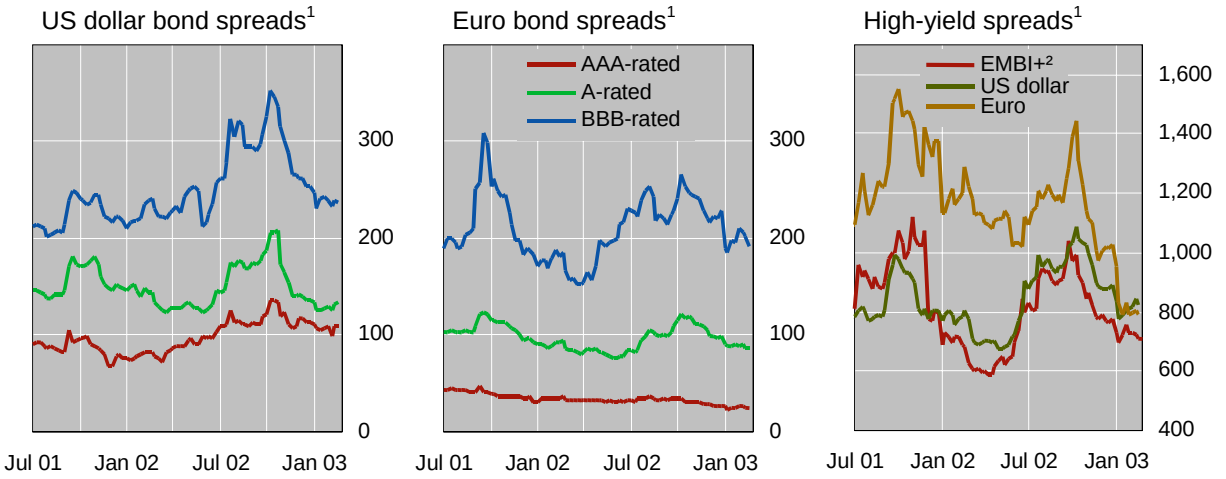
... as investors recognised some firms' efforts to deleverage

The apparent weakening of the relationship between corporate bond spreads and equity prices in the early part of 2003, a relationship evident for much of 2002, was driven in part by investors' recognition of corporations' efforts to deleverage. Measures to reduce debt, such as equity issues and asset sales, tend to favour bondholders over equity holders and so to lead to narrower credit spreads, lower equity prices, or both. Deleveraging is typically a slow process, and in 2001–02 mainly took the form of cutbacks in capital investment. While such cutbacks helped to stabilise corporate debt levels, more radical measures are often required to fundamentally restructure balance sheets.

Fallen angels begin to restructure

A number of "fallen angels" – firms whose debt was once rated investment grade but has since been downgraded to below triple-B minus – have begun to take more radical measures. Approximately $200 billion of debt previously rated investment grade fell to high-yield status in 2002. The market for high-yield debt is relatively small, and so the larger fallen angels are finding it difficult to refinance their maturing obligations. Some US and European firms resorted to asset sales. These sales frequently took the form of private sales or buyouts by venture capitalists rather than public offerings, owing to the weak state of equity markets. Indeed, signings of syndicated loans related to leveraged buyouts soared to $18 billion in the fourth quarter (see "International syndicated credits in the fourth quarter of 2002" on page 21). Some fallen

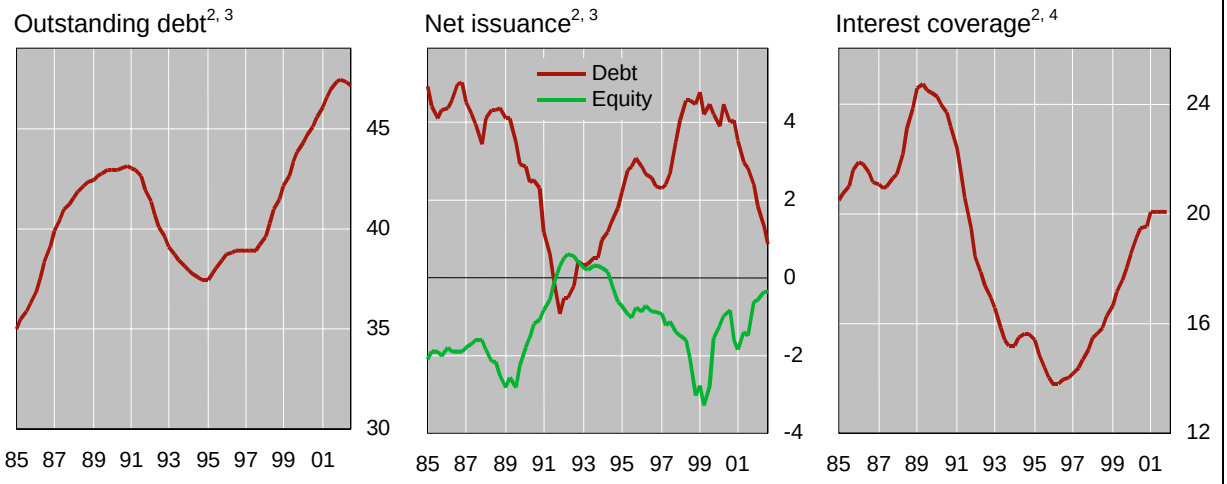
Corporate bond spreads



[1] Option-adjusted spreads over government bonds as calculated by Merrill Lynch for corporate bond indices with seven- to 10-year maturity; end-week data, in basis points. The high-yield spread indices also include bonds of other maturities. [2] Weighted spread of sovereign debt instruments over US Treasury securities as calculated by JP Morgan Chase.

Sources: Bloomberg; JP Morgan Chase; Merrill Lynch; national data; BIS calculations. Graph 1.6

Deleveraging by US corporations[1]



[1] Non-financial businesses. [2] Four-quarter moving average. [3] As a percentage of nominal GDP. [4] Net interest payments as a percentage of operating cash flows. Net interest payments exclude imputed interest. Operating cash flows equal earnings before interest, taxes and depreciation, adjusted for the effect of inflation on inventories.

Sources: Federal Reserve; Bureau of Economic Analysis; BIS calculations. Graph 1.7

angels announced equity rights offerings, giving existing shareholders the right to buy new shares. Others sold convertible bonds, and still others negotiated debt-for-equity swaps or debt exchanges.

Japan pursued its own course of financial restructuring. As previously mentioned, the four largest Japanese banks announced plans to boost their capital. Mitsubishi Tokyo Financial Group announced a ¥360 billion offering of common equity, the largest ever by a private firm in Japan and the first by a Japanese bank since the 1980s. Mizuho, Sumitomo Mitsui and UFJ collectively issued approximately ¥1.6 trillion in preferred shares. While preferred shares may improve regulatory capital ratios, their debt-like characteristics make them costly instruments for raising economic capital. For example, some preferred shares offered a dividend yield that was significantly higher than the coupon on bonds recently issued by the same bank. Furthermore, the amounts raised by the four banks equalled less than 5% of the official estimate of non-performing loans and an even smaller percentage of many economists' private estimates.

Low yields keep interest costs manageable despite high debt levels

The process of corporate restructuring which seems to be under way in the United States and other large economies is not yet as pronounced as during the previous period of deleveraging. Between 1991 and 1993, US corporations issued equity to retire outstanding debt (Graph 1.7). Coupled with lower interest rates, this contributed to a sizeable decline in the burden of interest charges on cash flows.[1] Today, debt levels for the US corporate sector as a whole are at an all-time high relative to the size of the economy. However, US corporations are under less pressure to deleverage than in the late 1980s because exceptionally low nominal yields help to keep debt servicing costs

[1] See E M Remolona, R N McCauley, J S Ruud and R Iacono (1992–93): "Corporate refinancing in the 1990s", *Federal Reserve Bank of New York Quarterly Review*, Winter, pp 1–27.

manageable. Despite record levels of corporate indebtedness, interest costs account for a smaller percentage of corporate cash flows today than in the late 1980s.

Net issuance in domestic and international bond markets slows sharply

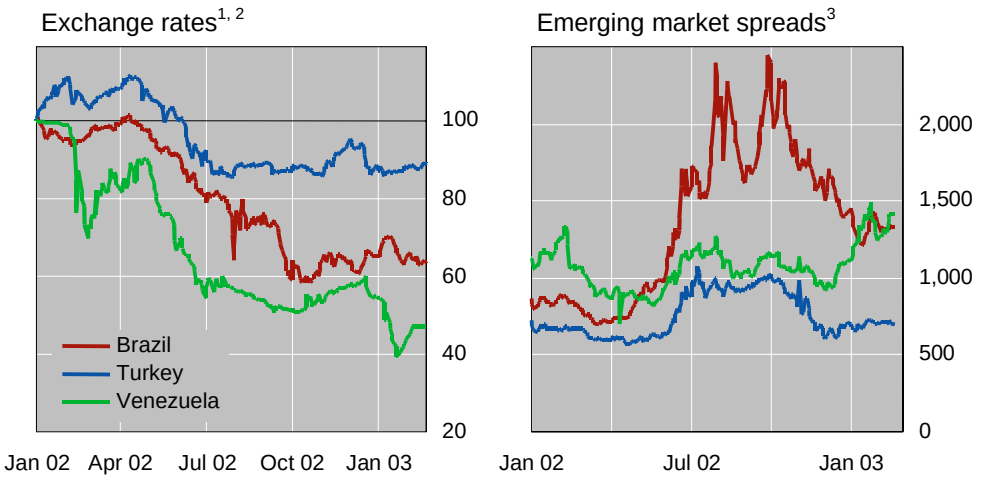
Nevertheless, many firms appear gradually to be following the example of the fallen angels and re-examining their balance sheets. Over the past few years, US corporations have sharply reduced their repurchases of shares, though net issuance of equities has still remained negative. In 2001, firms refinanced short-term debt in longer-term markets, contributing to a sharp drop in outstanding commercial paper and bank lending. In the latter half of 2002, firms curtailed their longer-term borrowing, with net issuance in domestic and international bond markets slowing sharply (see "The international debt securities market" on page 23).

Emerging markets lose momentum

In emerging markets, financing conditions also remained stable going into 2003 despite the volatility in global equity markets. Sentiment towards Brazil and Turkey improved following elections in those two countries, supported by the new governments' commitments to continue fiscal and economic reforms and the global easing of credit conditions. However, the improvement lost momentum in January as the situation in Venezuela deteriorated.

Developments in Venezuela were the focus of investor attention for much of January. The opposition had begun a nationwide strike in early December and vowed to continue until the president scheduled new elections. As the strike dragged on, pressure on the currency and sovereign spreads intensified (Graph 1.8). The bolívar fell by 32% against the US dollar between 2 December and 22 January, when the government halted foreign exchange trading. Trading resumed two weeks later after the authorities adopted a fixed

Emerging markets



[1] 1 January 2002 = 100. [2] A decrease represents a depreciation of the local currency against the US dollar. [3] In basis points; stripped spread over US Treasury securities of emerging market bond indices as calculated by JP Morgan Chase.

Sources: Bloomberg; Datastream; JP Morgan Chase; BIS calculations. Graph 1.8

exchange rate and currency controls. Ironically, the imposition of controls helped to stop the widening of Venezuela's sovereign spreads, as bondholders hoped that controls would preserve foreign exchange reserves to meet Venezuela's external debt obligations. A gradual return to work beginning in late January also helped to stabilise the market.

The strike in Venezuela boosts oil prices and adds to uncertainty

The strike had global repercussions through its impact on the price of oil. Venezuela is the world's ninth largest producer of oil and fourth largest exporter. Many employees of the state-owned oil company PDVSA joined the strike, resulting in a severe decline in oil production and exports. The price of Brent crude rose by more than 20% between early December and late January in response to both the shutdown in Venezuela and the prospect of war in Iraq.

The strike in Venezuela at times added to uncertainty in other Latin American countries. News that might have been expected to boost investor confidence in the early part of 2003, such as Brazil's announcement of a higher target for the primary fiscal surplus and Argentina's conclusion of a new seven-month programme with the IMF, was overwhelmed by negative developments in Venezuela. The economic consequences of a possible war in Iraq also weighed on sentiment. As a result, the narrowing of sovereign debt spreads experienced in the fourth quarter of 2002 did not continue into 2003.

Brazilian borrowers returned to international debt markets in late 2002 and early 2003 to refinance maturing debt. However, they raised little in the way of net new financing (see "The international debt securities market" on page 23). Although down from their early October peak, spreads on the Brazilian government's international bonds were still 500 basis points wider in mid-February than a year earlier, and the currency was down by 33% against the US dollar over the same period.

Asia imports riskier capital …

Whereas Latin American residents made net repayments of $5 billion in the international bond market in 2002, Asian residents raised $21 billion in net new bond financing. Indeed, issuers from Asia replaced those from Latin America as the most active emerging market borrowers in the international debt securities market last year. Emerging Asia also saw large inflows from banks abroad, with inflows in the third quarter of 2002 exceeding even inflows prior to the Asian crisis of 1997–98 (see "The international banking market" on page 13).

Recent inflows into emerging Asia were driven by both a positive economic outlook and robust demand for credit. Strong or improving fundamentals in much of the region attracted the interest of global investors. While the security situation in the Korean peninsula weighed on Korea's sovereign spreads in the early part of 2003, most economies in emerging Asia continued to enjoy very favourable access to international markets. At the same time, economic growth in the region supported household and corporate demand for credit. Borrowers often had difficulty placing lower-quality debt locally, such as subordinated debt, and so sought financing offshore.

… and exports safe capital

Despite these inflows, emerging Asia remains a net exporter of capital. Economies in East and Southeast Asia continue to post large current account surpluses, totalling approximately $90 billion in 2002. Asia appears to be attracting riskier capital, such as equity and subordinated debt, while paying

down its external debt and accumulating safe liquid assets. Asian central banks in particular have purchased substantial amounts of US agency securities and other lower-risk assets (see the special feature “Choosing instruments in managing dollar foreign exchange reserves” on page 39). This pattern of capital flows has resulted in a significant strengthening of Asia’s external balance sheet.

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2. The international banking market

Purchases of government securities supported activity in the international banking market in the third quarter of 2002. Banks in the BIS reporting area invested substantial amounts in euro area and US government securities and other lower-risk assets. At the same time, cross-border lending to corporations and other banks remained subdued. Thus, bank activity seems to have reflected the heightened sense of risk aversion evident among global investors in the third quarter, when spreads in the corporate bond market soared.

Bank flows to emerging markets in the third quarter also showed a shift towards lower-risk assets. Latin America experienced the largest outflow of funds since the third quarter of 1999, and banks again reduced their cross-border claims on Turkey. By contrast, emerging markets in Asia saw a record inflow of funds, driven by both a rise in claims and a repatriation of deposits. Banks also channelled funds to countries in accession negotiations with the European Union.

Euro area activity picks up

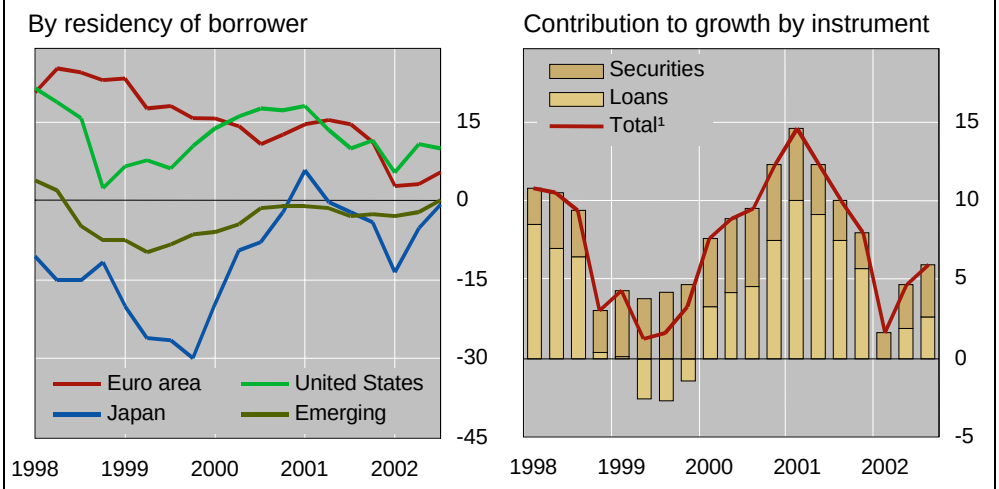
The growth of cross-border bank credit picked up very slightly in the third quarter of 2002, driven by investment in low-risk securities as banks in the BIS reporting area continued to shift their asset portfolios out of loans. The year-over-year growth in claims accelerated to 6%, up from 4.7% in the second quarter (Graph 2.1). In seasonally unadjusted terms, the outstanding stock of cross-border claims booked by banks in the reporting area increased by $142 billion between end-June and end-September 2002, to $12.7 trillion (Table 2.1).

Activity shifts from the interbank market

Much of the third quarter increase in total claims reflected investment in government and other debt securities. As discussed in the December 2002 *BIS Quarterly Review*, the growth in claims on non-banks, which include governments and quasi-government agencies as well as corporations, has consistently exceeded that of claims on banks since the second quarter of 2001. Boosted by a $113 billion investment in debt securities, claims on non-banks increased by $144 billion in the third quarter of 2002. This was the largest quarterly increase since the first quarter of 2001, and drove up the year-over-year growth rate of claims on non-banks to 9.6%, the third consecutive quarterly increase.

Cross-border claims by residency and instrument

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. Graph 2.1

Euro area activity picks up while claims on the US are flat

In terms of the location of borrowers, the pickup in overall activity was largely explained by robust activity in the euro area. Claims rose 5.5% year over year following two quarters of slow growth. Much of this expansion was driven by intra-euro area activity, as banks in Germany, France, Italy and Spain each increased claims on the area by $9 billion or more. The contraction in claims on borrowers in Japan observed in previous quarters appeared to come to a halt in the third quarter of 2002. Banks in the reporting area extended new loans to non-bank borrowers, pushing year-over-year total loan growth into positive territory for the first time since the second quarter of 2001. At the same time, following six quarterly increases, total claims on borrowers in the United States slowed considerably. A $43 billion rise in claims on US non-bank borrowers, much of it in the form of claims on the public sector, was completely offset by a reduction in loans to the banking sector, which largely reflected inter-office activity.

Euros are the currency of choice

Consistent with the increased activity in the euro area, claims in the international banking market continued to shift out of US dollars and into euros, while yen-denominated claims stabilised. Claims denominated in US dollars fell by $92 billion, the largest quarterly decrease since early 1999, and now comprise 43% of the stock of international claims (down from the peak of 46% in the first quarter of 2002). Conversely, euro-denominated claims expanded by $216 billion in the third quarter, the largest quarterly expansion in six quarters.

Banks park funds in government and other debt securities

Four fifths of the increase in claims in the third quarter of 2002 reflected investment in debt securities. While loans continued to be the primary claim instrument, the share of debt securities in total claims has risen, reaching 21% in the third quarter compared to 19% in mid-2001. A disproportionate amount of

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-Sep 2002
	Year	Year	Q3	Q4	Q1	Q2	Q3	
Total claims	1,221.5	859.4	–12.0	236.8	45.8	246.1	141.7	12,694.1
By instrument								
Loans and deposits	738.0	612.2	–52.1	165.5	–9.9	102.5	36.6	9,446.4
Securities[2]	483.5	247.2	40.1	71.3	55.7	143.6	105.2	3,247.7
By currency								
US dollar	513.0	423.7	13.3	184.5	48.2	192.7	–92.1	5,414.1
Euro	455.6	439.3	46.5	–12.2	43.6	106.2	215.8	4,101.6
Japanese yen	94.6	–65.3	–50.9	6.6	–81.5	5.3	15.7	707.3
Other currencies[3]	158.3	61.7	–20.9	57.9	35.5	–58.1	2.3	2,471.1
By sector of borrower								
Own offices	523.0	467.0	–22.3	365.0	–2.1	82.6	0.9	4,224.8
Other banks[4]	409.7	–49.7	–3.2	–222.9	0.1	80.6	–3.2	4,061.2
Non-banks	288.8	442.1	13.5	94.7	47.8	82.9	144.0	4,408.1
By residency of borrower								
Advanced economies	1,126.4	804.4	5.3	202.2	35.3	214.6	156.7	9,977.0
Euro area	389.1	368.7	9.2	8.4	55.2	36.6	97.7	4,083.6
Japan	–12.0	–23.3	–24.6	28.0	–52.3	22.2	–0.1	513.7
United States	309.0	236.6	16.6	73.8	14.4	133.9	0.3	2,528.4
Offshore centres	51.5	55.3	3.2	24.9	–7.3	25.2	–17.2	1,527.5
Emerging economies	–7.9	–23.3	–18.6	1.4	–3.1	3.4	–2.3	881.5
Unallocated[5]	51.5	23.0	–1.9	8.4	20.8	2.9	4.6	308.1
Memo: Local claims[6]	*207.1*	*90.4*	*–1.2*	*–0.1*	*66.1*	*–40.2*	*–26.5*	*1,634.9*

[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] Borrowers other than own offices, official monetary authorities (eg central banks) and non-banks. Owing to errors and omissions, claims on other banks reported above may differ from data reported in Table 8 in the Statistical Annex. [5] Including claims on international organisations. [6] Foreign currency claims on residents of the country in which the reporting bank is domiciled. Table 2.1

this shift to debt instruments took the form of claims vis-à-vis the non-bank sector, as banks in the reporting area increased their investment in agency and government debt. Reflecting this shift, the share of debt securities increased from 36% of all claims on non-banks in early 2001 to just over 40% in the third quarter of 2002. At the same time, the share of these instruments in claims on banks has remained relatively constant since early 2001.

Banks shift to government and other low-risk debt securities

In the light of the overall depressed economic conditions in the third quarter of 2002, the increased investment in debt securities is consistent with banks reducing credit risk by placing a larger share of assets in government debt. The BIS consolidated statistics, which net out inter-office positions, indicate that the shift towards securities largely took the form of claims on the public sector. Claims on the public sector accounted for 12.6% of total international consolidated claims in the third quarter of 2002, up from 11.8% a year earlier. At the same time, claims on unrelated banks have continued to fall as a share of outstanding international claims.

The shift from loans to securities has been particularly evident in claims vis-à-vis the euro area. The year-over-year growth in total claims on euro area non-bank borrowers has exceeded 11% every quarter since 1996. However, in recent quarters, this growth was driven by relatively large increases in debt security claims (as opposed to new loans). Investment in euro area government (and corporate) debt securities was up by $55 billion in the third quarter of 2002, the largest rise since the first quarter of 1999. Consistent with this, the BIS consolidated data indicate relatively large increases in claims on the public sectors of the major euro area countries. Banks in the reporting area expanded their claims on the euro area public sector by approximately $22.5 billion in the third quarter, with claims of euro area banks accounting for $9.5 billion of the total. German, Dutch and Italian banks were particularly active. In addition, investment by Japanese banks totalled $17 billion, and accounted for nearly 75% of the increase in claims on the euro area public sector.

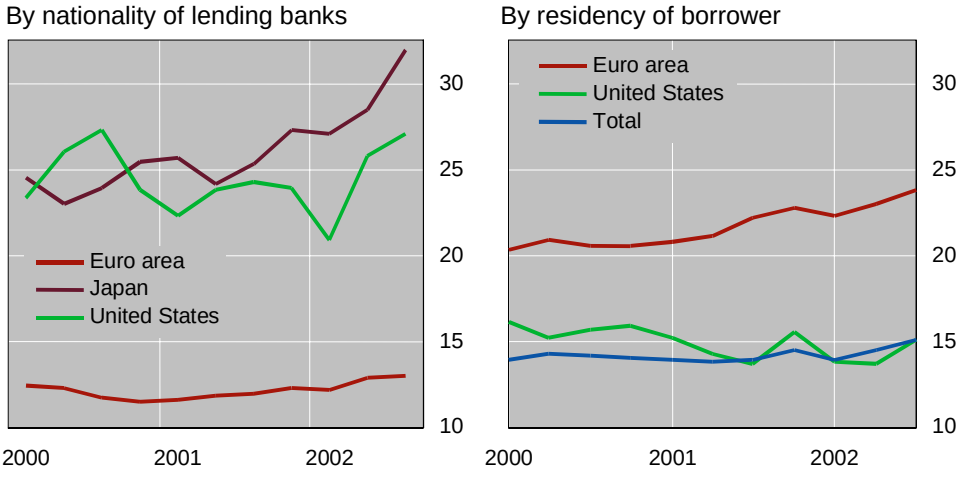
Claims on the euro area public sector rise ...

The shift into agency and government securities helped to reverse the fall in Japanese banks' total credit, which rose for the first time in six quarters. The positive third quarter flow slowed the year-over-year rate of contraction to 8% from approximately 14% in the previous two quarters. Claims on unrelated banks continued to contract. However, claims on the public sector and other non-bank borrowers expanded by a robust $64 billion, and now comprise more than 50% of Japanese banks' total claims (from 45% a year earlier). The consolidated data indicate that Japanese banks (as well as mutual and pension funds through trustee banks) purchased approximately $43 billion in government securities, up 17% from the previous quarter (Graph 2.2). Excluding the local currency claims of Japanese banks' offices located outside Japan, Japanese banks' claims on foreign governments reached $296 billion, or 32% of their total international claims (up from 25% a year earlier). In particular, credit to the US public sector grew to $150 billion, or 40% of all

... as Japanese banks step up purchases of government debt ...

Consolidated international claims on the public sector[1]

In percentages



[1] As a percentage of international claims.

Graph 2.2

Japanese international claims on the United States. Japanese banks also increased credit to the German, French and Italian public sectors.

... and US banks reduce claims on other banks

A shift towards public sector claims was also evident for US banks. On a consolidated basis, the share of claims on the public sector grew to 27% of US banks' total international claims in the third quarter of 2002, up from 24% a year earlier. Driving this expansion, however, was not an increase in investment in government securities, but rather relatively large reductions in claims on unrelated banks and the non-bank private sector. In the third quarter, US banks reduced cross-border credit to corporations by $19 billion, contributing to a 12% year-over-year contraction. At the same time, credit to banks fell 15% year over year, while claims on the public sector remained stable. Overall, US banks' cross-border claims stood at $424 billion, the lowest level since the fourth quarter of 2000.

Emerging markets

The net flow of funds into emerging markets from banks in the BIS reporting area was positive in the third quarter, although differences across regions were significant. Funds flowed out of Latin America, emerging Europe, and the Middle East and African regions, but were offset by a $26 billion inflow into Asia (Graph 2.3). Relatively large deposit repatriations in both the Asia-Pacific and Latin American regions drove the overall net inflow. Claims on emerging markets contracted slightly from the second quarter, falling to $882 billion, largely the result of credit reductions to the major Latin American countries.

Claims on Latin America at lowest level in six years

The net flow of funds to Latin America remained negative for the second consecutive quarter, at $2.9 billion. Claims contracted by 4%, to $269 billion, the lowest level since the third quarter of 1996. Banks in the reporting countries continued to reduce exposure to all sectors in Latin America, with cross-border claims on the banking sector declining more rapidly than claims on the public or non-bank private sectors.

Argentina sees a large net outflow ...

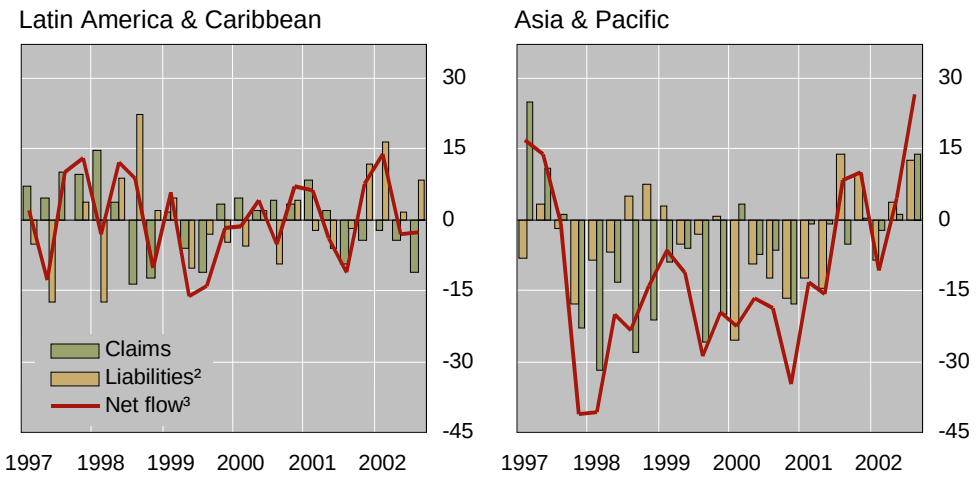
While the concerns of global investors had shifted from Argentina to Brazil by the third quarter, the outflow from Argentina was the largest in the region. The country recorded the largest outflow of funds ($4.7 billion) since the beginning of the financial crisis in the third quarter of 2001. This was driven by a cutback in claims and writedowns of non-performing loans. While the rate of contraction in claims on Argentine non-banks slowed, the rate of contraction in claims on the banking sector picked up. The third quarter of 2002 saw a decrease of $2.9 billion, the largest for the Argentine banking sector in the BIS coverage period. While banks located in virtually every reporting country cut back their claims on Argentina, banks in the United States reduced claims the most. Undisbursed credit commitments to Argentina also continued their downward slide, falling to $2.5 billion from $7.7 billion a year earlier.

... as do Brazil and Mexico

In Brazil, funds flowed out of both the bank and non-bank sectors, contributing to a net outflow of $2.4 billion, also the largest since the third

Net 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 2.3

quarter of 2001. The year-over-year rate of contraction in claims on Brazil accelerated from the previous quarter, rising to 7.3% from 4.8% in the previous quarter, as US, German and Spanish banks cut short-term credit. In particular, claims on the banking sector fell by 8% year over year, following two quarters of relative stability. In addition, undisbursed credit commitments contracted for the fourth consecutive quarter.

Like Argentina and Brazil, Mexico also experienced a net outflow of funds, as total claims contracted by $1.9 billion from the previous quarter. Claims on the banking sector dropped by 26% year over year, reflecting a reduction in the short-term positions of Spanish banks. As a result, claims on the banking sector reached a new low of 12% of total claims, down from 17% a year earlier. Following three quarters of modest growth, claims on non-banks also fell slightly in the third quarter, as banks in the reporting area continued to unload debt securities issued by this sector.

Record net inflow into the Asia-Pacific region

Asia withdraws deposits

A record $26 billion flowed into the Asia-Pacific region in the third quarter of 2002, larger even than the inflow observed in the second and third quarters of 1996. The inflow was driven by large deposit repatriations by the region's banks, as well as a $13.8 billion increase in claims, much of it in the form of loans to bank borrowers. Reflecting the flow of funds to the region's banking sector, consolidated cross-border claims on the region's non-bank private sector fell to 46% of total claims, down from 50% a year earlier. In addition, claims have continued to shift towards shorter-term maturities; claims with a maturity of one year or less comprised 52% of international claims on the region, up from 50% in the second quarter.

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-Sep 2002
		Year	Year	Q3	Q4	Q1	Q2	Q3	
Total[2]	Claims	–7.9	–23.3	–18.6	1.4	–3.1	3.4	–2.3	881.5
	Liabilities	140.1	23.1	–15.0	–27.6	–8.6	–4.8	–20.5	1,075.6
Argentina	Claims	1.2	–5.8	–2.4	–3.3	–4.3	–0.8	–4.4	31.7
	Liabilities	3.1	–16.7	–1.9	–11.1	–1.0	0.5	0.3	23.6
Brazil	Claims	9.5	0.9	–1.1	–2.2	1.0	–2.4	–3.6	91.8
	Liabilities	–4.6	0.4	4.9	–4.1	1.4	–3.8	–1.2	44.4
Chile	Claims	0.3	0.2	–0.9	0.2	–0.3	–0.5	0.1	18.3
	Liabilities	–1.5	–1.0	–0.4	–0.6	0.2	–0.8	–0.9	13.3
China	Claims	–5.4	–3.5	–2.6	–0.6	–7.3	1.0	4.1	53.5
	Liabilities	35.7	–6.5	–6.7	–4.0	–7.1	6.4	–0.9	93.8
Indonesia	Claims	–3.6	–5.4	–2.3	–0.8	–1.3	–2.1	–1.3	31.8
	Liabilities	–1.0	1.1	–0.4	0.7	–1.4	–0.3	–0.2	12.3
Korea	Claims	–4.8	–0.2	0.8	–2.0	6.4	1.8	6.5	78.7
	Liabilities	–1.7	1.7	–2.4	1.7	11.4	–5.6	–0.4	35.0
Mexico	Claims	–1.0	2.0	–3.3	0.6	3.2	1.8	–1.9	63.6
	Liabilities	6.9	8.8	4.5	0.6	–14.1	1.3	–0.2	50.1
Russia	Claims	–6.6	1.3	0.2	2.1	1.4	0.8	–1.1	31.9
	Liabilities	7.2	5.2	–2.8	1.7	3.6	0.0	4.0	36.5
Saudi Arabia	Claims	0.1	–2.4	–1.6	1.0	0.0	0.4	–1.8	23.1
	Liabilities	10.9	–9.7	–5.7	–7.3	–5.4	–0.1	1.4	48.6
South Africa	Claims	0.6	–0.4	0.8	–1.1	–1.5	0.2	–0.6	16.5
	Liabilities	0.4	2.1	1.1	–0.9	0.2	1.4	–0.3	18.1
Thailand	Claims	–7.8	–3.5	–3.1	1.4	–2.2	–0.5	–0.5	20.6
	Liabilities	1.9	1.3	–0.5	0.5	–0.7	–1.2	–1.4	12.5
Turkey	Claims	11.3	–12.0	–0.9	–3.7	0.9	–1.5	–2.1	35.4
	Liabilities	2.3	–2.1	0.8	–2.1	1.6	–1.9	–0.2	18.7
Memo:									
EU accession countries[3]	*Claims*	*7.5*	*6.3*	*–0.4*	*4.1*	*1.4*	*1.9*	*3.3*	*84.6*
	Liabilities	*5.5*	*9.9*	*0.9*	*4.8*	*–0.3*	*0.6*	*–1.3*	*65.4*
OPEC members	*Claims*	*–11.5*	*–14.0*	*–5.2*	*1.1*	*3.0*	*–0.2*	*–4.6*	*128.4*
	Liabilities	*37.7*	*–2.8*	*–9.7*	*–8.5*	*–5.5*	*–2.5*	*–1.8*	*240.1*

[1] External on-balance sheet positions of banks in the BIS reporting area. Liabilities mainly comprise deposits. An increase in claims represents an inflow into 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

Record inflow to the region supported by claims on Taiwan …

Taiwan, China experienced a net inflow of $10.7 billion, the largest of any economy in the region, as funds flowed into both the bank and non-bank sectors. The inflow to banks was the result of roughly $5 billion in US dollar-denominated deposit repatriations. Conversely, the net inflow into the non-bank sector resulted from $3.4 billion in new loans. In addition, Taiwanese firms were active in the syndicated loan market in the third quarter, signing $1.6 billion in new facilities. Most of this went to electronics firms.

The resurgence in claims on South Korea that had started in the first quarter of 2002 continued through the third. Total claims rose by $6.5 billion,

the largest increase in absolute terms since the onset of the regional currency crisis in 1997. Roughly half of this went to non-bank borrowers, reflecting the robust growth in domestic bank lending that continued through the third quarter of 2002. South Korean firms also signed $2.5 billion in syndicated credits, the largest increase since the fourth quarter of 2000, with transportation, oil refining and mining firms accounting for roughly half the total.

… and South Korea

The net flow of funds into China also turned positive, at $5.1 billion, driven by increased claims on the country's banking sector. Following two quarters of relatively large decreases, claims on China's banking sector increased by $4.9 billion. Much of the activity seems to have been driven by inter-office activity between banks located in the United States, United Kingdom and offshore centres vis-à-vis their offices in China.

Net inflow to EU accession countries, but overall outflow from emerging Europe

The net flow of funds to emerging markets in Europe turned negative in the third quarter of 2002, despite inflows to several countries in EU accession negotiations. Claims on the region contracted by $1.8 billion as banks in the reporting area reduced loans to the region's banking sector. As in Latin America, the share of claims on the banking sector in European emerging markets has continued to fall, sinking to 25% of cross-border claims in the third quarter of 2002 from 32% a year earlier.

Funds flow out of Turkey and Russia …

Turkey experienced a net outflow, as claims contracted by $2.1 billion to $35.4 billion. While claims on Turkey's non-banks have remained stable, claims on resident banks fell to $6.7 billion, and comprised 19% of total claims (down from 29% a year earlier). Russia also experienced a net outflow of $5 billion, the largest since the first quarter of 2001. Claims on Russia contracted by $1.1 billion, after five consecutive quarters of expansion, as loans to the banking sector were reduced. A $2.8 billion increase in euro-denominated deposits with banks in developed Europe contributed to the net outflow. Deposits and other liabilities placed in reporting area banks by banks in Russia have been on an upward trend since the fourth quarter of 1998, and have continued to migrate from banks in the United States to banks resident in Europe.

… but into Poland, Hungary and the Czech Republic

In contrast to Turkey and Russia, bank flows to the 12 countries in EU accession negotiations reached $4.6 billion. Claims on these countries have trended upwards since the second quarter of 2000. Activity in most of the accession countries was stable, while Poland, Hungary and the Czech Republic all experienced net inflows. Polish banks repatriated $867 million in deposits from banks in Germany and the United States, while claims on Polish borrowers rose as banks in the euro area purchased local currency denominated debt securities. Banks in the Czech Republic also repatriated $1.1 billion in deposits from euro area banks, while claims on Czech bank and non-bank borrowers expanded modestly. Claims on Hungary rose by $1.3 billion, as banks in the reporting area invested in debt securities, and extended $830 million in loans to the banking sector.

International syndicated credits in the fourth quarter of 2002

Blaise Gadanecz

Signings of international syndicated loans reached $312 billion in the fourth quarter of 2002, down by 7% from the fourth quarter of 2001. Electrical utilities and oil companies were the most active borrowers. Among these borrowers, E.ON of Germany signed the largest facility, for €15 billion, followed by Italy's Enel and Germany's RWE at €5 billion each. There was also intense activity in syndications related to leveraged buyouts. A €3.8 billion facility was arranged to buy out the Irish packaging company Jefferson Smurfit, and a €2.8 billion facility to purchase the French electronics firm Legrand.

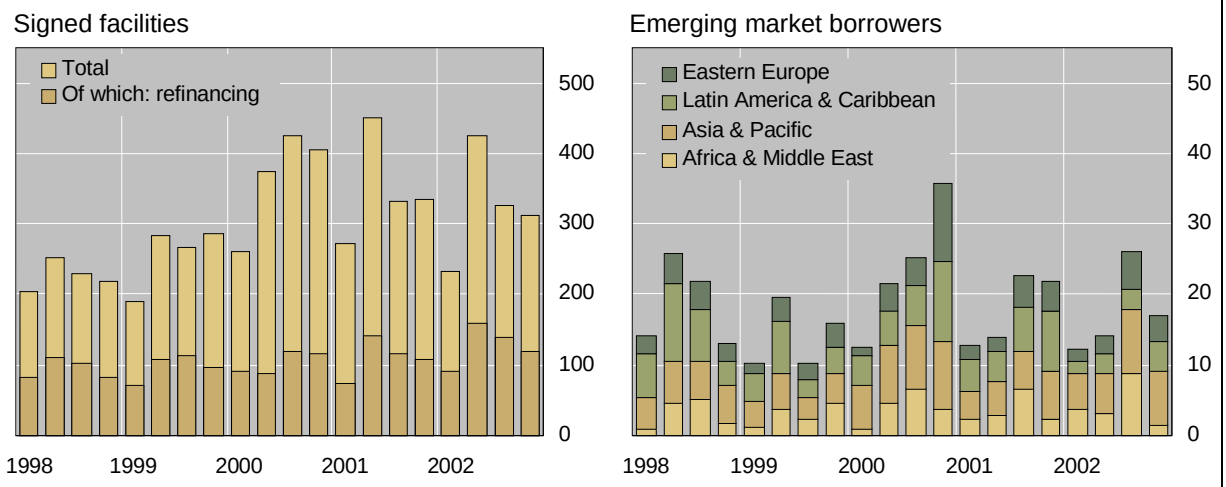
For the year as a whole, signings declined for the second consecutive period. Following a 5% contraction in 2001, the total volume of new facilities was down by 7% in 2002, to $1.3 trillion. Refinancing reached a record high of $509 billion, suggesting that net new financing raised in the international syndicated loan market fell by even more than gross signings. Borrowing by US entities was 13% lower than the previous year, at $745 billion. By contrast, borrowing by European entities was up by 13%, to $385 billion. Much of the increase in syndicated lending to European companies appears to have been driven by a shift on the part of banks away from bilateral loans and towards syndicated loans.

Emerging markets raised $17 billion in the international syndicated loan market in the fourth quarter of 2002. South Korean borrowers – mainly banks and consumer finance or credit card companies – were the most active, raising $3.5 billion. Taiwanese firms, mostly in the electronics industry, raised $1.3 billion. In Latin America, Mexican corporations closed facilities totalling $2.4 billion. An Argentine oil company, Pecom Energía, tapped the syndicated loan market to refinance bilateral loans totalling $600 million, prior to Petrobras of Brazil acquiring a controlling stake in the company. Turkish banks borrowed $1 billion, mainly to refinance maturing syndicated facilities.

For 2002 as a whole, lending to borrowers outside industrialised countries was more or less unchanged compared to 2001. Signings by borrowers in Latin America fell by 50% from 2001, to $11 billion. Borrowing by Argentine residents had already dropped off sharply in 2001 and all but ceased in 2002. Brazilian and Mexican borrowers raised about half the amounts arranged in 2001. The state oil company Pemex was the most active Mexican borrower in the market, and construction materials and energy firms the most active Brazilian borrowers. The decline in activity in Latin America was offset by increased activity in other regions. Fund-raising by Hong Kong and Singaporean borrowers – at $17 billion and $3 billion respectively – was modest compared to 2001, reflecting lower demand for real estate development financing. Yet lending to emerging markets in Asia increased by one third, to $28 billion, boosted especially by signings for Korean financial institutions and Taiwanese corporations. In Europe, a large volume of facilities was arranged for Russian entities, mainly for oil and gas projects.

Activity in the international syndicated credit market

In billions of US dollars



Sources: Dealogic Loanware; BIS.

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3. The international debt securities market

The fourth quarter of 2002 witnessed a continuation of the recent marked slowdown in international financing in the international debt securities market. Against the backdrop of a slowdown in economic growth, especially in the

Main features of net issuance in international debt securities markets

In billions of US dollars

	2001	2002	2001	2002				Stocks at end-Dec 2002
	Year	Year	Q4	Q1	Q2	Q3	Q4	
Total net issues	1,348.3	1,024.1	339.4	309.7	344.2	185.1	185.2	9,218.9
Money market instruments[1]	–78.9	1.6	–9.3	–7.8	8.3	11.8	–10.7	438.0
Commercial paper	*26.9*	*23.6*	*6.5*	*5.5*	*1.8*	*19.3*	*–3.0*	*292.2*
Bonds and notes[1]	1,427.2	1,022.5	348.8	317.5	335.8	173.3	195.9	8,780.8
Floating rate issues	*391.4*	*208.5*	*95.9*	*60.5*	*74.8*	*30.1*	*43.0*	*2,205.7*
Straight fixed rate issues	*996.4*	*801.7*	*237.5*	*253.5*	*247.1*	*146.5*	*154.7*	*6,263.1*
Equity-related issues	*39.4*	*12.3*	*15.3*	*3.4*	*13.9*	*–3.2*	*–1.9*	*312.1*
Developed countries	1,261.4	956.3	324.8	285.5	326.8	169.4	174.5	8,124.4
United States	*597.6*	*343.1*	*139.0*	*138.1*	*115.7*	*37.6*	*51.6*	*2,749.3*
Euro area	*551.2*	*473.9*	*147.9*	*128.7*	*154.3*	*91.4*	*99.5*	*3,591.2*
Japan	*–10.1*	*–21.9*	*–1.8*	*–10.2*	*3.2*	*–4.2*	*–10.7*	*258.2*
Offshore centres	25.3	8.6	5.1	4.2	–0.2	0.3	4.3	106.9
Developing countries	45.4	37.3	8.3	12.0	10.8	5.7	8.8	549.0
Financial institutions	1,038.5	843.1	259.4	237.2	280.1	156.8	169.0	6,630.2
Private	*959.6*	*721.5*	*242.8*	*216.7*	*243.7*	*120.8*	*140.4*	*5,705.8*
Public	*78.9*	*121.5*	*16.6*	*20.4*	*36.4*	*36.1*	*28.6*	*924.4*
Corporate issuers	208.1	60.0	59.3	13.1	41.6	1.0	4.3	1,270.6
Private	*171.7*	*58.0*	*49.6*	*19.4*	*41.3*	*–1.4*	*–1.2*	*1,053.3*
Public	*36.4*	*2.0*	*9.7*	*–6.2*	*0.3*	*2.5*	*5.4*	*217.3*
Governments	85.5	99.2	19.5	51.4	15.7	17.6	14.4	879.5
International organisations	16.3	21.8	1.3	8.0	6.8	9.6	–2.5	438.5
Memo: Domestic CP[2]	*–144.8*	*–100.1*	*31.2*	*–70.9*	*–65.8*	*–0.3*	*36.9*	*1,898.3*
of which: US	*–161.2*	*–98.0*	*28.3*	*–63.3*	*–57.0*	*0.2*	*22.1*	*1,342.9*

[1] Excluding notes issued by non-residents in the domestic market. [2] Data for the fourth 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

	2001	2002	2001	2002			
	Year	Year	Q4	Q1	Q2	Q3	Q4
Total announced issues	2,306.3	2,116.1	554.1	607.1	571.1	436.9	501.0
Bond issues	1,349.8	1,181.3	338.7	376.0	315.8	212.1	277.4
Note issues	956.5	934.8	215.4	231.1	255.3	224.8	223.6
Floating rate issues	643.4	607.5	168.7	142.5	160.2	145.9	159.0
Straight fixed rate issues	1,590.7	1,464.6	359.1	454.9	389.5	286.1	334.1
Equity-related issues[1]	72.2	44.1	26.3	9.7	21.4	4.9	8.0
US dollar	1,131.9	992.4	243.6	311.0	258.4	200.7	222.3
Euro	841.6	811.8	221.3	228.8	229.3	163.6	190.1
Yen	125.3	90.2	26.2	16.3	25.8	23.5	24.5
Other currencies	207.5	221.7	62.9	50.9	57.6	49.1	64.1
Financial institutions	1,709.1	1,643.6	409.0	448.6	430.8	354.3	409.8
Private	*1,478.7*	*1,386.3*	*352.7*	*392.5*	*363.8*	*295.2*	*334.8*
Public	*230.4*	*257.3*	*56.3*	*56.1*	*67.1*	*59.1*	*75.0*
Corporate issuers	348.2	212.2	99.4	63.8	74.9	33.9	39.7
of which telecoms	*135.6*	*45.8*	*35.7*	*11.9*	*16.1*	*7.8*	*10.0*
Private	*287.1*	*187.9*	*80.8*	*57.2*	*71.3*	*28.3*	*31.1*
Public	*61.1*	*24.4*	*18.6*	*6.6*	*3.6*	*5.6*	*8.6*
Governments	174.2	174.2	30.9	68.6	44.9	28.3	32.4
International organisations	74.8	86.1	14.8	26.0	20.5	20.5	19.2
Completed issues	2,306.1	2,105.4	568.4	588.5	579.0	443.8	494.1
Memo: Repayments	*878.9*	*1,082.9*	*219.6*	*271.0*	*243.1*	*270.5*	*298.2*

[1] Convertible bonds and bonds with equity warrants.

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

United States, net issuance was a low $185 billion (Table 3.1). Not since the second half of 1998, a period associated with substantial market turbulence, has there been a comparable slowdown in net borrowing. Net issuance by private financial institutions in particular remained subdued. While total gross issuance rose 15% to $501 billion between the third and fourth quarters (Table 3.2), record repayments during the fourth quarter kept net borrowing from rising.

The decline in corporate credit spreads during the fourth quarter of 2002 suggests that a reduced demand for funds by businesses was the primary cause for the continued weakness in net issuance. This lacklustre demand for funds reflected a reluctance on the part of firms to borrow more against the backdrop of a slowdown in global economic activity and greater uncertainty about economic prospects caused in part by heightened geopolitical risks. Nevertheless, credit conditions did remain tight for some borrowers, particularly issuers of lower-rated commercial paper.

Record slowdown in net issuance

Largest slowdown in issuance ever ...

Over the course of the last six months of 2002, net issuance in the international debt securities market recorded what is arguably the largest sustained slowdown ever. The shortfall in issuance totalled nearly $320 billion, relative to what would have prevailed if the rate of issuance witnessed during the second quarter had continued for the remainder of the year (Graph 3.1). The last time net issuance was below $200 billion for two quarters in a row was the second half of 1998, when the Russian default and the near collapse of a major hedge fund led to severe financial market strains and a sharp rise in corporate credit spreads. In contrast, the more recent retrenchment in net issuance appears to be related to a global slowdown in economic activity and has occurred against the backdrop of a general decline in borrowing rates.

... masks differences between countries

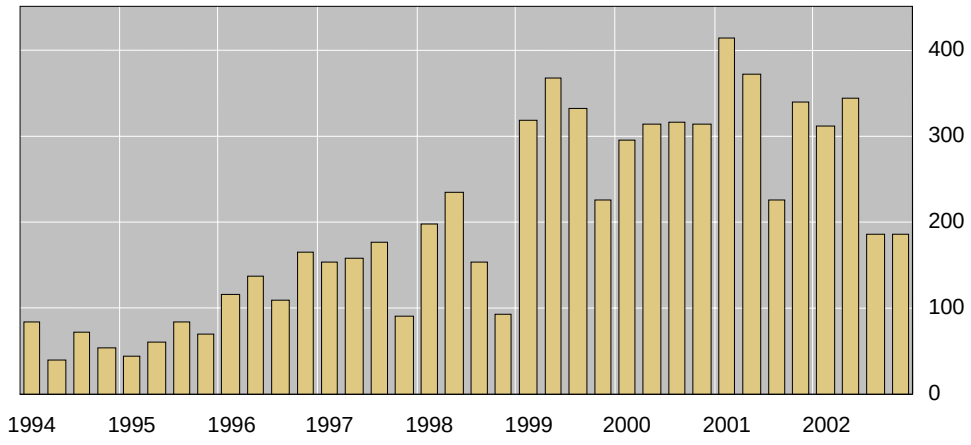
The constancy of aggregate net issuance between the third and fourth quarters of 2002 masks differences in borrowing patterns across developed countries. Net issuance by US and euro area borrowers increased over the period. In contrast, net issuance by Japanese and UK borrowers contracted, in the latter case by 32% to $20 billion. There were also some large declines in issuance within the euro area. Net issuance by German borrowers, for instance, fell by more than half to $25 billion. The small rise in aggregate net issuance by developed country borrowers between the third and fourth quarters was more than offset by a fall in net issuance by international organisations. Their net borrowing fell from $9.6 billion to –$2.5 billion. For the year as a whole, however, net issuance by international organisations was up by 34% from the previous year.

Private sector borrowing remains subdued

Private financial institutions are the largest borrowers in the international debt securities market. Their net issuance during the fourth quarter of 2002, while

Net issuance in the international debt securities markets

In billions of US dollars

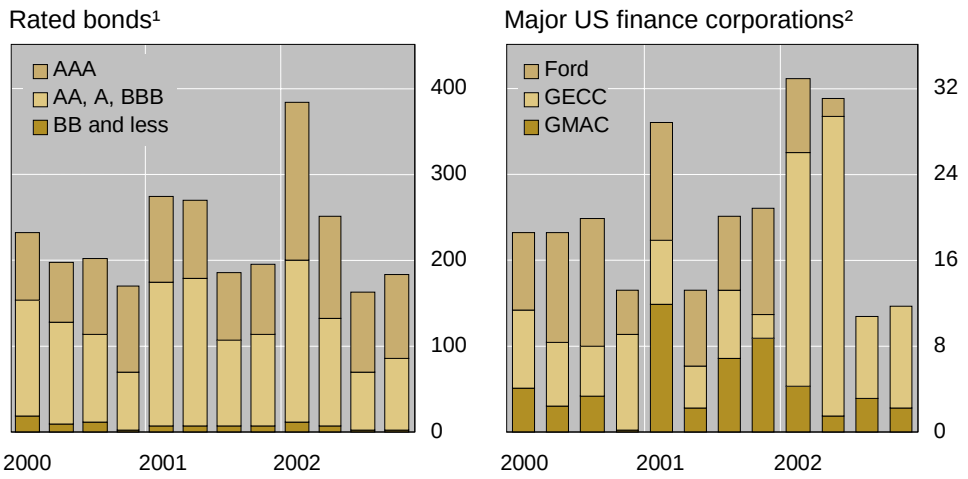


Sources: Bank of England; Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS.

Graph 3.1

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

Weak issuance by private financial companies ...

increasing 16% to $140 billion, nevertheless remained substantially below the recent peak attained in the second quarter. In the United States, as the economy stalled, these institutions increased their net issuance only slightly between the third and fourth quarters, from $42 billion to $48 billion. The most recent figure is only 38% of the net issuance by these institutions during the first quarter of 2002. Gross issuance by the major US finance companies remained essentially unchanged in the fourth quarter after falling by about two thirds in the third quarter (Graph 3.2). This may in part have reflected an increase in borrowing costs for these companies. As discussed in the Overview, Ford Motor Credit and General Motors Acceptance Corporation were both downgraded in late 2002 because of significant shortfalls in their pension plans.

... especially Japanese and German banks ...

Net issuance by Japanese and German private financial institutions was also weak, as concerns about prospective bank profits grew. In Japan, the government's apparent increased resolve to deal with the bad loan problem, accompanied by indications that this problem might be greater than previously thought, was associated with a slide in Japanese bank share prices and a sharp decline in net issuance by private financial institutions, from $1 billion to –$8 billion between the third and fourth quarters. This is the second largest contraction in the outstanding stock of international debt obligations of Japanese private financial institutions ever recorded. In Germany, a decline in borrowing by private financial institutions may have been associated with rating downgrades for some large banks. For the fourth quarter, net issuance of international debt securities by German private financial institutions was only $7 billion, less than half the previous quarter's amount. For the year as a whole, their net issuance was only $85 billion, $63 billion less than was recorded during 2001. Data for the first three quarters of 2002 indicate that German financial companies, both public and private, also borrowed less

domestically. In the first three quarters of 2002, the stock of outstanding domestic debt securities of German financial institutions contracted by $57 billion. This followed a $178 billion decline for 2001 as a whole.

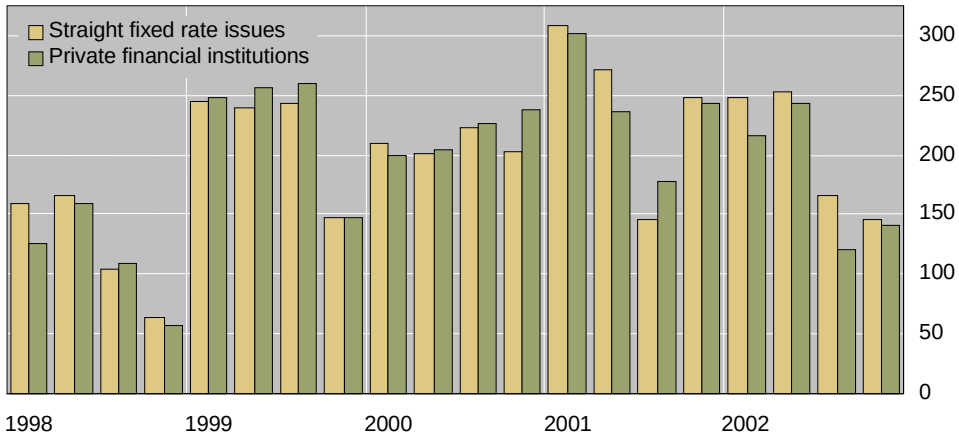
Historically, there has been a fairly tight relationship between net straight fixed rate issuance and total net issuance by private financial institutions (Graph 3.3). This is because a high and fairly constant proportion of net issuance by private financial institutions is in the form of straight fixed rate bonds and notes. It is therefore not surprising that net issuance of straight fixed rate securities peaked in the second quarter of 2002 and has fallen substantially since then. The largest straight fixed rate issue by a private financial company during the fourth quarter of 2002 was a €5 billion bond issued by Lehman Brothers.

... and US private non-financial corporations

Net issuance by private non-financial corporations did not recover in the fourth quarter and remained at –$1 billion, about $50 billion below that attained during the fourth quarter of 2001. The main reason for the year-on-year decline was a fall in net issuance by US private non-financial corporations. In the fourth quarter of 2001, these companies had been responsible for $32 billion of net issuance, or almost two thirds of the total. In the fourth quarter of 2002, however, net borrowing by US private non-financial corporations was only $1.5 billion, albeit up from –$3.4 billion in the previous quarter. Reduced borrowing activity by telecoms operators was partly responsible for the longer-term fall in net issuance by non-financial corporations. In the fourth quarter of 2001, AT&T Corporation alone had been responsible for $10.1 billion in gross issuance of bonds and notes, a quarter of total gross issuance by US non-financial corporations. In contrast, US telecoms operators were completely absent from the international debt securities market during the fourth quarter of 2002. Globally, gross issuance by telecoms operators fell by 72% to $10 billion between the fourth quarter of 2001 and the last quarter of 2002. This to some

Net issuance in the international debt securities markets

In billions of US dollars



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

Graph 3.3

extent reflected efforts by telecoms operators to restructure their balance sheets and is part of an ongoing trend by businesses to reduce their leverage in the wake of rating downgrades (see the Overview).

Commercial paper market sees continuing difficulties

Credit conditions apparently remained tight for some borrowers in the commercial paper (CP) market as spreads on lower-rated CP remained at relatively high levels during most of the fourth quarter. Moreover, the majority of the increase in net issuance in the domestic CP market can be explained by seasonal factors. Most of the rise in net domestic CP issuance can be attributed to US borrowers, for whom the fourth quarter is usually a strong one for domestic CP issuance. Financial firms typically issue CP in December to finance drawdowns of bank lines of credit by corporate customers. Net US domestic CP issuance actually declined between the fourth quarter of 2001 and the last quarter of 2002.

Issuance by developing country borrowers recovers

Emerging economies return ...

Borrowing by developing country entities in the international debt securities market rose between the third and fourth quarters of 2002 as the cost of funds for these borrowers generally fell. Net issuance increased by 54% to

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

In billions of US dollars

Region/currency		2001	2002	2001	2002			
		Year	Year	Q4	Q1	Q2	Q3	Q4
North America	US dollar	525.5	310.1	121.3	126.4	93.5	37.7	52.5
	Euro	65.1	40.0	22.0	18.3	14.7	7.3	–0.4
	Yen	19.1	–7.2	2.6	–4.1	1.0	–1.5	–2.5
	Other currencies	7.2	12.5	0.5	3.5	6.0	–0.8	3.8
Europe	US dollar	56.4	73.4	15.3	6.6	44.1	5.1	17.6
	Euro	520.1	469.6	141.8	137.6	134.3	101.5	96.1
	Yen	–2.9	–26.3	–3.3	–12.6	–4.0	–7.1	–2.5
	Other currencies	72.4	88.8	28.5	17.0	31.3	24.3	16.1
Others	US dollar	70.6	46.3	7.6	23.2	12.4	5.6	5.1
	Euro	12.0	14.4	2.2	3.1	7.1	5.5	–1.2
	Yen	0.5	–8.8	0.9	–12.5	6.0	2.1	–4.4
	Other currencies	2.2	11.4	0.1	3.2	–2.3	5.4	5.1
Total	US dollar	652.6	429.8	144.2	156.2	150.0	48.4	75.2
	Euro	597.3	524.0	166.0	159.1	156.2	114.3	94.5
	Yen	16.7	–42.4	0.1	–29.3	3.0	–6.6	–9.5
	Other currencies	81.8	112.7	29.1	23.7	35.0	28.9	25.0

[1] Based on the nationality of the borrower.

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

$8.8 billion, albeit from an unusually low level. The increased issuance was almost entirely attributable to European transition economy borrowers; their issuance increased from –$0.3 billion to $3.2 billion. In contrast, net issuance by borrowers in developing Asia and the Pacific slowed to $4 billion from $5.4 billion in the previous quarter and, as was also the case in the third quarter, there was almost no new net borrowing by Latin American borrowers as a group.

... with large Russian borrowing

Russian borrowers were responsible for half of the increased net issuance by entities from European transition economies. Total net issuance by Russian borrowers in the fourth quarter was $1.7 billion, the result of $2.3 billion in new announcements. This was the largest rate of gross issuance since the country's sovereign default in late 1998. The largest Russian borrower was OAO Gazprom, which floated $700 million in two issues.

Although in the aggregate there was almost no net new issuance by Latin American borrowers during the fourth quarter, the region did witness a significant amount of gross issuance. Mexico, for example, had $2.3 billion in gross announcements, which included the largest emerging market issue during the fourth quarter, a $1 billion offer by Pemex that was priced at a spread of 335 basis points. In the wake of the presidential elections, Brazil enjoyed a marked improvement in investor sentiment. Although sovereign spreads remained wide, Brazilian borrowers were quick to return to international markets and floated $2.7 billion in new announcements to refinance maturing debt. Two fifths of the total was due to a single borrower, a Brazilian financial company. In contrast, Venezuela has been completely absent from the international debt securities market since the Republic of Venezuela floated a €250 million note in December 2001 that priced at a spread of 710 basis points.

Brazil quickly returns to international bond markets

Turkey also enjoyed a marked improvement in investor sentiment following national elections. Between mid-November and early December 2002, the Republic of Turkey floated $1.15 billion in three bond issues, the largest of which priced at a spread of 780 basis points.

Cross-border holdings of securities top $12 trillion

Philip D Wooldridge

Portfolio investments now surpass loans as the most important source of cross-border finance. According to the latest Coordinated Portfolio Investment Survey (CPIS) compiled by the IMF, total cross-border investment in debt and equity securities equalled $12.5 trillion at the end of 2001. By comparison, the outstanding stock of cross-border loans and deposits totalled $8.8 trillion. Foreign direct investment (FDI) amounted to a further $6.8 trillion.

The 2001 CPIS collects information on cross-border portfolio investment by residents of 67 economies. It excludes FDI and instruments other than securities, in particular loans and deposits. The previous survey, in which 29 economies participated, was conducted in 1997, and beginning in 2002 the survey will be conducted on an annual basis. The methodology underlying the CPIS is similar to that for the locational banking statistics compiled by the BIS, making them useful complements. The locational statistics capture the cross-border assets and liabilities of deposit-taking institutions in 32 jurisdictions.

Total cross-border holdings of debt securities approximately doubled between 1997 and 2001, to $7.4 trillion. The international debt securities statistics compiled by the BIS show the same rate of growth and a similarly sized end-of-period stock. This suggests that, at least at a global level, international issuance was a reasonable proxy for cross-border investment over the 1997–2001 period. The relationship between international investment and issuance, however, is becoming increasingly tenuous as more and more countries liberalise their capital accounts and financial markets. Moreover, there are important differences at a disaggregated level. At end-2001, reported cross-border holdings of emerging market debt securities were significantly lower than the outstanding stock of international debt securities issued by emerging market residents: $297 billion, compared to $516 billion. Part of the difference can be explained by investors domiciled in the country of the issuer purchasing bonds sold in the international market. For example, Asian investors hold almost half of the international bonds issued by Asian borrowers. Gaps in the coverage of the CPIS might also be a factor. Many participants in the CPIS had difficulty obtaining information about securities held by households with non-resident custodians. Furthermore, whereas issuance volumes are recorded at face value, investments are recorded at market value.

The importance of bonds as instruments for raising cross-border debt finance increased greatly relative to bank loans over the 1997–2001 period. In 1997, the outstanding stock of cross-border loans and deposits was more than twice as large as cross-border holdings of debt securities; by 2001, the stock of loans was only 20% larger. Equity securities also increased in importance relative to bank loans, although not relative to debt securities.

Banks themselves contributed to the shift from loans to securities. Banks stepped up their FDI and purchases of securities between 1997 and 2001. As a result, loans and deposits declined from 85% of cross-border assets booked by banks in the BIS reporting area to 76%. Banks' relative importance as investors in the international bond market declined over the 1997–2001 period. Nevertheless, as much as 30% of the $7.4 trillion invested in foreign debt securities at the end of 2001 was held by banks.

Residency of borrower	Loans and deposits[1, 2]		Debt securities[1]				Equity securities[1]	
			Total holdings[3]		% held by banks[2]		Total holdings[3]	
	1997	2001	1997	2001	1997	2001	1997	2001
All countries	7,903	8,836	3,520	7,412	35%	30%	2,568	5,134
Developed countries	5,402	6,737	2,823	6,267	37%	30%	2,157	4,325
Euro area	1,699	2,390	1,111	2,917	43%	35%	811	1,811
Japan	840	444	152	194	42%	29%	242	334
United States	1,219	1,652	923	2071	36%	26%	428	998
Developing countries	946	712	319	297	30%	35%	232	300
Asia-Pacific	412	222	88	62	41%	50%	61	147
Europe, Middle East & Africa	272	271	72	94	32%	32%	53	62
Latin America	262	219	159	141	23%	31%	119	91

[1] In billions of US dollars unless otherwise noted. [2] Cross-border assets of banks domiciled in the BIS reporting area. [3] Cross-border holdings of investors domiciled in economies participating in the IMF's CPIS.

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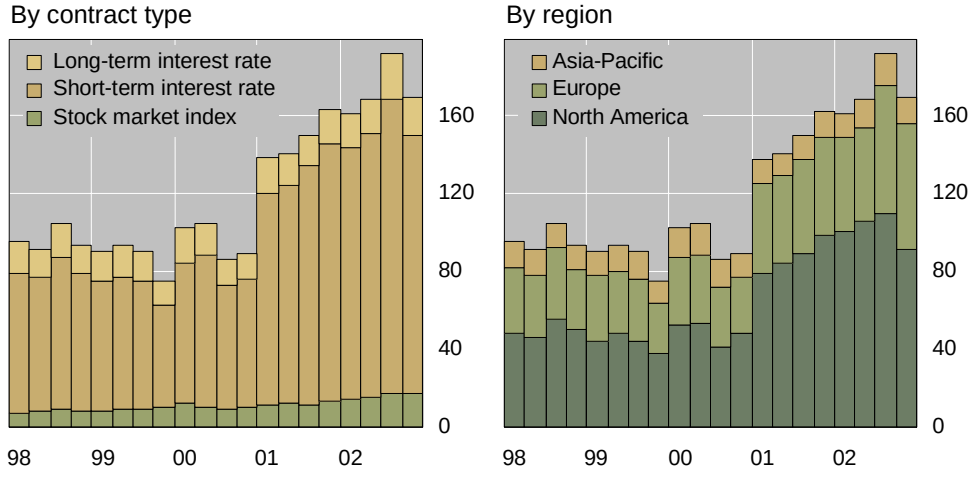
4. Derivatives markets

The aggregate turnover of exchange-traded financial derivatives contracts monitored by the BIS declined in the fourth quarter of 2002. The value of trading dropped by 12% to $170 trillion (Graph 4.1), following a 14% increase in the previous quarter. Activity was weaker across the major market risk groups, namely fixed income, stock indices and foreign exchange, although there was only a marginal reduction in the turnover of stock index contracts. Yet business was unusually brisk in October as US and European equity markets rebounded in the second week of that month. Global activity subsided sufficiently in the following two months to result in a weaker quarter than the previous one. Innovative contracts were introduced in both exchange-traded and over-the-counter (OTC) markets in the fourth quarter, including contracts on economic derivatives (see the box on page 36). For 2002 as a whole, the aggregate value of turnover in financial contracts rose by 17% to $694 trillion.

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

Contraction of market activity due to drop in interest rate contracts

Trading in exchange-traded interest rate contracts dropped by 13% to $152.3 trillion in the fourth quarter of 2002, compared with an increase of 14% in the previous quarter. Contracts on short-term (money market) interest rates, by far the largest segment of exchange-traded markets in value terms, accounted for much of the absolute decline in activity, with turnover contracting by 13% to $132.1 trillion.[1]

Contraction in US short-term business ...

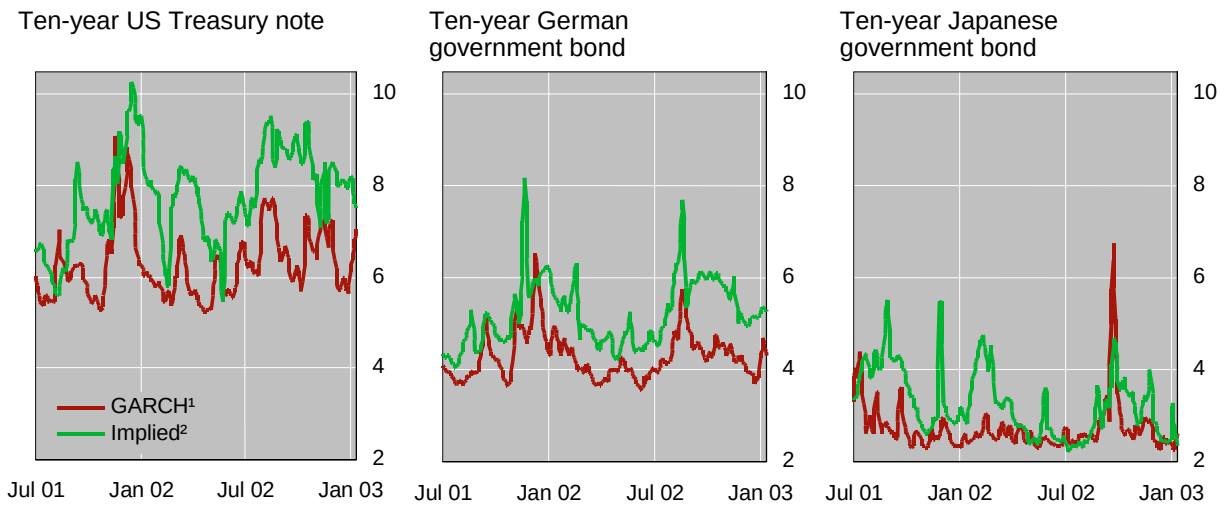
A notable feature of interest rate business in the fourth quarter was the pronounced contraction in US short-term activity. Turnover in US short-term contracts, the largest market for short-term instruments, declined by nearly 20% to $74 trillion. In October business in US short-term products was buoyant, with the turnaround in equity markets prompting traders to adjust their views on future economic growth and prospective monetary easing (see the Overview). Market sources reported that the record increase in mortgage refinancing in the first week of October and the threat of war in the Middle East had propelled the implied volatility of short-term interest rate options and swaptions to historically high levels. However, turnover contracted sharply after the Federal Reserve's surprising half point cut in policy rates on 6 November led market participants to believe that such rates would remain stable for some time. Activity declined further in December as market participants unwound their positions ahead of the year-end.

... in the wake of Fed easing

In Europe, turnover in short-term instruments increased slightly to $49.8 trillion. The monthly pattern of activity was fairly similar to that seen in the US market. Business reached an all-time record in October and declined

Volatility of major bond markets

Five-day moving averages



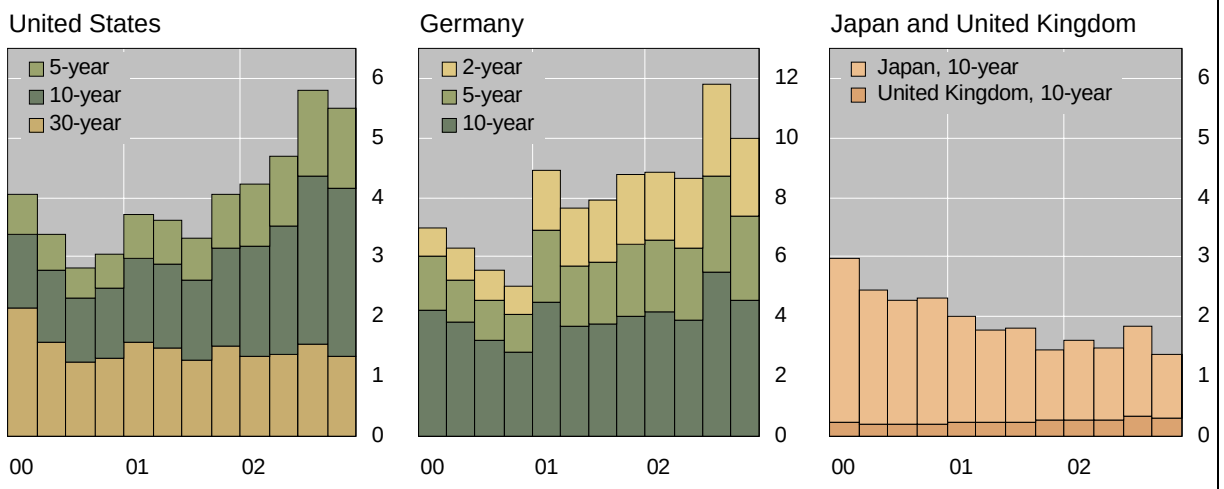
[1] Annualised conditional variance of daily changes in bond yields from a GARCH(1,1) model. [2] Volatility implied by the prices of at-the-money call options.

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

[1] Including contracts based on eurodollar, Euribor and euroyen rates.

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

gradually in the following two months. However, turnover remained at historically high levels throughout the quarter. As a result of this differential pattern of activity, European short-term activity edged up relative to US business. Turnover on European exchanges amounted to about 40% of US activity in the first half of 2002 but this increased to nearly 60% in the second half of the year.

Broad contraction in bond contracts ...

Activity in government bond contracts declined by 12% globally to $20.2 trillion, with the contraction broadly spread across geographical areas (Graph 4.3). Business in German government bond contracts, the largest market for such contracts, dropped by 13% to $10.9 trillion. As was the case with European short-term contracts, business in German government bond contracts reached a record in October and then subsided in the following two months. The slowdown affected most futures and options, with the bund contract seeing the most pronounced contraction. Options on two-year German government bond futures (or "schatz" in market parlance) were a notable exception, expanding by 56%. Such options have grown markedly since the beginning of 2002 and are now almost as actively traded as options on bund futures. Schatz contracts are used actively for positioning on potential changes in policy rates.

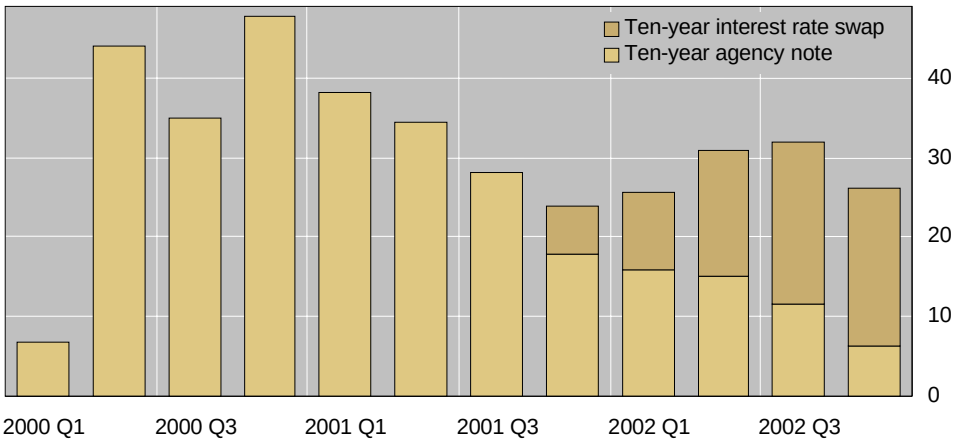
... with a particularly sharp drop in Japan

Trading in Japanese government bond contracts declined even more markedly than that in German contracts, with transactions dropping by 28% to $1.3 trillion. Turnover had risen sharply in September, with investors reacting to the potential fiscal implications of banking reform. Further news concerning financial reform had some impact on the Japanese government bond market in October but the effect on derivatives turnover appears to have been limited.

Activity in US Treasury contracts declined by somewhat less than in the other two major markets, with turnover down by 6% to $7.1 trillion. Most futures

Turnover of 10-year US agency note and interest rate swap futures

Notional amounts, in billions of US dollars



Source: FOW TRADEdata. Graph 4.4

and options witnessed a contraction, although activity in 10-year Treasury note contracts rose marginally on the back of a small increase in the turnover of options.

Expansion of US swap futures

One notable recent development in the US market has been the gradual displacement of the CBOT's 10-year US agency note futures by the exchange's own 10-year interest rate swap futures (see Graph 4.4). Agency note futures were introduced in early 2000 but failed to develop sufficient liquidity to enable market participants to execute their hedges cost-effectively. Interest rate swap futures were launched in the last quarter of 2001 and, although their turnover pales in comparison to the CBOT's 10-year Treasury futures, they have nevertheless expanded at a steady pace. Rates on comparable agency notes and swaps are highly correlated, which means that in principle the two futures should be close substitutes for hedging and trading on non-government rates. However, the agency futures contract is physically settled, which makes it somewhat less appealing to traders than the cash-settled swap futures contract.[2]

Stock index contracts steady

Activity in stock index contracts was fairly steady, declining marginally to $17.3 trillion. However, this outcome resulted from a diverging pattern of activity across regions. Declines of 6% and 10% on US and European marketplaces respectively were offset by growth of 17% in Asia. The expansion of Asian business largely reflects the continuing development of stock index activity in Korea, a market that now accounts for 30% of global turnover in such products.

[2] Physical settlement tends to be more complex since it involves a delivery option giving the seller of a contract a choice in the tendering of instruments satisfying his delivery obligations.

Exchanges introduce innovative contracts in fourth quarter

In November, One Chicago (a joint venture between the three big Chicago exchanges) and NQLX (a joint venture between Nasdaq and Euronext.liffe), launched US trading in futures on single stocks. Both exchanges provide for the electronic trading of their respective contracts. Fears that futures on single stocks would have an adverse impact on the trading and volatility of underlying shares had led to a ban in the early 1980s.[①] Although futures on single stocks have been traded for years on some marketplaces, they have yet to find broad market acceptance. The global volume of transactions in single stock futures amounted to less than 2% of the number of trades in single stock options in 2002.

In the same month, One Chicago and NQLX also launched futures on a number of US exchange-traded funds (ETFs).[②] Options on ETFs have been traded in the United States since 1999 but futures on such instruments have only been allowed recently. At the same time, Eurex became the first European exchange to list futures and options on a number of domestic and pan-European ETFs. ETFs have expanded rapidly in recent years and exchanges see them as a promising area for the development of new contracts.

[①] The securities industry had expressed fears that futures contracts based on the equity or debt securities of a single issuer might have an adverse impact on the cash market for the underlying securities. The Shad-Johnson Accord of 1982 included a ban on futures contracts on single equities, which was removed in December 2000 with the passage of the Commodity Futures Modernization Act of 2000. [②] ETFs are exchange-traded securities (or index funds) that are backed by an underlying basket of stocks held in trust. They can be bought and sold at intraday prices throughout the trading day, in contrast to conventional mutual funds, which are generally purchased or redeemed only at end-of-day prices.

Exchange-traded activity remains buoyant in 2002

For 2002 as a whole, the aggregate value of turnover in exchange-traded financial derivatives monitored by the BIS rose by 17% to $694 trillion. This compares to an increase of 55% in the previous year.

Stock index contracts active in 2002

Business in stock index contracts grew by 32% to $64 trillion, fuelled largely by the rapid expansion of option contracts in Korea, the development of continental indices in Europe and the success of retail-targeted index contracts in the United States. Turnover in interest rate products, the largest segment of the market for exchange-traded financial instruments, increased by 15% to $627 trillion. The percentage increase in short-term rate contracts was comparable to that on government bond contracts. Aggregate activity on money market and government bond contracts amounted to $548 trillion and $79 trillion respectively. Lastly, currency contracts increased by a modest 3% to $2.9 trillion. Exchanges have failed so far to compete successfully with OTC markets in this segment. This is largely explained by the availability of a wide range of liquid short-term hedging and trading instruments in the international interbank market.

Economic derivatives: new contracts on information events

Blaise Gadanecz

In October 2002, Deutsche Bank and Goldman Sachs introduced a new kind of option in the OTC derivatives market. The options allow market participants to take positions on important US macroeconomic data releases. This box describes innovative aspects of these options and discusses the information that can be extracted from their prices.

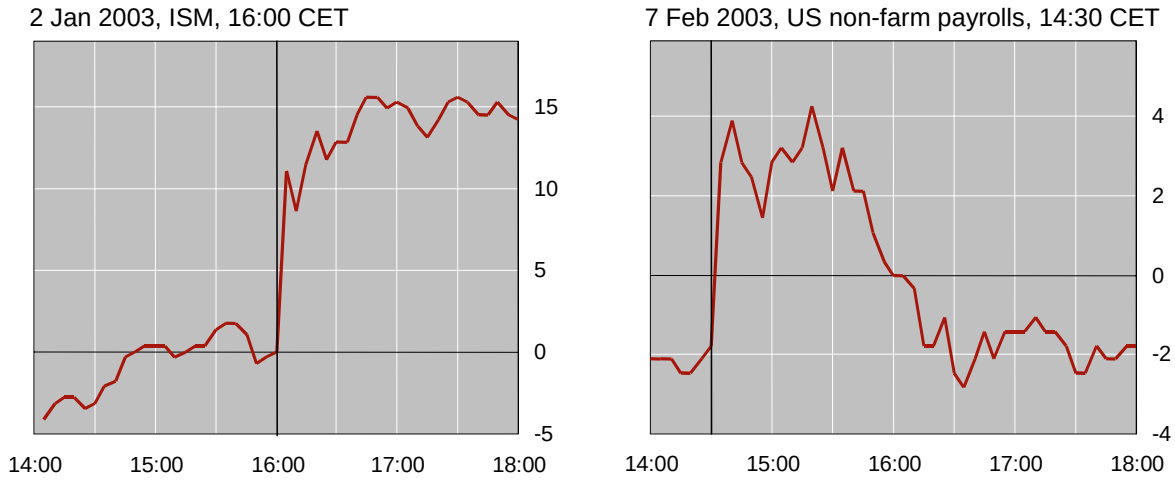
The releases of scheduled US macroeconomic announcements are among the most important information events in financial markets. The most closely watched indicators include the employment report, the ISM manufacturing index, the producer price index (PPI) and retail sales. These are each released once a month. They are all scheduled in the sense that market participants know not only the day of the release but also its precise time. The employment report, for example, is released on Friday at 14:30 Central European Time.

The highest price volatility in the US Treasury market is typically found in intervals of just a few minutes around these announcements, reflecting market participants' forceful and instantaneous reaction to the new information.[1] The graph below illustrates the market's reaction to typical surprises in macroeconomic announcements. The ISM manufacturing index data for December 2002 revealed a rise in new orders, production and other indicators, causing Treasury yields to jump. The release of the non-farm payrolls for January showed surprisingly strong growth in employment, and yields initially rose, although this effect was overshadowed by other factors later in the day.

The innovative feature of the new options is that they explicitly recognise the existence of a data release and allow participants to take positions on the actual numbers to be announced. In the past, a speculator could take a position only on the direction of the surprise, that is, on whether the actual number would be smaller or larger than expected. For example, if one thought that the change in the number of jobs for non-farm payrolls in the employment report would be greater than that in the economists' consensus forecast, one could take a short position in Treasury securities. A higher than anticipated number would indicate economic strength and thus lead to a decrease in

Five-year yields on announcement days

Difference from yield quoted at announcement for US Treasury note, in basis points



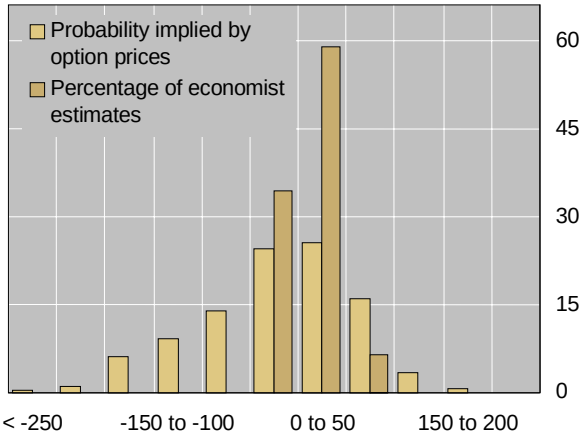
Note: Yields quoted in five-minute intervals between 14:00 and 18:00. The vertical line denotes the time of the announcement; the vertical axes represent the difference from the yield at announcement.

Sources: Bloomberg; BIS calculations.

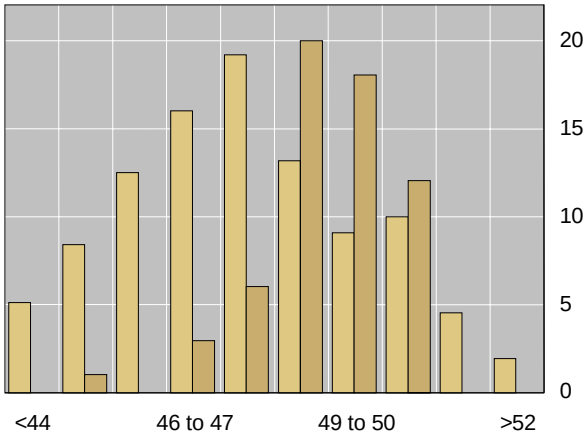
[1] See E M Remolona and M J Fleming (1999): "Price formation and liquidity in the US Treasury market: the response to public information", *The Journal of Finance*, vol LIV, no 5, October. See also C Furfine (2001): "Do macro announcements still drive the US bond market?", in *BIS Quarterly Review*, June.

Economists' forecasts vs probabilities implied by option prices

US non-farm payrolls, September 2002[1]



ISM manufacturing index, October 2002[2]



[1] Bureau of Labor Statistics data release of 4 October 2002; absolute changes, in thousands. [2] Institute for Supply Management data release of 1 November 2002, in percentage points.

Sources: Bloomberg; Deutsche Bank; BIS calculations.

bond prices. However, one could not have taken a position on whether the number would be 50,000 jobs greater rather than only 10,000 jobs greater than expected. One can do so with the new options since the strike prices specify particular levels for the announcements.

The options are traded in Dutch auctions with settlement payments corresponding to the difference between the strike and the actual outcome of the indicator.[②] Goldman Sachs acts as counterparty on every executed option. Auctions have taken place or are scheduled for such announcements as the non-farm payrolls number in the employment report, the ISM manufacturing index and retail sales. There are plans to also offer options on European macroeconomic indicators.

The option prices that result from the auctions allow a calculation of the implied probabilities attached to the various outcomes of the announcements.[③] However, it is important to note that these are "risk neutral" probabilities, which in the terminology of modern finance theory actually mean probabilities that incorporate risk premia. Hence, an outcome to which investors are averse would be assigned an implied or "risk neutral" probability that is higher than the objective or empirical probability.

The graph above illustrates probability distributions for two announcements, namely the change in US non-farm payrolls for September 2002 and the ISM manufacturing index for October 2002. There are two probability distributions for each announcement, one based on option prices observed at the closing of the auction held before the release, the other based on the frequency distribution of economists' forecasts. Note that the two distributions differ since they are based on different populations of market participants. The implied distributions tend to attach higher probabilities to negative outcomes. The reason for this is that the distributions of economists' forecasts reflect empirical probabilities, while the distributions derived from options prices incorporate market risk premia. Their comparison allows one to gauge the extent of investor risk aversion. By supplying an additional, forward-looking measure of market expectations about the outcome of macroeconomic indicators, economic derivatives could contribute to a more efficient incorporation of macroeconomic fundamentals into prices.

[②] In financial markets, the term "Dutch auction" refers to a tender mechanism whereby securities are allocated to the highest bidders until the total amount of securities on offer is covered. All successful bidders pay the price quoted by the lowest bidder. The Dutch auction is sometimes known as a unitary or uniform price auction. [③] Option prices are determined in part by the probability attached by the market to possible values of the underlying asset on the maturity date of the option. By comparing options with different strike prices, it is possible to infer the probabilities that the market attaches to different levels of the underlying asset price. Such probabilities can then be used to construct an implied distribution of the asset price.

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Choosing instruments in managing dollar foreign exchange reserves[1]

Two years ago, managers of official foreign exchange reserves were pondering the uncertain but serious prospect of a shrinking stock of outstanding US Treasury securities. This concern reflected the fact that some three quarters of global foreign exchange reserves were held in US dollars, and their management traditionally favoured US Treasury securities. Today, with the US economy growing slowly after a shallow recession, and the effects of discretionary tax cuts being felt, the outstanding stock of Treasury securities is once again expanding. Moreover, while the risk of a war of unknown duration and expense attaches more than usual uncertainty to any forecast of future US deficits, there is little doubt that this expansion will continue for some time. The challenge posed by the gradual disappearance of the outstanding stock of the traditional investment vehicle no longer seems so pressing as it was two years ago. Managers of official foreign exchange reserves no longer face the gradual disappearance of the outstanding stock of their traditional investment vehicle as a given.

The pressure to achieve returns in an environment of lower interest rates may nevertheless pose other challenges to reserve managers. It puts the spotlight on reserve managers' choice of instrument. This note analyses the instruments in which central banks have invested their dollar reserves in recent years and poses three questions: How is the official dollar portfolio invested? How has the choice of instrument evolved over time? And how have recent events, including the return of recession and US fiscal deficits, lower Treasury yields and corporate defaults, altered its evolution?

How is the official dollar portfolio invested?

A top-down view …

The analysis in this feature is based, not on a bottom-up aggregation of central bank portfolios, but rather a top-down approach using just two sources: US Treasury data augmented by information collected by the BIS. The US authorities have recently published the results of one of their periodic surveys of foreign holdings of US securities. As a result, we have for end-March 2000

… based on US Treasury …

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

an unusually well grounded set of information on the instruments in which a significant proportion of official holdings of dollars are invested. Since not all officially held dollars are invested in US securities, we must add in officially held bank deposits and money market instruments, such as commercial paper, held in the United States. In addition, dollar reserves are also invested in dollar bank deposits outside the United States, as reported in data collected by the BIS. Finally, investments that cannot be readily captured are officially held dollar debt securities that were originally marketed outside the United States and remain in depositories offshore. Outstanding international debt securities denominated in dollars amounted to $4.1 trillion at end-2002,[2] of which $346 billion were issued by the sovereign and other government borrowers whose obligations are favoured by reserve managers.

… and BIS data …

The top-down view of *identified* official holdings of dollars based on US Treasury and BIS data suggests that US Treasury securities represented more than half (58%) of holdings in March 2000 (Table 1). As noted, however, this top-down view is not exhaustive: a bottom-up aggregation of dollar reserves shows a larger total. In particular, (top-down) identified holdings of dollars aggregate to a sum about 17% short of (bottom-up) estimated global dollar reserves ($1,130 billion versus $1,359 billion).[3] On the hypothesis of the accuracy of the US survey of foreign holders of US securities, then the Treasury share is lower. It would be in the neighbourhood of 48% of total official holdings of dollars, if unidentified dollar reserves are invested in eurodollar securities.[4]

… taking account of gaps in the data …

… suggests that US Treasury securities amount to about half of US dollar reserve holdings

Investments in US Treasuries bulk larger in holdings of long-term securities than in holdings of short-term instruments. Given the limitations of the data, the share of Treasury coupon securities in (top-down) identified long-

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[2] Summing straight bonds, floating rate notes and short-term issues from Tables 13A and 13B. The BIS formerly reported the obligations of state agencies, but, starting with this *Review*, has reclassified these as the debt of financial institutions or corporations (see p A79). The last reported amount of dollar-denominated debt securities outstanding issued by state agencies was $827 billion at end-September 2002. Agency debt is also an important investment habitat for central banks.

[3] $1,359 billion is the estimate of total dollar reserves for end-1999, while the $1,130 billion represents total identified dollar reserves three months later. IMF data show that total reserves grew by $27 billion or 1.5% in the first quarter of 2000.

[4] Note that this estimate is higher than the 43% estimated on the same basis by Fung and McCauley (2000), which was for end-1999, just three months earlier. This is because the new benchmark survey reported in US Treasury et al (2002) identified $492 billion in official holdings of US Treasury coupon securities for March 2000 rather than $422 billion for end-1999, which we had estimated based on the previous survey and subsequent flows. Given an $8 billion reported official inflow into US Treasury coupon securities in the first quarter of 2000, the implication is that our previous estimate for Treasury coupon securities in official hands at end-1999 was understated by $62 billion. The benchmark survey uncovered proportionally larger official holdings of long-term agency securities, $91 billion instead of our estimate of $32 billion plus a first quarter 2000 inflow of $8 billion. The survey also identified $12 billion in corporate bond holdings, compared to our estimate of $8 billion plus the first quarter 2000 inflow of $0.4 billion. Less surprising was the finding of $96 billion in equity holdings, rather than our estimate of $79 billion plus the first quarter inflow of $0.5 billion. In contrast to the upward revision of official holdings, the new benchmark survey reported in US Treasury et al (2002) indicated a half trillion dollar overstatement in overall foreign holdings of long-term US securities. See Nguyen (2002).

Instrument composition of US dollar reserves at end-March 2000

In billions of US dollars

	Short-term	Long-term	Total
Treasury securities	165	492	657 (58%)
Other assets	262	211	473 (42%)
Deposits in the United States	32	·	32 (3%)
Money market paper in the United States	104	·	104 (9%)
Offshore deposits	126	12	138 (12%)
Agency securities	·	91	91 (8%)
Corporate bonds	·	12	12 (1%)
Equities	·	96	96 (8%)
Total	427	703	1,130 (100%)
Memo:			
Share of Treasury securities in assets of the given maturity	*39*	*70*	·
Total estimated US dollar reserves at end-1999	·	·	*1,359*

Sources: Figures for US Treasury securities, agency securities, corporate bonds and equities are from US Treasury et al (2002), p 11. Figures for deposits and money market paper in the United States are from the US *Treasury Bulletin*, Tables CM-I-2 and IFS-2. Figures for offshore US dollar deposits are from the BIS international banking statistics, Table 5C. The figure for official dollar foreign exchange holdings for end-1999 is from BIS (2000), p 86. Table 1

term securities almost surely substantially overstates the actual share. Nevertheless, it seems safe to say that most holdings of long-term securities take the form of US Treasuries. In contrast, less than half of investments in short-term instruments are held in Treasury bills.

How has the choice of instrument evolved over time?

Three big shifts in the last 40 years, two of which involve more credit risk:

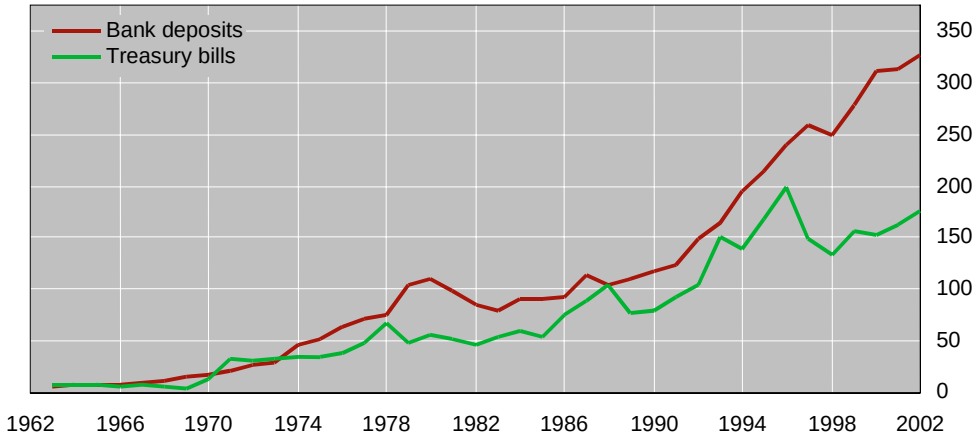
The evolution of reserve managers' choice of instrument over the last 40 years broadly shows three successive trends. First, they began to diversify their short-term holdings away from Treasury bills in the mid-1970s. Then they extended maturities during the 1980s and into the 1990s. Most recently, they have diversified their longer-term holdings away from Treasury notes. The first and third of these trends involved an acceptance of greater credit risk, while the second involved an acceptance of greater market risk. In all cases, the evolution of benchmarks has tended to remove the risk-taking from the immediate reserve managers.

... from Treasury bills to bank deposits and other money market instruments ...

Reserve managers shifted most of their short-term holdings out of Treasury securities and into bank deposits and private money market instruments in the 1970s, and further decreased the weight of Treasury bills in their portfolio in the late 1990s (Graph 1). Reserve managers presumably found that they could obtain better yields by investing in bank deposits, especially in the euromarket, rather than in US Treasury bills. Moreover, for a

Official holdings of Treasury bills and bank deposits

In billions of US dollars



Note: Bank deposits include money market paper held in the United States.

Sources: US Treasury; BIS. Graph 1

time holding bank deposits offered a way to beat the returns on (possibly informal) Treasury bill benchmarks, although with time these benchmarks tended to become more inclusive. Changes in the allocation between Treasury bills and other short-term instruments also reflected, at times, the changing composition of reserve holders as well as occasional flights to quality back into Treasury bills.

... from short-term to longer-term ...

The second trend emerged as the bond market entered a long bull period in the 1980s. Reserve managers found that they could enhance returns by extending maturities and continued to do so into the 1990s (Table 2). Among identified dollar reserves, long-term instruments rose from an estimated 54% to 62% of total holdings.

... and from US Treasury notes to more risky medium-term instruments

The last trend became evident in the 1990s, especially in the last few years of the decade, when reserve managers decided to enhance returns on their longer-term holdings by accepting more credit risk. Among identified long-term holdings, the share of Treasury securities dropped from 83% to 70% between 1989 and March 2000. As with the Treasury share of short-term instruments, the decline was most evident after 1997, implying a significant recent acceptance of credit exposure.[5] Holdings of debt securities issued by government-sponsored enterprises like Fannie Mae and Freddie Mac rose sharply, with their share roughly tripling from 2–3% to 8%. Corporate bond holdings also rose sharply but still amounted to no more than about 1% of total holdings in March 2000. Thus, the process of diversifying away from Treasuries, earlier well established at the short end of the yield curve, proceeded apace at longer maturities.

Perhaps surprisingly, equities held by official institutions remained the largest single class of reserve assets among identified holdings of long-term

[5] Truman (2001) infers: "Foreign official holders are adjusting to the reduced supply of Treasuries and substituting into other dollar-denominated assets."

non-US Treasury securities. Notwithstanding net sales during most of the 1990s, estimated capital gains lifted overall holdings. In the past, such equity holdings have figured in the core portfolios of relatively few official investors, but their numbers may grow despite recent equity price declines. It may be that these recorded investments also include equities bought by central banks to provide for their employees' pensions. Such funds are often managed on the central banks' own balance sheets, so that it is not possible to disentangle investments on the national account from investments intended to provide retirement security for central bank staff.

It needs to be emphasised as well that the extent of maturity extension and credit diversification captured in the top-down view may understate actual portfolio shifts, owing to the limitations of the data used. As mentioned earlier, the investment allocation of 17% of estimated dollar reserves at end-March 2000 was not identified. This was not the case for 1989, when only a negligible amount of dollar reserves was unidentified. If we had been able to identify the composition of all the official holdings of international dollar securities, they would almost surely show that an even greater extension of maturities and diversification away from long-term Treasury securities had occurred in the 1990s.

Instrument composition of US dollar reserves in 1989 and 2000

In percentages

	End-1989[1]			End-March 2000[2]		
	Short-term	Long-term	Total	Short-term	Long-term	Total
Treasury securities	19	45	64	15	44	58
Other assets	27	9	36	23	18	42
Deposits in the United States	3	.	3	3	.	3
Money market paper in the United States	6	.	6	9	.	9
Offshore deposits	18	.	18	11	1	12
Agency securities	.	2	2	.	8	8
Corporate bonds	.	0	0	.	1	1
Equities	.	7	7	.	8	8
Total	46	54	100	38	62	100
Memo:						
Share of Treasuries in assets of given maturity	*41*	*83*	.	*39*	*70*	.
Identified US dollar reserves (in billions of US dollars)	.	.	*403*	.	.	*1,130*

[1] Figures for US Treasury securities, deposits and money market paper are from the US *Treasury Bulletin*, Tables CM-I-2 and IFS-2. Figures for offshore US dollar deposits are from the BIS international banking statistics. Figures for corporate bonds, agency securities and equities are from the US Treasury Department, *Report on foreign portfolio investment in the United States as of December 1992*. [2] See Table 1. Table 2

How have recent events altered the choice of instrument?

Since March 2000, reserve managers have had to contend with the after-effects of the global decline of equity prices, a sharp deceleration of economic growth, falling interest rates, and increased political risks. How have they changed their allocation of dollar reserves among instruments?

Investments in short-term instruments hold steady as yields fall

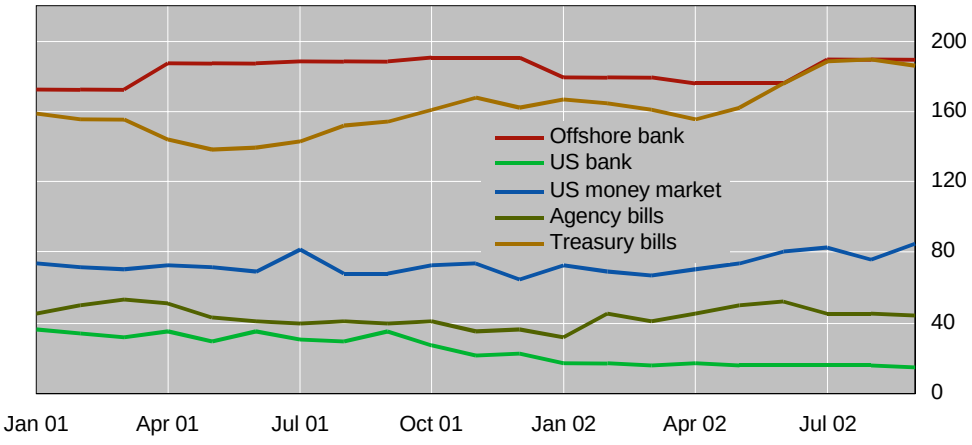
Overall holdings of short-term assets did not increase much in 2001–02, which is not surprising in view of the low yields on such dollar instruments (Graph 2).[6] However, despite the overall weak growth of official holdings of short-term instruments, interesting shifts occurred across the various categories. In particular, it appears that the earlier willingness to accept greater credit risk was reversed by recession and the events of September 2001. Going into the summer of 2001, official reserve managers were reducing their holdings of Treasury bills while increasing their holdings of offshore bank deposits. Subsequently, holdings of offshore bank deposits levelled off, while foreign official portfolio managers returned to the quality and liquidity of US Treasury bills. The decline over the same period of official bank deposits in the United States is particularly noteworthy, although its interpretation is not obvious. Official holdings of money market paper held up well in view of the contraction of commercial paper outstanding in this period. This probably reflects the fact that the contraction of outstandings was concentrated in lower-tier paper, while official holdings are concentrated in higher-tier paper.

Shift towards safer instruments after the events of September 2001 …

As with the management of their money market instruments, official reserve managers seemed in the third quarter of 2001 to become more risk-averse in managing their long-term fixed income portfolio (Graph 3). From April 2000 to August 2001, official reserve managers had reduced their holdings of

Official holdings of short-term US dollar instruments

In billions of US dollars

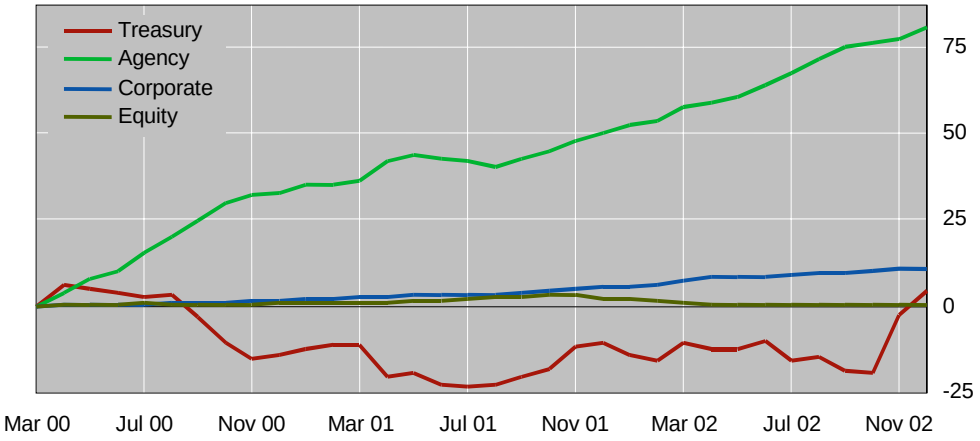


Sources: US Treasury; BIS. Graph 2

[6] The US Treasury's decomposition of agency paper from other money market paper begins in March 2001.

Official purchases of long-term US dollar instruments[1]

In billions of US dollars



[1] Cumulative figures since March 2000.

Source: US Treasury. Graph 3

Treasury coupon securities by $23 billion (neglecting capital gains) while adding $40 billion in agency coupon securities. With net purchases in late 2001 and late 2002, however, they bought back the Treasury coupon securities that they had sold in the earlier period. Meanwhile, they continued to buy agency securities. The lack of any reported gain in the liquidity of the Treasury market relative to that of agencies argues for the interpretation of greater risk aversion rather than a more passive response to liquidity developments.

… but investment in US corporate bonds continues

On balance, corporate accounting scandals and record corporate defaults led official reserve managers to slow but not to reverse their acquisition of corporate bonds. Indeed, heavy monthly purchases occurred in March and April 2002. The months since then, during which the loss of confidence spread from the stock market to the corporate bond market (Barth and Remolona (2002)), saw at most reduced purchases but no sales by official reserve managers.

Conclusions

In the 1990s, official reserve managers continued to extend the maturity of their dollar portfolio as they had in the 1980s. Among their long-term holdings, however, they doubled the weight on instruments other than Treasury notes. Overall, by early 2000, reserve managers appeared to have only about half of their official dollar reserve portfolio invested in US Treasury securities. More recently, their preference for agency and US corporate debt has further diversified the official portfolio away from US Treasury securities. The uncertainties of recession, corporate defaults and world politics appear to have slowed but not reversed this process.

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The euro interest rate swap market[1]

The euro interest rate swap market is one of the largest and most liquid financial markets in the world. Indeed, the swap curve is emerging as the pre-eminent benchmark yield curve in euro financial markets, against which even some government bonds are now often referenced. However, owing to the current structure of the swap market, liquidity is not as robust to market stress as in the larger government securities and futures markets.

Size and growth of the swap market

An interest rate swap is a contract between two parties to exchange streams of interest payments. Typically, one stream of payments is based on a fixed rate of interest and the other stream on a floating rate of interest. Only the net cash flows are paid; the notional principal on which the interest payments are calculated is not exchanged. A forward rate agreement is equivalent to a single-period interest rate swap, in which interest payments are exchanged only once. A swap can be characterised as a portfolio of forwards.

In terms of notional principal outstanding, over-the-counter markets for euro- and US dollar-denominated interest rate derivatives are the largest financial markets in the world (Graph 1). The notional stock of euro-denominated interest rate swaps and forwards totalled €26.3 trillion at end-June 2002. The stock of US dollar-denominated contracts was slightly smaller, at €26.2 trillion.

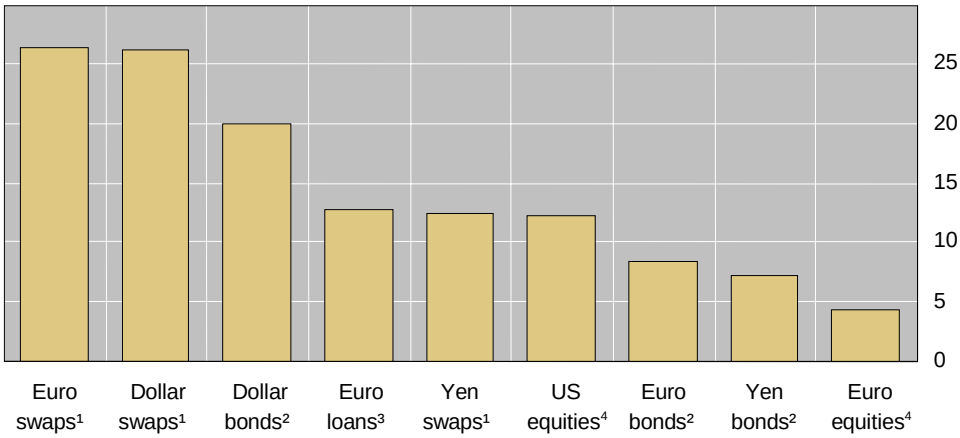
The euro swap market has doubled in size since 1999

Interest rate swap markets in several of the euro legacy currencies, especially Deutsche marks and French francs, were large and growing even before European monetary union. Since the launch of the single currency, the euro swap market has nearly doubled in size (Graph 2). The growth of the euro swap market significantly outpaced the growth of euro bond and loan markets, which expanded by approximately 40% and 25%, respectively, between end-December 1998 and end-June 2002. However, the US dollar swap market grew even faster, increasing by 170%. Whereas the US dollar swap market was much smaller than the euro swap market on the eve of monetary union, by end-June 2002 it was approximately the same notional size.

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

Global financial markets

Amounts outstanding at end-June 2002; in trillions of euros



[1] Notional principal. [2] Money market instruments and bonds issued by governments and non-governments in domestic and international markets. [3] Including interbank and cross-border loans. [4] Market capitalisation of shares of domestic companies.

Sources: ECB; World Federation of Exchanges; national data; BIS calculations. Graph 1

Swaps as benchmark instruments

The growth of the euro swap market was driven by hedging and positioning activity. Following monetary union swaps quickly gained benchmark status in euro financial markets, displacing some of the benchmarks in the legacy currencies as the locus for price discovery about future short-term interest rates.

Swap trading was boosted by hedging activity ...

The introduction of the euro led to a surge in euro-denominated bond issuance, and this in turn boosted arbitrage and hedging activity by issuers, dealers and investors. Participants in European markets began to use interest rate swaps to hedge their holdings of non-government bonds in the early 1990s, several years before participants in the US dollar and other markets began to do so. At that time, financial institutions were the dominant non-government issuers in European markets, and as a result quality conditions in the non-government bond market were similar to those in the swap market. Participants in European markets thus became accustomed to hedging credit products with swaps.

... the fragmented nature of European government markets ...

The fragmented nature of European government securities markets strengthened the incentive to switch to swaps for speculating on and hedging interest rate movements. The market for unsecured interbank deposits was among the first euro financial markets to become integrated and, given that swap rates embody expectations of future interbank rates, this contributed to the rapid integration of swap markets in the euro legacy currencies. In fact, a single euro swap curve emerged almost overnight. Therefore, short positions – positions taken in expectation of an increase in interest rates – can be created with relative ease in the swap market, by choosing the "pay fixed" side of a swap. In contrast, the secured market, specifically the general collateral repo market, was slower to break out of the segmentation that characterised it prior

to monetary union. Differences in governments' credit ratings, settlement systems, tax regimes and market conventions remain obstacles to the complete integration of euro government securities markets (ECB (2001b)). As a result, a single market for general collateral repos does not yet exist; market participants must still specify the nationality of government debt used as collateral before they conclude a repo transaction (ECB (2001a)). This complicates the use of government securities to hedge or speculate on interest rate movements.

... and traumatic market events

The switch to swaps was reinforced by a series of traumatic market events in the late 1990s. Events surrounding the near collapse of Long-Term Capital Management in September 1998 highlighted the risks inherent in the use of government bonds and related derivatives to hedge positions in non-government securities. This had been a routine strategy among dealers up until that time, albeit more so in the US dollar market than in the euro market. Squeezes in German government bond futures contracts over the 1998–2002 period had a similar effect. Temporary increases in the scarcity premium on euro government securities during auctions of third-generation mobile telephone licences in 2000 also made government securities less attractive for hedging and position-taking purposes.

Rapid growth of trading in short-dated EONIA swaps

Overnight index swaps (OISs) have become especially popular hedging and positioning vehicles in euro financial markets. An OIS is a fixed-for-floating interest rate swap with a floating rate leg tied to an index of daily interbank rates.[2] In the euro market, OISs are overwhelmingly referenced to the euro overnight index average (EONIA) rate – a weighted average of interest rates contracted on unsecured overnight loans in the euro area interbank market. Trading in EONIA swaps is highly concentrated in maturities of three months or less, and EONIA swap rates are widely considered to be the pre-eminent benchmark at the short end of the euro yield curve. Banks, pension funds, insurance companies, money market mutual funds and hedge funds all make extensive use of EONIA swaps to hedge and speculate on short-term interest rate movements (ECB (2001a, 2002)). OISs are also traded in US dollars and other major currencies, but they have not gained benchmark status in these markets.

The benchmark status of the euro swap curve is reflected in quoting practices for corporate bonds. These practices often depend on the credit quality of the issuer and the nationality of the investor. Euro-denominated bonds issued by investment grade borrowers are usually quoted in terms of a spread over the swap curve. For non-investment grade corporate bonds, prices are quoted in the form of outright yields. Interest rate swaps are becoming more widely used as benchmark instruments in the US dollar market too (McCauley (2001)). However, the shift is less advanced than in the euro

[2] One significant difference between an OIS and a plain vanilla interest rate swap is that the floating rate leg of an OIS is determined and paid only at maturity. In a plain vanilla interest rate swap, the floating rate leg is determined at one settlement date and paid at the next, ie determined in advance and paid in arrears.

Turnover of interest rate products

Average daily turnover, in billions of euros

	Total turnover[1]		Of which: Futures turnover	
	April 1998	April 2001	April 1998	April 2001
Euro market				
Interest rate swaps[2, 3]	112	260	. . .	1
Euribor futures[4]	. . .	. . .	198	404
German government securities[5]	99	202	76	150
Italian government securities	316	195	14	. . .
French government securities	110	130	6	15
US dollar market				
Interest rate swaps[2, 6]	54	156	. . .	. . .
Libor futures	. . .	. . .	465	958
US government securities	253	396	54	63
Yen market				
Interest rate swaps[2]	16	28	. . .	. . .
Libor futures	. . .	. . .	83	29
Japanese government securities	111	195	26	32

[1] Trading activity in money, bond and futures markets. [2] Including interest rate forwards. [3] LIFFE began trading euro swap futures in March 2001. [4] Data for 1998 refer to futures contracts referenced to Deutsche mark Libor, Lira Libor, Mibor, Pibor and Ribor. [5] Data on money and bond market turnover refer only to the most actively traded bonds on Euroclear and probably underestimate cash market turnover of German government bonds by a significant amount. Data on cash market turnover for 2001 refer to January 2001. [6] The Chicago Board of Trade began trading US dollar swap futures in October 2001, and the Chicago Mercantile Exchange and LIFFE introduced US dollar swap futures in April 2002 and July 2002, respectively.

Sources: Euroclear; FOW TRADEdata; Futures Industry Association; national data; BIS calculations. Table 1

market. For example, many US investors still prefer to price dollar-denominated corporate bonds against the Treasury yield curve rather than the swap curve.

Notwithstanding the growth of the euro swap market, futures contracts continue to be heavily used as hedging and positioning vehicles. Indeed, trading in euro-denominated money and bond market futures soared in the run-up to and years immediately following the introduction of the single currency (Table 1). Contracts based on three-month Euribor – a trimmed average of interest rates quoted for term deposits in the euro area interbank market – and traded on the London International Financial Futures and Options Exchange (LIFFE) are by far the most actively traded short-term interest rate futures in the euro market. Contracts based on German government securities and traded on Eurex dominate activity in longer-term euro futures.

Participants in the swap market

Greater diversity in the range of players using swaps ...

The growth of the euro swap market has been accompanied by greater diversity in the range of players using interest rate swaps. In the run-up to European monetary union, the inter-dealer segment drove the growth of the euro swap market. At end-1998, positions vis-à-vis other dealers accounted for 52% of the outstanding notional amount of euro interest rate swaps and

forwards. Since 1999, the dealer-customer segment has become increasingly important (Graph 2). By end-June 2002, positions vis-à-vis financial customers accounted for 42% of the outstanding notional amount of euro interest rate swaps and forwards, and positions vis-à-vis non-financial customers a further 7%. By comparison, in the dollar swap market, positions vis-à-vis financial customers accounted for 41% of outstanding contracts, and positions vis-à-vis non-financial customers 15%. The smaller share of the dollar swap market accounted for by inter-dealer positions – 45%, compared to 51% in the euro market – is explained in part by greater concentration in the dollar market, which results in dealers offsetting more of their transactions internally rather than with other dealers.

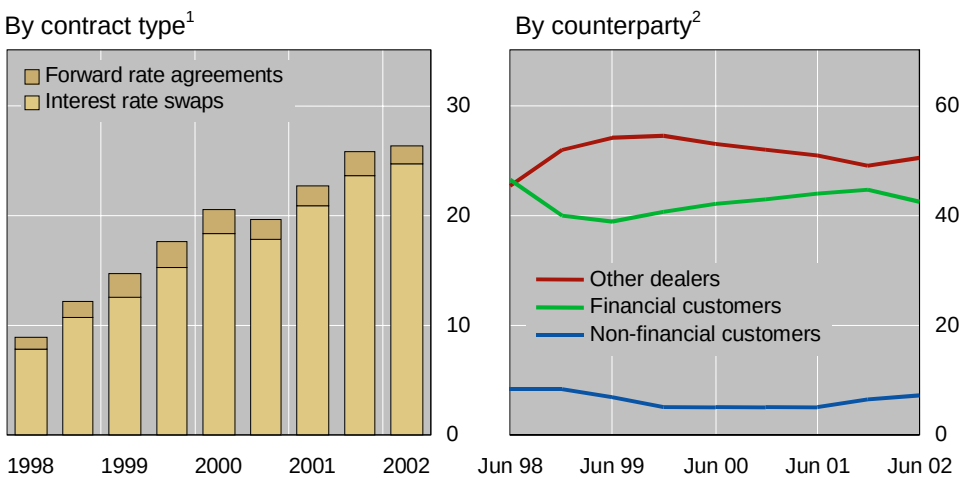
... including European governments

Even European governments have begun to use interest rate swaps to manage their risk exposures. The French government has since October 2001 employed swaps to shorten the average maturity of its debt.[3] As of end-July 2002, it had written swaps totalling €61 billion in notional principal, equivalent to approximately 8% of outstanding French government debt. The German government uses swaps to lower its interest costs. At present, it is authorised to swap up to €20 billion, equivalent to about 3% of its outstanding debt. The Dutch, Italian and Spanish governments are also active in the euro swap market. The entry of governments into the interest rate swap market has tended to put a ceiling on euro swap spreads. When the spread between government yields and swap yields widens, governments find it attractive to receive fixed in the swap market.

Although the range of players using swaps is increasing, the number of intermediaries is declining. Swaps are overwhelmingly traded over the counter (OTC), and so dealers are critical to the functioning of the swap market. Given

Over-the-counter derivatives markets

Notional principal of euro-denominated derivatives



[1] In billions of euros. [2] As a percentage of outstanding FRAs and interest rate swaps.

Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 2

[3] The French government temporarily suspended its swap programme in September 2002 owing to concerns about the level and volatility of swap spreads.

customers' traditional preference for dealing with high-quality counterparties, trading in OTC markets has long been dominated by a handful of better-rated dealers. In particular, the major dealers have tended to be commercial banks with credit ratings of at least double-A.[4] In recent years, intermediation in OTC markets has become even more concentrated owing to mergers and acquisitions. For example, following the merger of Chase Manhattan and JP Morgan in 2000, the combined entity's share of the global OTC interest rate derivatives market equalled approximately 25%. In the EONIA swap market, the five largest dealers accounted for 48% of all trading activity during the second quarter of 2001, and the 20 largest dealers 88% (ECB (2002)). Other segments of the euro interest rate swap market were more concentrated, with the five largest dealers accounting for 60% of turnover. The euro swap market, however, is less concentrated than the dollar market. Two banks hold nearly three quarters of all interest rate derivative contracts booked by US banks, and the five largest banks hold over 90% of outstanding contracts.

But intermediation is concentrated among a handful of dealers

Banks headquartered in the euro area are the most active dealers in the euro swap market, writing 46% of notional contracts outstanding at end-June 2002 (Table 2). Among euro area banks, German banks are the largest

Market shares of the largest swap dealers

As a percentage of notional swaps outstanding at end-June 2002

Headquarters of dealer[1]	Euro swaps[2]	Dollar swaps[2]	Yen swaps[2]
Euro area	45.8	24.2	19.5
Germany	20.5	13.1	11.0
Deutsche Bank, Dresdner Bank, Commerzbank, HypoVereinsbank			
France	14.7	7.1	7.3
BNP Paribas, Société Générale, Crédit Agricole			
Belgium, Italy, Netherlands	10.6	4.0	1.2
ABN AMRO, Rabobank			
United States	35.0	53.8	37.2
JP Morgan Chase, Bank of America, Citigroup, Goldman Sachs, Merrill Lynch			
Japan	2.0	4.5	33.1
Fuji Bank, Bank of Tokyo-Mitsubishi, Sumitomo Bank			
Canada, Sweden, Switzerland, United Kingdom	17.2	17.4	10.3
UBS, Royal Bank of Scotland, Barclays, HSBC			
Memo: Notional principal, in billions of euros	*26,322*	*26,247*	*12,507*

[1] Individual dealers identified had outstanding swap contracts of at least €1 billion at end-2001. [2] Interest rate swaps and forwards.

Sources: Swaps Monitor; national data; BIS calculations. Table 2

[4] Securities firms tend to be lower-rated than banks, typically single-A. In the late 1980s and early 1990s, a number of securities firms set up triple-A derivatives subsidiaries, but these subsidiaries never captured a substantial share of the market.

dealers, with a 21% market share, followed by French banks at 15%. US banks' share of the euro swap market was 35% at end-June 2002. By comparison, US banks' share of the dollar swap market was 54%. Japanese banks play only a marginal role in the euro and dollar swap markets but have a 33% share of the yen market.

Pricing of euro swaps

EONIA and Euribor are the most common reference rates

The pricing of interest rate swaps in general depends on the interest rate used for the floating rate leg of the contract. The yield used for the fixed rate leg is supposed to embody expectations about the future path of the floating rate for the life of the contract and the risk associated with the volatility of that rate. For euro swaps, the choice of the floating rate tends to depend on the contract's maturity. As discussed above, for short-dated swaps, EONIA is the most common basis for the floating rate leg. Euribor was commonly referenced following monetary union, but by 2000 had been superseded by EONIA at the short end of the swap curve. For longer-dated swaps, Euribor remains the key reference rate. The underlying instruments for both EONIA and Euribor are unsecured interbank deposits, and therefore these rates reflect a degree of credit risk. Indeed, most of the banks in the EONIA and Euribor contributor panels are rated double-A (BIS (2001)).

The pricing convention for euro swaps is to provide quotes in terms of the yields that specify the fixed payments for the contracts. This is unlike the convention for US dollar swaps, which are typically quoted in terms of spreads over US Treasury yields. Hence, the price of a five-year euro swap might be quoted as 4%, without any reference to a government bond yield, while that of a five-year US dollar swap might be quoted as 50 basis points over the five-year US Treasury yield.[5]

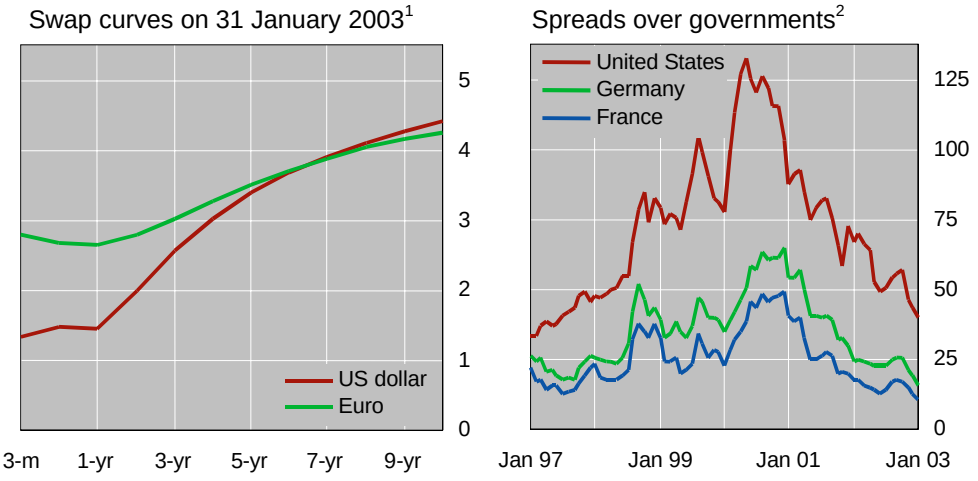
Swap rates include a premium for counterparty risk

In spite of the benchmark status of euro swaps, their yields still tend to hover above the yields for the most liquid triple-A rated government bonds in a given maturity, just as dollar swap yields tend to be higher than US Treasury yields. At the 10-year maturity, for example, the fixed rate on euro swaps at end-January 2003 was about 20 basis points above the yield on the German bund (Graph 3). Swap rates are typically higher than rates on triple-A rated securities because they contain a premium for counterparty credit risk, which is often associated with the major dealers in the market. Alternatively, a deterioration in the perceived creditworthiness of the government could result in a narrowing of the spread. For example, fiscal difficulties in Germany appeared to contribute to a narrowing of the spread between euro swaps and German government bonds in 2001 and 2002 (Artus and Teiletche (2003)).

In the past, a customer could mitigate counterparty risk by spreading positions across several dealers. As consolidation in the financial industry reduced the number of active swap dealers and credit ratings of the remaining

[5] To be more precise, quoting in spreads for US dollar swaps is conventional for dealers in New York, while quoting in yields for this contract would be more typical for dealers in London.

Swap curves and spreads



[1] Libor for three-, six- and 12-month yields; fixed rate leg of interest rate swaps for longer-term yields; in percentages. [2] Ten-year swap rate over 10-year government yield; in basis points.

Sources: Bloomberg; national data; BIS calculations. Graph 3

dealers were downgraded, daily settlement and especially collateralisation became increasingly common. The widespread use of such mechanisms for mitigating counterparty risk resulted in narrower and more stable swap spreads. Nevertheless, counterparty risk can still at times unsettle the swap market. For example, credit concerns about several large US banks – including major derivatives dealers – caused dollar and, to a lesser extent, euro swap spreads to widen in July 2002 (BIS (2002b)).

Collateralisation is increasingly common

Other possible influences on swap spreads include the general level of interest rates and the slope of the yield curve. However, the economic rationale behind these factors is difficult to explain, and their relationship with spreads tends to be unstable over time. Liquidity was a concern in the past but, as discussed below, liquidity in the euro swap market is now such that yields tend not to be driven by imbalances in supply and demand.

Market liquidity

European swap markets were already quite liquid prior to monetary union, and they gained liquidity following the introduction of the single currency. The use of interest rate swaps by some market participants as hedging and positioning vehicles increased the willingness of other participants to do likewise, resulting in a self-reinforcing process whereby liquid markets become more liquid.

As described in CGFS (2000), a liquid market is one “where participants can rapidly execute large-volume transactions with a small impact on prices”. There are at least three dimensions to market liquidity: tightness, depth and resiliency. Tightness refers to the difference between buying and selling prices. Depth relates to the size of trades possible without moving market prices. Resiliency denotes the speed with which prices return to normal following temporary order imbalances.

EONIA swaps are the most liquid segment of the euro money market ...

The available data indicate that euro swaps are one of the most liquid instruments available in euro financial markets. Indeed, EONIA swaps are the most liquid segment of the euro money market (ECB (2001a)). EONIA swaps of €2 billion are regularly traded in the inter-dealer market for maturities up to three months, and significantly larger trades are not uncommon. Bid-ask spreads are typically 1 basis point. The Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity shows that the average daily turnover of euro-denominated OTC interest rate contracts almost doubled between April 1998 and April 2001, to €231 billion (BIS (2002a)). By 2001, the turnover of euro swaps and forwards exceeded that of all interest rate products other than money market futures, US Treasuries and (probably) German government securities (Table 1). Trading in EONIA swaps appears to account for much of this growth.

... but government securities markets are more liquid at longer maturities

Beyond two years, however, the euro swap market is neither as tight nor as deep as the larger European government securities markets. Anecdotal evidence suggests that bid-ask spreads for euro swaps are wider than those for government securities: 1 basis point for inter-dealer swaps, compared to less than half a basis point for the most recently issued German government securities. Quote sizes are also smaller: approximately €100 million for five- and 10-year swaps, compared to at least €150 million for the most recently issued German bobls and bunds. Trading activity in longer-dated swaps is a fraction of that in futures contracts on German government bonds.

Liquidity in OTC markets is less robust to stress than on organised exchanges

Moreover, liquidity in the euro swap market appears more likely to evaporate during periods of extreme volatility than liquidity in the larger government securities markets. In particular, interest rate swaps remain less liquid than they would be if they were traded on an organised exchange, where a central clearing house could act as the counterparty to all trades. Counterparty credit risk becomes of paramount concern during periods of market volatility, when uncertainty about the health of financial institutions often increases. Consequently, arrangements for dealing with counterparty risk play a major role in determining market liquidity under stress (Borio (2000)). Assuming that the soundness of the clearing house is ensured, the liquidity of instruments traded on organised exchanges tends to be more robust to stress than that of instruments traded over the counter (Borio (2000), CGFS (1999)).

Steps have been taken to encourage greater centralisation in the swap market. In the early part of 2001, the London Clearing House, supported by several of the largest swap dealers, began clearing and settling interest rate swaps in all of the major currencies. At about the same time, LIFFE introduced futures contracts on two-, five- and 10-year euro swaps. However, trading of swap futures accounts for an insignificant proportion of global swap activity (Table 1). By contrast, trading of futures contracts on German government bonds accounts for the larger part of activity in the German government securities market.

The future of swaps

It remains unclear whether swaps will continue to erode the benchmark status of government securities and consolidate their position as the dominant positioning and hedging vehicles in euro fixed income markets. In addition to the previously mentioned concern about counterparty risk, another concern is that the participation of large, one-sided players, such as governments, could increase the risk of idiosyncratic movements in swap yields – ie it could increase basis risk – and so make swaps less effective hedges.

European repo markets are becoming more integrated

Repos could eventually compete with EONIA swaps for benchmark status at the short end of the euro yield curve, as they do in the US dollar market. European repo markets are growing rapidly and steadily becoming more integrated, boosted in large part by market participants' efforts to limit counterparty credit exposures. The development of a triparty repo market – in which settlement and management of the collateral is delegated to a central clearing house – is especially noteworthy because it allows a basket of securities to back a transaction, including lower-quality, less liquid securities (ECB (2002)). At the longer end of the yield curve, government securities remain attractive benchmark instruments, not least because of the tremendous liquidity of German government futures contracts.

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Volatility and derivatives turnover: a tenuous relationship[1]

It is often presumed that higher market volatility begets more active trading in derivatives markets. A number of empirical studies have confirmed that such a positive relationship between volatility and activity exists. However, those studies have usually drawn on analyses that apply mainly to daily or intraday data. Very few studies have considered the existence of a possible relationship between volatility and volume from one month to the next. Moreover, the nature of the trading that could give rise to such a relationship is generally left unexplained.

In this special feature, we examine the relationship between volatility and monthly activity in exchange-traded derivatives contracts. First, we discuss the various trading motives that would lead to such a relationship. We distinguish between hedging motives and information-based motives. Moreover, we distinguish between motives that tend to generate a relationship between volatility and volume on a day-to-day basis from those that would create a relationship on a month-to-month basis.

We then examine the issue empirically. We look at two different markets, that for S&P 500 stock index contracts and that for 10-year US Treasury note contracts. We further look at two types of contract for each market, futures and options, and two measures of activity, turnover and open interest. We also use two conceptually distinct measures of market uncertainty, namely actual (or historical) and implied volatility.

Our results generally show a tenuous relationship between volatility and monthly activity in our selected contracts. More specifically, there is no statistically significant relationship between volatility and turnover in 10-year US Treasury note futures and options contracts. However, there does seem to be a negative relationship between volatility and turnover in S&P 500 stock index contracts. Such results stand in contrast to much of the earlier literature on the relationship between financial market volatility and activity. We suggest an interpretation of these results.

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

Links between volatility and activity in derivatives markets

Other studies find a positive link between volatility and activity ...

Previous research has tended to find a positive relationship between volatility and activity in financial markets. Much of that research has focused on the behaviour of volume as volatility changes from one day to the next. In a detailed review of the early literature, Karpoff (1987) noted that most studies based on daily data had found a positive correlation between the volatility of prices in equity and futures markets and trading volume. In one of the few studies that considers a month-to-month relationship, Martell and Wolf (1987) show that volatility is the most significant explanatory variable of monthly turnover in futures markets. However, other macroeconomic factors such as interest rates and inflation also play an explanatory role.

... but the nature of the link remains unclear

The analysis of the factors that could potentially account for such a relationship is often set in highly general terms. Cornell (1981), for example, associates volatility with uncertainty and argues that such uncertainty should lead to an increase in both hedging and speculative trading in derivatives contracts. First, uncertainty may induce risk-averse economic agents to transfer risk to those better able to bear it, at least assuming that uncertainty will make some agents relatively more willing to bear that risk. Second, uncertainty is supposed to lead to differential or asymmetric information, thus greater uncertainty provides a speculative motive for trading. Although these two trading motives are intuitively appealing, the precise interaction between volatility and trading is not spelled out. In fact, one could think of several potential links between volatility and trading, each working in a different way. Moreover, these links could be of varying intensity or even work in opposite directions. We examine some of these links below.

Hedging-related transactions

Hedging creates a clear positive link

Hedging creates an unambiguously positive link between volatility and trading. Hedgers tend to use mechanical trading strategies, such as dynamic hedging to replicate the payoff of options or immunisation to fix the duration of fixed income portfolios. Here price changes automatically call for changes to the exposure to the risks of the underlying securities. Dynamic hedging, for example, involves purchases or sales of the underlying asset to maintain an exposure in proportion to the options' delta.[2] In the case of immunisation, financial institutions target the gap in duration of their assets and liabilities. A rise in interest rates shortens duration, and this forces them to take a position in longer-term assets to return to their duration target. These examples are sufficient to show that price changes will tend to be accompanied by corresponding transactions in the underlying assets and/or derivatives contracts.

[2] Delta measures the change in an option's price relative to the change in the price of the underlying.

Speculative transactions

Type of information has an impact on speculative trading

Speculative or "information-based" transactions also create a link between volatility and activity in asset and derivatives markets. This link depends in part on whether the new information is private or public and on the type of asset traded. In theory, the arrival of new private information should be reflected in a rise in both the volatility of returns and trading volumes in single equity and equity-related futures and options. The price of individual stocks tends to be influenced by firm-specific rather than economy-wide information. Such firm-specific information is often private in nature (perhaps arising from stock research or investors' "hunches" about a firm's prospects) and is conveyed to the market through trading. The incorporation of new private information will therefore tend to generate a relationship between price volatility and trading. Indeed, this is one of the main links found by empirical studies of activity in stock markets at a daily or intraday level.

Trading with public information

Impact of public information on our two derivatives contracts

In the case of the contracts we look at – namely on 10-year US Treasury notes and the S&P 500 stock index – price movements in the underlying asset would tend to be driven by information on the economy, which is by and large public in nature. Such public information comes primarily in the form of regular macroeconomic data releases, which become available to the market as a whole at scheduled release times. Significant US releases include non-farm payrolls, the producer price index and the consumer price index. Each of these numbers is released once a month and tends to be associated with both unusual volatility and unusual trading volume in government bonds and related derivatives markets during the day of the announcement.

Macro announcements generate unusually high volatility and trading

The arrival of public information tends to be associated with a degree of disagreement over what the information precisely means, leading to a rise in trading and thus an association between volatility and turnover. Fleming and Remolona (1999) show with intraday data that the arrival of public information in the US Treasury market sets off a two-stage adjustment process for prices and trading volumes. In a brief first stage, the release of major macroeconomic announcements induces a sharp and nearly instantaneous price change with a reduction in trading volume. In a prolonged second stage, price volatility persists and trading volume surges as investors trade, seemingly to reconcile residual differences in their views. Hence at the daily level, new market-wide information will be associated with price volatility and an increase in activity arising from disagreement over the new information.

Day-to-day versus month-to-month effects

The above discussion of the links between volatility and trading suggests that the uncovering of a relationship may depend on the time frame used for analysis. Daily data will tend to show a positive link since trading volumes will tend to be substantially higher on announcement days than on days for which

no announcements are released.[3] Monthly data will probably show less of a relationship because the main macroeconomic announcements tend to be repeated every month. Their impact is also likely to dissipate fairly quickly. However, if announcement surprises happen to be bigger in one month than in another, then market prices and activity may fluctuate more strongly and for longer periods, creating a relationship that is observable at monthly levels. Moreover, such a relationship is more likely to be induced by surprising events that do not take place according to regular monthly schedules. These events may include important political developments or significant market disruption.

Link may depend on time frame for analysis

The remainder of this article will look at two main issues. First, we will look at whether the positive relationship found in earlier studies between volatility and daily activity is also present using month-to-month data. Second, we will look at whether there are differences in the behaviour of the two contracts we selected, both for futures and options and for turnover and open interest.

Empirical approach and key market variables

We use regression analysis to quantify the relationship between volatility and activity in exchange-traded derivatives contracts (see the box on page 62). The focus of our analysis is on volatility but we also attempt to account for the particular characteristics of our data sets, such as seasonal patterns. We use two concepts of market volatility and two standard measures of activity in exchange-traded markets.

Regression analysis is used ...

Two concepts of market volatility

We look at two rather distinct types of volatility commonly used by market participants: actual and implied volatility. Actual volatility is generally measured by the annualised standard deviation of changes in asset prices. It often presents a time-varying pattern, which has prompted the development of models, such as GARCH-type estimators (Engel (1982)), accounting for this pattern. In contrast, implied volatility is based on options prices, which incorporate a premium reflecting the time-varying nature of risk aversion.[4] As shown in Graph 1, the two series can show sizeable short-term deviations.

... on actual and implied volatility ...

Two measures of market activity

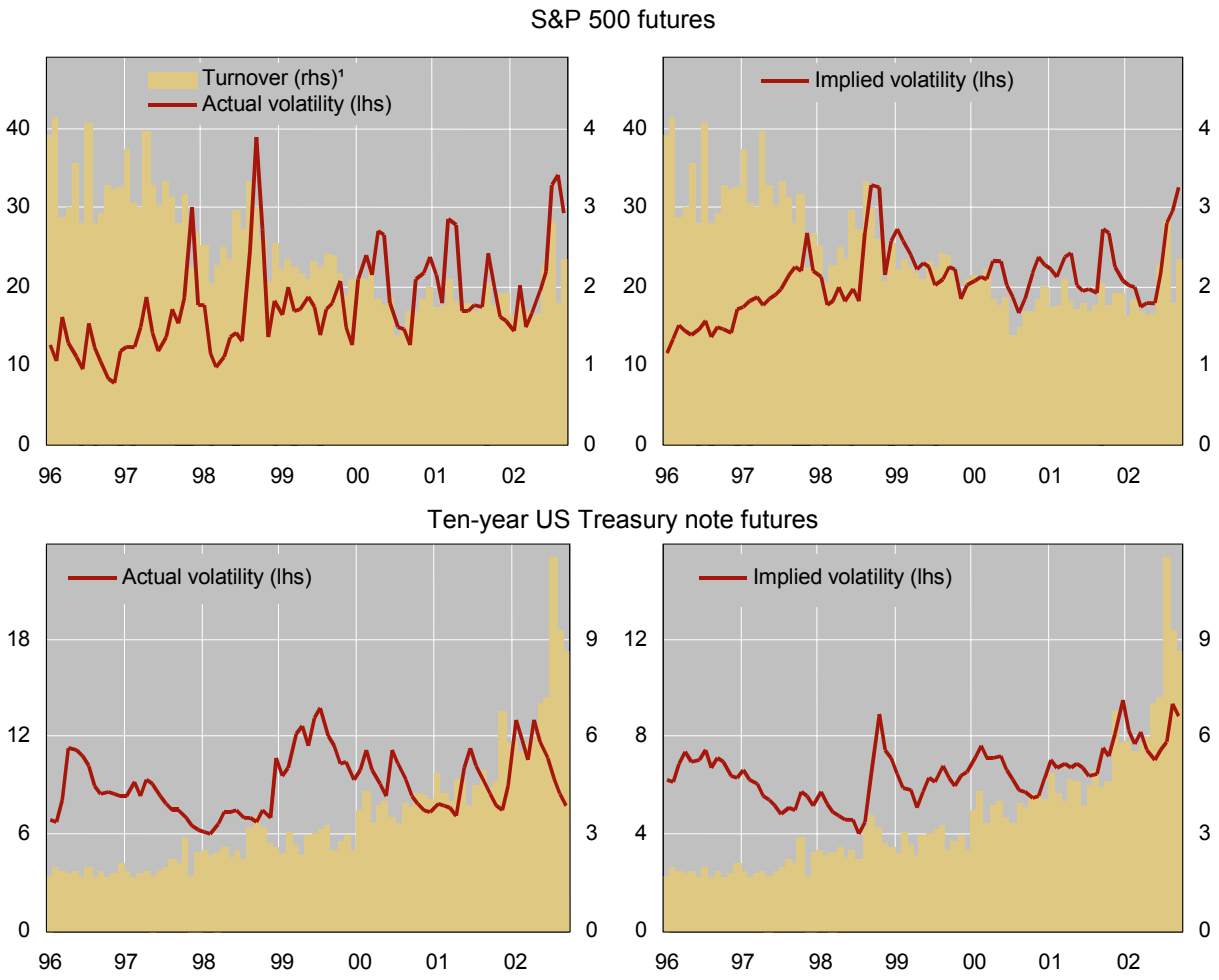
There are two main measures of activity on derivatives exchanges. *Turnover (or volume)* refers to the number of purchases/sales in the various contracts listed on an exchange during a given period of time. Since the exchange automatically matches a purchase with a corresponding sale, turnover gives an

[3] Very high frequency data, such as intraday series, would be useful in determining whether volatility emanates from trading itself since at high frequencies, the pressure and turbulences induced by trading are likely to be an important, if not the main source of volatility.

[4] Traders generally calculate implied volatility in an iterative fashion through the use of an option pricing model along with the prices of actively traded options.

Turnover and volatility

In millions of contracts and percentages



[1] The series on turnover were seasonally adjusted for contract expiry effects and structural breaks.

Sources: Bloomberg; FOW TRADEdata; Futures Industry Association; national data; BIS calculations. Graph 1

... and turnover and open interest in derivatives

account of the total number of purchases or sales in the specified period. The basic unit of time on exchanges is the trading day, with the information on activity usually being reported in number of contracts traded. Turnover is a flow concept, which is generally used by market participants as an indicator of liquidity in a particular contract or as a measure of an exchange's success in attracting trading business.

Open interest refers to the total number of contracts that have not yet been offset by an opposite transaction or fulfilled by delivery of the asset underlying a contract. Although each transaction has both a buyer and a seller, only one side of the transaction is included in open interest statistics. Open interest is a stock concept reflecting the net outcome of transactions on a given date. It is often interpreted as an indicator of the hedging or "long-term" commitment of traders to a particular contract. Open interest is generally smaller than turnover because a large number of contracts that are bought or sold during the course of the day are reversed before the end of the trading session.

Empirical methodology and estimation results

We use regression analysis to quantify the relationship between market volatility and activity in exchange-traded derivatives. The regressions allow us to control for other factors such as a time trend and the effect of lagged volumes.

Dependent variables

We use as dependent variables two standard measures of activity in derivatives markets, namely turnover and open interest. Turnover is the total number of contracts traded in each month, while open interest is the number of contracts outstanding at the end of each month. We look at futures and options on the S&P 500 index and US 10-year Treasury notes. The series for the S&P 500 contracts are adjusted by incorporating activity in the S&P 500 E-mini contracts, retail-targeted instruments that have expanded rapidly since their launch in September 1997. They are also adjusted for the impact on turnover of the reduction in the contract's size in November 1997. The data on turnover and open interest are collected by the BIS from commercial databases (Futures Industry Association and FOW TRADEdata) and published on a quarterly basis in the *BIS Quarterly Review*. The sample period runs from January 1995 to September 2002.

The series were seasonally adjusted for contract expiry effects. Volume and open interest also follow a predictable pattern over the life cycle of a contract. Activity is minimal when the contract is far from its maturity date. It then rises gradually as maturity approaches, reaches a plateau two to three months before expiration and falls sharply as traders close out or roll over their positions to the next contract to avoid delivery. Delivery poses a number of practical problems to market participants and, for this reason, they prefer to avoid it by taking offsetting positions in the contracts to which they are exposed. This means that there is often a peak of turnover and open interest in the months when contracts come to the end of their maturity cycle, namely March, June, September and December.

Explanatory variables and estimation methodology

Our main explanatory variables are actual and implied volatility. For actual volatility, we use a GARCH specification initially developed by Glosten et al (1993).[①] Such a measure allows for the asymmetric impact on volatility of price increases and decreases. The underlying data used for the calculation of actual volatility are the returns on 10-year US Treasury notes and the S&P 500 index. For implied volatility, we use the price of at-the-money exchange-traded options.

Given that price volatility and exchange-traded volumes are jointly determined, we adopt an approach enabling us to deal with the problems created by endogeneity. Specifically, we use an instrumental variable approach and estimate a single equation of volume against implied volatility by two-stage least squares. In the case of actual volatility, we use price volatility predicted by our asymmetric GARCH model and estimate the equation by ordinary least squares.[②] In the case of implied volatility, we use the first lag of volatility as an instrument for the contemporaneous value of volatility. This should be a good approximation since there is evidence of persistence in volatility. The following equation, which relates price volatility and volume in a dynamic specification, is estimated:

$$Volume_t = \beta_0 + \beta_1 Volume_{t-1} + \beta_2 TREND_t + \beta_3 Volatility_t + \varepsilon_t$$

where:

- *Volume* is our measure of market activity (turnover and open interest).
- *TREND* is an exponential time trend to account for structural growth factors, such as financial innovation.
- *Volatility* is our measure of price volatility (predicted by GARCH in the case of actual and lagged in the case of implied).

Here β_i are the parameters to be estimated and ε_t are randomly distributed errors.

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① Borio and McCauley (1996) discuss measures of volatility that account for this asymmetric response. ② Such a specification is used because the GARCH measure of volatility is conditional on its past values.

Basic estimates

As shown by the table below, we find no statistically significant relationship between either of our two concepts of volatility and monthly activity in 10-year US Treasury note futures and options contracts. However, our results also show a negative relationship between volatility and turnover in S&P 500 futures and options. Our interpretation of those results is provided in the body of the text.

Volatility and activity in exchange-traded contracts

	Actual volatility[1]	Implied volatility[2]
Turnover		
Ten-year US Treasury note contracts		
Futures	–6.45 (43.28)	–103.49 (118.40)
Options	–24.24 (15.34)	–109.73 (52.49)*
S&P 500 contracts		
Futures	–53.29 (14.55)**	–41.10 (11.74)**
Options	–10.39 (4.35)**	–14.97 (3.69)**
Open interest		
Ten-year US Treasury note contracts		
Futures	1.13 (2.88)	2.05 (6.42)
Options	–5.18 (5.25)	–23.54 (14.98)
S&P 500 contracts		
Futures	–0.68 (1.08)	–0.01 (0.54)
Options	–2.00 (1.50)	–5.93 (1.38)**

Note: Standard errors in parentheses; * and ** denote significance at the 5% and 1% levels.

[1] Based on a GARCH specification developed by Glosten et al (1993). [2] Implied volatility of at-the-money options.

Estimation results: the impact of volatility

Our results show a tenuous link

Our estimation results are generally at odds with the results found by earlier empirical studies using daily data.[5] We generally find a tenuous relationship between volatility and monthly activity in our selected contracts. More specifically, there is no statistically significant relationship between either of our two concepts of volatility and monthly activity in 10-year US Treasury note futures and options contracts. However, our results also show a negative relationship between volatility and turnover in S&P 500 stock index futures and options.

Lack of relationship for Treasury note contracts

The lack of relationship for 10-year Treasury note contracts suggests that higher volatility in financial markets creates offsetting effects between speculative trading and hedging-related transactions. In fact, high monthly levels of volatility could lead to a sufficiently large retrenchment by information-based traders to offset the mechanical increase in hedging-related transactions. Such a reduction in activity could result from a desire by

[5] Early studies have found a significant autocorrelation of futures turnover at daily and intraday frequencies. Our empirical results confirm such persistence for monthly frequencies, with an important first-order autocorrelation of our measures of activity. This is a fairly frequent result in financial markets, as volatility and activity tend to cluster.

speculators to reduce their exposures during times when market developments are difficult to ascertain or when market liquidity dries up.

Negative link for S&P 500 contracts

In the case of the S&P 500 index contracts, the consistently negative relationship between volatility and turnover could imply that the reduction in speculative transactions is stronger than any possible increase resulting from mechanically determined transactions. It might also reflect the fact that variations in volatility tend to be more pronounced for S&P 500 contracts than for 10-year Treasury note contracts. Given this higher risk exposure in stock index contracts, market participants may react more strongly to significant market events. Such events appear to drive much of the negative and significant relationship found between volatility and activity in S&P 500 stock index contracts.

Market stress associated with weaker activity

Indeed, an analysis of the sharpest contractions in the turnover of S&P futures shows that they are associated with recent episodes of market stress. These episodes include the 1997 Asian crisis, the Russian debt default of 1998, the 2001 terrorist attacks in the United States and the restatement of WorldCom's accounts in 2002. In most cases, higher volatility is initially accompanied by an increase in the monthly turnover of futures contracts but it is also followed by an even more significant contraction.

In the case of the Asian crisis of June to December 1997, implied volatility of the S&P 500 index increased steadily from 19.7% in July to 26.9% in November, whereas seasonally adjusted futures turnover declined from a peak of 3.3 million contracts in July to 2.2 million in November. In the case of the Russian crisis, implied volatility jumped from 18.2% in July 1998 to 26.8% in August and remained high until October 1998, when it reached a level of 32.5%. However, after an initial surge in turnover in August 1998 to 3.3 million contracts, activity declined to 2.6 million in October. The terrorist attacks of September 2001 for their part led to an increase in volatility to about 27% for September and October but turnover only showed a significant increase in September, to 2.1 million contracts. Finally, the restatement of WorldCom's accounts in late June 2002 resulted in a prolonged period of high volatility in equity markets. However, turnover only rose for two months, June and July 2002, and then declined thereafter.

Consistently negative link for options

Another notable result is that there is a more consistently negative relationship between volatility and activity in options contracts. Given that exchange-traded options tend to be less actively traded than corresponding futures, higher volatility could affect their liquidity to a greater extent than that of futures and thus amplify any retrenchment by information-based traders.

Little difference between actual and implied volatility

Lastly, there is little difference in the impact of actual and implied volatility. This is somewhat surprising since they measure different things. Actual volatility is a measure of the past dispersion of returns, while implied volatility incorporates the market price of risk. This suggests that the risk premium is not an important factor in the volatility-turnover relationship, at least at the monthly level.

Conclusions

Previous empirical work has tended to find a positive relationship between the volatility of asset returns and the volume of transactions in exchange-traded derivatives markets. However, those studies have usually drawn on analyses that apply mainly to daily or intraday data. Very few studies have considered the existence of a possible relationship between volatility and volume from one month to the next. In this article, we examined the relationship between volatility and monthly activity in 10-year US Treasury note and S&P 500 futures and options contracts.

Our estimation results show a tenuous relationship between volatility and monthly activity in our selected contracts. More specifically, there is no statistically significant link between either of our two concepts of volatility and monthly activity in 10-year US Treasury note futures and options contracts. However, they also show a negative relationship between volatility and turnover in S&P 500 stock index futures and options. These results could be explained by the fact that mechanically determined hedging transactions are offset by a retrenchment of speculative trading in periods of heightened market turbulence and reduced liquidity. Moreover, in the case of the S&P 500 index contracts, significant market events seem to be associated with a major reduction in activity. This probably drives the negative relation between volatility and monthly volumes. Lastly, our two concepts of volatility, actual and implied, do not have a markedly different impact on market activity, which is also somewhat surprising given their different nature.

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

Basel Committee on Banking Supervision

The BCBS launches a third quantitative impact survey ...

In October, the Basel Committee on Banking Supervision (BCBS) launched its third quantitative impact survey, called QIS 3, a comprehensive field test to gauge the effects of the proposed minimum capital requirements under Pillar 1 of the New Basel Capital Accord. The test was undertaken with the goal of gathering information about whether further modifications would be necessary prior to the release of a new formal package for consultation in the spring of 2003. The QIS 3 is in three parts: a questionnaire, a set of instructions for completing the questionnaire and a technical guidance paper setting out the common capital requirements in detail.[1]

... examines cross-border electronic banking ...

In the same month, the BCBS also released a paper on the management and supervision of cross-border electronic banking activities.[2] The discussion contained in the document supplements that of an earlier paper, stressing the need for banks to integrate cross-border e-banking risks into their overall risk management framework.[3] The new paper has two main areas of focus. The first is to identify banks' risk management responsibilities with respect to cross-border e-banking. The second looks at the need for effective home country supervision of cross-border e-banking activities as well as continued international cooperation between banking supervisors regarding such activities.

... and discusses new elements of securitisation

Also in October, the BCBS published a second working paper on the treatment of asset securitisation.[4] The rapid growth of securitisation makes it essential to develop a robust treatment in the New Basel Capital Accord. The purpose of the paper is to discuss some of the new elements of the securitisation framework, such as improvements to the internal ratings-based

[1] See *Overview paper for the impact study*, BCBS, October 2002, at www.bis.org.

[2] See *Management and supervision of cross-border electronic banking activities*, BCBS, October 2002, at www.bis.org.

[3] See *Risk management principles for electronic banking*, BCBS, May 2001, at www.bis.org.

[4] See *Second working paper on securitisation*, BCBS, October 2002, at www.bis.org.

(IRB) treatment, as well as those concerning liquidity facilities and structures containing early amortisation features. They are all aimed at improving the risk sensitivity of the minimum capital requirements. The BCBS is also seeking input on the supervisory review component (Pillar 2) of the securitisation framework.

Committee on Payment and Settlement Systems

The CPSS details how to assess securities settlement systems

In November, the Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of the International Organization of Securities Commissions (IOSCO) released a report entitled *Assessment Methodology for* "*Recommendations for Securities Settlement Systems*".[5] The new report sets out a clear and comprehensive methodology for use in the assessment of such systems. The methodology is primarily intended for use in self-assessments by national authorities or in peer reviews of such self-assessments. It is also intended to serve as guidance for other international financial institutions (eg the IMF and the World Bank) conducting a Financial Sector Assessment Program, and for other forms of technical assistance.

Financial Stability Forum

In October, the Financial Stability Forum (FSF) held a regional meeting in which participants from the Asia-Pacific region exchanged views on vulnerabilities in domestic and international financial systems. The meeting, which took place in Beijing, China, was the second of its kind in the region. Senior representatives from finance ministries, central banks, and supervisory and regulatory authorities of six FSF member economies and nine regional non-member economies attended the meeting. Senior officials from international institutions which are members of the FSF, as well as the Asian Development Bank, also took part in the meeting.

The FSF discusses vulnerabilities in financial systems ...

The participants discussed vulnerabilities in the light of a scenario of continued moderate global growth but with significant downside risks and uncertainties. They also noted that the recovery under way in many regional economies was well entrenched but could still weaken should downside risks materialise. Participants considered that the adjustments implemented in regional financial sectors following the Asian crisis were now bearing fruit. However, in a number of economies, non-performing loan (NPL) problems were regarded as a continuing challenge, especially in the context of deflationary pressures. Significant ongoing efforts were needed to restructure and dispose of past stocks of NPLs and to strengthen credit cultures to limit new NPLs.

[5] In November 2001, the CPSS and the Technical Committee of IOSCO had published *Recommendations for Securities Settlement Systems*. That report had set out 19 recommendations concerning minimum standards that should be met to enhance the safety and efficiency of securities settlement systems. The recommendations are designed to cover systems for all types of securities, for securities issued in both industrialised and developing countries, and for domestic as well as cross-border trades.

They also agreed that further reforms in the financial sector should be pursued vigorously.

... and exchanges views on weaknesses in market foundations

Meeting participants also exchanged views about policy responses that are necessary to address weaknesses in market foundations. Opaqueness of corporate governance practices in the region was cited as one of the factors that had led to the Asian crisis. Although progress has been made since then, it was felt that further reforms were necessary and their urgency had increased following recent corporate failures in major markets. All agreed that enhancement of corporate governance practices and strengthening of accounting and auditing practices were of critical importance. In this context, they expressed hope that an improved and coherent set of international principles and standards in these areas could be agreed upon as soon as possible so that all countries could begin to implement them.

Interest is also expressed in the New Basel Accord

Participants expressed continued interest in the ongoing work to finalise the New Basel Capital Accord. Some concerns were expressed about the ability of regional banks to adopt the IRB version of the New Accord given that some of them are comparatively less sophisticated. It was explained that ample time would be available for banks outside the G10 countries to make the transition to the new regime. Participants also reviewed the progress of discussions at the FSF on a number of other issues of concern to them, including highly leveraged institutions.