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1. Overview: the prospect of rate increases shakes markets

The prospect that US policy rates might start to rise sooner than expected triggered a broad sell-off in global financial markets in April and early May. Market participants around the world reacted unusually strongly to a few US macroeconomic releases, leading to sharp falls in government bond, emerging debt and equity markets.

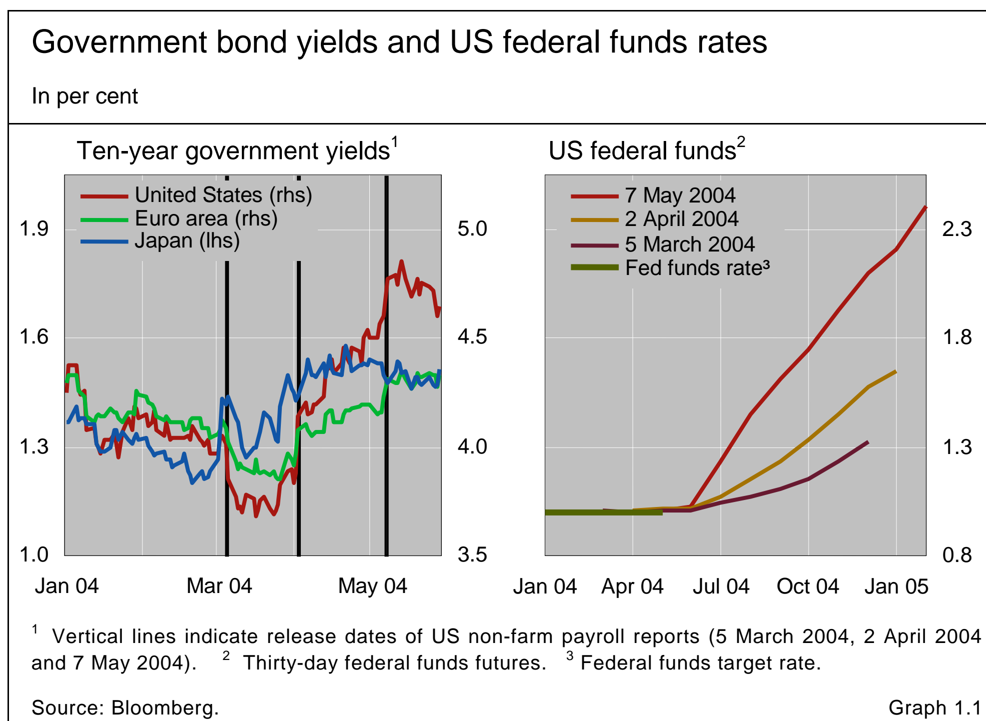
While most markets fell, some were more adversely affected than others. Indeed, some markets that had previously tracked each other closely showed signs of diverging. US bond yields rose more sharply than those in other major markets, with euro yields in particular decoupling from dollar yields. Spreads on emerging market bonds widened by substantially more than those on high-yield corporate debt, owing in part to the greater influence of carry trades in the market for emerging market debt. Asian equity markets declined by more than equity markets in other regions on added concerns about a possible slowdown in the growth of the Chinese economy.

Despite the magnitude of the sell-off, market conditions remained orderly. There were few indications that the sharp movements in prices caused immediate financial difficulties for either issuers or investors, although those most exposed to higher interest rates could yet experience difficulties in the months to come.

US yields price in Fed rate increases

Yields increase along with expectations for Fed tightening

Bond yields in the major economies moved up from early March to May, rising especially sharply in the United States. From mid-March to mid-May, the yield on the 10-year US Treasury note climbed by more than 100 basis points to more than 4.80%, a level not seen since mid-2002. The increase in yields was somewhat more pronounced at intermediate-term maturities, reflecting a shift in expectations for both the timing and degree of monetary tightening by the US Federal Reserve. The key data releases that moved markets were the employment statistics announced on 2 April and 7 May, each of which revealed growth of non-farm payrolls greatly in excess of market expectations and triggered daily increases in bond yields of over 20 basis points (Graph 1.1). Evidence of robust consumption in the United States also weighed on bonds, as did the US Federal Open Market Committee’s statement following its



Government bond yields and US federal funds rates

In per cent

[1] Vertical lines indicate release dates of US non-farm payroll reports (5 March 2004, 2 April 2004 and 7 May 2004). [2] Thirty-day federal funds futures. [3] Federal funds target rate.

Source: Bloomberg. Graph 1.1

meeting of 4 May, which was perceived as indicating less patience with regard to raising rates. By the end of May, forward curves adjusted for term premia implied that market participants expected the Federal Reserve to start tightening in June 2004, and the policy rate to increase by over 250 basis points in the following two years.

The bond market sell-off is similar to that of 2003 …

In some respects, the recent bond market decline was similar to the sell-off in global bond markets during the summer of 2003. In particular, both episodes saw yields on long-dated Treasuries surge by more than 100 basis points in less than two months. Likewise, in both cases investor efforts to offset the increased duration of mortgage-backed securities (MBSs) by selling in other long-dated fixed income markets appear to have amplified the rise in US Treasury bond yields.

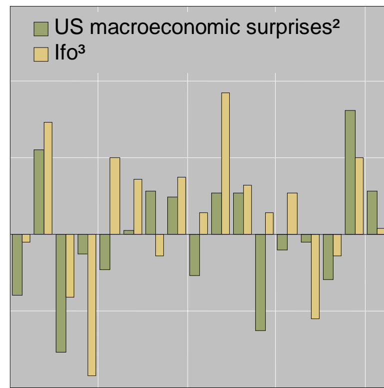
… though driven more this time by positive labour market data

Even so, there were a number of important differences. For one, the most recent move up in US yields was primarily the result of positive macroeconomic data, particularly from the labour market (Graph 1.2). Since the Federal Reserve had given clear signals that it would wait for a marked improvement in labour market conditions before raising rates, bond markets moved to incorporate expectations of Fed tightening as soon as strong data from the labour market came in. By contrast, in the summer of 2003, increases in yields had been driven more by changes in the perceived likelihood of the Federal Reserve's turning to unconventional monetary measures (such as large-scale bond buying) in response to the risk of deflation.

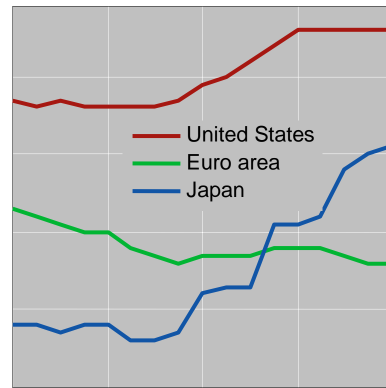
A second difference is that, in the present episode, the impact of MBS hedging seems to have been less pronounced than before. For instance, in the swap market, where the effect of convexity-related flows is greatest, spreads widened from late April by around 10 basis points, but this movement was much more limited and gradual than the spike of the previous summer (Graph 1.3). At that time, deteriorating liquidity conditions in the swap markets

Macroeconomic data and growth forecasts

Macroeconomic surprises[1]



Growth forecasts for 2004[4]



[1] Normalised announcement surprises, based on the difference between actual numbers and consensus forecasts. The observations are positioned in the month in which the actual numbers were released. [2] Weighted average of normalised surprises of the ISM survey, non-farm payrolls, retail sales and producer price and consumer price announcements. [3] The German Ifo survey is a business climate index derived by the Institut für Wirtschaftsforschung from survey responses. [4] Changes over previous year, in per cent. Forecasts as published monthly by Consensus Economics. The observations are positioned at the end of the month in which the forecast was made.

Sources: Bloomberg; © Consensus Economics; BIS calculations. Graph 1.2

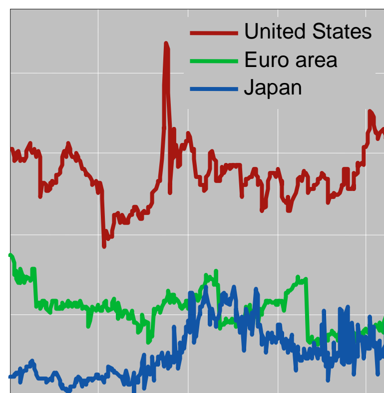
had resulted in additional direct selling pressure on MBSs and agencies, but disorderly market conditions have not been evident in the current period.

The bond market sell-off is much less pronounced in the euro area …

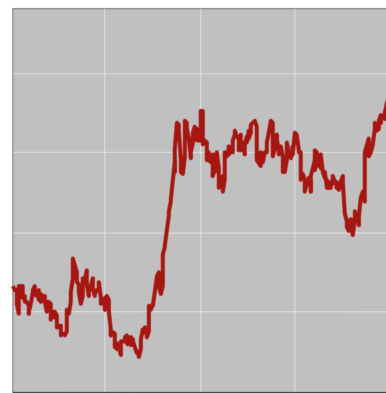
A third key difference is that the bond market sell-off was much less pronounced in mature bond markets outside the United States than it had been in the previous episode. In the euro area, bund yields rose by less than half the amount of the yield increases in the summer of the previous year (Graph 1.4). This was so despite the market's downward revision of the likelihood of ECB rate cuts following the meeting of the ECB Governing Council on 1 April. Bund

Swap and mortgage markets

Five-year swap spreads[1]

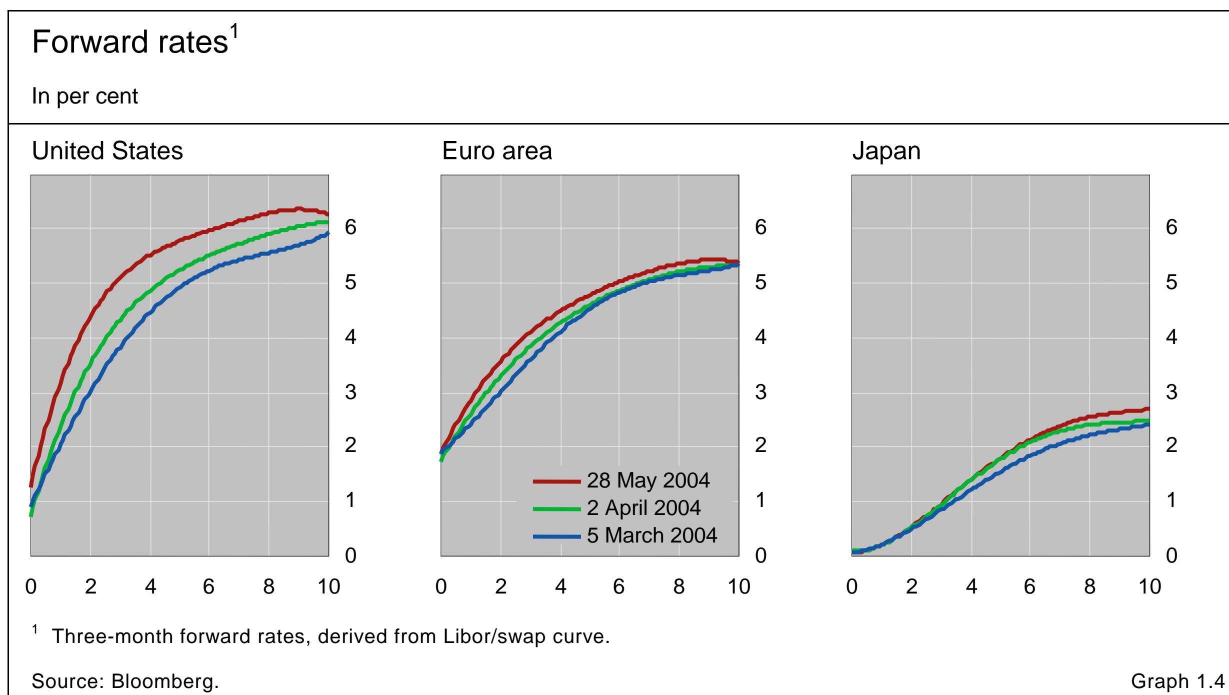


Duration of MBSs[2]



[1] Spread between five-year interest rate swaps and five-year government yields; in basis points. [2] Modified adjusted duration of Lehman Brothers MBS fixed rate index.

Sources: Bloomberg; Lehman Brothers. Graph 1.3



[1] Three-month forward rates, derived from Libor/swap curve.

Source: Bloomberg. Graph 1.4

rates not only decoupled from dollar rates on a level basis, but the exceptionally high correlation in weekly changes of bund and dollar rates that had been observed in late 2003 and early 2004 diminished considerably. The decoupling probably reflected a growing consensus that macroeconomic fundamentals were not as strong in the euro area, as indicated by downward revisions to euro area growth forecasts (Graph 1.2).

… while Japanese yields are virtually unchanged at the short end

Similarly, while Japanese yields rose slightly over the period under review, the rise was much more subdued than that observed in the United States. In fact, already low correlations in weekly movements between Japanese government bond yields and dollar or bund yields declined even further. In particular, the sharp fall in Japanese equity prices from late April increased demand for Japanese government bonds among domestic investors. Worries about the prospective slowdown of growth in China, exports to which had been a major contributor to Japanese growth over the preceding year, also helped restrain bond market yields. And in contrast to both the US and European markets, Japanese yields remained anchored at the short end of the curve (Graph 1.4), probably weighed down by a number of statements from the Bank of Japan indicating that the likelihood of a near-term return to inflation (and, by extension, the end of the quantitative easing policy) remained remote.

Falling equity markets shrug off positive earnings announcements

Equity markets fall despite positive news on earnings …

Despite the fact that increases in yields on government securities were fundamentally the result of a strengthening US economy, equity markets declined across the major economies (Graph 1.5). This occurred even as earnings announcements continued to improve (Graph 1.6). For instance, although over 70% of the firms in the S&P 500 Index announced first quarter earnings that beat forecasts and the profit warnings diffusion indices continued

to rise, the S&P 500 and DJ EURO STOXX indices fell by 4% and 3% respectively from early March to late May.

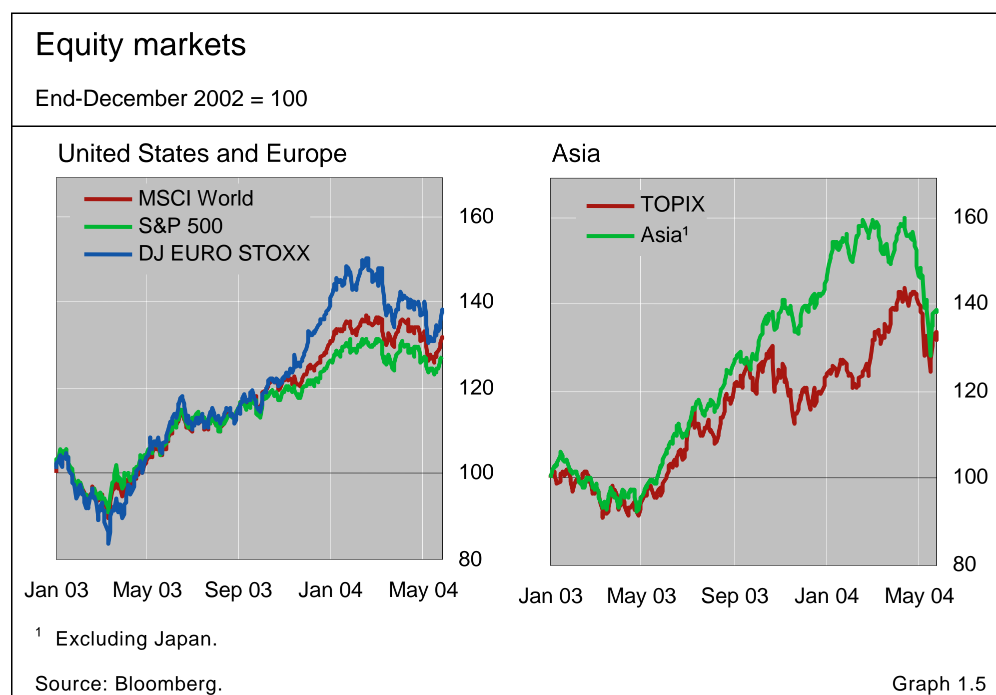
… on the back of concerns over higher rates …

The main reason for this weakness was that growing concerns about a rise in policy rates more than offset positive earnings surprises. Admittedly, market participants did not ignore earnings announcements altogether. For instance, positive announcements from eBay and Qualcomm on 21 April contributed to large gains in major US share indices. Even so, revisions of expectations of monetary policy played a dominant role. For example, for the week of 19–23 April as a whole, market indices were flat owing to Congressional testimony from Federal Reserve Board Chairman Alan Greenspan, interpreted as hinting at an increased likelihood of higher rates.

This pattern, which was repeated numerous times during the period, was especially clear at the daily frequency. For instance, major US share indices fell markedly on 13 April, notwithstanding positive earnings announcements by Merrill Lynch and Johnson & Johnson; the higher than expected retail sales report that day led markets to bring forward the anticipated path of Fed tightening. Similarly, US indices decreased sharply on the better than expected payroll report of 7 May despite the fact that confirmation of the long-delayed recovery in the labour market could conceivably boost household incomes and consumer sentiment as well as interest rates.

… and increasing risk aversion

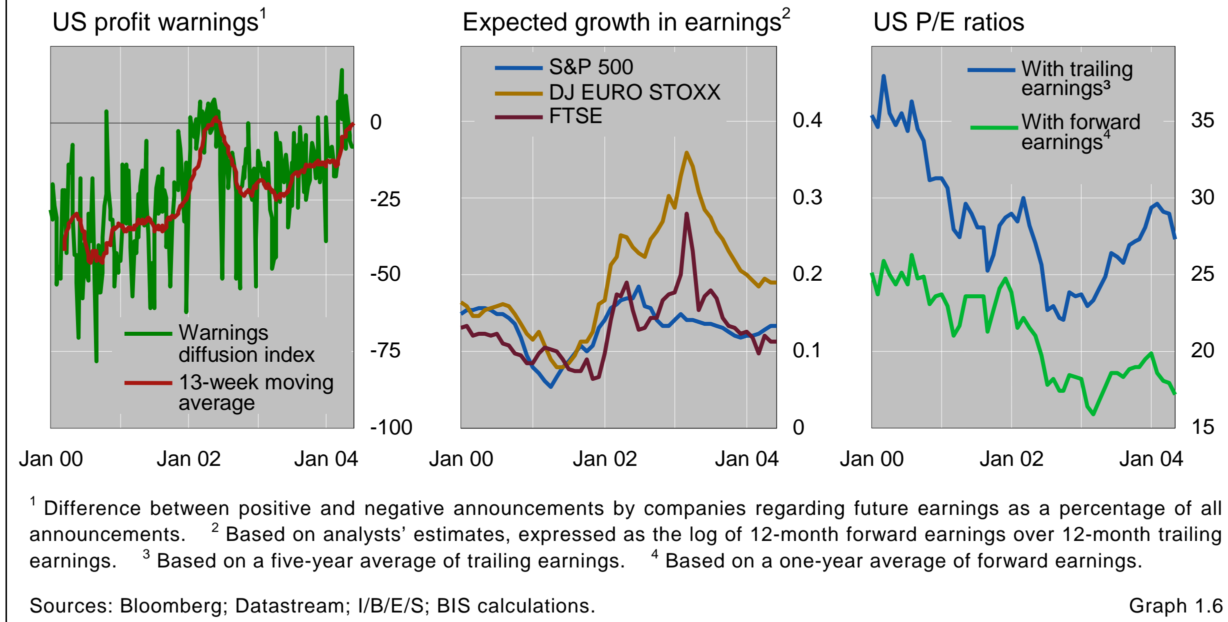
A partial reversal of the long-lived rise in risk tolerance among equity investors also seems to have been a factor weighing on stock markets in the period under review (Graph 1.7). Growing risk aversion was particularly notable in the case of continental Europe. Here, after the marked decline in share prices and the spike in conditional volatilities following the terrorist bombings in Madrid on 11 March, the BIS measure of risk aversion for the DAX increased substantially. The US equity market-based measure also indicates heightened risk aversion starting in March.



[1] Excluding Japan.

Source: Bloomberg. Graph 1.5

Earnings and valuations



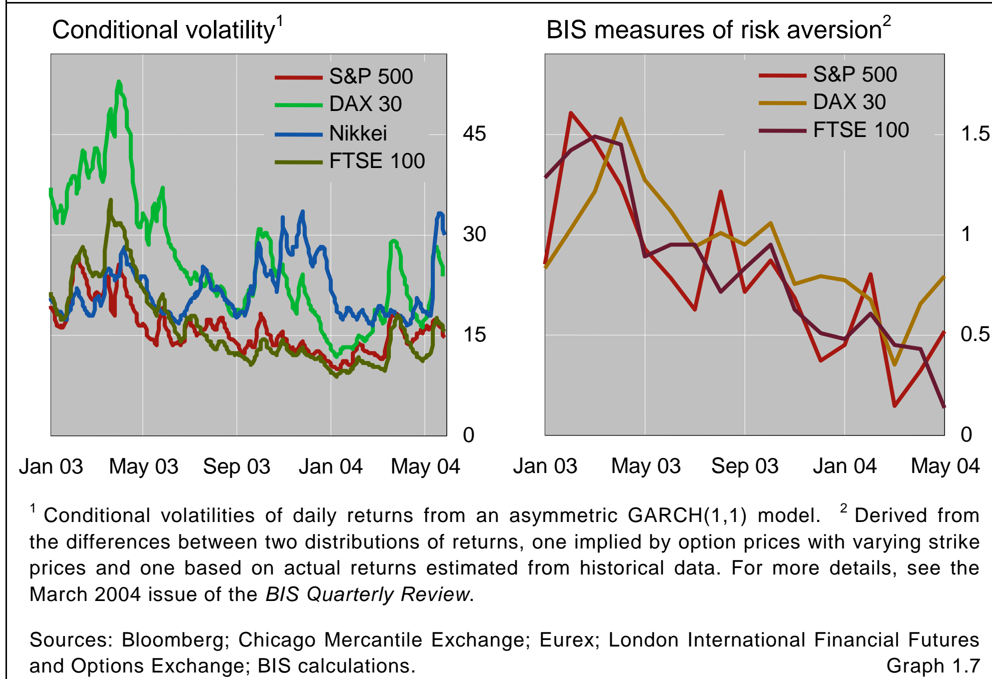
[1] Difference between positive and negative announcements by companies regarding future earnings as a percentage of all announcements. [2] Based on analysts' estimates, expressed as the log of 12-month forward earnings over 12-month trailing earnings. [3] Based on a five-year average of trailing earnings. [4] Based on a one-year average of forward earnings.

Sources: Bloomberg; Datastream; I/B/E/S; BIS calculations. Graph 1.6

From mid-April, the equity market sell-off was by far the sharpest in Japan and other Asian markets. The TOPIX and broader indices for Asia (excluding Japan) declined by 6% and 11%, respectively. The Japanese market was particularly volatile in May, with the four largest price moves in a single day since March coming in the first few weeks of May. This included a drop on the 10th that was the largest since the terrorist attacks of 11 September 2001. It appears that concerns about the potential for an economic slowdown in mainland China, a major engine of growth in the region, played a substantial role, especially given the steps announced by the Chinese government to curb

The sell-off is sharpest in Asia

Volatility and risk aversion in equity markets



[1] Conditional volatilities of daily returns from an asymmetric GARCH(1,1) model. [2] Derived from the differences between two distributions of returns, one implied by option prices with varying strike prices and one based on actual returns estimated from historical data. For more details, see the March 2004 issue of the *BIS Quarterly Review*.

Sources: Bloomberg; Chicago Mercantile Exchange; Eurex; London International Financial Futures and Options Exchange; BIS calculations. Graph 1.7

the expansion of credit. Higher oil prices were also a factor, as were increasingly mixed macroeconomic signals concerning the Japanese recovery. For instance, the announcement on 13 May of much lower than expected machinery orders contributed to a 2% decline in the Nikkei 225.

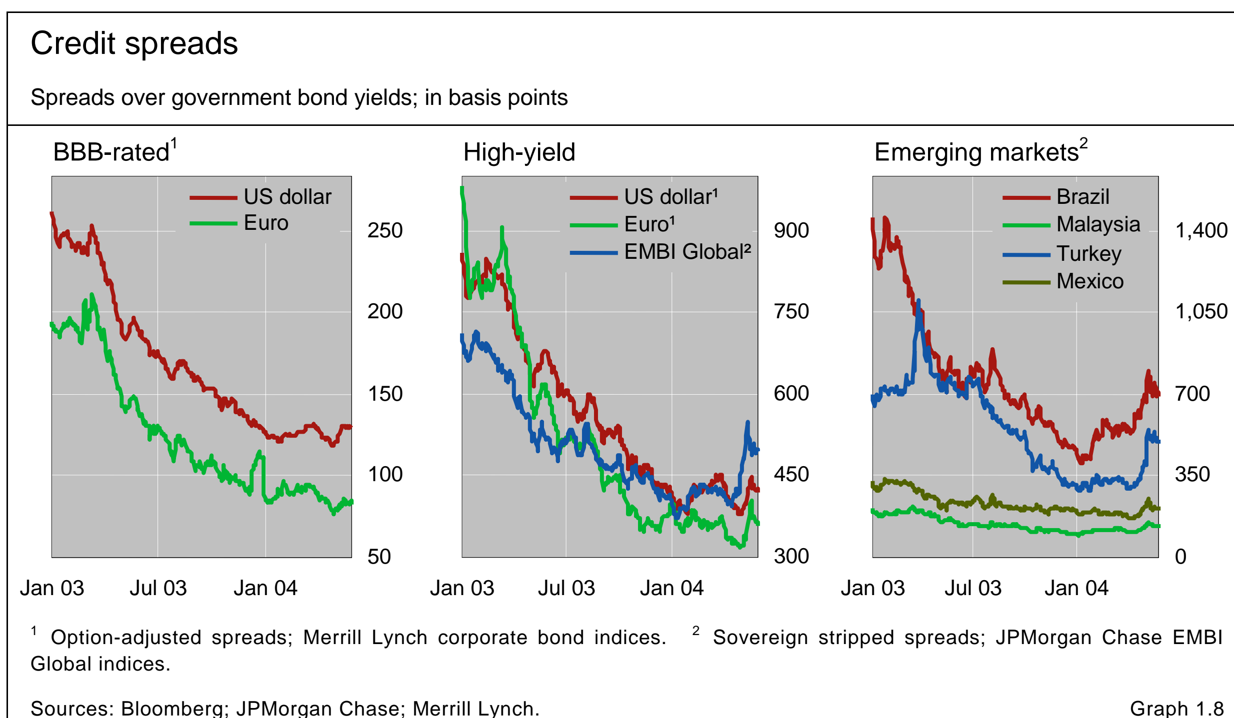
Rally in credit markets loses momentum

The prospect of an earlier than expected increase in US policy rates ended the long rally in credit markets. The downward trend in corporate and emerging market bond spreads evident since October 2002 lost momentum in early 2004 and, for emerging market borrowers, reversed direction in late April.

Corporate spreads trade within a narrow range

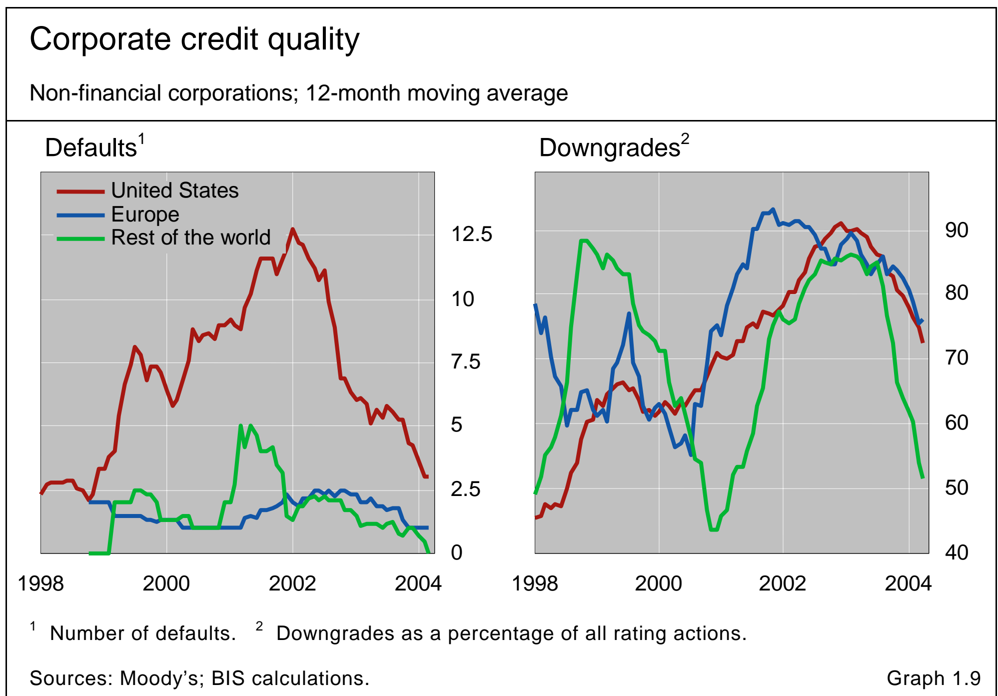
Spreads on corporate bonds traded within a relatively narrow range over the first five months of 2004, with BBB-rated credits fluctuating between 120 and 135 basis points in the dollar market (Graph 1.8). As during the sell-off in government bond markets in mid-2003, the increase in long-term yields in April and May had only a modest impact on corporate bond spreads. Indeed, through much of April investment grade and high-yield corporate spreads narrowed even as government bond yields rose and equity markets fell. It was not until late April that spreads started to widen. By end-May neither investment grade nor high-yield spreads were significantly different from their end-2003 levels. In fact, excluding the troughs reached earlier in 2004, corporate spreads were still lower than at any time since August 1998.

A decline in investors' appetite for risk, or more specifically an abatement in the search for yield, put upward pressure on credit spreads in April and May. Investors previously attracted by the high yields offered by corporate and emerging market bonds shifted out of higher-risk assets and into government



[1] Option-adjusted spreads; Merrill Lynch corporate bond indices. [2] Sovereign stripped spreads; JPMorgan Chase EMBI Global indices.

Sources: Bloomberg; JPMorgan Chase; Merrill Lynch. Graph 1.8



Corporate credit quality

Non-financial corporations; 12-month moving average

[1] Number of defaults. [2] Downgrades as a percentage of all rating actions.

Sources: Moody's; BIS calculations. Graph 1.9

bonds as yields on lower-risk securities increased. For example, US mutual funds investing in high-yield and emerging market debt registered large outflows in April and especially May.

Improvements in credit quality cap any rise in corporate spreads

At the same time, improvements in credit quality appeared to cap the rise in corporate spreads. Investors seemed confident that the growth of the US economy in particular would support a further strengthening of corporate balance sheets and compensate for any negative impact arising from higher interest rates. The robust growth of corporate earnings in the first quarter of 2004, coupled with further declines in the number of defaults and credit rating downgrades, reinforced this confidence (Graph 1.9). Past experience also reassured investors; corporate bond spreads had tended to narrow during the early phases of previous monetary tightening cycles.

The subdued level of corporate bond issuance in early 2004 provided further support for spreads. In both the United States and the euro area, total issuance by non-financial corporations was down by approximately 5% over the first four months of 2004 compared with the same period in the previous year, despite lower borrowing costs. The pickup in earnings reduced many firms' borrowing requirements, while those needing to raise capital had prefunded a large part of their needs in 2003. Some borrowers took advantage of the rebound in equity prices over the past year to raise new equity capital. In March, General Electric – one of the largest issuers in the dollar corporate bond market and one of very few corporations with a top AAA credit rating – issued new shares for the first time since 1961, raising $3.8 billion to retire outstanding debt. And in late April, an internet search company, Google, announced its intention to raise $2.7 billion in a widely anticipated initial public offering (see the box on page 9).

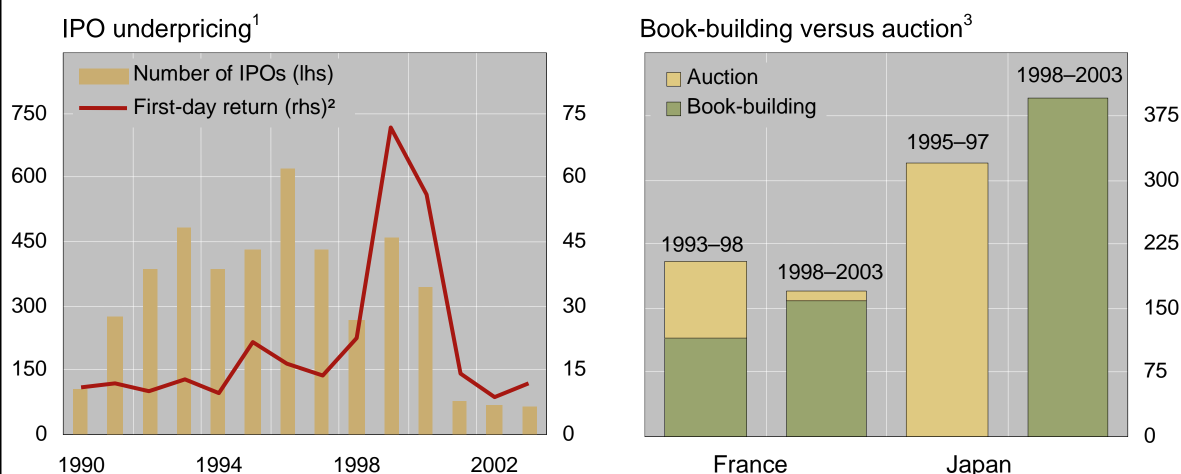
Google and the pricing of IPOs

The announcement in April of plans for the initial public offering (IPO) of Google, an internet search company, aroused great interest in the financial markets. One reason for this interest is that it will be by far the highest-profile IPO since the bursting of the technology bubble in 2000 and the marked slowdown in IPO issuance that followed in the United States (see graph below). The scale of the planned issue – $2.7 billion – is also one of the largest of recent years. But perhaps most significant is Google's announced intention to price the deal through an electronic auction, for the purpose of having a "fair process … inclusive of both small and large shareholders". As auction-based pricing is not typical for IPOs of private corporations, there has been widespread speculation that the Google IPO might trigger a fundamental change in the way large IPOs are priced.

The most common process for taking a firm public is the so-called "book-building" procedure, which has often been criticised for its tendency to underprice shares at issuance.[①] Here the lead underwriter(s) sets an offer price in consultation with the issuer after gathering expressions of interest from investors. This is how virtually all IPOs are priced in the United States, the world's biggest IPO market. The process has often resulted in offer prices that are far below the market prices on the first day of trading, in some years by as much as 70% on average (see graph). Such underpricing implies that significant sums that could have been raised for companies and early stage investors have instead been "left on the table" for recipients of the IPO allocation. In fact, the trading of commission business for IPO allocations in explicit profit-sharing arrangements has been the target of numerous legal investigations over the past few years.

Academic models of the book-building procedure often assume widely dispersed private information about the value of companies going public. In this context, underpricing and discretionary allocation can be a means of compensating institutional investors for an accurate revelation of their private information. At the same time, auctions that are open to all interested investors, allowing them to primarily determine the offer price and allocation, provide an alternative method of distribution and price discovery that has been tried in many countries. Auctions are the main mechanism in Israel and in Taiwan, China. Furthermore, the empirical evidence appears to suggest that auctions result in significantly less underpricing than book-building.

Initial public offerings



[1] Refers to IPOs in the United States, based on data in J Ritter, *Some factoids about the 2003 IPO market*, University of Florida, January 2004. [2] Equally weighted average of the change, in per cent, in the closing price on the first day of trading from the offer price. [3] Based on data in F Degeorge, F Derrien, and K Womack, "Quid pro quo in IPOs: why book-building is dominating auctions", *working paper*, March 2004; F Kerins, K Kutsuna and R Smith, "Why are IPOs underpriced? Evidence from Japan hybrid auction-method offerings", *working paper*, September 2003; Japan Securities Dealers Association.

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[①] Cross-country evidence indicates that the so-called fixed price method (where the price is established before information is collected about demand) has resulted in even more underpricing than book-building (see T Loughran, J Ritter and K Rydqvist, "Initial public offerings: international insights", *Pacific-Basin Finance Journal*, June 1994).

Google will utilise a Dutch (uniform price) auction to sell its shares, in which all winning bidders must pay only the minimum clearing price. The most common alternative is the discriminatory auction, in which investors with accepted bids must pay what they bid.[2] Though a discriminatory auction might appear advantageous to the issuing company, investors know that they face a “winner’s curse”, in which having a bid accepted is likely to mean paying more than the marginal bidder will pay. By mitigating this problem, a Dutch auction induces a more aggressive bidding strategy. In fact, both theory and the bulk of experimental evidence suggest that issuers can raise more funds for a given number of shares by a uniform price auction than a discriminatory one.

Nonetheless, the possible advantages of auctions – Dutch or otherwise – would appear to be belied by the fact that auctions are still only rarely used for IPOs in the United States, and have been losing ground in a number of other major IPO markets. For instance, in France, while auction and book-building methods were more or less evenly split in the 1990s, auctions are now in decline (see graph). In Japan, a hybrid procedure in which a first stage auction played a very significant role in determining the market price was the norm in the late 1990s, but was virtually abandoned once a book-building procedure was allowed. This suggests that factors other than the maximisation of revenue for existing owners at the time of the IPO may dominate the choice of IPO method.

[2] SEC requirements mandate that all shares of an IPO be sold at the same price, and thus prohibit discriminatory auctions for IPOs in the United States. Google has reserved the right to set the offer price below the auction clearing price, in which case everyone who bids above the offer price receives a pro rata allocation.

Sell-off in emerging markets

Emerging market spreads decouple from high-yield corporate spreads …

In contrast to the relatively modest moves in corporate bond spreads, emerging market spreads jumped sharply higher during April and May. Indeed, the sell-off of emerging market debt over this period was the heaviest since mid-2002, when political uncertainty in several important emerging markets in conjunction with a repricing of credit risk following the earnings restatement by WorldCom had caused emerging market spreads to soar. By end-May 2004, spreads on emerging market bonds were 125 basis points higher than their January lows, reversing the gains of the past year. Even so, at approximately 500 basis points, spreads were still substantially below their average level over 1998–2003.

The sell-off began on 14 April, when Brazil in particular witnessed a jump in its spreads following a large decline in US equity prices. Spreads on Brazil’s sovereign dollar bonds peaked at 800 basis points on 10 May – almost twice as high as their January low – before falling back to about 700 basis points by end-May. Spreads on Turkish bonds also widened sharply, especially after the release of the US payroll report on 7 May. Even investment grade sovereigns, including Malaysia and Mexico, saw spreads on their international bonds temporarily widen.

Surprisingly, spreads on emerging market debt decoupled from those on high-yield corporate debt during the sell-off. Emerging market spreads began to widen two weeks before high-yield spreads, and by significantly more. The two had tracked each other closely during the rally in credit markets, owing in part to the influence of investors’ search for yield. Their divergence during the sell-

off suggests that factors other than a waning of the search for yield played a role in the widening of emerging market spreads.

… because of emerging markets' uncertain growth prospects …

One such factor was uncertainty about the growth prospects of emerging markets. Whereas the credit quality of US and European corporations seems likely to continue improving even in an environment of rising interest rates, many emerging markets appear vulnerable to higher rates. The prospect of higher oil prices and slower growth in China has further clouded the economic outlook for some emerging markets. Countries with large fiscal deficits, such as Brazil and Turkey, appear to be particularly susceptible to any diversion of capital flows from emerging to mature markets. The large volume of issuance by emerging market borrowers in the first quarter of 2004 highlighted their need for external funding, especially when juxtaposed with the decline in corporate issuance. Many emerging market borrowers were able to raise long-dated funds on very favourable terms and so to smooth the maturity profile of their debt (see "The international debt securities market" on page 29). However, a lasting improvement in financing conditions would seem to require an acceleration in macroeconomic and structural reforms.

… and the unwinding of carry trades

The larger presence of hedge funds and other leveraged investors in the market for emerging economy debt also contributed to the divergence between emerging market and high-yield spreads. Borrowing short-term funds to invest in higher-yielding bonds had been a popular strategy among leveraged investors during the rally in credit markets. Liquidity is an important consideration in such carry trades because of the potential need to unwind positions quickly if interest rates rise or credit lines are reduced. Emerging market bonds had reportedly been a popular investment because of their greater liquidity compared to similarly rated corporate bonds. For example, the average issue size of bonds included in JPMorgan Chase's EMBI Global index exceeds $1.5 billion, compared to less than $300 million for bonds included in Merrill Lynch's US High-Yield Master index. Moreover, credit default swaps referenced against emerging market sovereigns are among the most heavily traded contracts. Consequently, when carry trades began to be unwound in response to the prospect of higher US policy rates, this had a larger impact on emerging market debt than on corporate debt.