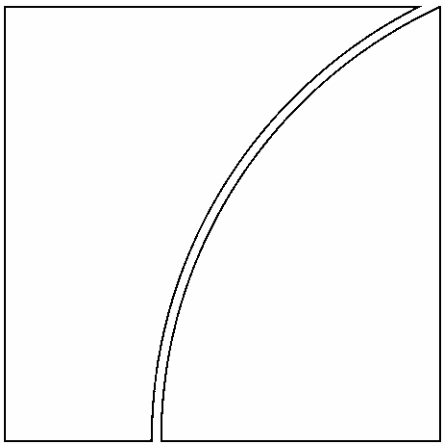
BANK FOR INTERNATIONAL SETTLEMENTS

BIS Quarterly Review

March 2004



International banking and financial market developments

BIS Quarterly Review
Monetary and Economic Department

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Special features

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

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1. Overview: appetite for risk lifts markets

Financial markets around the world rallied into the new year, adding to the impressive gains recorded in 2003. Improvements in global growth prospects and corporate finances, coupled with a robust appetite for risk, underpinned increases in equity and credit prices. Not even further revelations of corporate malfeasance seemed to unsettle investors.

Even as equity and credit markets rallied, the general level of yields declined. Government securities markets appeared to pay greater attention to the lack of inflationary pressures and the likely stance of US and euro area monetary policy than to the global recovery per se. Possibly illustrating the importance of the low level of interest rates for current market valuations, a rise in yields in late January following a change in the US Federal Reserve's language on policy accommodation led to a temporary fall in credit and equity prices.

Prior to the brief sell-off in late January, equity and debt prices in emerging markets had outperformed most other markets. Investors' appetite for risk contributed to a marked pickup in equity issuance in Asia and international bond issuance in Latin America. It also led Asian authorities to intensify their efforts to stem the appreciation of their currencies against the US dollar, efforts which may have contributed to the low level of dollar yields.

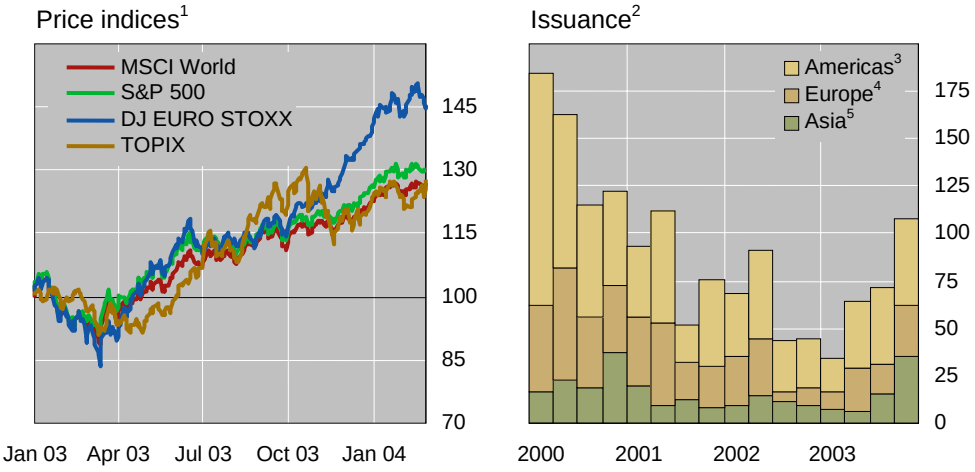
Equity prices outpace earnings growth

The rally in global equity markets which had begun in March 2003 continued through the early part of 2004. Following three successive years of losses, the MSCI World index gained 23% in 2003 and a further 3% over the first eight weeks of 2004 (Graph 1.1). Markets were especially buoyant in December and early January, on expectations of robust earnings growth.

Profits exceed expectations ...

Earnings have recovered strongly from their 2001–02 lows. Profits of listed firms rose by more than expected in 2003: 27% year-on-year in the United States and almost 100% in the euro area according to I/B/E/S (Graph 1.2). For 2004, analysts forecast another year of double digit earnings growth. The impressive results posted by many firms in the final quarter of 2003 appear to have given analysts greater confidence in their forecasts. However, firms seem less confident in the strength of the economic recovery. US companies

Equity markets



[1] End-December 2002 = 100; in local currency. [2] Announced initial and follow-on public offerings; domestic and international data are not fully comparable and so some issues may be counted twice; in billions of US dollars. [3] Canada and the United States. [4] France, Germany, Italy and the United Kingdom. [5] China, Indonesia, Japan, Korea, Malaysia, the Philippines, Taiwan (China) and Thailand.

Sources: Bloomberg; Datastream; Dealogic; BIS calculations. Graph 1.1

announcing negative outlooks for future earnings continued to outnumber those announcing positive outlooks.

... but equity valuations still seem high ...

Since early 2003 the improvement in earnings has been outpaced by increases in equity prices. Consequently, price/earnings ratios have trended upwards. Although still below their recent peak, valuations in some major markets are high relative to their historical average. Based on a five-year average of trailing earnings – which smooths out the effects of the business cycle – the price/earnings multiple for the S&P 500 equalled 29 at the end of January 2004, well above its 1961–2003 average of 20. If based on forward earnings, the price/earnings ratio is closer to historical norms.

Investors were not insensitive to news that might call current valuation levels into question. The S&P 500 fell by 1.4% on 28 January after the US Federal Reserve was perceived to have weakened its commitment to leaving policy rates unchanged and by 0.8% on 4 February following a profit warning by leading technology firm Cisco Systems. The TOPIX fell by 0.8% on 26 January in response to a news report that regulators would make a special inspection of UFJ Bank's valuation of its non-performing loan portfolio.

... boosted by declining risk aversion

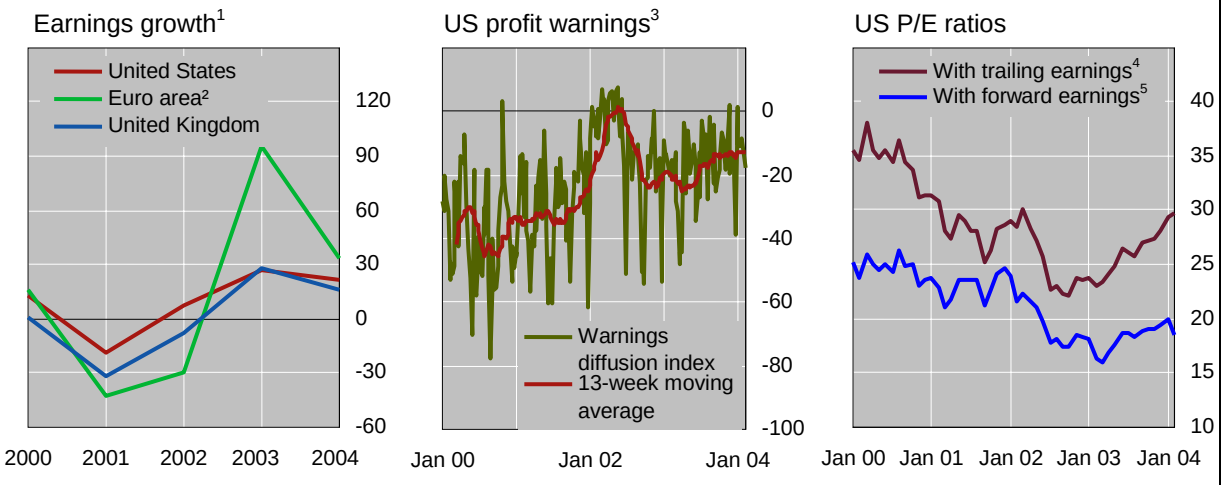
Yet any doubts proved short-lived. Indeed, the implied volatility of options on US equity indices, which reflects investors' perceptions of future volatility as well as their aversion to risk, fell to a record low early in the new year. Estimates of effective risk aversion derived from these options suggest that investors' aversion to risk continued to decline up to December before increasing slightly in January and February (see the box on page 4). This is consistent with an ongoing portfolio shift by US investors out of cash equivalents and into equities and other higher-risk assets.

The worldwide rally in equity markets stimulated a pickup in equity issuance in late 2003 (Graph 1.1). Equity issuance rose to its highest level in more than two years. Led by Japanese and Chinese companies, Asian firms raised $35 billion in domestic and international equity markets in the fourth quarter of 2003. The largest initial public offering of the year was by a Chinese life insurance company, China Life, which tapped international markets for almost $4 billion. Domestic Chinese investors seemed not to share international investors' enthusiasm for Chinese equities; the Shanghai stock market, where the participation of international investors is tightly restricted, was one of the worst performing markets in the world in 2003, rising by only 10% in local currency terms. By contrast, the Thai and Indonesian stock markets rose by 117% and 63% respectively in 2003. Thai and Indonesian firms took advantage of the rally by tapping domestic equity markets for funding.

Rally leads to an increase in equity issuance and mergers

Current equity market valuations facilitated firms' efforts to strengthen their balance sheets as well as to engage in mergers and acquisitions (M&As). In Europe and North America, several fallen angels (companies whose debt had once been rated investment grade but was subsequently downgraded to below BBB–) raised large amounts in equity markets as part of their restructuring plans. Dutch food retailer Ahold, which had reported serious accounting irregularities in early 2003, offered rights totalling €3 billion, with the proceeds directed towards the retirement of debt. M&A activity also began to revive, with several multibillion dollar deals announced in late 2003 and early 2004. In the largest deal for several years, JPMorgan Chase announced in January a stock-for-stock merger with Chicago-based Bank One worth $58 billion.

Earnings and valuations



[1] Annual percentage changes; earnings of listed companies as reported by I/B/E/S. For 2003, estimated earnings; for 2004, forecast earnings. [2] France, Germany and Italy. [3] Difference between positive and negative announcements by companies regarding future earnings as a percentage of all announcements. [4] Based on a five-year average of trailing earnings. [5] Based on a one-year average of forecast earnings.

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

Measuring risk aversion

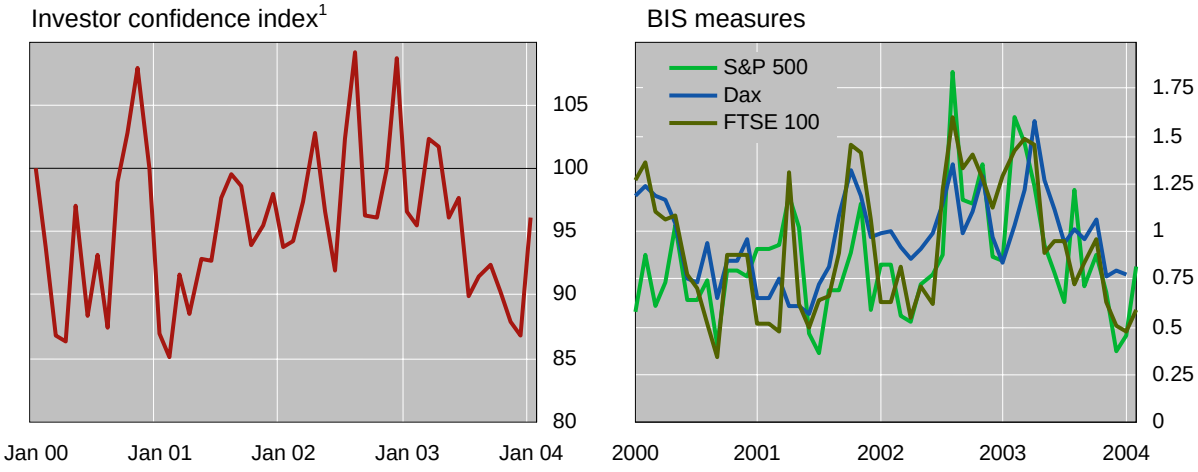
Movements in asset prices may be driven by a shift in fundamentals or a change in investors' effective aversion to risk. It is difficult to disentangle the two effects because neither is directly observable. Market participants often rely on simple proxies to capture risk aversion. One popular such proxy is JPMorgan's Liquidity, Credit and Volatility Index (LCVI).[①] It incorporates seven different measures of risk – from the swap spread and high-yield spreads to the implied volatility of currency options – but its conceptual link to risk aversion is not well specified. In recent years, modern finance theory has provided tools that have facilitated the construction of indicators of risk aversion with solid conceptual underpinnings.

One such indicator, State Street's Investor Confidence Index (ICI), relies on information from global portfolio flows.[②] The ICI is based on a model that employs information about global investors' equity holdings and purchases to separate changes in fundamentals from changes in the relative risk aversion of global (institutional) investors and domestic (retail) investors. Changes in risk aversion are captured by the common component across all countries of sales or purchases of equities by global investors as a proportion of their individual country holdings.

A second indicator, reported in this *Quarterly Review* since June 2003, exploits information from the prices of equity index options.[③] It measures risk aversion by comparing the empirical distribution of equity returns with the distribution implied in options prices. The latter distribution weights the empirical probabilities according to investors' risk preferences, attaching greater value to the avoidance of low payoffs and less value to the possibility of high payoffs. The greater the area under the left tail of the option-implied distribution, the greater is investors' effective aversion to negative outcomes.

Despite different sources of information, the ICI and the BIS indicator seem to give similar signals regarding risk aversion. According to both indicators, risk aversion declined during much of 2003 and increased slightly in January 2004. One possible reason for the similarity of the signals is that the global investors in the ICI model may also represent the marginal investor driving options prices in the BIS model.

Alternative measures of risk aversion



[1] Shown as the inverse of the index, ie a lower number indicates less risk aversion; January 2000 = 100.

Sources: State Street; Bloomberg; BIS calculations.

[①] See JPMorgan Chase: "Using equities to trade FX: introducing the LCVI", Global Foreign Exchange research note, 1 October 2002. [②] See Kenneth Froot and Paul O'Connell: "The risk tolerance of international investors", *NBER Working Papers*, no 10157, December 2003. [③] See Nikola Tarashev, Kostas Tsatsaronis and Dimitrios Karampatos: "Investors' attitude towards risk: what can we learn from options?", *BIS Quarterly Review*, June 2003, pp 57–65.

Credit markets rally despite the collapse of Parmalat

Credit spreads tighten ...

Like equity markets, credit markets also continued to rally into the new year. The spread between dollar-denominated BBB-rated corporate bonds and US Treasuries fell to approximately 130 basis points by 27 February 2004, 260 basis points below its October 2002 peak and its lowest level since August 1998 (Graph 1.3). Spreads on emerging market debt declined to near record lows, a remarkable 490 basis points below their October 2002 level.

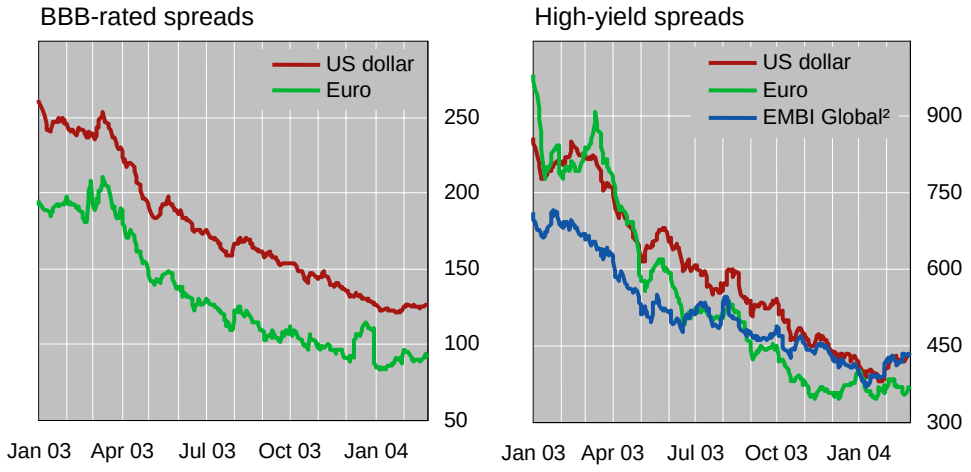
... supported by stronger financials ...

Improvements in corporate finances helped to support the narrowing of credit spreads. Corporate defaults fell sharply from their 2001 high, and measures of default risk derived from equity prices declined from their 2002 high (Graph 1.4). Despite exceptionally favourable financing conditions, borrowing by investment grade corporations remained restrained in the latter half of 2003. Business investment in the major economies accelerated in 2003, with the increase financed largely from rising profits; firms seemed hesitant to take on new debt to fund investment. While corporate issuance in the international bond market picked up towards the end of the year, in large part this reflected firms' efforts to lengthen the maturity of their debt.

As a result of such improvements in corporate balance sheets, the number of credit rating downgrades declined substantially over the past year. Although downgrades of US companies continued to exceed upgrades, the share of downgrades in all rating actions by Standard & Poor's fell from 82% in 2002 to 74% a year later. In Japan, upgrades exceeded downgrades in 2003, with downgrades accounting for only 48% of rating actions. Europe lagged the other two regions but still recorded a decline in the share of downgrades, to 83% of all rating actions.

Credit spreads[1]

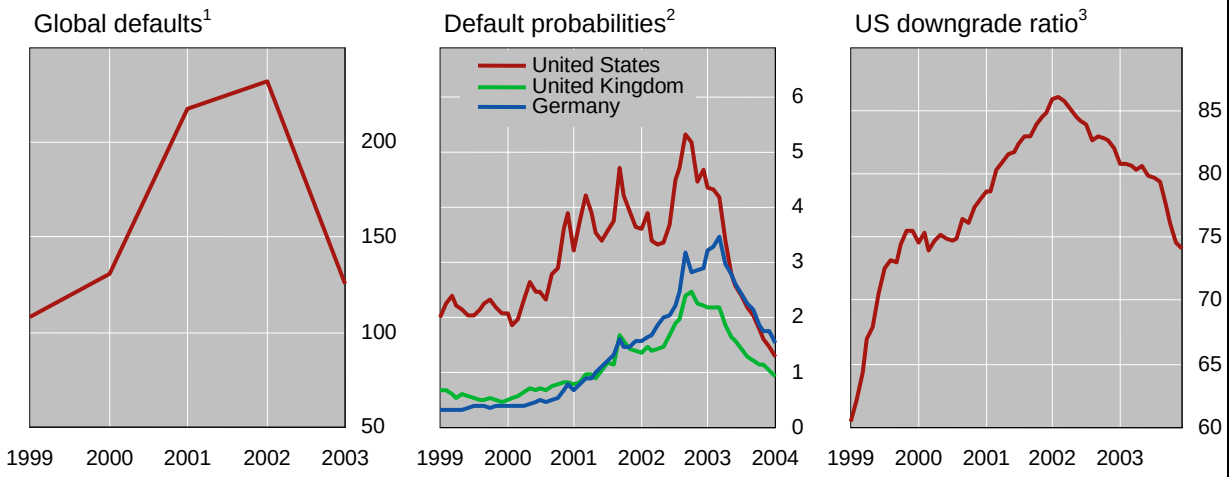
In basis points



[1] Option-adjusted spread over government bonds as calculated by Merrill Lynch for corporate bond indices. [2] Spread of sovereign debt instruments over US Treasury securities as calculated by JPMorgan Chase.

Sources: Bloomberg; JPMorgan Chase; Merrill Lynch. Graph 1.3

Credit quality



[1] Number of financial and non-financial issuers that defaulted during the year. [2] Expected default frequency for non-financial corporations over a one-year horizon, as calculated by KMV; in percentages. [3] Credit rating downgrades by Standard & Poor's as a percentage of all rating actions on US non-financial corporations; 12-month moving average.

Sources: Bloomberg; KMV; Standard & Poor's Global Fixed Income Research. Graph 1.4

... and a growing appetite for risk

Investors' growing appetite for risk – manifested in credit markets as a search for yield – also contributed to the narrowing of spreads. This was especially evident in the high-yield debt market, where investors bid up prices even while sovereign and corporate borrowers stepped up their activity. Emerging market borrowers raised $19 billion in the international debt securities market in January 2004, the largest amount since June 1997 prior to the Asian financial crisis. A surprisingly large amount, 35% of the total, was raised by borrowers rated B or lower, including Brazil, Turkey and Venezuela (see "The international debt securities market" on page 31). By contrast, in 2003 such borrowers had accounted for 20% of gross issuance by emerging markets, and in 2002 only 10%.

In a further sign of investors' willingness to discount risks in their search for yield, financing for leveraged buyouts (LBOs) increased after years of lacklustre activity (see "International syndicated credits in the fourth quarter of 2003" on page 29). Whereas the LBOs of the late 1980s had contributed to rising levels of corporate indebtedness, the same was not necessarily true of the most recent deals. Several of the largest LBOs involved the sale of subsidiaries of firms seeking to strengthen their balance sheets, such as Fiat's sale of its aviation division.

Credit markets shrug off Parmalat ...

Thanks in large part to the favourable credit environment, contagion from new revelations of corporate malfeasance, most notably at the Italian dairy conglomerate Parmalat in December, was limited. Parmalat is estimated to have understated its net indebtedness by upwards of €12 billion, more than even Enron or WorldCom. Parmalat's collapse appeared to interrupt temporarily the narrowing of credit spreads in the euro market; however, the widening was in fact driven almost entirely by Parmalat's own spreads, and euro spreads narrowed sharply once Parmalat was removed from the index at the end of December (Graph 1.3). The default swap premium on several of

Parmalat's major creditors, mainly Italian banks, widened as events unfolded, but not significantly so.

... but are unsettled by the prospect of higher interest rates

Possibly foreshadowing events that could end the long rally in credit markets, financing conditions in the high-yield market deteriorated in late January. The trigger was a perceived weakening in the Federal Reserve's commitment to leaving policy rates unchanged. In the days that followed the Fed's policy meeting on 28 January, spreads on high-yield corporate bonds and emerging market debt widened by approximately 35 basis points. Sovereign spreads on Brazilian dollar debt widened by as much as 100 basis points. While the high-yield market quickly stabilised, the episode illustrated the importance of the low level of interest rates for the rally in credit markets.

Yields less certain of economic recovery

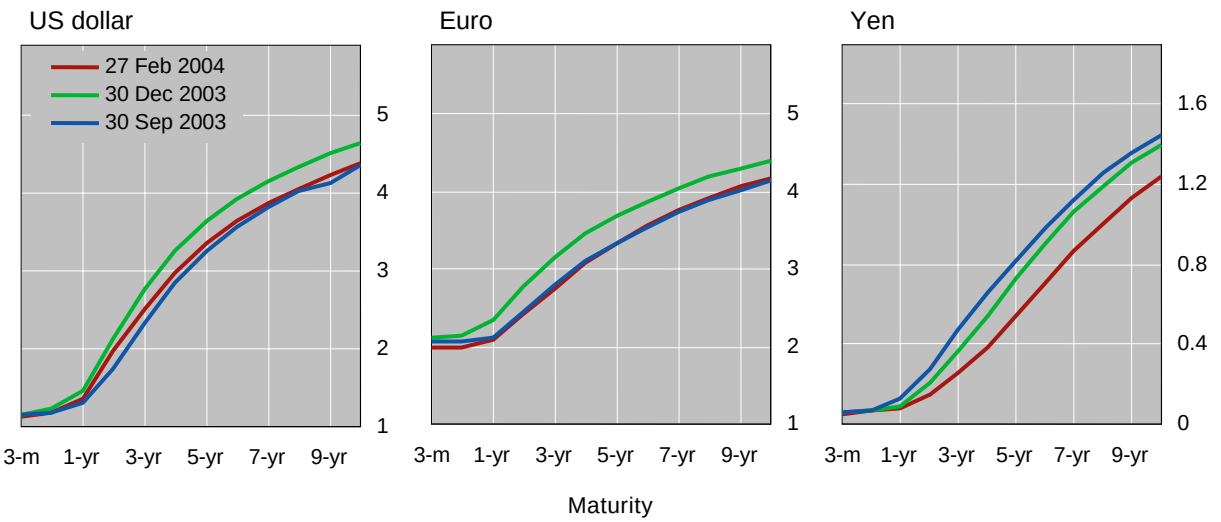
US yields decline on weak employment and subdued prices ...

Despite the improved economic outlook and related gains in other markets, government yields in the G3 declined markedly in the new year. The most pronounced decline was in the US dollar market, where 10-year Treasury yields sank under the 4% mark on 14 January for the first time since early October. The key data release was the December employment report announced on 9 January, which greatly undershot market expectations. Evidence of subdued producer prices also helped keep yields down, as did a number of speeches made in early January by Federal Reserve officials suggesting that the Fed would not raise rates until the emergence of risks of inflation, which at the time were seen as remote.

Other major bond markets saw less pronounced declines in yields, but the general direction of moves tended to mirror those in the US dollar segment (Graph 1.5). In the euro market, yields declined in December and early January

Swap yield curves

In percentages

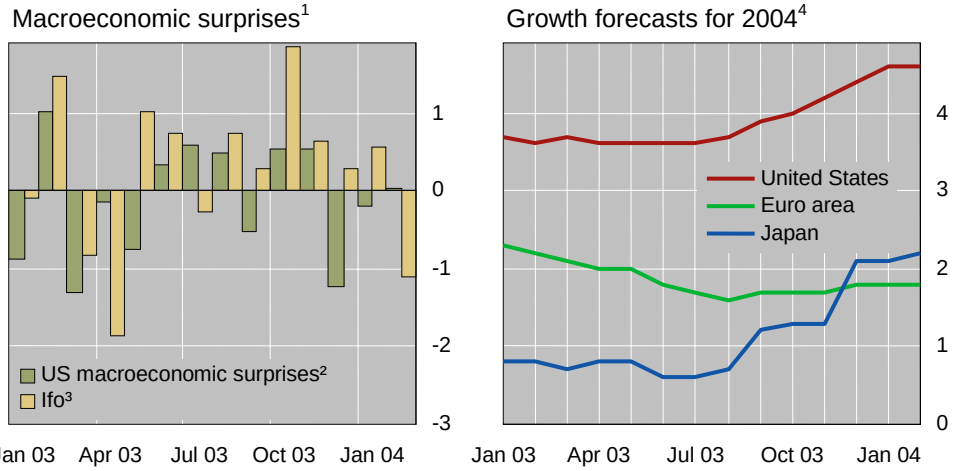


Note: For three-, six- and 12-month US dollar and yen maturities, Libor; for three- and six-month euro maturities, euro deposit rates.

Source: Bloomberg.

Graph 1.5

Macroeconomic data and growth forecasts



[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] Percentage changes over previous year. 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 1.6

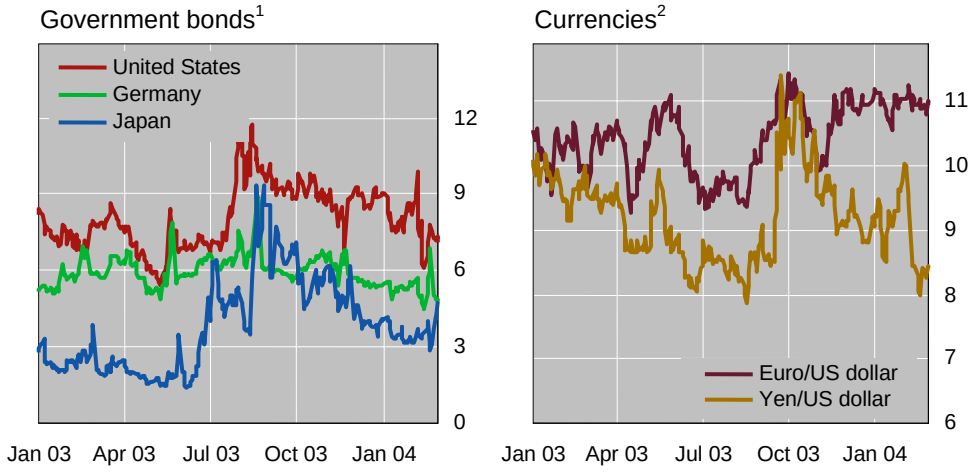
despite a positive tenor to euro area macroeconomic announcements (Graph 1.6). One contributing factor seems to have been the appreciation of the euro, which many market participants appeared to associate with lower growth prospects. In Japan, yields declined till late February as indicators pointed to persistent deflation, despite surprising momentum to the recovery. Meanwhile, declining implied volatilities for Japanese government bonds suggested that the increased uncertainty that had accompanied the sharp bond market sell-off of mid-2003 had diminished considerably (Graph 1.7).

... but increase briefly following a Fed policy meeting

A number of factors that had been keeping down yields in the dollar bond market weakened in late January. Markets appeared to be reminded of the United States' deteriorating fiscal situation on 23 January, when yields rose by nearly 10 basis points on news that the US Treasury was considering plans to introduce a 20-year inflation-indexed bond. More importantly, the change on 28 January in the Federal Reserve's language on policy accommodation, which dropped mention of "a considerable period" and inserted a reference to "patience", temporarily shifted forward most market participants' expectations of a policy rate hike in 2004. Nonetheless, a sustained move up in yields was stopped short by a weaker than expected US employment report on 6 February, which signalled again that the US labour market had yet to join in fully in the recovery.

Despite the low level of nominal yields on longer-dated dollar bonds, the slope of the term structure remained steep by historical standards. For instance, in the early part of 2004 the difference between 10-year and three-month rates remained above 300 basis points, more than twice the average

Implied volatilities



[1] Price volatility implied by the price of at-the-money call options on 10-year government bond futures contracts. [2] Three-month currency option volatilities.

Source: Bloomberg. Graph 1.7

since January 1990. The steep slope of the term structure can be viewed as largely attributable to expectations of a change in the monetary stance beyond the short term as well as increased risk premia due to uncertainty about that stance. Indeed, in contrast to Japanese government securities, implied volatilities on 10-year US Treasuries remained at relatively elevated levels (Graph 1.7).

New concerns over euro appreciation

Euro strength becomes more of a concern ...

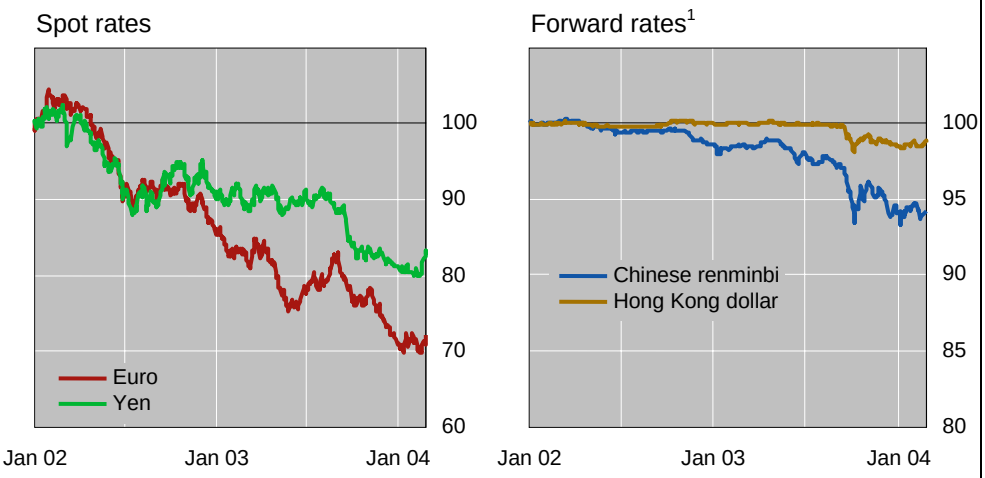
Exceptional volatility was evident in foreign exchange markets at the turn of the year, particularly for the euro. The euro's steep appreciation against the dollar dating from November intensified further in early January, contributing to a pickup in trading of currency derivatives (see "Derivatives markets" on page 41). Subsequently, the ECB President's remarks on 12 January about "brutal" moves in the euro were interpreted as indicating that European financial authorities at the highest levels were concerned and helped temporarily to halt the euro's rapid rise (Graph 1.8). Nonetheless, the implied volatility of the euro/dollar exchange rate remained high, suggesting considerable uncertainty over whether an appreciating euro might continue to bear the brunt of the adjustment of US external imbalances (Graph 1.7).

... while Asian intervention to support the dollar continues

Upward pressures on Asian currencies vis-à-vis the US dollar remained a concern in many Asian countries. Asian financial authorities continued to accumulate dollar reserves in the new year as a by-product of foreign exchange intervention to stem those pressures. Many observers also cited this accumulation as a technical factor holding down dollar yields, although the direction and degree of causation are by no means clear (see the box on page 11). In the case of Japan, the scale of foreign exchange intervention seen in 2003 was raised a notch with a record ¥7 trillion of yen sales in January

US dollar exchange rates

1 January 2002 = 100



[1] Twelve-month forward rate; for the renminbi, non-deliverable forwards.

Sources: Bloomberg; national data. Graph 1.8

alone. An unexpected increase in the Bank of Japan's target range for current account deposits on 20 January was interpreted as supporting the government's efforts to restrain the pace of yen appreciation. As China continued to accumulate reserves at more than $10 billion per month to maintain the renminbi peg, speculation grew over the possibility of a revaluation, reflected in forward markets (Graph 1.8). In Korea the authorities took measures to curb offshore trading of foreign exchange derivatives, which they viewed as contributing to upward pressure on the won.

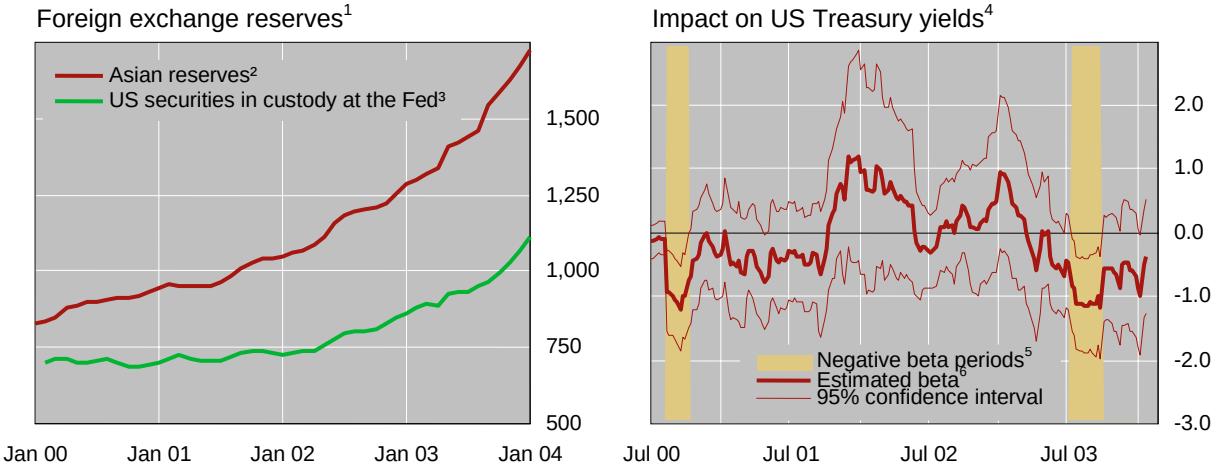
Treasury yields and foreign official holdings of US bonds

Robert McCauley and Guorong Jiang

In the process of resisting appreciation of their currencies, Asian central banks have recently accumulated substantial foreign exchange reserve holdings. A large portion of reserves are held in US dollar assets, and many central banks invest much of their dollar holdings in US Treasury and agency securities. Even though not all central banks use the Federal Reserve as custodian for such securities holdings, market participants try to track these holdings by closely watching the Federal Reserve's weekly report on changes in marketable securities held in custody for foreign official and international accounts (the H.4.1 release). Treasury and agency securities held in custody by the Fed for foreign official and international accounts started to rise more quickly after the dollar began to depreciate in early 2002 (see graph below).

The effects and sustainability of such flows have become an important topic of discussion among market participants. Many have persuaded themselves that such securities flows are holding down US long-term interest rates and worry about potential bond market turbulence if Asian official flows stopped or even reversed. Official investment in US fixed income markets might affect yields on long-term securities because official buying is nowadays focused on Treasury and agency coupon securities, rather than the more traditional Treasury bills.① Others have downplayed the significance of Asian central bank buying, however, highlighting more fundamental factors as well as private inflows as determinants of US interest rates. To shed some light on this controversy, we go beyond the often indirect inferences based on deviations from warranted yields or spreads between swap and Treasury yields. Instead, we use regression analysis to examine the hypothesis of a negative relationship between central bank investment in US bonds and their yields and consider alternative explanations for the observed results.

Foreign official holdings of US bonds



[1] In billions of US dollars. [2] Foreign exchange reserves held by China, Hong Kong SAR, Japan, Korea, Taiwan (China), Thailand and Singapore. [3] US Treasury and agency securities held in custody by the Federal Reserve for foreign official institutions, including Asian and other central banks. [4] Estimated from a 26-week rolling regression of the weekly change in 10-year US Treasury bond yields on the change in custody holdings for foreign official accounts; in basis points per $1 billion change in foreign official custody holdings. [5] Period in which the beta coefficient from the bivariate regression is significant at the 95% level of significance. [6] Coefficient on the change in custody holdings.

Sources: US Federal Reserve; International Monetary Fund; Bloomberg; BIS calculations.

① Treasury international capital data show that officials purchased three times as many Treasury and agency coupon securities as Treasury bills in 2002–03, similar to the proportions in the benchmark survey of 2000 reported in Robert McCauley and Ben Fung: "Choosing instruments in managing dollar foreign exchange reserves", *BIS Quarterly Review*, March 2003, pp 39–45.

Some initial evidence can be found for such a negative relationship, but this evidence is mixed and seems even less strong upon closer examination. A simple regression of the weekly changes in 10-year Treasury yields on the weekly change in custody holdings suggests a statistically significant relationship, but only over a specific and short period last year, despite continued reserve accumulation by Asian central banks. Moreover, changes in the methodology indicate that these results are not very robust.

The yield change is measured as the weekly change to Tuesday's closing yield to match the custody data on the weekly change up to Wednesday, given the one-day settlement lag in the US bond market. This way of specifying the relationship posits that the flow of purchases itself affects yields; separate tests find no evidence of an effect of the Thursday announcement of custody holdings. Each coefficient (beta) is estimated from a (rolling) regression over a 26-week period. The estimated relationship only reached standard levels of statistical significance from mid-July to end-September last year and in an even shorter period during 2000, from mid-August to mid-October. To be sure, if taken at face value, the estimates would suggest that the impact of the central bank buying at the time was economically sizeable. A $1 billion inflow was associated with about a 1 basis point decline in the 10-year yield, based on an average weekly inflow of around $2.3 billion. Much the same results are obtained if one analyses the five-year yield, which may better approximate the official habitat. These findings would seem to underpin the market perception of the significance of Asian central bank inflows on yields. However, such an estimated impact should not be taken at face value. A widening of the regression window to 52 weeks results in less reliable estimates.

More fundamentally, a third factor may underlie both bond market performance and central bank investments. In particular, surprisingly well behaved US inflation readings, weak job growth or indications of the Federal Reserve's patience in setting policy might lead to lower short-term rates, lower bond yields, a weaker dollar, intervention by Asian central banks and thus strong official inflows. Indeed, the inclusion in the regression analysis of the change in six-month Libor six months forward, as a proxy for short-term interest rate expectations, lowers the estimated coefficient from about 1 basis point per billion dollar inflow to about 0.7 basis points per billion dollar inflow during the period when a significant relationship was found. Even the direction of causality in the relationship is not clear. The data show a stronger relationship between the previous week's change in yields and the current week's change in custody holdings than between the contemporaneous changes. One could read this to suggest the dominance of official reactions to the exchange market effects of lower US bond yields, compared to the effects on the bond markets of official investments.

Analysis of this matter to date has certainly not settled the question of the importance of foreign central bank buying of US bonds to US fixed income markets. While the asserted importance has gained currency through the force of repetition, robust direct evidence for it is not so easy to come by.

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2. The international banking market

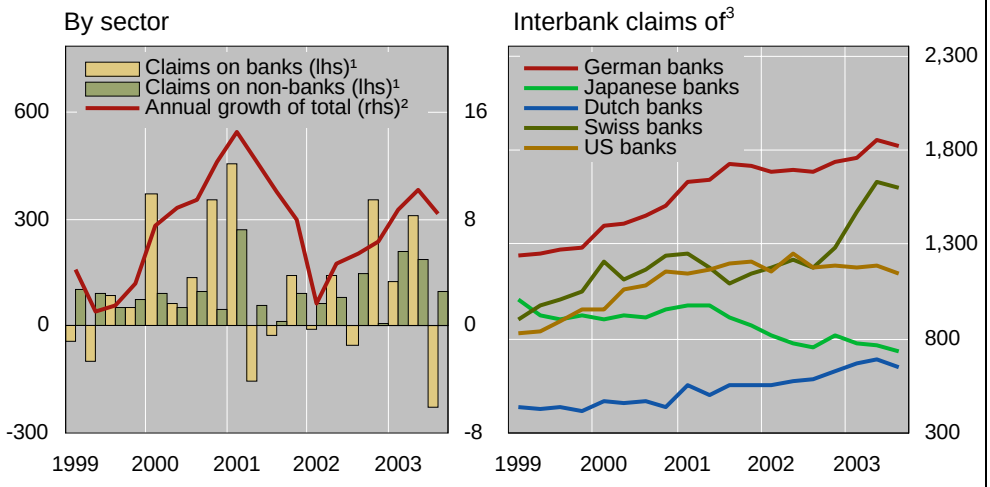
The interbank market contracted considerably in the third quarter of 2003, with nearly one third of the funds built up during the expansion of the previous three quarters disappearing from bank balance sheets. Much of this reflected reduced lending by European and US banks in the interbank market via their offices in the United Kingdom and offshore centres. At the same time, loans to non-bank borrowers rose noticeably. While possibly indicative of a pickup in corporate loan demand, the rise was partially the result of lending to this sector in offshore centres, which is more suggestive of increased hedge fund activity.

Banks in the reporting area continued to move their exposures to emerging markets into safer assets. This shift took the form of a rise in the share of claims on the public sector, a shift out of Latin America into credits perceived to be less risky, and a further improvement in the average rating of the overall emerging market portfolio. In addition, growth in net risk transfers from some regions suggests that banks may increasingly be seeking third-party guarantees for their loans to emerging markets. In the third quarter, an expansion in deposits placed with BIS reporting banks outpaced a rise in lending, resulting in an overall net outflow from emerging market economies. Growth in claims on emerging Europe led to a net inflow to the region, while increased deposits with reporting area banks contributed to net outflows from Asia-Pacific and Latin America.

Interbank market unwinds as loans flow to end users

Following a build-up in interbank claims in the previous three quarters, banks reduced lending to other banks in the third quarter of 2003, signalling a possible beginning of the periodic contractionary phase in interbank loan flows. Roughly one third of the funds which had accumulated in the interbank market disappeared from bank balance sheets in the third quarter, as US and European banks withdrew. At the same time, some banking systems increased lending to non-bank borrowers, particularly in the United States and Germany. In seasonally unadjusted terms, a reduction in interbank claims led to a fall in the outstanding stock of total cross-border claims, the first decline in a year. This pushed the year-over-year growth in claims down to 8% from 10% in the previous quarter (Graph 2.1, left-hand panel).

Cross-border claims by sector and nationality of banks



[1] Exchange rate adjusted changes in amounts outstanding, in billions of US dollars. [2] 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, in percentages. [3] Exchange rate adjusted outstanding amounts, base period 2003 Q3, in billions of US dollars. Includes inter-office claims.

Graph 2.1

Interbank lending contracts by record amount

Following a build-up in the three previous quarters ...

Claims on banks, typically the main component of quarterly loan flows, declined substantially in the third quarter of 2003 (Graph 2.1, left-hand panel). A $259 billion decrease in loans to other banks (including to own offices) led to the largest contraction in the interbank market in the BIS coverage period. Interbank claims had swelled by $788 billion in the previous three quarters as banks parked funds with other banks, possibly because of muted demand for corporate loans and uncertainty over future interest rate movements (Table 2.1). However, roughly one third of these funds disappeared from bank balance sheets in the third quarter, largely as a result of reduced inter-office activity. Despite the build-up of funds earlier in the year, this decline in the third quarter seems to have pushed the stock of interbank claims farther from its long-term equilibrium level vis-à-vis liabilities to non-bank borrowers (see the box on page 15).

... a third of funds disappears in the third quarter

While the contraction in the interbank market was widespread, it primarily took the form of reduced business with banks in the United Kingdom and the United States, and to a lesser extent with those in Japan and the euro area. Loans to banks in the United States fell by $59 billion, a decline of 5% from the previous quarter, largely explained by reduced loans from banks in the United Kingdom, the euro area, Switzerland and offshore centres. Similarly, claims on banks in the United Kingdom also dropped substantially, by $71 billion, as banks in the euro area cut a combined $31 billion in loans and banks in offshore centres an additional $18 billion. In the euro area as a whole, $24 billion in interbank loans disappeared, while claims on banks in Japan fell

Long-run equilibrium in the interbank market

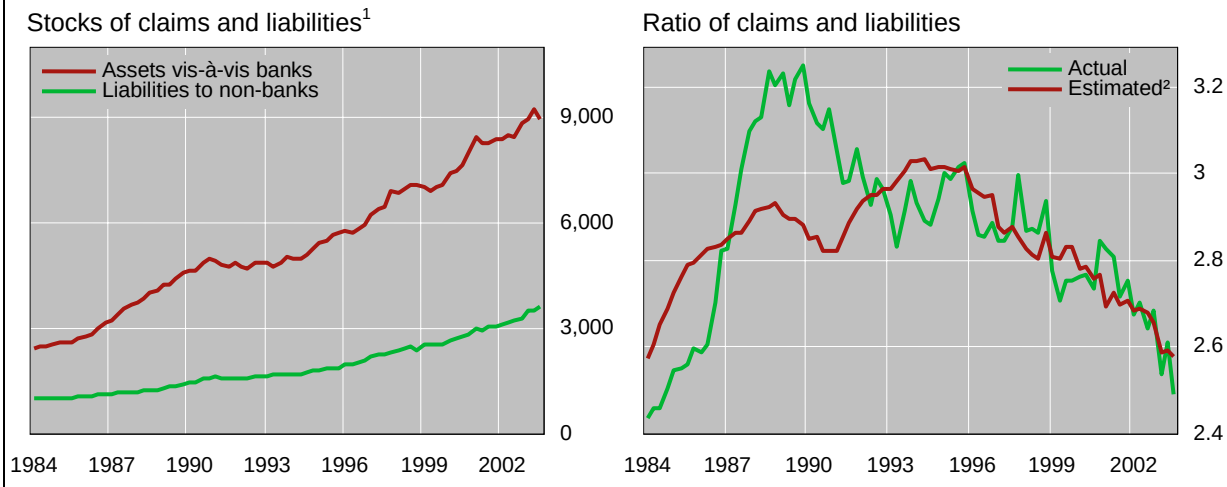
Large expansions and contractions in the interbank market occur frequently. What drives these movements? Aggregate data on cross-border bank claims suggest that a portion of increases in deposits is initially recycled in the interbank market, possibly because of short-term misalignments in the demand for and supply of funds to end-use borrowers. As these funds are passed from one bank to the next, each leg of the transaction is reflected in the aggregate claims figure, and generates swellings in interbank loan flows. All else equal, a permanent increase in deposits should (ultimately) result in a corresponding permanent rise in claims on non-bank borrowers.[①] However, in the short term, the stock of claims on banks may only gradually return to its equilibrium level vis-à-vis the stock of liabilities as funds are passed out of the interbank market.

With this function of the interbank market in mind, this box touches on the long-term relationship between the size of the interbank market and the stock of banks' liabilities to providers of funds. Such an analysis may be useful in determining whether a large contraction in interbank lending, such as that which occurred in the third quarter, is a move towards a long-term equilibrium or a new shock to the system. More broadly, we address questions related to the relative size of the interbank market; for each dollar of bank funding, how many dollars appear in the interbank market as this dollar is passed around? Has this relationship changed over time as banks have become more globalised?

The simple framework described above suggests a statistical relationship called cointegration. Our model includes bank liabilities vis-à-vis non-banks (primarily deposits from governments and the private sector) and the stock of claims on other banks (a measure of the size of the interbank market), and assumes that these variables will tend to gravitate towards an equilibrium relationship following shocks to the system. Taking time trends into account, estimates of the parameters governing this long-term relationship can shed light on whether large movements in claim flows represent a return to equilibrium.

The broad characteristics of the size of the interbank market are summarised in the graph below. As shown in the left-hand panel, both the stock of claims on banks and liabilities vis-à-vis non-banks rose consistently over the last two decades.[②] The size of the interbank market has been, on average, twice the size of the stock of liabilities to non-banks, although this ratio has been

Long-term relationship between interbank assets and liabilities to non-banks



[1] In billions of US dollars. [2] Based on a cointegration model which includes a constant and a time trend.

[①] Since the international banking market is not a closed system, movements in domestic lending markets will also affect international loan flows. [②] This analysis relies on data from 24 reporting countries which have continuously reported since the fourth quarter of 1983. The stock of claims/liabilities is calculated as the sum of the outstanding exchange rate adjusted stock of claims/liabilities of these 24 reporting countries vis-à-vis the world. Thus the stocks displayed in the graph will not correspond exactly to those reported elsewhere due to the exclusion of certain reporting countries.

declining since the early 1990s (as shown in the right-hand panel). While this probably reflects to some extent the retrenchment of Japanese banks over the last decade, it may also be due to other, more structural factors. For example, globalisation and consolidation (and possibly the rise in offshore centre activity) in the international banking market over the 1990s may have led to increased economies in funds placement as the global reach of commercial banks expanded. Consistent with this hypothesis, the share of inter-office claims in total interbank claims has risen over this same period.

The longer-term relationship between claims on banks and liabilities to non-banks implied by the data suggests that the large contraction in the third quarter of 2003 may have been a movement away from equilibrium rather than a shedding of the build-up in interbank claims in recent quarters. While the evidence is tentative at best, the estimates of the long-term ratio of these stocks are graphed alongside the actual ratio in the right-hand panel of the graph.[③] The decline in the actual ratio reflects the large fall in interbank lending in the third quarter. While the estimated equilibrium ratio does decrease in the third quarter of 2003, the actual decline is much larger and implies the system moved farther from equilibrium relative to the previous three quarters.

[③] The estimates are based on a simple error correction model which includes a constant and time trend, and uses data up to 2002 Q3. Other, more sophisticated models which include the stock of claims on non-banks as an endogenous variable in the system also indicate that the actual ratio and the implied equilibrium ratio of claims on banks and liabilities to non-banks diverged in the third quarter of 2003.

by $49.5 billion, reflecting reduced business with banks in the United Kingdom.[1]

Contraction resonates in major financial centres

Which national banking systems figured prominently in reducing interbank activity? Overall, much of the decrease in interbank lending was initiated by banks *located* in major financial centres or in offshore centres, as is typical of large contractions in the interbank market. However, very little of the overall movement was explained by banks *headquartered* in these financial centres. Roughly one quarter of the total reduction in claims on banks was accounted for by banks located in the United Kingdom, and an additional 17% by banks in offshore centres.[2] Yet the activity of UK banks themselves was hardly a contributing factor. As shown in Table 2.2, Dutch banks actually cut interbank claims the most, and did so largely through their domestic offices and their offices in the United Kingdom. Similarly, US, German, Japanese and Swiss banks also experienced large declines in interbank claims, a significant portion being recorded at their offices in the United Kingdom or offshore centres.[3]

Banks reduce interbank loans from UK offices ...

[1] Intra-euro area interbank lending actually rose by $9 billion, a small rise relative to those in recent quarters.

[2] Overall, roughly 90% of the decrease in interbank lending was accounted for by inter-office activity. UK banks located in the United Kingdom increased interbank lending by $5 billion, contributing to a $14 billion increase for UK banks globally.

[3] The breakdown of national banking systems also suggests that those banks that did not book their activity through offices in the United Kingdom tended to use offshore centres more intensively (Swedish, German, Canadian and US banks). The scale of activity recorded through offices in United Kingdom in the third quarter of 2003 was roughly similar to previous quarters in which there were large contractions in the interbank market. Furthermore, as might

Cross-border claims of BIS reporting banks

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

	2001	2002			2003			Stocks at end-Sep 2003
	Year	Year	Q3	Q4	Q1	Q2	Q3	
Total cross-border claims	859.2	742.0	92.9	366.9	335.8	494.4	–132.8	14,929.9
on banks	417.1	438.9	–54.6	356.0	123.3	308.4	–229.6	9,572.2
on non-banks	442.1	303.1	147.5	10.8	212.5	186.0	96.8	5,357.7
Loans: banks	362.8	408.1	–65.3	433.4	98.1	322.7	–259.1	8,202.6
non-banks	249.2	93.1	67.1	–16.2	167.1	14.7	64.9	2,887.1
Securities: banks	27.3	36.3	8.4	–51.9	18.7	–4.7	18.1	958.1
non-banks	201.4	202.2	98.8	27.9	55.2	133.0	12.5	2,217.0
Total claims by currency								
US dollar	422.7	320.8	–114.4	201.9	93.8	251.9	–90.0	6,008.7
Euro	439.6	463.0	201.1	119.1	226.8	206.1	–3.0	5,408.6
Yen	–65.5	–40.0	16.6	19.4	–16.2	–25.6	–0.3	751.6
Other currencies[2]	62.3	–1.8	–10.4	26.5	31.4	63.0	–39.5	2,761.0
By residency of non-bank borrower								
Advanced economies	384.8	303.1	134.2	64.2	158.8	160.2	80.2	4,166.3
Euro area	139.0	118.4	49.7	7.2	55.4	67.6	52.1	1,891.3
Japan	–3.7	4.1	–0.4	0.5	21.5	15.6	6.5	179.8
United States	183.4	153.1	59.1	59.1	25.8	60.0	17.0	1,407.4
Offshore centres	55.0	18.9	16.7	–28.2	80.8	18.9	10.3	613.8
Emerging economies	2.5	–16.5	2.4	–23.8	–6.4	3.3	5.6	527.7
Unallocated[3]	–0.1	–3.5	–5.8	–1.3	–20.8	3.6	0.6	49.9
Memo: Local claims[4]	*84.1*	*52.4*	*–26.8*	*36.9*	*184.1*	*83.0*	*49.4*	*2,073.6*

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

Not all national banking systems that had participated in the expansionary phase of the interbank market experienced an unwinding of positions in the third quarter, or at least not to an extent that reflected the previous build-up. French and UK banks, which were amongst the top 10 lenders during the swelling phase, have yet to unwind their interbank positions, while more than 50% of the funds placed in the market by Swiss, German, Italian, Danish and Dutch banks are still in search of end-use borrowers.

Loans directed to private borrowers

... and channel funds to non-bank borrowers

Concurrent with the contraction in interbank lending, loans to non-bank borrowers picked up in the third quarter of 2003. Total claims on non-banks rose by $97 billion, not a large amount by the standard of recent quarters, but noteworthy nonetheless, particularly because this increase was largely driven

be expected, roughly the same share of overall activity during the swelling of the interbank market in the previous three quarters was booked through offices in the United Kingdom.

Contractions in interbank claims by office location

	Claims on banks[1]	Percentage share[2] for offices in				
		Home offices	Germany	United States	United Kingdom	Offshore centres
Most recent:						
2003 Q3 grand total	–194.6	66.7	13.7	12.8	26.2	16.9
Banks headquartered in:						
Netherlands	–48.1	52.2	–2.0	13.6	34.8	25.5
United States	–46.7	63.5	5.1	63.5	10.2	31.7
Germany	–38.8	44.0	44.0	14.2	20.9	67.3
Japan	–34.4	46.9	14.1	13.3	38.8	–17.6
Switzerland	–30.7	77.4	–7.4	–18.8	61.0	–11.5
Sweden	–21.5	50.0	4.6	12.6	–1.6	26.3
Finland	–15.6	51.2	0.0	0.0	37.4	11.4
Canada	–12.7	18.7	–2.0	47.9	–21.2	50.5
Italy	–12.1	13.5	18.7	–4.3	4.8	9.0
Denmark	–8.9	98.3	–4.1	0.0	–17.6	18.9
Total of above	–269.5	53.2	8.8	18.1	23.6	22.3
Previous contractions:						
1999 Q2 grand total	–88.3	56.5	–13.9	–53.6	34.4	–17.0
2001 Q2 grand total	–153.0	43.5	–8.9	–3.2	38.5	28.3
Recent expansion:						
2002 Q4 to 2003 Q2 grand total	1,073.5	44.8	16.1	14.3	39.0	5.2

[1] Exchange rate adjusted changes in claims on banks, including inter-office activity. Billions of US dollars. [2] Negative numbers indicate an increase in claims (except during the recent expansion).

by increased loan flows rather than repo activity and investment in government and other debt securities. Roughly one third of the $65 billion increase in loans flowed to non-bank borrowers in the United States, followed by those in Germany and the United Kingdom.

Lending to the non-bank private sector ...

While greater loan flows to non-banks can be indicative of a pickup in corporate loan demand, particularly if directed towards non-bank *private sector* borrowers, definitive evidence of renewed corporate lending remained absent (see also the Overview on page 1). The BIS consolidated data (which net out inter-office positions) suggest that several banking systems did shift their claim portfolios away from public sector and interbank lending and towards claims on the non-bank private sector, a key element that was not evident in the first quarter of 2003, when the increase in claims on non-bank borrowers had been unusually large. However, the latest portfolio shift was concentrated in only a few banking systems and partially reflected a rise in lending to the non-bank private sector in offshore centres, which could be more indicative of increased hedge fund activity.[4]

[4] Total loans to non-banks in offshore centres rose $6 billion. However, excluding a relatively large cutback in loans by a single reporting country on one offshore centre, loans to these

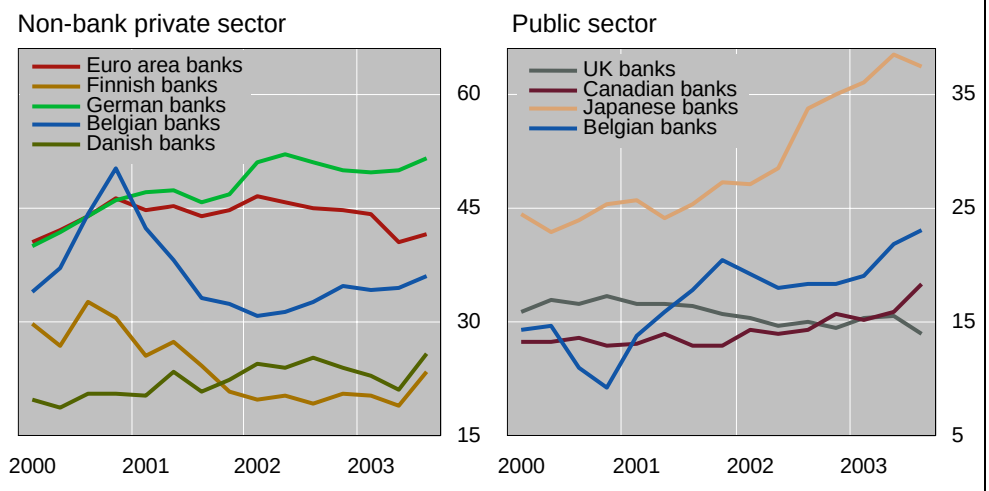
The portfolio shift towards non-bank private sector borrowers seems to have been most pronounced among European banks (Graph 2.2, left-hand panel). Overall, claims of banks in the euro area on the non-bank private sector rose to 39% of their total international claims (from 38% in the previous quarter), with a corresponding fall in the share of their claims on other banks. Particularly noteworthy was the shift in the portfolio of German banks; they channelled funds to such borrowers in Japan and the euro area, primarily in the Netherlands, France and Italy. This, combined with growth in claims on this sector in developing countries and offshore centres, pushed total international claims of German banks on the non-bank private sector to $993 billion, or 51.5% of their total international claims (up from 50% in the previous three quarters).[5]

... partially reflects activity in offshore centres

Elsewhere, Japanese banks reduced their holdings of securities issued by foreign governments, possibly a reaction to the sudden rise in interest rates during the quarter.[6] The BIS consolidated data indicate that Japanese banks' international claims on the public sector fell to $387 billion after they cut their holdings of euro area and US government securities. Their claims on the US public sector totalled $179.5 billion, or 47% of their total international claims on

Consolidated international claims of selected reporting countries

By sector, as a percentage share of total



Graph 2.2

borrowers rose by $15.2 billion. The BIS consolidated data indicate that international claims on offshore centres reached $799 billion in the third quarter; 72% of these claims were on non-bank private sector borrowers (up from 71% in the previous quarter and 69% a year earlier). Moreover, claims on the non-bank private sector in offshore centres continued to trend upwards, surpassing 14% of total claims on this sector in the third quarter.

[5] Over the longer term, German banks make up an increasingly larger share of claims on this sector; they accounted for 27% of total international claims on the non-bank private sector in the third quarter of 2003, up from 25% a year earlier and 22% in the third quarter of 2000.

[6] This was the first decline in claims on this sector for Japanese banks since the first quarter of 2002.

the United States (down from 47.5% in the previous quarter), while their share of claims on the public sector in the euro area fell to 54% of their total international claims on that region, from 57% in the previous quarter.

Emerging markets increase deposits, driving net outflow

Following two consecutive quarters of net inflows into emerging markets, increased deposits placed with BIS reporting banks overshadowed a substantial rise in lending to emerging markets. This yielded a net outflow of $9.8 billion in the third quarter (Graph 2.3). Greater lending contributed to net inflows of funds to emerging Europe, while growth in deposits with reporting area banks contributed to net outflows from Asia-Pacific and Latin America. Total gross claims on emerging markets rose by $20.5 billion, the second largest quarterly expansion since the third quarter of 1997 (Table 2.3). At the same time, the liabilities of reporting area banks vis-à-vis emerging markets grew by $30.4 billion as banks in Brazil, Russia, India and Taiwan, China increased deposits with BIS reporting banks.

Claims on emerging markets shift into safer credits

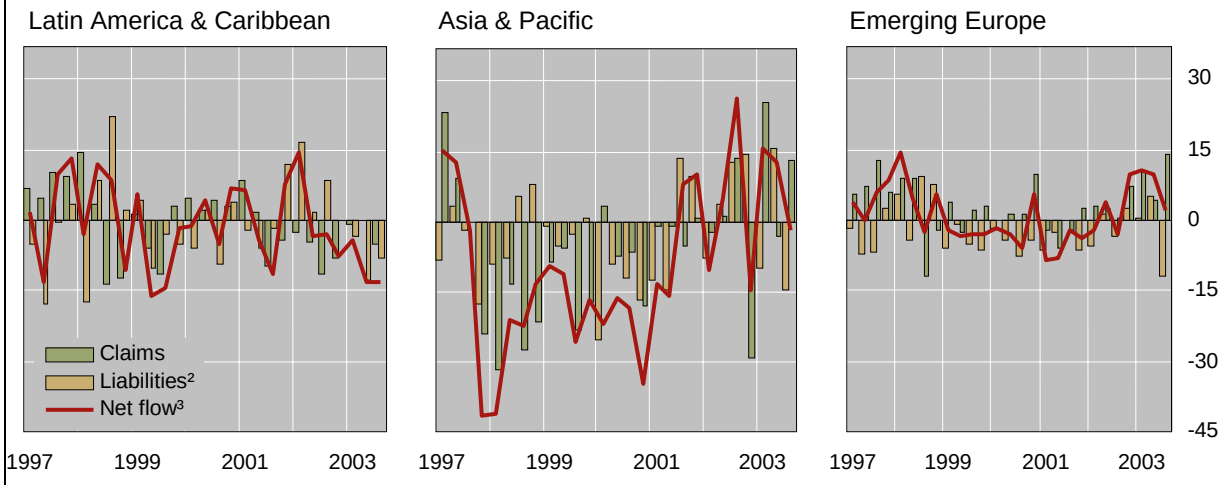
A discernible shift to safer emerging market credits ...

While increasing the overall size of claims on emerging markets, banks continued to move their emerging market portfolios out of riskier credits. This was evidenced by the persistence in the third quarter of three broad trends that had been observable over the previous year: a shift away from claims on Latin America, a portfolio shift towards public sector claims, and a fall in reporting banks' ultimate risk claims as a share of contractual claims on emerging markets (a measure of exposure).

The shift in claims on emerging markets towards regions with higher average credit ratings occurred even as the share of total claims flowing to

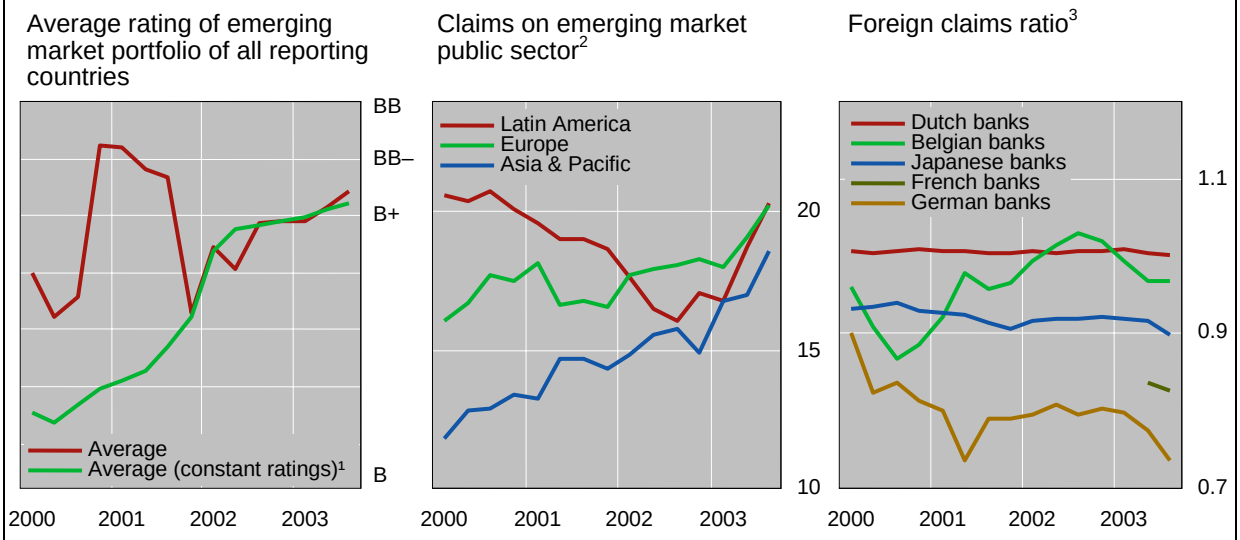
Banking flows to emerging economies[1]

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

Emerging market asset portfolios of BIS reporting banks



[1] Vis-à-vis country ratings held constant at their 2002 Q4 levels. [2] Share of international claims. [3] Ratio of foreign claims vis-à-vis emerging economies on an ultimate risk basis to those on an immediate borrower basis. Graph 2.4

emerging market borrowers remained stable. Claims on Latin America, which have an estimated (claim-weighted) average rating near Standard & Poor's B rating, fell to 28% of total claims on emerging markets, from 30% in the previous quarter and 31% in late 2002.[7] Over this same period, the share for Asia-Pacific (with close to a BB estimated rating) rose to 32% from 31% last quarter and that for emerging Europe (with between a BB and BB+ estimated rating) to 22% from 21% in the previous quarter. Overall, this shift to better-quality credits, both within and across emerging market regions, went hand in hand with a continued improvement in the average rating of reporting area banks' total emerging market portfolio. With the Standard & Poor's sovereign ratings of the emerging market vis-à-vis countries held constant at their 2002 Q4 levels, the average rating of the emerging market portfolio for all reporting countries has edged above B+ (Graph 2.4, left-hand panel).

... shows up in improved average ratings ...

Further indicating a move towards safer assets, banks in the reporting area continued to adjust their emerging market claim portfolios away from non-bank private sector borrowers and towards the public sector (Graph 2.4, centre panel). This shift took place against a backdrop of robust debt issuance by emerging market governments and falling spreads on emerging market debt. The BIS consolidated statistics, which net out inter-office claims, show that the share of claims on the non-bank private sector in emerging markets fell to 52% of total international claims on emerging markets in the third quarter of 2003, the third consecutive quarterly decline. At the same time, the share of claims

... and more lending to the public sector

[7] The average rating of the emerging market portfolio is calculated as the weighted average of the Standard & Poor's sovereign ratings of all vis-à-vis countries to which banks in the reporting area lend. The weights are the share of ultimate risk claims on each vis-à-vis country in total ultimate risk claims. See the September 2003 issue of the *BIS Quarterly Review* for details of the calculation.

Cross-border bank flows to emerging economies

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

	Banks' positions[1]	2001	2002			2003			Stocks at end-Sep 2003
		Year	Year	Q3	Q4	Q1	Q2	Q3	
Total[2]	Claims	–27.0	–36.9	–0.3	–37.0	32.9	–3.5	20.5	963.1
	Liabilities	20.3	–45.9	–18.2	–11.0	10.9	–10.3	30.4	1,157.9
Argentina	Claims	–5.8	–11.8	–4.5	–2.3	–1.9	0.9	–5.3	25.5
	Liabilities	–16.7	0.0	0.3	0.2	0.6	0.1	–2.2	24.0
Brazil	Claims	0.9	–11.2	–3.5	–6.3	2.2	–1.7	1.0	90.7
	Liabilities	0.4	–8.0	–1.4	–4.3	3.3	6.6	7.7	59.4
China	Claims	–3.5	–12.4	4.1	–10.2	16.0	–6.4	4.9	60.5
	Liabilities	–6.5	–3.6	–1.0	–1.9	1.4	–11.3	1.6	86.6
Czech Rep	Claims	0.9	2.3	0.5	0.3	0.7	0.5	0.8	16.7
	Liabilities	3.4	–3.7	–1.3	–2.7	–1.8	0.1	0.2	10.5
India	Claims	–1.4	–0.1	0.1	–0.2	2.1	2.4	3.4	28.5
	Liabilities	0.7	–1.1	–0.4	–0.9	–1.7	3.4	6.8	33.9
Indonesia	Claims	–5.4	–6.0	–1.3	–1.2	–1.1	–1.0	–1.9	28.6
	Liabilities	1.1	–2.4	–0.2	–0.5	0.4	–0.1	–0.5	12.0
Korea	Claims	–0.2	8.2	6.5	–6.4	2.3	–2.0	–1.7	74.8
	Liabilities	1.7	0.5	–0.4	–4.8	–0.8	–6.1	1.8	26.9
Mexico	Claims	2.0	3.1	–1.9	0.0	–0.5	–0.1	0.8	65.4
	Liabilities	8.8	–11.4	–0.3	1.7	4.5	2.2	0.2	62.0
Poland	Claims	2.3	2.9	1.1	–0.4	0.9	0.9	1.1	30.9
	Liabilities	2.8	–3.1	–0.8	–2.5	0.8	–1.1	–1.2	16.5
Russia	Claims	1.3	3.6	–1.1	2.4	1.8	1.7	3.3	42.9
	Liabilities	5.2	9.6	4.0	2.0	5.6	–4.4	6.9	48.3
Thailand	Claims	–3.5	–5.0	–0.5	–1.8	–0.3	0.3	0.0	19.8
	Liabilities	1.3	–4.6	–1.4	–1.2	2.5	–0.9	0.9	14.2
Turkey	Claims	–12.0	–2.8	–2.1	–0.1	2.4	–0.5	3.5	43.1
	Liabilities	–2.1	0.0	–0.2	0.5	–3.9	1.5	1.0	18.9
Memo:									
EU accession countries[3]	*Claims*	*6.3*	*10.1*	*3.4*	*3.3*	*5.7*	*1.4*	*5.8*	*110.9*
	Liabilities	*9.9*	*–6.4*	*–1.3*	*–5.4*	*–2.1*	*–1.2*	*1.9*	*63.2*
OPEC members	*Claims*	*–13.7*	*–9.8*	*–4.4*	*–8.2*	*–0.3*	*–6.4*	*–1.5*	*124.6*
	Liabilities	*–2.9*	*–8.8*	*–1.1*	*1.5*	*–5.2*	*–11.8*	*–9.1*	*233.8*

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

Table 2.3

on the public sector increased in all emerging market regions (except Africa and the Middle East), pushing the overall share to 19% from 18% in the second quarter and 16% a year earlier.

A final trend consistent with banks' heightened sensitivity to risk is the increase in the share of claims on emerging markets backed by third-party guarantees. The BIS consolidated data indicate that relatively large outward risk transfers led to a third consecutive quarterly decline in the ratio of ultimate risk claims to claims on an immediate borrower basis, from 92% in the second

quarter of 2003 to 91% in the third (Graph 2.4, right-hand panel). In particular, net risk transfers out of emerging Europe and the Middle East and Africa over the last year have been noteworthy. Reflecting activity vis-à-vis Russia, Poland, Turkey and Hungary, net risk transfers out of emerging Europe rose from $25 billion in the second quarter of 2002 to $37 billion in the third quarter of 2003.[8] Over this same time period, the ratio of ultimate risk to immediate borrower claims of German banks, the largest creditor banking system to emerging Europe, fell from 79% to 72%. Similarly, euro area banks were largely responsible for the change in the ratio of ultimate risk to immediate borrower claims on Africa and the Middle East; it declined from 98% in the first quarter of 2003 to 91.5% in the third, partially as a result of an increase in net risk transfers (from $0.9 billion to $4.2 billion).

Net outflow from Latin America for the sixth quarter in a row

Latin America experienced its sixth consecutive net outflow in the third quarter of 2003, due both to reduced lending to non-bank borrowers in the region and to increased deposits placed with banks in the reporting area. Despite a relatively steep fall in claims on the region (the ninth consecutive quarterly decline), the year-over-year rate of contraction in claims continued to fall, reaching 5.2% (from 7.2% in the previous quarter). At the same time, liabilities vis-à-vis Latin America rose by $8.2 billion as both banks and non-banks in the region built up deposits with reporting area banks. Reduced claims on Argentine residents and increased deposits by Brazilian residents were noteworthy, while activity in most other countries was subdued.

Restructuring reduces claims on Argentina ...

Following a pickup in lending in the previous quarter, claims on Argentina fell by $5.3 billion amidst the restructuring of several of the largest banks in the country. This was the largest quarterly decline in the BIS coverage period. Banks in offshore centres cut loans to the Argentine banking sector by $2.9 billion, a partial reversal of increased credit in the previous quarter, while banks in the United States reduced loans to Argentine non-bank borrowers. Combined, this pushed claims on Argentina down to 9% of claims on the region, from 11% in the previous three quarters. Banks in Argentina also repatriated $1.8 billion in deposits, primarily from banks in offshore centres, partially offsetting the reduction in claims.

.. while banks in Brazil place deposits abroad ...

As in the second quarter of 2003, banks in Brazil built up deposits in reporting area banks in the third quarter. Coinciding with a substantial expansion in issuance in capital markets by Brazilian residents, banks in Brazil deposited a total of $5.1 billion with banks in the United States, the United Kingdom, offshore centres and the euro area, the third consecutive quarterly rise. Similarly, growth in the deposits of the Brazilian non-bank sector with banks in the United States and offshore centres led to a net outflow of $6.7 billion, the second largest since the third quarter of 1999.

[8] These figures, and those for the Middle East and Africa which follow, exclude France as a reporting country because of recent reporting changes.

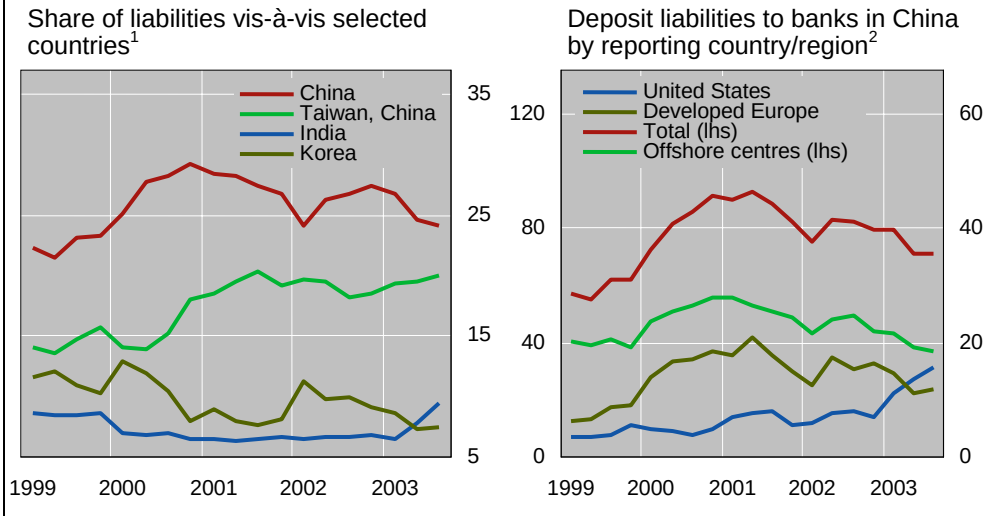
Increased deposits by banks in India drives net outflow from Asia-Pacific

Increased deposits placed with reporting area banks slightly outpaced new lending to Asia-Pacific in the third quarter, yielding a modest net outflow of $2.0 billion. Funds flowed out of Korea and India as banks in these countries boosted deposits abroad, and into Taiwan and China as lending to banks in these countries expanded. Overall, claims on non-bank borrowers in the region remained stable from the previous quarter. However, total claims on the region's banking sector grew by $12.8 billion, the second largest increase since the first quarter of 1997.

... as do banks in India ...

Robust lending to banks in India was insufficient to counter a substantial rise in deposits placed with reporting area banks. As a result, India saw its largest net outflow in the BIS coverage period, at $3.5 billion. Banks in India deposited a total of $6.7 billion, mostly with banks in the United States, and pushed the liabilities vis-à-vis the country to $33.9 billion.[9] At 9% of total liabilities vis-à-vis the region in the third quarter, liabilities to India surpassed those vis-à-vis Korean residents, placing India in third position behind China and Taiwan (Graph 2.5, left-hand panel). At the same time, claims on the Indian banking sector increased for the fourth consecutive quarter, by $2.9 billion, as banks in offshore centres, the United Kingdom and the euro area extended new loans. Reflecting relatively robust lending to this sector over the past year, India accounted for 9% of all claims on the region in the third quarter, up from 8% in the previous quarter and 7% a year earlier. As a result, India overtook Malaysia, and is now tied with Indonesia as the fourth largest borrowing nation in the region.

Liabilities of BIS reporting banks vis-à-vis Asia-Pacific



[1] As a percentage of liabilities vis-à-vis Asia-Pacific emerging economies. [2] In billions of US dollars.

Graph 2.5

[9] A portion of this probably reflected deposits of foreign currency reserves with banks abroad. Data from the Reserve Bank of India indicate that the approximate market value of official reserve assets and other foreign currency assets placed abroad increased from $50 billion at end-June 2003 to $55.5 billion by end-September.

Funds flowed into Taiwan for the second consecutive quarter, as increased claims on Taiwanese borrowers compensated for greater deposits placed with banks in the reporting area. Banks in the United States, the United Kingdom and offshore centres channelled a combined $5 billion in new loans to banks in Taiwan, while banks in the United Kingdom also invested in equity and securities issued by Taiwanese non-bank borrowers. Combined, this pushed total claims on Taiwan to $36.1 billion, or 12% of all claims on the region, from 10% in the previous quarter and 9% a year earlier.

The stock of net claims vis-à-vis the Chinese banking sector continued to move towards positive territory in the third quarter, reflecting the longer-term trend described in the December 2003 *Quarterly Review*. Increased lending to as well as deposit repatriations by banks in China contributed to the country's third consecutive net inflow, of $3.3 billion. Banks in the United States and the United Kingdom channelled a combined $3.7 billion in loans to banks in China, much of it denominated in US dollars. This pushed the share of claims on the Chinese banking sector to 24% of total claims on this sector in the region, from 23% in the previous quarter.

... while banks in China continue to repatriate

Contributing to the rise in the stock of net claims on China, deposits placed by the Chinese banking sector in the international banking system declined for the fifth consecutive quarter. The $634 million net repatriation in the third quarter, although smaller than that in previous quarters, brought the net repatriation of deposits by the Chinese banking sector since the first quarter of 2001 to $23 billion (see box on page 26). Much of this reflected an $8 billion drop in US dollar deposits placed with banks in Europe, a $6 billion decline in US dollar deposits with banks in Japan, and an $11 billion contraction in Hong Kong dollar deposits placed with banks in Hong Kong SAR over this period. By contrast, deposits placed with banks located in the United States by the Chinese banking sector rose further; deposits totalled $16 billion in the third quarter of 2003, up from $13.5 billion in the previous quarter and $7 billion in the first quarter of 2001 (Graph 2.5, right-hand panel).

Record claims on emerging Europe drive fourth consecutive net inflow

Increased claims overshadowed a rise in deposits placed abroad to produce a fourth consecutive net inflow into emerging Europe in the third quarter of 2003. While Russia continued to be a net contributor of funds to the international banking community, positive loan flows over the past year to the EU accession countries drove up the net stock of claims on the region (Graph 2.6, left-hand panel). Claims on the region rose by $13.9 billion, the largest increase in the period covered by the BIS statistics, reflecting greater lending to all sectors from virtually every major banking system. Six billion dollars of this increase flowed to EU accession countries, with new claim flows to Turkey and Russia accounting for much of the rest. As a result, claims on emerging Europe reached 22% of total claims on emerging markets, up from 21% in the previous two quarters. Liabilities vis-à-vis the region also experienced a marked rise, of $11.7 billion, again the largest in the BIS coverage period. This was mainly the result of increased deposits by banks in Russia with banks in the reporting area.

Robust lending to emerging Europe ...

Tracing China's foreign exchange liquidity

Guonan Ma and Robert N McCauley

The underlying growth of China's official foreign exchange reserves accelerated in 2003, expanding by over $100 billion or some 10% of the country's GDP. To some extent, this more rapid growth reflected China's shift from building up claims on the international banking system to drawing them down. The renewed inflow of international bank funds into China came in response to an increased demand there for foreign currency loans and to a reduced supply of foreign currency deposits as US dollar interest rates fell below their renminbi counterparts. This inflow in turn fuelled sales of dollars by the private sector to the authorities, helping to accelerate official foreign exchange growth. This box updates our earlier analysis of the sources of foreign currency liquidity in the official and banking sectors in China and traces its use in overseas securities markets.[①]

Transactions of Chinese residents with Chinese banks in foreign currency have shifted from building up net long dollar positions to reducing them since 2001, when US short-term interest rates began their fall to current low levels. Before 2001, households and firms were increasing their foreign currency deposits in banks in China, while firms were retiring foreign currency loans. Thereafter, households and firms slowed their accumulation of foreign currency deposits and in 2003 even reduced them. In 2002, firms in China again started rapidly to step up their borrowing in

Changes in China's foreign currency liquidity flows

In billions of US dollars

	1999	2000	2001	2002	2003[1]	1999–2003[1]
Sources[2]	38.0	45.7	58.8	67.9	71.3	281.7
Foreign exchange reserves	9.7	10.9	46.6	74.3	97.5	239.0
Deposits in onshore banks[3]	15.4	26.4	7.9	15.8	–2.6	62.9
Less loans of onshore banks[3]	12.9	8.4	4.3	–22.2	–23.6	–20.2
Uses[2]	25.7	55.0	45.4	71.6	33.2	230.9
Net claims on BIS reporting banks	10.7	33.6	–4.2	5.8	–22.8	23.1
of which: on banks in Hong Kong SAR	*3.8*	*14.4*	*–4.2*	*2.2*	*–7.2*	*9.0*
Net purchases of US debt securities[4]	15.0	20.4	44.1	65.3	56.0	200.8
Treasury bonds and notes	8.2	–4.0	19.1	24.1	19.1	66.5
Agency bonds	8.3	18.8	26.0	29.3	24.3	106.7
Corporate bonds	0.5	0.8	6.7	6.0	3.5	17.5
Money market instruments	–2.0	4.8	–7.7	5.9	9.1	10.1
Net purchases of German securities	1.4	2.0	1.8	0.9	.	6.1
Net purchases of Japanese securities	–1.4	–1.0	3.7	–0.4	.	0.9

[1] To September 2003. [2] Sources do not include the corporate and non-deposit finance sectors; uses are also incomplete. [3] At both domestic and foreign banks. A decline of onshore loans adds to sources, while an increase, as in 2002–03, subtracts from sources. [4] Latest US Treasury data suggest that for the full year 2003, Chinese official and banking sectors continued their net purchases of US Treasury ($30.5 billion), agency ($29.6 billion) and corporate ($4.6 billion) debt securities.

Sources: The People's Bank of China; Deutsche Bundesbank; Hong Kong Monetary Authority; Bank of Japan; US Treasury; BIS; authors' estimates.

① See our articles "Following Chinese banks' foreign currency liquidity", *BIS Quarterly Review*, June 2002, pp 18–19, and "Opening China's capital account amid ample dollar liquidity", in *China's capital account liberalisation: international perspectives, BIS Papers*, no 15, April 2003, pp 25–34.

foreign currency. These shifts came in response to to the decline of US short-term interest rates to levels below their Chinese equivalents.[2] Any consideration of possible revaluation gains on long renminbi/short dollar positions only added to the interest rate incentives to acquire renminbi deposits or borrow dollars.

Accommodating this shift, BIS area banks went from acting as an outlet for surplus dollars in China to serving as a source of dollars needed to fund foreign currency loan growth in the country, against the background of reduced domestic deposits of foreign currency by Chinese residents. In particular, China swung from providing $6 billion to the international banking system in 2002 to withdrawing $23 billion in the first three quarters of 2003 (both figures are adjusted for exchange rate changes). Such dollar borrowing can increase official reserves either as a result of direct dollar sales against the renminbi by the Chinese non-bank sector or, more indirectly, by financing their delayed payments for imports and accelerated receipts from exports.

Where did China's foreign currency liquidity go? Publicly available data pertain to the sum of investments by China's private sector, largely its banking system, and its official sector. On this basis, it is evident that much of China's surplus foreign currency liquidity flowed into US debt securities in the first three quarters of 2003. In particular, the US Treasury reports that Chinese residents balanced their purchases of US Treasury and agency securities. Purchases of corporate bonds in the United States continued, and purchases of money market instruments also increased.

For the first three quarters of 2003, a wider gap than usual opened up between the sources and uses of China's foreign currency. To some extent, sources are overstated by the effect of the stronger euro and yen on the change in official reserves. In addition, the flow of Chinese funds into German and Japanese securities in 2003 remains to be reported, and even then these uses capture only a limited range of non-dollar investments.

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[2] See our article "Rising foreign currency liquidity of banks in China", *BIS Quarterly Review*, September 2002, pp 67–73, for evidence of the sensitivity of foreign currency deposits in China to interest rate differentials.

The expansion in claims on non-bank borrowers was sizeable. Total claims on this sector rose by $8.3 billion, as banks in the reporting area, primarily in the United Kingdom, Germany, Austria and offshore centres, channelled $4.7 billion in new loans to non-bank borrowers, mainly in Turkey, Russia and, to a lesser extent, Poland. This constituted the sixth consecutive quarterly increase in loans to these borrowers in Russia, and the second largest rise in loans to Turkish non-bank borrowers in the BIS coverage period ($1.8 billion).

... is partly investment in public sector debt

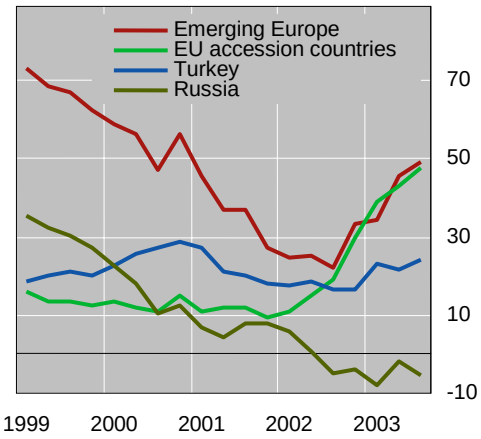
This expansion in claims was partially the result of investment in public sector debt securities. Investment in international debt securities rose by $3.2 billion, driven by increased claims on the non-bank sector in Hungary, Russia and Poland. The BIS consolidated statistics, which net out inter-office positions, indicate that US banks channelled funds to the Russian public sector, while German banks stepped up their lending to this sector in Hungary and Poland. As a result, international claims on the region's public sector rose to 20% of total international claims, from 19% in the previous quarter and 18% in the preceding four quarters.

Following three consecutive quarterly contractions, liabilities vis-à-vis the region rose dramatically in the third quarter, fuelled primarily by an expansion in deposits placed with reporting area banks. Banks in the region deposited an

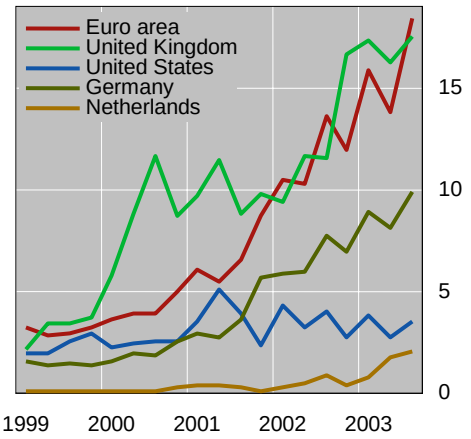
Cross-border positions vis-à-vis European emerging economies

In billions of US dollars

Net claims vis-à-vis selected countries[1]



Deposit liabilities to Russia



[1] Changes in claims minus changes in liabilities.

Graph 2.6

additional $10.3 billion abroad, with a $7.3 billion increase by banks in Russia the driving factor. These banks increased euro-denominated deposits in Germany by $1.3 billion, and US dollar deposits in France and other euro area countries by $2.4 billion. Deposits placed abroad by banks in Russia have risen in every quarter (except three) since end-1998 (Graph 2.6, right-hand panel), pushing total liabilities of reporting area banks vis-à-vis banks in Russia to $41 billion (third behind the Chinese and Taiwanese banking sectors).[10]

[10] Total liabilities vis-à-vis all sectors in Russia increased to $48 billion in the third quarter and now rank fifth among emerging markets, behind China, Taiwan (China), Mexico and Brazil.

International syndicated credits in the fourth quarter of 2003

Blaise Gadanecz

Activity on the market for international syndicated loans rebounded in the last quarter of 2003. Signings of new facilities totalled $347 billion, which represented a 17% rise from the previous quarter on a seasonally adjusted basis. The year ended on an unusually strong note for borrowers from both industrialised countries and emerging markets. After a long period of stagnation, deals arranged to finance management and leveraged buyouts picked up in the second half of 2003.

In the United States, as the economic outlook improved, lending recovered from the historical low of the previous quarter. At $167 billion, activity was stronger than a year earlier, mainly directed to the energy sector. The investment grade segment accounted for a sizeable 47% of lending. Spreads became narrower on loans priced off the US prime rate.

Refinancing and M&A-related funding for western European borrowers was buoyant. European borrowers, in particular Italian ones, were most active on the LBO market: some of the largest amounts were obtained by Seat Pagine Gialle SpA, a business directory publisher (€4.4 billion) and FiatAvio SpA, the aerospace division of Fiat (€1.3 billion). Activity was further boosted by large-scale refinancings among vehicle manufacturers such as BMW ($7 billion) and electricity firms (Germany's E.ON AG and RWE and Italy's Enel rolled over a combined total of €12.5 billion). The auto and energy industries helped bring syndicated lending to German, Italian, Finnish and Spanish entities to record highs for 2003 as a whole.

Japanese activity was consistent with historical levels, as international deals totalled $5 billion. However, it should be noted that large Japanese firms – such as Mitsubishi Corp and Fujitsu Ltd, which raised the largest amounts in the fourth quarter – still commonly rely on purely domestic syndicates, which are not captured in the international data compiled by the BIS.

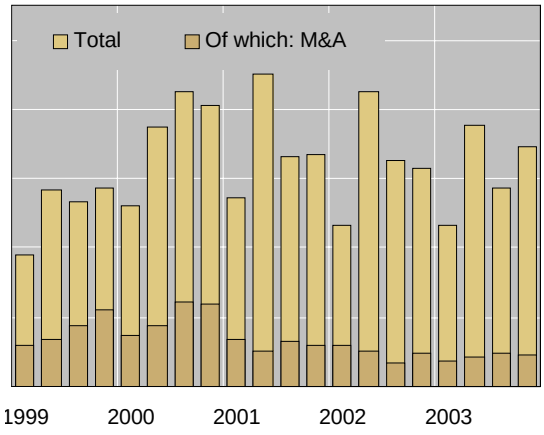
Lending to emerging markets was only slightly above the previous quarter's high volume, but rose by 53% from one year earlier. Spreads on emerging country loans narrowed in the second half of 2003. In the fourth quarter, a slight year-on-year reduction in Asian volumes was more than offset by strong year-on-year growth in the three other main regions. For 2003 as a whole, this brought international syndicated lending to emerging market borrowers to its highest level since 2000, albeit still far from the pre-Asian crisis peak observed in 1997.

Business was strongest in eastern Europe but Latin American borrowers were also active. Borrowing by a Czech telecoms firm and by Polish, Hungarian and Russian oil companies, as well as refinancing by Turkish banks, boosted eastern European business to a three-year high of $9 billion. Pemex, the Mexican oil corporation, arranged a $2.3 billion multicurrency facility. This included the largest international syndicated loan tranche to date denominated in Mexican pesos. The company also raised funds on international securities markets (see "The international debt securities market" on page 31).

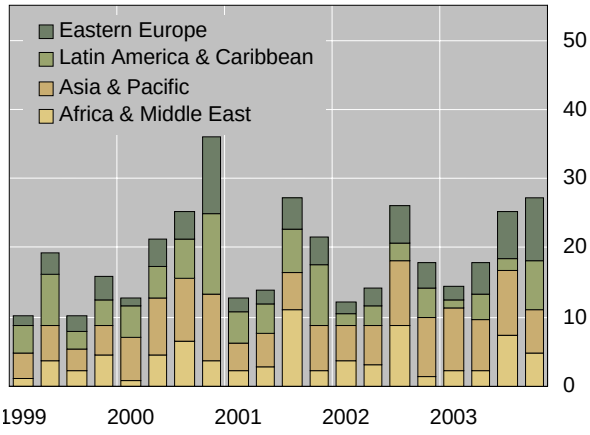
Activity in the international syndicated credit market

In billions of US dollars

Signed facilities



Facilities for emerging economies



Sources: Dealogic Loanware; BIS.

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3. The international debt securities market

Net issuance of international debt securities hit an all-time high of $460.4 billion in the fourth quarter of 2003 (Table 3.1). The rise was primarily due to sharply increased fund-raising by euro area nationals, both in

Main features of net issuance in international debt securities markets

In billions of US dollars

	2002	2003	2002	2003				Stocks at end-Dec 2003
	Year	Year	Q4	Q1	Q2	Q3	Q4	
Total net issues	1,010.8	1,467.1	183.7	356.7	348.9	301.2	460.4	11,681.4
Money market instruments[1]	1.6	74.9	–10.2	55.4	3.7	–32.9	48.8	569.5
Commercial paper	23.7	83.3	–3.0	46.8	13.3	–25.4	48.7	417.9
Bonds and notes[1]	1,009.2	1,392.2	193.9	301.3	345.1	334.2	411.6	11,111.9
Floating rate issues	199.0	–37.4	39.7	–41.6	–27.7	–14.5	46.4	2,383.9
Straight fixed rate issues	800.1	1,408.5	156.8	342.6	372.2	344.4	349.3	8,366.0
Equity-related issues	10.1	21.1	–2.7	0.3	0.6	4.3	15.9	361.9
Developed countries	945.6	1,363.9	171.4	330.7	316.2	279.9	437.1	10,404.5
United States	329.6	271.0	48.8	55.1	29.2	88.3	98.4	3,078.3
Euro area	479.3	770.1	99.9	211.9	208.1	125.6	224.5	5,014.0
Japan	–22.4	–0.2	–10.2	–3.0	–1.8	–3.4	8.0	271.3
Offshore centres	8.1	16.4	4.7	2.8	4.1	0.4	9.1	134.0
Emerging markets	36.2	64.2	10.5	13.7	13.3	18.9	18.3	635.8
Financial institutions	833.6	1,187.8	168.4	274.1	247.7	255.5	410.5	8,546.5
Private	698.3	989.0	131.8	225.9	199.5	212.6	350.9	7,235.4
Public	135.4	198.9	36.6	48.2	48.2	42.9	59.6	1,311.2
Corporate issuers	55.0	109.9	2.0	16.1	32.0	20.9	40.9	1,497.0
Private	53.3	95.2	–3.5	10.6	29.7	17.9	37.0	1,234.2
Public	1.7	14.7	5.5	5.4	2.3	3.1	3.9	262.8
Governments	101.3	146.8	16.2	57.1	53.8	22.8	13.1	1,130.7
International organisations	20.9	22.6	–3.0	9.4	15.3	2.0	–4.2	507.1
Memo: Domestic CP[2]	*–102.6*	*–36.5*	*22.8*	*13.6*	*–28.9*	*–36.8*	*15.6*	*1,893.5*
Of which: US	*–91.4*	*–81.3*	*23.8*	*–15.7*	*–41.9*	*–22.3*	*–1.4*	*1,288.8*

[1] Excluding notes issued by non-residents in the domestic market. [2] Data for the fourth quarter of 2003 are partly estimated.

Sources: 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

	2002	2003	2002	2003			
	Year	Year	Q4	Q1	Q2	Q3	Q4
Total announced issues	2,100.6	2,883.9	490.4	758.8	755.4	655.1	714.6
Bond issues	1,165.2	1,610.4	266.2	436.2	424.2	341.8	408.2
Note issues	935.5	1,273.5	224.3	322.6	331.2	313.3	306.4
Floating rate issues	603.2	512.3	157.0	123.3	126.9	116.9	145.1
Straight fixed rate issues	1,454.7	2,283.7	325.2	617.3	611.9	511.3	543.1
Equity-related issues[1]	42.8	87.9	8.2	18.2	16.6	26.8	26.4
US dollar	985.9	1,167.0	218.9	332.8	281.8	283.0	269.4
Euro	806.7	1,289.9	184.9	330.6	369.6	272.7	317.0
Yen	88.3	102.9	24.5	23.3	26.0	24.5	29.1
Other currencies	219.7	324.0	62.2	72.0	78.0	74.9	99.1
Financial institutions	1,632.0	2,281.7	401.3	581.8	569.4	535.4	595.1
Private	1,361.4	1,919.9	320.7	488.6	467.5	454.3	509.5
Public	270.6	361.8	80.6	93.2	101.9	81.1	85.6
Corporate issuers	211.4	269.8	40.2	56.5	78.1	66.5	68.6
Of which: telecoms	45.9	51.1	10.1	23.5	6.6	8.0	13.0
Private	186.4	218.8	31.1	39.7	69.9	53.1	56.1
Public	25.1	51.0	9.0	16.8	8.3	13.4	12.5
Governments	172.9	240.4	31.1	81.6	79.2	38.8	40.7
International organisations	84.3	92.0	17.9	38.9	28.6	14.3	10.2
Completed issues	2,100.2	2,861.9	495.6	717.7	727.4	682.0	734.8
Memo: Repayments	*1,091.0*	*1,469.7*	*301.7*	*416.4*	*382.3*	*347.8*	*323.1*

[1] Convertible bonds and bonds with equity warrants.

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

bonds and notes and in commercial paper. Net issuance by both financial institutions and corporate issuers picked up, whereas it declined for governments. The fourth quarter capped a year in which borrowing in euro-denominated securities made significant gains, both in absolute terms and relative to other markets.

Emerging market borrowers continued to place large amounts of new debt – more than in any fourth quarter since 1996. This probably reflected an ongoing search for yield by international investors amidst the continuing narrowing of credit spreads that characterised the period. In Asia, there was substantial new net issuance by the Chinese government and financial institutions, while Russian financial institutions and the Polish government drove net borrowing in eastern Europe. Brazilian entities were prominent among Latin American borrowers.

A greater willingness on the part of international investors to take on risk was also evident in other sectors of the international securities markets. On the back of a buoyant stock market, issues of equity-related debt securities picked up markedly after more than a year and a half of stagnation. International

equity issuance grew sharply as well, particularly out of Asian countries such as China and Thailand.

Euro market gains on the back of euro area issuance

Fund-raising in the euro soars in 2003 ...

A striking trend apparent in both the fourth quarter and the year overall was the growth in euro-denominated borrowings, which accounted for more than half of all net international debt securities issuance in 2003. Fund-raising in the fourth quarter was well above the third quarter figure and more than twice as high as that for the fourth quarter of 2002; for the year as a whole, the net placement of euro-denominated debt securities, at $834 billion, was almost 60% higher than in 2002. By comparison, US dollar-denominated net issuance of $150 billion in the fourth quarter of 2003 was double that of the fourth quarter of 2002, while for the year as a whole it was only 10% higher, at $463 billion (Table 3.3).

What factors underlay the growth in euro-denominated issuance (Graph 3.1)? Some of the increase simply reflects the 20% appreciation of the euro vis-à-vis the dollar in 2003. Indeed, when measured in terms of the euro, the increase in net terms in 2003 was about half the unadjusted figure, at some 30%. Another important factor was an increased tendency of euro area nationals to come to the market; these borrowers naturally tend to issue in the euro (84% of their net borrowing was euro-denominated in 2003). Euro area nationals placed $224.5 billion for the fourth quarter, more than double the

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

In billions of US dollars

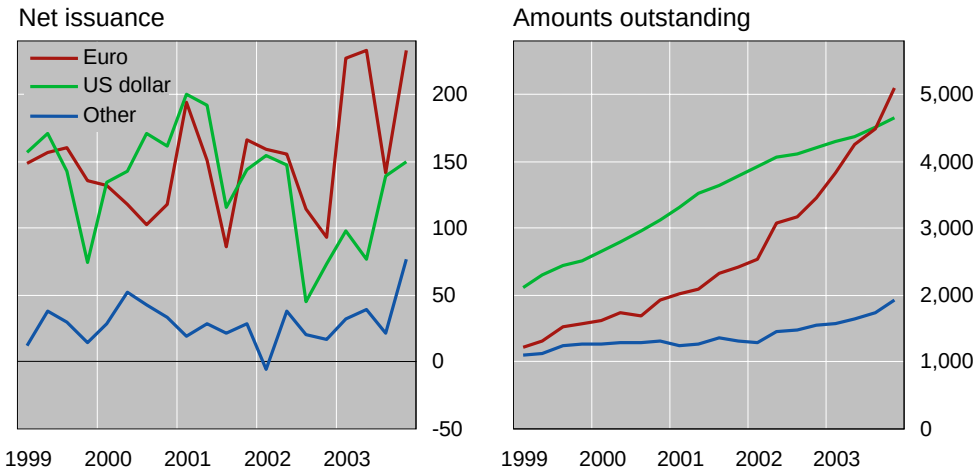
Region/currency		2002	2003	2002	2003			
		Year	Year	Q4	Q1	Q2	Q3	Q4
North America	US dollar	297.0	216.3	48.2	38.0	25.9	71.4	81.0
	Euro	39.7	51.9	0.4	16.1	6.3	14.9	14.6
	Yen	–7.4	–2.8	–2.5	0.0	–1.8	–1.6	0.6
	Other	12.1	25.4	4.5	1.8	7.6	6.4	9.6
European Union	US dollar	68.4	150.6	16.5	39.7	31.1	42.4	37.3
	Euro	463.3	744.2	92.5	203.8	212.5	117.2	210.8
	Yen	–26.2	–9.0	–2.7	–4.5	–3.2	–3.5	2.1
	Other	86.1	116.6	13.9	28.8	27.1	17.6	43.2
Others	US dollar	53.7	96.3	8.5	20.2	19.3	25.1	31.8
	Euro	19.7	38.2	0.9	7.1	14.4	8.9	7.8
	Yen	–9.7	7.6	–3.3	–1.6	1.9	–1.8	9.2
	Other	14.1	31.7	6.9	7.2	7.8	4.2	12.4
Total	US dollar	419.1	463.3	73.1	97.9	76.3	138.9	150.1
	Euro	522.7	834.3	93.8	227.0	233.1	141.0	233.2
	Yen	–43.3	–4.2	–8.5	–6.1	–3.1	–6.9	11.9
	Other	112.3	173.8	25.2	37.9	42.6	28.2	65.2

[1] Based on the nationality of the borrower.

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

International debt securities by currency

In billions of US dollars



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

amount for the fourth quarter of 2002. This left 2003 fund-raising 61% ahead of the previous year's total (Graph 3.2). Among euro area nationals, new net issuance from Germany, Spain and France was particularly strong.

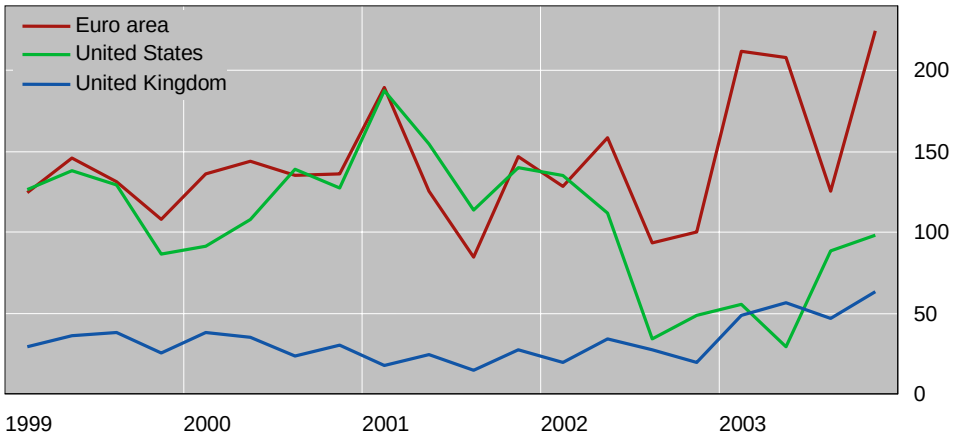
... as European financial institutions come to the market

By industry sector, euro-denominated borrowing was dominated by euro area financial institutions. While financial institutions accounted for around three quarters of all euro-denominated net issuance by euro area nationals in 2003, nearly 90% of the increased year-on-year growth in fourth quarter euro-denominated euro area fund-raising came from that sector. Securities placements by both public and private financial institutions' grew significantly.

There was also evidence of an increasing internationalisation of euro issuance. Borrowing by nationals outside the euro area accounted for 22% of net euro issuance in the fourth quarter of 2003, compared with around 4%

Net issuance of international debt securities by nationality of issuer

In billions of US dollars



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

Euro-denominated issuance also gains popularity outside the euro area

in the fourth quarter of the previous year. Even though the full year-on-year contrast is less stark, at 22% for 2003 versus 20% for 2002, fund-raising in the euro by non-euro area residents has clearly kept pace with the rapid growth of the market for euro-denominated instruments. Traditional issuers in currencies other than the euro appear to be encountering a growing demand for euro-denominated paper; there have been reports of international asset managers looking to increase their euro holdings in an effort to diversify their currency exposure.

Fund-raising strong in US dollars and other currencies

While euro-denominated securities played a dominant role, borrowing in other currencies was hardly weak in the fourth quarter of 2003. US dollar net issuance, at $150 billion, was more than twice that of the fourth quarter of 2002, borrowing in yen, at $11.9 billion, was positive for the first time in more than a year and a half, and activity in other currencies was also up by around 55% year on year (Table 3.3).

Despite the increasing use of the euro, the US dollar continues to be the currency of choice for most borrowers outside North America, the European Union and Japan. As much as 60% of the fourth quarter net issuance by such borrowers was in US dollars, 15% was in euros, and around one quarter was in other currencies. For the year as a whole, 61% of funds raised by these borrowers were in US dollars, and 20% were in euros.

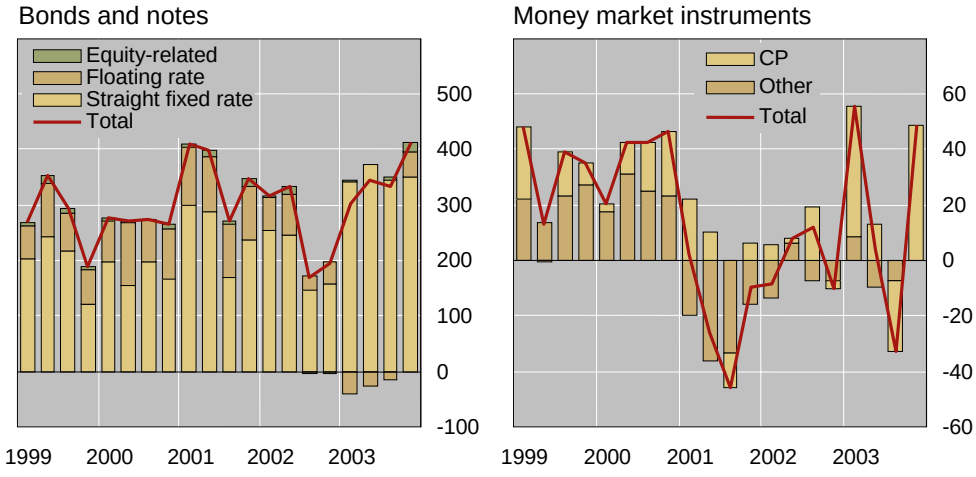
Borrowers opt for short-term, variable rate finance

Issuers look to the short end of the yield curve

Another characteristic of fourth quarter activity was increasing reliance on short-term debt, as borrowers chose the lower rates available at the short end of a yield curve that was steeper than earlier in the year (Graph 3.3). Net

Net issuance of international debt securities by type of security

In billions of US dollars



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

issuance of money market instruments (including commercial paper) was $48.8 billion, as against –$10.2 billion in the fourth quarter of 2002. This difference was also reflected in the full-year comparison ($74.9 billion in 2003 versus $1.6 billion in 2002).

Relatively low rates at the short end probably also stimulated floating rate finance. At $46.4 billion, this form of debt gained ground in the fourth quarter, accounting for 11% of overall bond and note issuance. In all the previous quarters of the year, issuers in the international debt securities markets had in aggregate redeemed variable rate instruments.

Private corporate borrowing takes a high-yield turn

The fourth quarter was a robust one for non-financial private corporate issues of international debt securities generally. Net issuance of $37 billion outpaced that in all other quarters of the year (Table 3.1). The number also compared favourably with net redemptions in the fourth quarter of 2002.

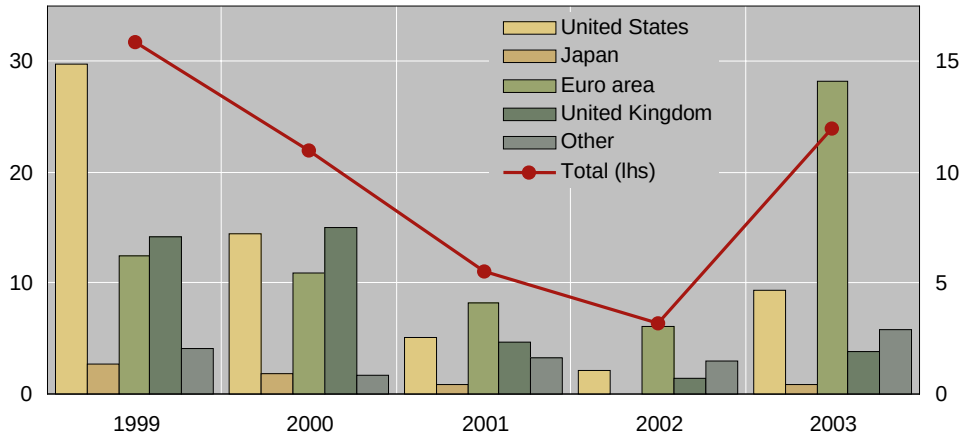
High-yield issuance by euro area nationals is particularly strong

The strong investor demand for high-yielding paper and the resulting decline in credit spreads fuelled continued strong activity by lower-rated developed country entities in the fourth quarter. Gross issuance of high-yield international bonds – those with ratings lower than BBB– from a major rating agency – was very buoyant at $5 billion in the fourth quarter, capping a strong year in which issuance (at $24 billion) was nearly four times that of 2002. High-yield was another segment where euro area nationals were particularly active borrowers in 2003, at $14 billion up by more than four times over 2002 (Graph 3.4).

Issuance of equity-related bonds – convertible bonds and bonds with equity warrants – had a renaissance in the fourth quarter. On the back of

Non-investment grade[1] issuance of international bonds by developed country entities, by nationality of borrower

In billions of US dollars



[1] Issuers rated BB or lower.

Sources: Dealogic; BIS. Graph 3.4

generally buoyant stock markets, activity in this category picked up sharply in the fourth quarter of 2003 after more than a year of stagnation to score more than $15.9 billion on a net basis.

Asian markets drive fourth quarter emerging market borrowing

Continued robust emerging market borrowing ...

Investors' search for yield also appears to have supported the robust growth in emerging market borrowing. Backed by continuing benign financing conditions, issuance by emerging market entities remained brisk in the fourth quarter of 2003. Total net issuance stood at $18.3 billion, of which the largest part was raised by entities in Asia (Graph 3.5).

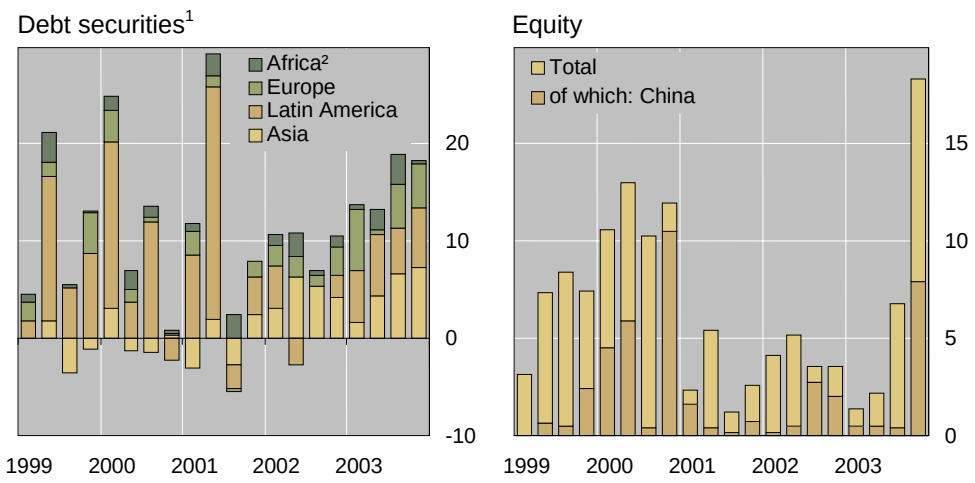
... supported by Chinese entities ...

Fund-raising activity in international markets by Chinese entities was quite significant in the fourth quarter. Following an upgrade by Moody's in October from A3 to A2, the People's Republic of China returned to the international bond markets, after an absence of two and a half years, by launching a $1 billion 10-year bond and a €400 million five-year bond. The issue reflected the Chinese government's efforts to ease other Chinese borrowers' access to international capital markets by establishing a pricing benchmark. The government had little need for foreign currency funding, given its rapid accumulation of foreign exchange reserves in recent quarters (see the Overview on page 1). Chinese financial institutions were also active in the market, with net borrowing amounting to $1.7 billion. The country's largest state-owned commercial bank, Industrial and Commercial Bank of China, raised the largest amount: over $500 million through its notes programme.

Mirroring developments in international debt securities markets, Chinese entities also tapped international capital markets to the tune of a remarkable

Issuance of debt securities and equity in international markets by emerging market entities

In billions of US dollars



[1] Net issuance. [2] Including the Middle East.

Sources: Dealogic; Euroclear; ISMA; Thomson Financial Securities Data; BIS. Graph 3.5

$7.9 billion in the form of international equity instruments in the fourth quarter. The largest IPO (initial public offering) of the year was carried out by China Life, the country's largest life insurer, when it raised $3.9 billion in Hong Kong and New York on 12 December. Boosted by this strong Chinese activity, international equity issues by emerging market entities totalled a record high of $18.3 billion (Graph 3.5).

... as well as other Asian entities

Other Asian entities took advantage of the benign financing conditions as well. The Republic of the Philippines raised $1.3 billion in international debt securities markets through issuance of three bonds on very attractive terms. Net borrowing in Asia was further supported by buoyant activity by the Taiwanese corporate sector ($2.0 billion) as well as Malaysian and Korean financial institutions ($1.3 billion and $2.0 billion respectively).

Brazilian borrowers remain active

In Latin America, net fund-raising picked up slightly in the fourth quarter, driven by increased Brazilian and Mexican borrowing. The Federative Republic of Brazil issued a $1.5 billion seven-year note on 22 October, and Mexican borrowing rebounded as a result of greater activity by both the government and the corporate sector. On 14 October, the United Mexican States tapped the market for $1 billion, issuing a 10¼-year dollar-denominated bond. An even larger issue was launched by the state-owned oil company Pemex, which monetised its entire 5% holding in the Spanish oil company Repsol YPF SA through a $1.4 billion seven-year convertible bond. In addition to its heavy recourse to international debt securities markets, Pemex has also recently raised substantial amounts in the domestic market as well as in that for international syndicated credits (see the box on page 29).

Other Latin American sovereigns were also present in the market. After an unusually high level of borrowing in the third quarter, the Bolivarian Republic of Venezuela continued to be active in the market in the fourth quarter. On 23 October, planned issuance of another $350 million of a 10-year bond, of which $700 million had already been placed in September, was increased to $470 million as a result of favourable market conditions. A new 15-year bond with a face value of $1 billion was launched only a month later. Another large sovereign placement was made by the Republic of Peru, which came to the market with a $500 million 30-year bond in November after being absent for eight months.

Russia obtains investment grade status

Borrowing in emerging Europe was driven by Russian financial institutions and the Polish government. Sberbank, a state-owned Russian bank, raised $1 billion in October with a three-year floating rate note shortly after an upgrade by Moody's of Russian sovereign debt to investment grade. The Republic of Poland raised $1 billion with a 10¼-year bond in October, as favourable market conditions prompted higher issuance than the targeted $500–750 million.

A sharp fall in net borrowing by South African entities was behind the reduced fund-raising in the Africa and Middle East region. This was only partly offset by a $750 million 20-year bond issued by the State of Israel, as part of its funding programme guaranteed by the US Agency for International Development, and a $700 million seven-year floating rate note issued by the State of Qatar (through a financing vehicle: Qatar Global Sukuk QSC), the

Qatar launches largest Islamic financing issue to date

highest-rated sovereign credit in the Middle East. The latter was Qatar's first Islamic bond[1] and the largest Islamic financing issue to date. Conventional investors took 48% of the final allocation, which was upsized from the target of $500 million as a result of strong demand.

Emerging market borrowing strong in 2003

Issuance in 2003 at highest level since Asian crisis

The fourth quarter concluded a year of strong borrowing activity by emerging market entities in international debt securities markets. Total net borrowing in 2003 amounted to $64.2 billion, the highest level since 1997. By far the largest amount, $14.2 billion, was accounted for by Brazilian entities (Table 3.4).

The US dollar remains the preferred currency, with 80% of gross issuance being dollar-denominated, although in emerging Europe issuance of euro- and dollar-denominated international debt securities was evenly balanced.

Emerging market borrowers move early in 2004

Strong borrowing activity in early 2004 ...

Prompted by low borrowing costs, the beginning of 2004 has seen notable front-loading activity by emerging market borrowers, especially in Latin America and emerging Europe. Partial data from Dealogic Bondware show that announced issuance of bonds in January 2004 amounted to $18.9 billion, the highest monthly figure since the Asian crisis and more than 30% above that of January 2003.

... led by Latin American sovereigns ...

Latin American sovereigns have been particularly active in early 2004. Large placements, often of longer-maturity securities that meet investors' search for yield, have been launched by the Federative Republic of Brazil

Net issuance of international debt securities by selected emerging market entities in 2003, by currency and nationality of borrower

In billions of US dollars

	US dollar	Euro	Yen	Other currencies	Total
Brazil	18.2	–1.6	–2.3	0.0	14.2
Korea	4.5	1.3	1.4	0.6	7.8
Taiwan, China	6.9	0.0	0.2	0.0	7.0
Russia	5.4	0.4	0.0	0.0	5.9
Poland	0.9	4.5	0.2	0.0	5.5
Mexico	4.2	1.1	–0.3	0.4	5.5
Philippines	4.0	0.3	–0.4	0.0	3.9
South Africa	2.0	0.8	0.0	–0.1	2.6
China	1.5	0.5	–0.3	0.6	2.3
Israel	2.0	0.0	0.0	0.0	2.1
Venezuela	2.7	–0.8	0.0	0.0	1.9

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

[1] An Islamic bond is one that complies with Islamic law (sharia), which does not allow interest payments. Investors are instead redeemed via a share of the profit from the bonds sold.

($1.5 billion 30-year bond), the United Mexican States ($1 billion five-year floating rate note and £500 million 20-year bond) and the Bolivarian Republic of Venezuela ($1 billion 30-year bond). Other sovereigns with less frequent presence in the market have also taken advantage of the beneficial financing conditions. The Republic of Chile, the Republic of Costa Rica and the Government of Jamaica all wrapped up their entire 2004 external financing needs in January or early February.

... and sovereigns in emerging Europe

Borrowing activity by emerging Europe in early 2004 has also been substantial, although much more concentrated on fewer sovereigns that have raised large amounts. As early as 14 January, the Republic of Turkey locked in the low funding costs by issuing a $1.5 billion 30-year bond. In early February, this was followed up by a €1 billion 10-year bond less than two weeks after the Republic of Hungary covered one third of its financing need for 2004 through a similar placement. An even larger issue of a €1.5 billion five-year bond, however, had already been launched on 15 January by the Republic of Poland under its EMTN programme.

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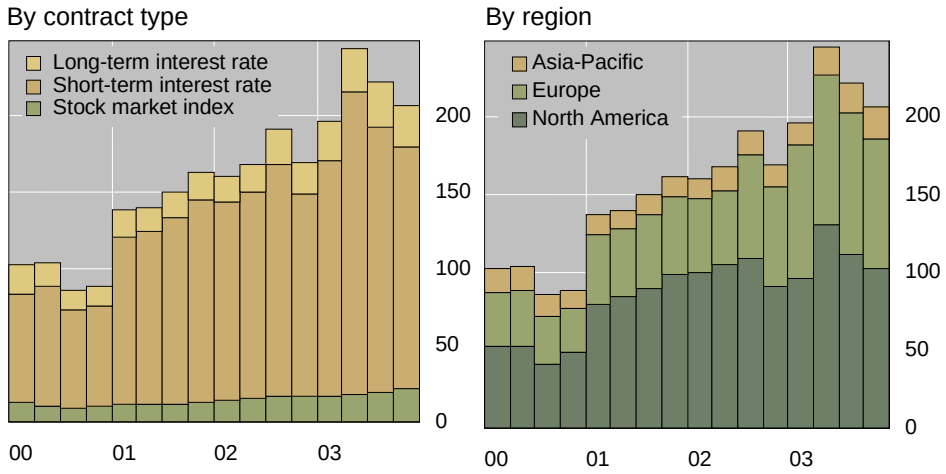
4. Derivatives markets

The aggregate turnover of exchange-traded financial derivatives contracts monitored regularly by the BIS shrank further in the fourth quarter of 2003. The combined value of trading in interest rate, stock index and currency contracts amounted to $207 trillion, a 7% decline from the third quarter (Graph 4.1). Activity was uneven across the major market risk groups, with turnover in interest rate contracts falling substantially and that in stock index and currency contracts growing at a moderate pace. The overall decline in the turnover of interest rate instruments, the largest of the broad market risk categories, resulted from a drop in both money market and government bond contracts.

Nonetheless, for 2003 as a whole the aggregate value of turnover in financial contracts rose considerably. Transactions during the year reached $874 trillion (see the box on page 44). This represented a 26% increase, which compares with increases of 55% and 17% in 2001 and 2002 respectively. Business was brisk in all of the broad market risk categories. Activity in the small market for currency contracts was particularly buoyant after a long period of stagnation.

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

Fixed income contracts slow down in calmer markets

Activity in fixed income contracts declines ...

Aggregate trading in exchange-traded interest rate contracts declined in the fourth quarter of 2003. The volume of transactions fell by 9% to $184.5 trillion, compared with a decline of 10% in the third quarter. This overall slowdown in fixed income business resulted from a drop in the two major market segments, namely money market and government bond contracts. Turnover in short-term interest rate contracts, including eurodollar, Euribor and euroyen, fell by 9% to $157.7 trillion, while business in longer-term instruments, including US Treasury notes, German government bonds and Japanese government bonds, weakened by 10% to $26.7 trillion (Graph 4.3).

... across most regions ...

Trading in fixed income contracts declined across most geographical regions. In North America, business weakened by 9% to $93.7 trillion. Money market contracts fell by 8% to $84.7 trillion and longer-term instruments by 15% to $9 trillion. In contrast to earlier quarters in 2003, there was little difference in the behaviour of the various money market and government bond contracts or in that of futures and options.

... reflecting calmer US markets ...

Aside from the seasonal slowdown often observed in the last part of the year, the overall reduction in US money market and longer-term activity reflected two main factors. First, US fixed income markets returned to a measure of calm in the fourth quarter following the abrupt spike in the yields on Treasuries and dollar-denominated interest rate swaps between mid-June and mid-August. The US Federal Reserve Open Market Committee's statements in October and December acknowledged an improvement in the economic outlook but also implied that monetary policy would continue to be accommodative for a considerable period of time. Although US Treasury yields faced bouts of upward pressure during the course of the quarter, market participants interpreted the Federal Reserve's statements as an indication that it would not increase policy rates. Such an interpretation would be consistent with the observed reduction in the implied volatility of eurodollar rates (Graph 4.2) and less active position-taking in related contracts.

... and perhaps the persistence of risk aversion

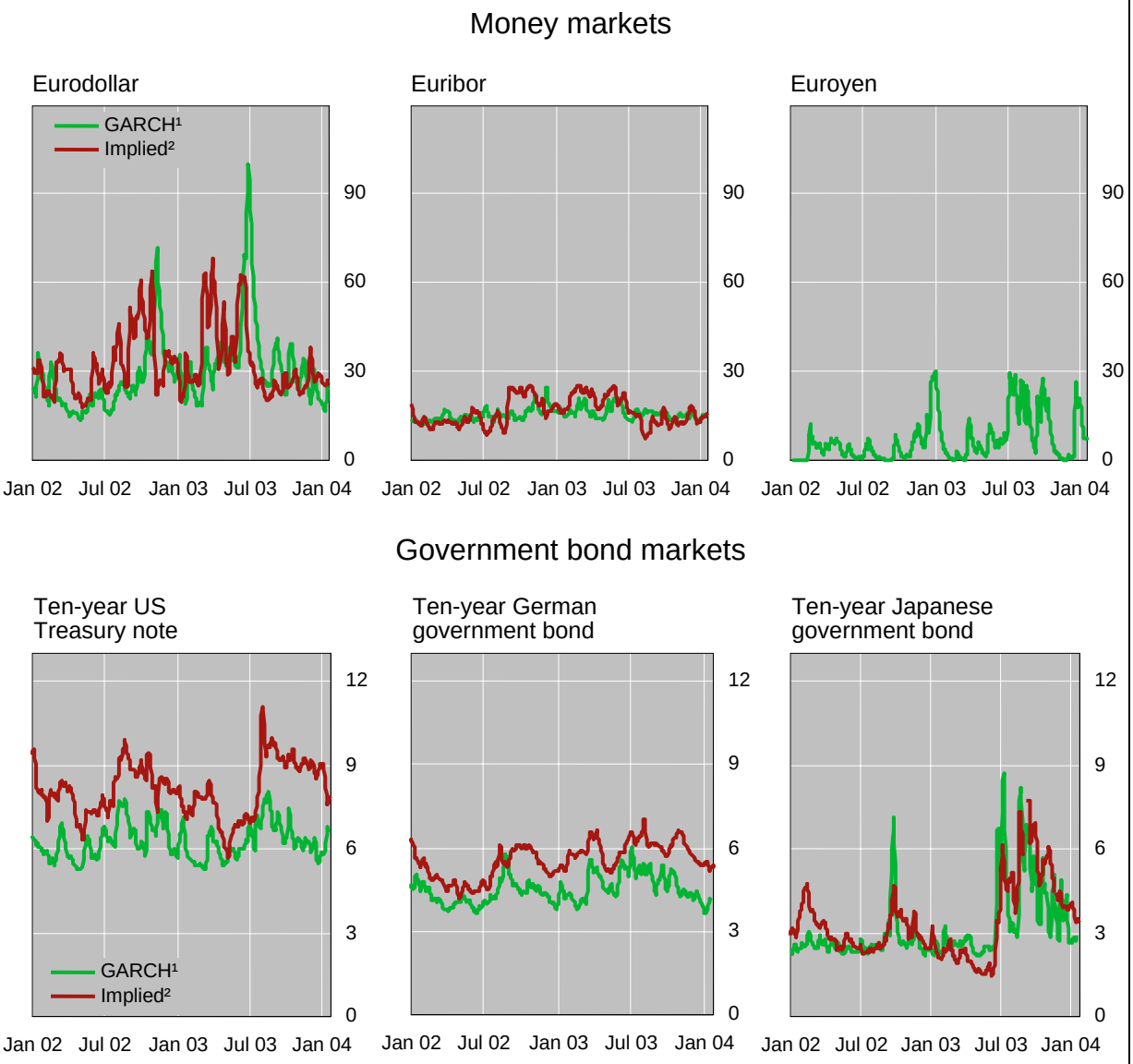
Second, position-taking may have been hampered by the persistence of risk aversion in the US government bond market in the wake of the market's wide swings in the summer. The spread between implied and realised volatility of options on US government bonds (Graph 4.2) remained unusually wide in the fourth quarter, reflecting the high price charged by intermediaries for market risk. Some dealers were reported to have made significant losses in their market-making and proprietary trading activities in the third quarter, which may have led to a retreat from market-making in the fourth.

In Europe, fixed income business contracted by 9% to $79.5 trillion in the fourth quarter. Transactions on money market rates dropped by 9% to $64.1 trillion, while trades in longer-term instruments fell by 8% to $15.3 trillion.[1] The lower volume of activity in European money market

[1] It should be noted, however, that the decline in European fixed income activity in US dollar terms represents an "underestimate" of the underlying reduction in business, since the 6% increase in the average value of the euro relative to the US dollar between the third and fourth

Volatility of major fixed income rates

Five-day moving averages



[1] Annualised conditional volatility 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

European business slows with consensus on rates

contracts was almost entirely accounted for by a decline in the trading of options on three-month Euribor futures. The expected path of three-month rates implied by Euribor futures with delivery dates in 2004 rose substantially during the fourth quarter. Even so, market participants seemed to display a high degree of agreement concerning the near-term evolution of short-term rates, as illustrated by the low volatility of options on three-month Euribor rates (Graph 4.2). The slowdown of business in European government bond

quarters inflated the dollar value of transactions. An analysis of European transactions in terms of the number of contracts traded shows a 13% reduction in actual turnover.

Exchange-traded markets remain buoyant in 2003

Trading in exchange-traded financial derivatives contracts monitored by the BIS continued to grow rapidly in 2003, with turnover expanding by 26% to $874 trillion. This compares with increases of 17% in 2002 and 55% in 2001. Business in 2003 was brisk in all of the broad market risk categories. Money market contracts accounted for most of the increase in trading in dollar terms but activity in the small market for currency contracts grew at the most rapid pace.

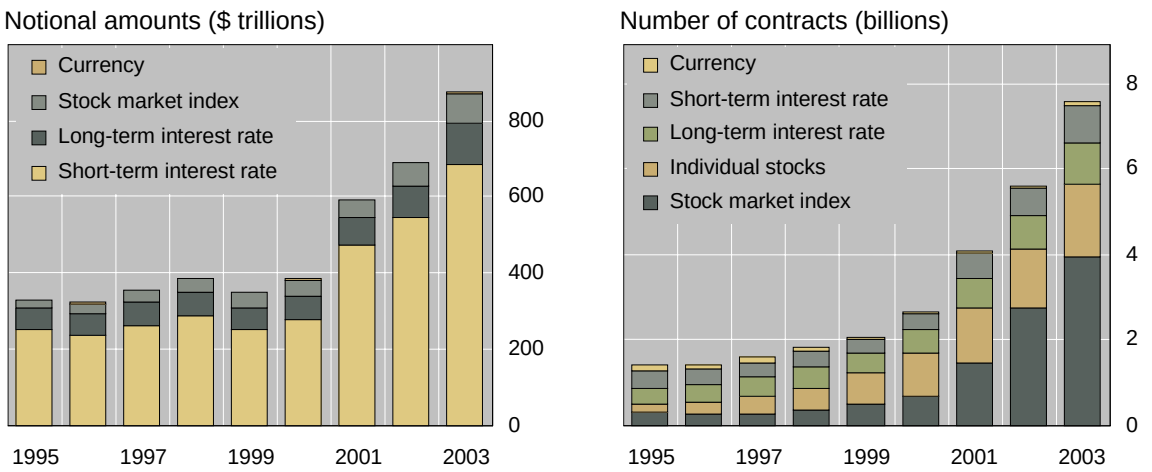
European fixed income business benefits from deepening liquidity

Worldwide trading in fixed income contracts, the largest segment of exchange-traded markets, rose by 27% to $794 trillion. Money market contracts, including futures and options on eurodollar, Euribor and euroyen rates, accounted for the biggest increase in activity in dollar terms, rising by $137 billion, or 25%, to $683 trillion. However, longer-term contracts, largely on government bonds, expanded at a faster pace, up by 41% to $111 trillion.

One of the most notable developments in the area of money market products was the particularly strong expansion of activity on European exchanges. European trading of such instruments, principally on Euribor, jumped by 64% to $278 trillion, compared with an increase of 7% in North America to $369 trillion. Trading in options on European money market rates was particularly buoyant, up by 111% to $83 trillion compared with an increase in futures of 50% to $195 trillion. Trading in European money market instruments has been catching up rapidly with that in North America since 2002. Changing expectations about the stance of monetary policy in the euro zone played a role in the expansion of the short-term segment but activity also appears to have been boosted by a deepening of liquidity in over-the-counter (OTC) derivative instruments indexed to Euribor. In particular, the euro-denominated interest rate swap market continued to grow vigorously in 2003, generating a flow of secondary hedging transactions in Euribor futures. The notably strong increase in exchange-traded options may have resulted from a shift of business away from the OTC derivatives market. Volatility in several types of option products traded in the OTC market, including interest rate swaptions, reached unusually high levels in the second half of 2003. This may have prompted some market participants to switch to exchange-traded instruments.

Activity in longer-term fixed income instruments was also more buoyant on European exchanges than in other major geographical areas. European business in such contracts rose by 49% to $66 trillion, compared with an increase of 36% to $36 trillion in North America. As was the case for European trading in short-term rate contracts, European business in options on government bonds was especially active. Trading in such options rose by 86% to $5.6 trillion compared with an increase in futures of 46% to $60 trillion. Trading in government bond contracts in Europe and North America was fuelled by sharp swings in long-term interest rates in the first three

Turnover of exchange-traded financial derivatives contracts by broad market risk category



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

quarters of 2003. The rally in fixed income markets in the first half of the year and its subsequent reversal from the end of June created a heavy volume of rebalancing transactions. Financial institutions, in particular, actively use fixed income futures and options to adjust the duration of their assets and liabilities as the level of interest rates changes. Such "immunisation" strategies create a positive link between transactions and market movements.

By comparison, fixed income activity in the relatively smaller marketplaces of the Asia-Pacific region was somewhat subdued. Trading in money market contracts grew by 8% to $32 trillion, while transactions in government bond contracts rose by 12% to $9 trillion. Trading in Australia was the main exception to this pattern of moderate growth, with transactions on short-term rates and government bonds together rising by 59% to almost $10 trillion. This sharp increase seems to have been related to the hedging of new issuance in the corporate bond market and a readjustment of positions in the wake of the Reserve Bank of Australia's increases of its cash target rate in November and December.

Stock index business driven by Asian activity

Global activity in stock index contracts rose by 20% to $75.5 trillion. Business expanded at widely differing rates across the major geographical areas. Turnover in the Asia-Pacific region rose by 48% to $27.8 trillion and that in Europe by 19% to $14.7 trillion. The notable increase in activity in Asia was once again largely attributable to robust trading in options on the Korea Stock Exchange's KOSPI 200 index, with a rise in turnover of such instruments of 49% to $21 trillion. Options trading in Korea was introduced in 1997 but has expanded exponentially in recent years. Meanwhile, business in Japanese stock index contracts rose by 40% to $3 trillion, a tentative recovery following the stagnation observed in recent years. By contrast, activity in North America was much weaker, with transactions growing by 4% to $32.3 trillion. The upward movement of US equity markets from March onwards was accompanied by significantly lower volatility, realised and implied, which may have acted to weaken investor demand for protection.

Contracts on individual stocks, for which turnover is measured only in terms of the number of contracts, also expanded by 20% in 2003 to 1.7 billion. Business on North American exchanges rose by 17% to 837 million contracts, while that on European exchanges grew by 8% to 592 million. Trading in the Asia-Pacific region jumped by 112% to 43 million contracts, largely because of the introduction of trading in options in India. Activity in the rest of the world received a boost from a 96% increase in futures and options in Brazil to 176 million.

Currency contracts recover on dollar weakness

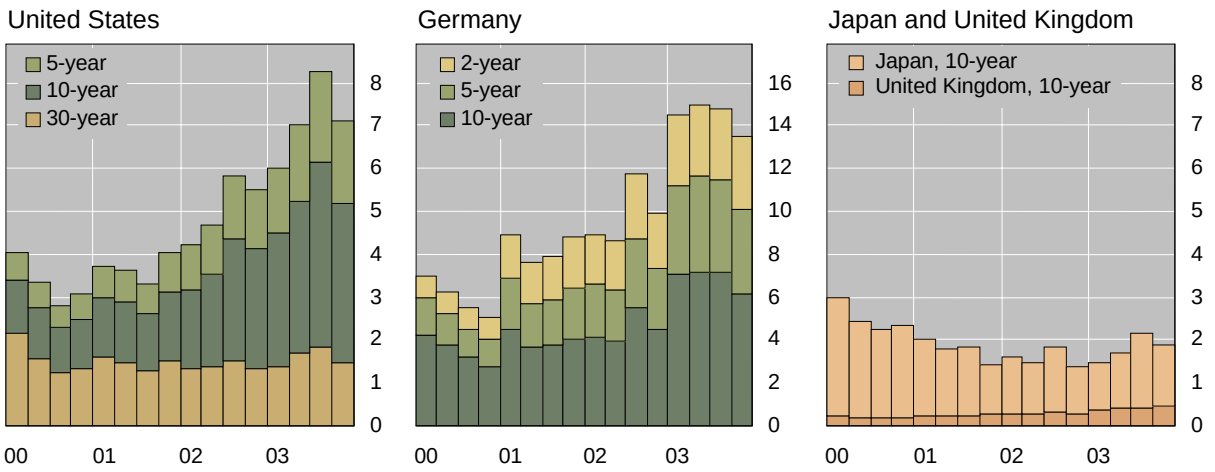
Exchange-traded currency contracts, which account for less than 1% of overall turnover in financial instruments, grew by 51% to $4.4 trillion in 2003. Such contracts appear to have been recovering in recent years from a long period of stagnation. This recovery stems largely from a significant increase in the turnover of dollar/euro futures on the Chicago Mercantile Exchange (CME), the largest marketplace in the world for exchange-traded currency contracts. Trading in such contracts was boosted by protection-seeking as the dollar depreciated sharply in the foreign exchange market. Trading in dollar/yen futures also rose notably, fuelled by the G7 countries' call in September for more exchange rate flexibility. Market participants noted that the introduction by the CME of round-the-clock electronic trading for its currency contracts in April 2001 had helped enlarge the pool of traders in such instruments. Electronic trading may enable exchanges to compete more effectively with the much larger OTC market for currency instruments.

Commodity contracts grow with the rise of commodity prices

Business in commodity contracts, as measured by the number of contracts traded, also expanded in 2003. Overall, turnover rose by 10% to 530 million contracts. Trading in contracts on precious and non-precious metals, which together account for one third of total turnover in commodity contracts, was particularly brisk, up by 26% and 30% respectively. Activity in contracts on non-precious metals appears to have been fuelled by stronger expectations of a pickup in global economic activity. Transactions in contracts on precious metals, especially gold, mirrored to some extent the movements of the dollar, playing the role of safe asset when the slide in the US currency accelerated. By comparison, business in agricultural commodities and energy products was lacklustre, with turnover rising by 4% and 2% respectively.

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

contracts resulted largely from weaker activity in both futures and options on 10-year German government bonds, probably owing to reduced uncertainty in longer-term markets.

Drop in interest rate activity in Asia-Pacific ...

Trading in interest rate products in the Asia-Pacific region dropped by 11% to $10.3 trillion. There was a sharp contrast between the pattern of activity in Japan and Singapore, the two largest marketplaces for fixed income products in Asia, and that in Australia, which is the third most important centre. Business in Japan and Singapore contracted by 19% and 18% respectively, while that in Australia expanded by 15%. The lower volume of activity observed in Japan reflected calmer market conditions following the burst of speculative trading in the previous quarter (see the December 2003 issue of the *BIS Quarterly Review*). The slowdown observed in Singapore resulted largely from weaker activity in eurodollar contracts traded on that marketplace as traders anticipated steady US short-term rates. The buoyancy of turnover in Australia reflected a number of factors. First, the Reserve Bank of Australia's increase of its cash target rate in early November occurred slightly sooner than market participants had expected, leading to some readjustment of positions in the money and government bond markets. Second, government bond contracts were actively used by intermediaries to hedge a steady flow of corporate bond issues. Third, foreign investors demonstrated a strong appetite for bonds denominated in Australian dollars, possibly using government bond futures to fix the purchase price of securities ahead of their planned acquisition.

... except in Australia, where business rises sharply

Equity contracts expand despite falling volatility

Equity index derivatives grow ...

Trading in stock index contracts gained strength in the fourth quarter of last year. Turnover rose to $21.8 trillion, a 13% increase over the previous period. Growth was stronger for options than for futures, 19% against 7%, with

... more in Asia and in Europe ...

turnover reaching $12.8 trillion and $9.0 trillion respectively.[2] The growth in activity was substantially higher in Asia, up by 26% to $9 trillion, and in Europe, up by 10% to $4 trillion.[3] The buoyancy of trading in Asia reflected almost entirely a further increase in the turnover of options on the KOSPI 200 index traded on the Korea Stock Exchange. In Europe, business grew particularly rapidly on German exchanges, where trading expanded by 14%. Much of the increase was accounted for by contracts on the Dow Jones EURO STOXX 50 and the Dow Jones STOXX 50 indices. Activity in such indices seems to have been supported by concerns that the depreciation of the dollar could have adverse effects on the profitability of European export-oriented firms.

... than in the United States ...

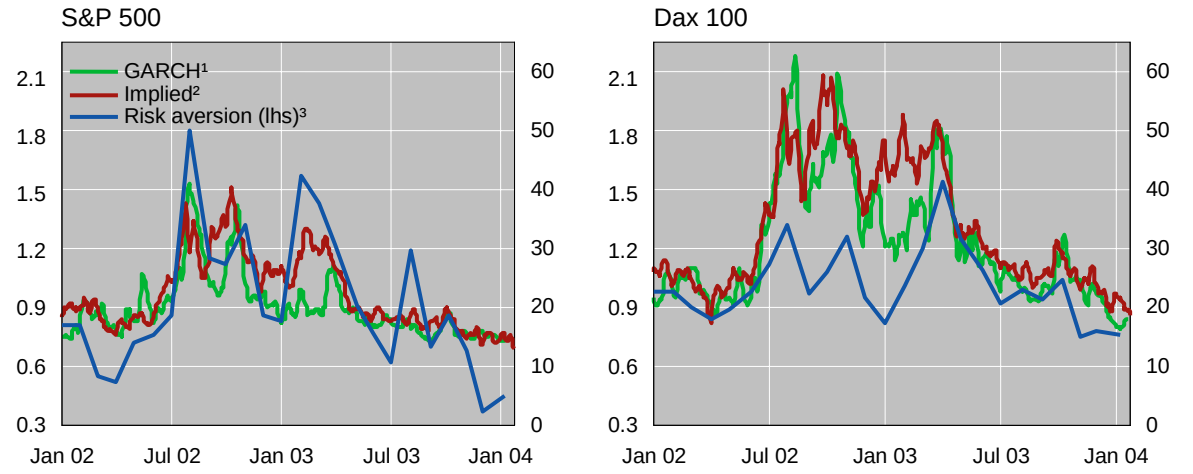
Derivatives business grew at a comparatively slower pace in North America, with transactions on US exchanges expanding by 3% to $8 trillion. The rise in activity on US marketplaces derived almost entirely from options on the S&P 500 index traded on the Chicago Board Options Exchange (CBOE).

... despite lower volatility

This increase in global activity was somewhat surprising given that it coincided with a further decline in market uncertainty. Implied and realised volatilities continued to fall from the peaks reached in 2002 (Graph 4.4), a development that should have limited the demand for insurance against market

Volatility of major equity markets

Five-day moving averages



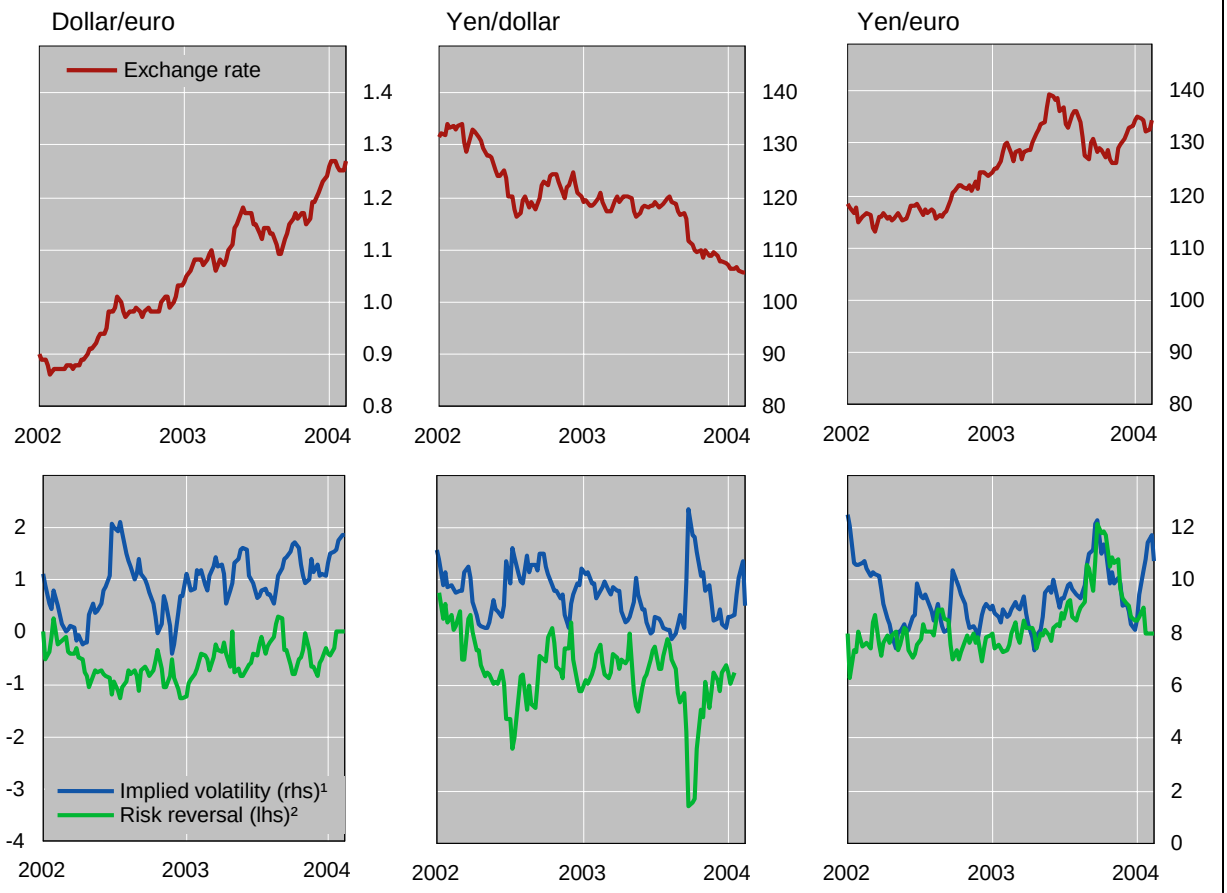
[1] Annualised conditional volatility of daily stock returns from a GARCH(1,1) model. [2] Volatility implied by the prices of at-the-money call options. [3] Monthly calculation (interpolated).

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

[2] When changes are calculated over the corresponding quarter of the preceding year, thereby controlling for the presence of seasonal factors, the rise in stock index derivatives trading in the last quarter of 2003 is even larger, with turnover expanding by 28%, for both futures and options.

[3] The growth in the dollar value of European activity resulted largely from a 6% increase in the average value of the euro relative to the US dollar between the third and fourth quarters of 2003. Exchange rate effects worked in the other direction in Asia, where the dollar value of trading in Korean contracts was weakened by a 4% depreciation of the Korean won against the dollar.

Exchange rates, implied volatilities and risk reversals



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

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

risk offered by options. At the same time, however, other factors may have induced a shift in the cost of protection against downside risk. Among these factors, the market price of risk, as measured by the coefficient of risk aversion calculated from stock index options, has followed a downward trend since mid-2002 (see the Overview).

... and wider disagreement about future growth

The higher volume of trading could perhaps be explained by an unusual degree of disagreement between agents about the strength of the global economic recovery. Asset trading naturally arises when economic agents entertain divergent opinions about the evolution of fundamental variables. This appears to have been the case since March 2003, with analysts surveyed by Consensus Economics showing increasingly diverging views about expected GDP growth in the United States and Europe in 2004. For the United States, their forecasts ranged from 3.7 to 5.1% in November, compared to a range of 3.3–4.4% in September.

Along with derivatives on stock indices, contracts on individual equities also expanded in the fourth quarter, with turnover, measured by the number of contracts, growing by 7%. Options account for 97% of turnover, and over half

of these are traded on US exchanges. Global activity in such contracts remains concentrated on the International Securities Exchange and the CBOE. In the fourth quarter the use of these instruments grew sharply in the United States, by nearly 20%, and also in Asia, although activity slowed down almost everywhere in Europe, notably in France and Germany.

Dollar weakness boosts currency contracts

Currency futures expand ...

The turnover of exchange-traded currency derivatives, whose value represents only a small fraction of exchange-traded financial derivatives surveyed by the BIS, reached a notional amount of $1.2 trillion in the last quarter of 2003, a 9% increase. The rise in activity stemmed almost entirely from futures, for which turnover expanded by 10% to $1.1 trillion. Trading of currency derivatives remains concentrated on US-based exchanges, which account for nearly 90% of global turnover.

... on expectations of a weakening dollar

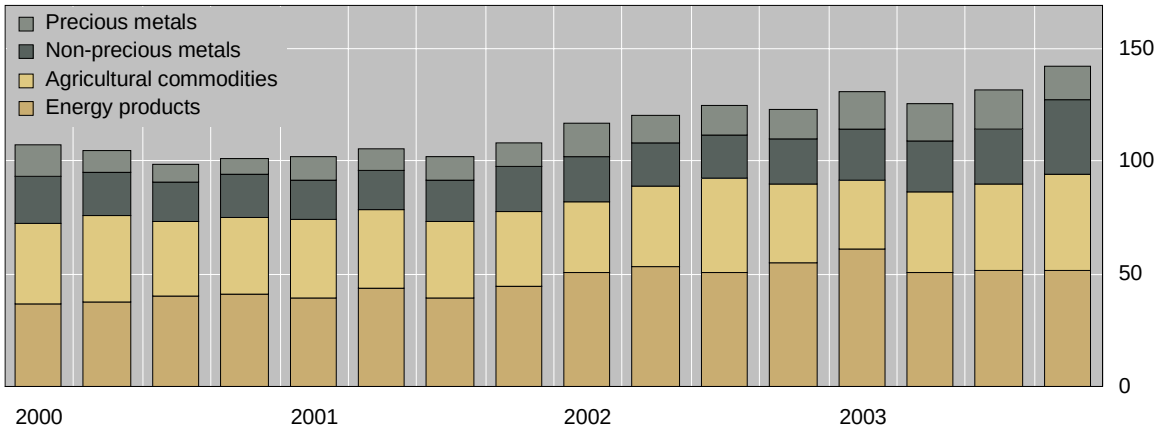
Activity seems to have been influenced recently by the movements of the dollar, with futures growing particularly sharply in December, when the US currency slid below the $1.2 threshold against the euro. The increase was fuelled by customers seeking protection against persistent expectations of dollar depreciation, against both the euro and the yen, as illustrated by the risk reversal indicator implicit in currency options prices (Graph 4.5).

Global recovery and flight to safety drive commodity contracts

The turnover of derivatives on commodities, measured by the number of contracts traded, expanded by 8% in the last quarter of 2003. Trading was particularly brisk for non-precious metals, which grew by 36% (Graph 4.6). Activity in these derivatives, mostly represented by futures, was driven by positive revisions to expected GDP growth in most areas of the world.

Turnover of exchange-traded commodity contracts by underlying type of commodity

Number of contracts (millions)



Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 4.6

Gold seen as a safe asset

Activity in derivatives on precious metals declined by almost 20% during the most recent review period. However, open interest in such contracts, which measures positions opened but not yet closed, rose by 57% between the end of 2002 and the end of the third quarter of 2003. This suggests that precious metals may have played the role of safe assets in a period characterised by marked dollar weakness. Open interest subsequently returned to the levels prevailing in late 2002, probably because the remarkable increase in the price of gold led many investors to take profits by either exercising their options or closing their futures positions.

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Household debt and the macroeconomy[1]

Lower interest rates and an easing of liquidity constraints have led to a substantial rise in household debt over the past two decades. The greater indebtedness has made the household sector more sensitive to changes in interest rates, income and asset prices. This enhanced sensitivity is higher where more households have variable instead of fixed rate mortgages.

JEL classification: E210, E520.

Household borrowing has increased considerably in a number of developed countries over the past two decades, both in absolute terms and relative to household incomes. This has raised concerns about the sustainability of household debt, and the implications for the stability of the financial system if it is not sustainable.

Much of the increase in household borrowing can be attributed to two factors: the decrease in the prevalence of credit rationing that followed from the financial deregulation of the early 1980s; and the reduction in interest rates, both in real and nominal terms, as inflation declined over the past two decades. These factors have contributed to a significant easing of liquidity constraints on households.

Regardless of whether the increase in household debt is sustainable, the greater indebtedness has important macroeconomic implications. The household sector will be more sensitive to movements in interest rates, particularly if they are unexpected, and to changes in income, most notably arising from unemployment. This enhanced sensitivity depends critically on the share of fixed versus variable rate mortgages held by households, with the sensitivity increasing more in those countries with predominantly variable rate mortgages. Moreover, in some countries part of the recent expansion in household borrowing has taken the form of a withdrawal of equity from the housing stock, which has provided a substantial boost to consumption spending. If this process of housing equity withdrawal were to slow or reverse,

[1] This article was written while the author was at the BIS and the Massachusetts Institute of Technology, on leave from the Reserve Bank of Australia. The views expressed in this article are those of the author and do not necessarily reflect those of the BIS or the Reserve Bank of Australia. The author thanks Olivier Blanchard and Claudio Borio for helpful discussions and comments.

as might occur were house price growth to slow or mortgage rates to rise, there could be a sizeable negative effect on the macroeconomy.

This special feature first discusses the increase in household borrowing that has occurred. It then briefly presents some factors that are likely to have contributed to this situation. Finally, it examines the macroeconomic implications of increased household indebtedness.[2]

Facts

Household debt has risen substantially

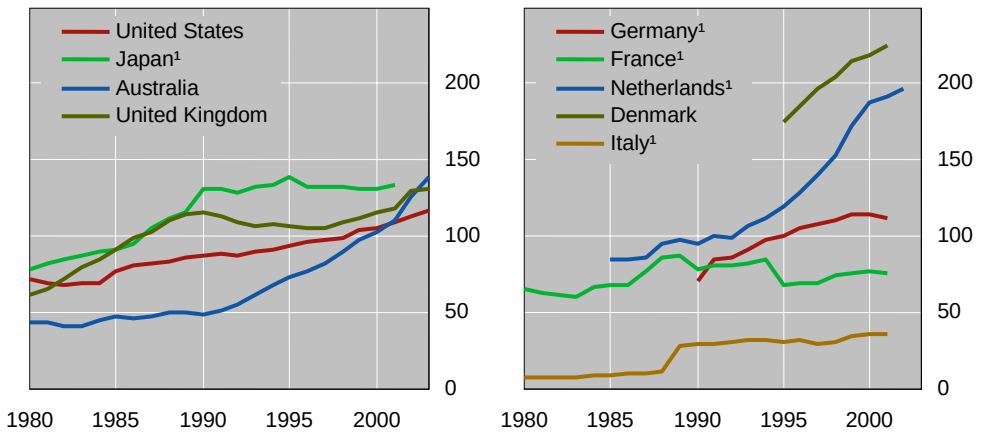
In most developed countries, the growth in household debt over the past two decades has exceeded that of income. However, the timing, extent and rate of the increase have varied considerably across countries. As shown in Graph 1, household indebtedness rose substantially in the 1980s in France, Japan and the United Kingdom, and in the 1990s in Australia and the Netherlands. The graph also shows considerable variation across countries.

Much of the borrowing has been for housing

In every country, the bulk of the increase in household debt has been in the form of borrowing for housing. For example, such borrowing currently accounts for around 75% of total household debt in the United States and the United Kingdom and around 60% in France and Germany, while in Australia it accounts for 85%. Although growth in borrowing for other purposes, particularly in the form of credit card debt, has also exceeded that of income over this period, it comprises a markedly smaller share of total household debt.

Household debt/income ratio

In percentages



¹ Includes unincorporated sector.

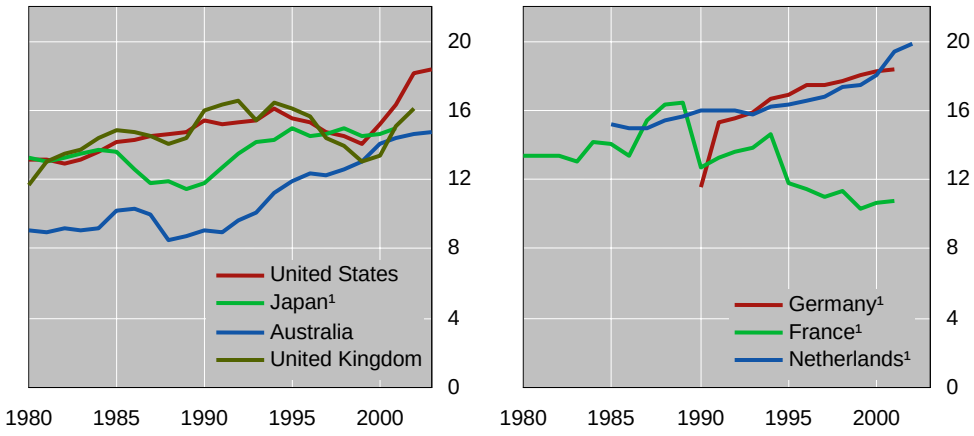
Sources: OECD; central banks.

Graph 1

[2] For a discussion of similar issues see: for Australia, Macfarlane (2003); for Ireland, Kearns (2003); for Norway, Gjedrem (2003); for the United Kingdom, HM Treasury (2003), Nickell (2003) and Tucker (2003); as well as recent Financial Stability Reports for Finland and Sweden inter alia.

Household debt/asset ratio

In percentages



[1] Includes unincorporated sector.

Sources: OECD; central banks. Graph 2

Scaling the amount of household borrowing by household income enables a comparison across time and across countries, but it does not necessarily provide a suitable benchmark for determining whether the amount of borrowing is excessive. When assessing the borrowing decisions of a corporation, a measure of gearing – the level of debt relative to the assets of the firm – is generally used, or a measure of interest cover such as debt service as a share of income. Similar measures for the household sector may be more appropriate when considering debt sustainability. The leverage of households can be calculated by scaling household debt by the value of household assets. The interest cover can be measured by dividing household loan repayments (which include both interest payments and required principal repayments) by a measure of household disposable income.

Leverage has not increased greatly …

Using the assets of the household sector as the scaling factor, the leverage of the sector does not increase nearly as dramatically. Graph 2 shows that leverage ratios have generally risen by no more than 5 percentage points; in the case of France, the ratio has actually decreased. In large part, this reflects the concomitant increase in house prices that has occurred in most countries, although in some instances it also reflects an increase in the value of equity wealth.[3] Were house prices to fall, this measure of household gearing would deteriorate rapidly, as the value of household assets declined but the associated debt did not. Hence care must be taken in using this measure to assess the sustainability of household debt.

… nor has debt service

The interest cover of households does not show a clear upward trend in most countries. The effect of the increase in household indebtedness has been offset by the decline in borrowing rates so that, on average, households are not

[3] The articles by Borio and McGuire, and Tsatsaronis and Zhu in this issue of the *BIS Quarterly Review* examine possible causes of the growth in house prices.

devoting any greater share of their income to debt service than in the past.[4] However, in some countries, debt service is already close to historical highs, and would rise further were mortgage rates to increase.

Indebtedness varies considerably across households

The aggregate numbers on the indebtedness of the household sector conceal substantial variation in the distribution of the debt across individual households. For example, according to the 2001 *Survey of consumer finances* in the United States, only around 45% of households have mortgage debt, while around one quarter of households hold no debt at all. In addition, cross-sectional data from Australia, Sweden and the United States show a hump-shaped pattern of debt relative to age. In aggregate, young households carry comparatively little debt relative to income (although young households that have debt have very high levels of debt relative to income). This hump-shaped pattern follows that of home ownership, reflecting the fact that housing debt accounts for the bulk of household debt.

These distributional issues have important implications for the sustainability of the increase in debt, and for the macroeconomic consequences of the increase. Unfortunately, there is little data available on the change over time in the distribution of debt across households.

Why has debt increased?

Borrowing helps smooth consumption over the life cycle

A useful framework for examining trends in household borrowing is the life cycle model of Ando and Modigliani (1963). In periods during which income is low relative to the average lifetime income of the household, the household will borrow to fund current consumption, and repay the loan in periods during which income is high. As most households experience a rising income through their (working) life, debt will tend to be high relative to income early in life, and then gradually decline with age.

The presence of liquidity constraints complicates this story. Early in their working life, when income is relatively low, households may not be able to borrow as much as they desire. This particularly applies to the decision to purchase housing, which is the largest single expenditure a household undertakes. In most countries, financial institutions will not lend the full value of the dwelling being purchased, requiring the household to contribute to the cost of the purchase. Hence younger households are required to rent while saving for a down payment. As their incomes and savings grow, liquidity constraints are eased, so that households can borrow the large sum required to purchase a dwelling. This contributes to the hump-shaped pattern of household debt and home ownership over the life cycle that is observed in many countries.

Liquidity constraints have eased …

Liquidity constraints explain why changes in the structure of the lending market seem to have had such a significant effect on the extent of household borrowing. Financial deregulation occurred in nearly all developed economies

[4] This measure has the potential to misrepresent the effect of mortgage interest repayments on household cash flows because of changes in home ownership (Dynan et al 2003). If home ownership rates rise, households which were previously renting are substituting mortgage payments for rental payments, with considerably less effect on their disposable income net of housing costs than that suggested by the rise in their debt service ratio.

through the 1980s and 1990s, although the timing and extent of the deregulation varied considerably across countries. Thus a significant part of the growth in household borrowing may reflect a move from a suboptimally low (from the household's point of view) level of indebtedness in the period prior to financial deregulation to a higher level now that households are no longer liquidity constrained. This is likely to have allowed households to better structure their path of consumption spending over the life cycle.

… but still remain

Despite the deregulation that has occurred, there remain institutional features, particularly related to lending for housing, which still result in some households being liquidity constrained. Financial institutions generally set a limit on the amount of disposable income that a household can use to service its loan, thereby restricting the maximum amount it can borrow. This means the level of borrowing costs can affect household indebtedness beyond the direct effect of a reduction in the real cost of borrowing caused by a fall in real interest rates. Given a household's income, a decline in nominal interest rates will allow an increase in the maximum amount a financial institution will lend to the household (Stevens (1997) and Wadhwani (2002)).

Lower inflation can boost debt relative to income …

The effects of inflation and interest rates are illustrated in Graph 3 (see also Miles (1994), Bank of England (2002) and Reserve Bank of Australia (2003b)). Assume that a housing mortgage is taken out for 30 years and that payments are constant over the life of the mortgage. With a standard mortgage, in the early part of the loan, payments predominantly comprise interest payments with relatively little principal being repaid. Over the life of the loan, the share of interest payments in the monthly payment decreases, while the share of principal repayments increases.

… as interest rates are lower and income growth is slower

With higher rates of inflation, and concomitant higher nominal interest rates, the upfront payments are larger relative to income, while later payments decline considerably as a share of income. The nominal value of the repayments remains constant, but the real value drops rapidly because of higher growth in nominal household income. With lower inflation, the upfront payments on a mortgage of the same size are smaller relative to income, but decline less rapidly over the life of the loan, as the real value of the debt is eroded more slowly.[5] As inflation rates have fallen, the associated decline in nominal borrowing rates has allowed households to borrow larger amounts for a given limit on debt service.

The tax system also affects borrowing

The tax system also has an effect on household indebtedness, which varies with the rate of inflation. In a number of countries, mortgage interest payments on owner-occupied housing are tax-deductible and, in some cases, part of the principal may also be deducted.[6] In countries such as Finland, Norway and Sweden, negative after-tax real interest rates contributed to rapid growth in borrowing for housing in the second half of the 1980s.

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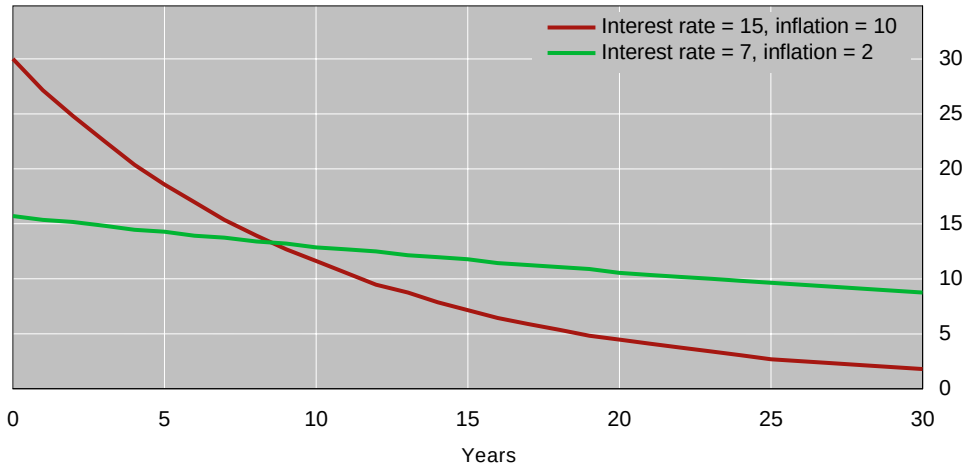
[5] Indeed, in a deflationary environment, repayments could conceivably rise as a share of income as the real value of the debt increases.

[6] Group of Ten (2003) describes the different tax treatment of housing across countries and the effect this has had on house prices and household borrowing.

Shares of debt service in household income

In percentages, over the life of the mortgage



Source: Author's calculations. Graph 3

In terms of the debt/income ratio, lower inflation has two effects. First, it boosts the numerator because of increased borrowing by households in response to the decline in nominal interest rates. Second, it will result in lower growth of nominal household income, so the nominal value of the debt is eroded more slowly for each individual household, thereby also boosting the aggregate household debt/income ratio.

Thus, much of the increase in household borrowing that has been observed can be explained by the combination of declining interest rates, in both real and nominal terms, and financial deregulation. For example, assume that interest rates fall from 15% to 7%, nominal income growth declines from 9% to 4% (a situation similar to the experience of some countries over the past two decades), and households borrow in such a way that their initial repayment is 30% of income. This could lead to a more than doubling of the aggregate household debt/income ratio (Reserve Bank of Australia (2003b)). Barnes and Young (2003) conduct a similar exercise for the United States and show that much of the growth in household debt in the 1990s can be explained by these factors (although not the increase observed in the 1980s).

Macroeconomic implications

Regardless of whether households have "over-borrowed", the larger stock of household debt has important macroeconomic implications. These include the increased sensitivity of the household sector to fluctuations in income, interest rates and house prices. In some countries, there may also be a reversal in the process of housing equity withdrawal, which has provided a boost to consumption in recent years.

Households will be more sensitive to …

As mentioned above, the decline in inflation has had two effects on household borrowing. First, the reduction in borrowing costs has allowed a greater number of households to borrow and/or increased the average level of debt per borrowing household. Thus, in a number of countries, aggregate debt

service ratios are currently close to the highest levels of the past few decades, despite the fall in interest rates. Second, with lower inflation, the real value of the debt (which is fixed in nominal terms) is not eroded as fast as in the past. Households may be surprised in later years by the proportion of income still required to service their debt, and hence have lower than desired consumption. The higher aggregate debt/income ratio means that households will be more exposed to shocks, and will also remain exposed for a longer period of time than in the past.

Declines in household income

… declines in income, in particular via unemployment …

The largest and most significant negative shock to household income is unemployment. Greater household indebtedness and higher debt service levels will heighten the sensitivity of households to a rise in unemployment, amplifying the effect of a negative shock to the economy. Households with debt will find it more difficult to maintain their mortgage payments through a period of unemployment, and hence will be more likely to default. This has the potential to increase the incidence of distressed selling, the likelihood of a downward spiral in house prices and the incidence of negative equity (where the value of the house falls below the outstanding mortgage). Such developments would be particularly unwelcome if the source of the unemployment shock were already placing downward pressure on house prices. Financing difficulties would be even more acute if the rise in unemployment were associated with higher interest rates, as for example occurred in Scandinavia and the United Kingdom in the early 1990s. For related reasons, greater household indebtedness might also reduce the ability of households to relocate in search of employment in a downturn.[7]

Admittedly, unemployment generally affects only a relatively small section of the population, and the degree of overlap between those households with a higher risk of unemployment and those with high debt levels has historically been low. Nevertheless, because households now have higher debt service levels for longer, they are more likely to experience a spell of unemployment while debt service is still a significant share of household income.

Declines in house prices

… declines in house prices …

Even in the absence of a downturn, increased indebtedness means that the household sector is more exposed to falls in house prices that result in negative equity. The primary impact of such a fall might be lower consumer confidence and reduced household spending, exacerbated by a turnaround in housing equity withdrawal (see below). Household financial distress need not increase, however, as it is primarily a function of the household's ability to

[7] That is, the need to sell the house to repay the mortgage may substantially increase the cost of searching for employment in distant labour markets. Blanchard and Katz (1992) and Decressin and Fatas (1995) highlight the importance of labour mobility in the United States and Europe. Gardner et al (2001) and ECB (2003) examine the relationship between home ownership and labour mobility.

service the mortgage. This is determined by the interest rate on the mortgage and the household's income rather than by the value of the house itself.

Changes in interest rates

… and changes in interest rates

Changes in interest rates will generally affect a much greater number of households than a rise in unemployment. The sensitivity of the household sector to interest rate changes will depend critically on whether households mainly have fixed or variable (floating) rate mortgages, which varies considerably across countries (see Table 1).[8] It will also depend on the degree to which the change in interest rates was anticipated by households at the time they initiated their mortgage; that is, whether changes in interest rates are perceived to be consistent with the normal variation over the business cycle, or whether there has been a change in the interest rate regime involving a complete shift in the nominal term structure (for example, from a high to a low interest rate environment).

With fixed rate mortgages, the impact may be smaller

In those countries where mortgages predominantly have fixed rates, including France, Germany and the United States, movements in policy interest rates over the business cycle should, in theory, have only a small effect on mortgages. The borrowing rate is most closely related to longer-term interest rates and thereby the average policy interest rate expected to prevail over the life of the mortgage.

A change in the interest rate regime will have an asymmetric effect on households. If there is a downward shift in the interest rate regime, there is an incentive for existing borrowers to refinance their mortgages at the lower interest rate, thereby boosting the amount of household income available for other purposes, most notably consumption, as monthly mortgage payments are reduced. The extent to which this occurs will depend on the cost of refinancing, which is relatively low in Denmark and the United States, but relatively high in other countries with fixed mortgage rates (see the article by Frankel et al in this issue of the *BIS Quarterly Review*). If there is an upward shift in the interest rate regime, existing fixed rate borrowers will be shielded from the effects of

Predominant type of household mortgage interest rate			
Australia	Variable	Italy	Mixed
Austria	Fixed	Japan	Mixed
Belgium	Fixed	Netherlands	Fixed
Canada	Fixed	Norway	Variable
Denmark	Fixed	Portugal	Variable
Finland	Variable	Spain	Variable
France	Fixed	Sweden	Variable
Germany	Fixed	Switzerland	Variable
Greece	Variable	United Kingdom	Variable
Ireland	Variable	United States	Fixed

Sources: Borio (1995), based on majority of the stock of mortgages; ECB (2003). Table 1

[8] For a similar discussion of this issue, see Miles (1994, 2003) and FSA (2001).

the rising interest rates; only prospective new borrowers will be affected and the magnitude of this latter effect will be little influenced by the level of aggregate household debt.

The risk is borne by financial institutions and pension funds

While there may be no change in the impact on households of an upward shift in interest rates, the effect on lending institutions may be more pronounced, particularly if it comes after a period during which a large number of households have refinanced at lower interest rates. Financial institutions will be faced with higher funding costs but, with the bulk of their assets earning fixed rates, will not experience a rise in the return on these assets as interest rates rise. However, the greater securitisation of housing mortgages means that financial institutions may also be shielded from the increase. The end holders of the securitised product, which are generally pension funds, may thus be most exposed to the risk (IMF (2003)). The household sector still ultimately bears the risk, but as it is transmitted through changes in the value of pensions, there is likely to be a much more gradual adjustment in consumption. Hence the macroeconomic effect is likely to be smaller and/or more protracted than if the household is bearing the interest rate risk directly.

With variable mortgages, the household bears the risk

In countries where mortgages are predominantly variable (floating) rate, such as Australia, Ireland, Spain and the United Kingdom, the implications of increased household indebtedness are potentially much greater. Variable interest rates are more directly related to the policy interest rate, often changing one-for-one with it. In these cases households with mortgages, rather than financial institutions, directly bear the risk of interest rate fluctuations.

Households may be able to smooth the impact …

The size of the impact will again depend on whether the movement in interest rates is within the range of normal cyclical variation or is rather a shift in the interest rate regime. The impact of policy interest rate changes will be reduced to the extent that households treat the variable rate as effectively fixed over the life of the loan, and interest rates do vary over the cycle within the range that has been anticipated by households.[9] For example, if the interest rate is at a cyclical low, households may save the temporary decline in required repayments, with consumption being relatively unaffected. A simple way to save in such situations is to maintain the monthly repayments at a constant level, thereby paying off the loan principal faster than necessary. This prepayment buffer, which is built up when interest rates are low, will allow the household to also maintain constant mortgage payments as interest rates rise, again diluting the impact of these increases on consumption.

If there is a downward shift in interest rates that is perceived to be permanent, households may opt to increase their borrowing and/or their spending on housing or other forms of consumption. When there is a permanent upward shift in the interest rate regime, only those borrowers whose repayments are at the minimum required will be affected initially. With no prepayment buffer, interest rate rises will directly feed into higher mortgage payments and hence reduce consumption approximately one-for-one. As

[9] Miles (2003) discusses some evidence that households expect the variable interest rate at which they initiated the mortgage to prevail over the whole life of the mortgage, even if it is only at a cyclical low.

interest rates continue to climb, the prepayment buffers of more and more households will be eroded, increasing the impact on consumption.

With the downward shift in interest rates over the past decade or so, it is possible that many indebted households are "ahead" on their mortgage payments (so that the duration of the mortgage is reduced). Hence, were interest rates to rise substantially, the effect on consumption might be smaller than would be suggested by the larger size of aggregate household debt. Offsetting this possibility, many households have re-borrowed at the lower rates of recent years and in some cases have taken advantage of the lower rates to increase the size of their mortgage, most notably to trade up to a larger dwelling.

... but sensitivity to interest rate changes is greater

Thus, in countries where mortgages are predominantly variable rate, the rise in household indebtedness is likely to have increased the potency of monetary policy. The effect may well be broadly symmetrical. However, the extent of the increase in potency will be diminished by the degree to which households regard variable rate mortgages as effectively fixed over the interest rate cycle.

Housing equity withdrawal

Greater tendency for withdrawal of housing equity

One aspect of the increase in household indebtedness which has had a marked impact on the macroeconomy has been the growing tendency of households to extract equity from the value of their houses to finance consumption or the purchase of other assets. This process of housing equity withdrawal has played a significant role in boosting consumption in a number of countries in recent years, most notably the United States, the United Kingdom, the Netherlands, Australia and Ireland. In the Netherlands, after providing a substantial boost for some time, this effect has recently been experienced in reverse. A significant decline in equity withdrawal has acted as a major drag on the economy over the past two years (Netherlands Bank (2003)).

Housing equity withdrawal can be measured as the difference between net borrowing by households secured against housing and spending by households on housing assets. The latter can take the form of either spending on new housing or upgrades to the existing housing stock (ie renovations). Households are extracting equity from the value of the housing stock when borrowing exceeds the spending on the housing stock, and injecting equity when spending on the housing stock exceeds borrowing.

Housing equity is easier to access

The ability of households to extract equity has been considerably strengthened by the greater availability of products such as home equity loans, and the lower transaction costs of using those products. Some products effectively provide a revolving credit line for households, secured against the house. This has enhanced the ability of households to smooth temporary declines in income, and also allowed them to borrow better against increases in expected future income by using their house as collateral, significantly easing liquidity constraints.[10]

[10] Whether a rise in house prices increases the net worth of the household sector is debatable. While house price rises boost the wealth of existing homeowners, they also reflect an

The equity extracted can be used for a number of purposes: increasing consumption spending on durable or non-durable goods and services; repaying other forms of debt; purchasing other assets such as shares or bank deposits, etc. As interest rates on debt secured against housing are generally lower than those on all other forms of household borrowing, there is a large incentive for households to consolidate other forms of borrowing into their mortgage. In particular, equity withdrawal may be used to finance durable goods consumption, which would otherwise be financed by borrowing at interest rates markedly higher than mortgage rates.[11]

Equity withdrawal boosts disposable income and consumption ...

Housing equity withdrawal has boosted both consumption and residential investment in those countries where it has been prevalent. In Australia, it is estimated to have increased household disposable income and thereby consumption growth by around 1 percentage point in each of the past four years (Reserve Bank of Australia (2003a)), while in the United Kingdom and the United States, equity withdrawal boosted household incomes by over 2% in 2000 (Davey (2001) and Deep and Domanski (2002)).[12] In the opposite direction, the reversal of this process is estimated to have reduced growth in household consumption in the Netherlands by around 0.5 percentage points in 2001 and 2002 respectively, having raised it by 1 percentage point in 2000 (Netherlands Bank (2003)).

However, to continue to boost consumption, the amount of equity extracted needs to continue to rise each period. That is, equity withdrawal needs to keep growing to maintain consumption growth; simply maintaining the level of housing equity withdrawn constant will reduce consumption growth as the proportionate boost to income declines.

... but may be vulnerable to a slowdown in house price growth

Recently, equity withdrawal has occurred in a period of rising house prices. While there is still a considerable amount of equity that could potentially be extracted, it is also possible that, if house prices were to flatten out or fall, households would reduce the amount of equity being extracted or even revert to injecting housing equity. Hence the boost to household income and consumption provided by equity withdrawal could diminish or conceivably reverse were households to reassess the outlook for house prices.

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offsetting increase in the implicit rental cost of housing. There is a transfer of wealth within the household sector between current homeowners on the one hand and renters and future homeowners on the other. The fact that housing can also be used as collateral for borrowing for liquidity constrained households may explain the common finding of a positive effect of rising housing wealth on consumption.

[11] Using a slightly different concept of equity withdrawal, Canner et al (2002) estimated that, in 2001 and 2002, around one quarter of funds extracted from the value of the US housing stock through mortgage refinancing was used to repay other debts (although this happened in over half of the refinancing transactions), 16% was spent on consumption including on durables such as automobiles, 10% was invested in the stock market or in other financial instruments, 10% in businesses or other real estate, and one third was spent on home improvement.

[12] See McConnell et al (2003) for a discussion of the recent US experience.

Conclusion

The rise in household debt that has occurred over the past two decades reflects the response of households to lower interest rates and an easing of liquidity constraints. This is likely to have allowed households to achieve a more desirable path for lifetime consumption. However, the increased indebtedness has heightened the sensitivity of the household sector to changes in interest rates, income and asset prices. This is particularly the case in countries with mainly variable rate mortgages, where the household sector bears the risk of fluctuations in policy interest rates. In countries with more fixed rate mortgages, the household sector is shielded from the direct effects of policy interest rate changes, with the risk being borne instead by the end holder of the securitised mortgage. Hence the macroeconomic effects of greater indebtedness will be somewhat muted. If central banks factor these larger effects into their interest rate decisions, it is possible that the amplitude of policy interest rate cycles will be lower than in the past (ceteris paribus).

Increased household indebtedness, in and of itself, is not likely to be the source of a negative shock to the economy. Rather the primary macroeconomic implication will be to amplify shocks to the economy coming from other sources, particularly those that affect household incomes, most notably rises in unemployment. The macroeconomic effects of greater indebtedness will also depend on the distribution of the debt across the household sector. Unfortunately, less is known about this issue.

A related phenomenon has been increased borrowing by existing mortgage holders against their housing equity to finance consumption. This has helped to maintain consumption through the recent global slowdown. However, the experience of the Netherlands illustrates that any slowing or reversal of this process, which may result from a deceleration in house price growth, can also have a substantial negative impact on the macroeconomy.

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What drives housing price dynamics: cross-country evidence[1]

House prices generally depend on inflation, the yield curve and bank credit, but national differences in the mortgage markets also matter. House prices are more sensitive to short-term rates where floating rate mortgages are more widely used and more aggressive lending practices are associated with stronger feedback from prices to bank credit.

JEL classification: G120, G210, C320.

A house is the largest single asset of most households, and assets whose value is linked to residential real estate represent an important component of the aggregate portfolio of financial intermediaries. The behaviour of house prices, therefore, influences not only business cycle dynamics, through their effect on aggregate expenditure, but also the performance of the financial system, through their effect on the profitability and soundness of financial institutions. Understanding this behaviour is thus of key interest to central banks charged with maintaining price and financial stability.

Of particular importance from a policy perspective is the relationship between housing prices and the structure of mortgage finance markets. Because a house purchase generally requires external financing, the cost of mortgage credit and the conditions under which it becomes available play a major role in shaping the pattern of house price dynamics. Conversely, the servicing of outstanding mortgages, determined in part by the dynamics of house prices, has an impact on the health of lenders and their ability and willingness to extend credit.

In this article we use a common empirical framework to analyse the main forces that drive aggregate house prices across a number of industrialised countries. After discussing the common features in house price dynamics, we relate the broad differences across countries to distinguishing features of the national markets for housing finance. The most striking result emerging from this analysis is the dominance of inflation in the determination of real house prices despite marked differences in the individual aspects of national markets.

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

Another important result is that the feedback from house prices to credit growth is stronger in the case of countries with more market-sensitive valuation methods for mortgage accounting. This suggests that prudential rules may have an impact on the co-movement between residential real estate prices and the performance of the financial system.

The rest of this article is organised in two sections. The first section presents an overview of the determinants of house prices and the financing arrangements that prevail in the countries included in our analysis. The second section discusses our empirical findings and maps the variation in the relative importance of the different factors onto the structural characteristics of the various national markets.

The economics of house price determination

House price cycles …

Residential real estate prices are characterised by long swings. Graph 1 plots inflation-adjusted house prices for 17 industrialised economies between 1970 and 2003. Each country experienced about two full cycles over this period of 33 years.[2] Moreover, most of the countries experienced a house price boom after the mid-1990s. In fact, the prolonged increase in house prices has outlasted the run-up in equity market valuations and, despite evidence of a slowdown in its rate of growth, does not show any signs of similar reversal.[3]

… differ across countries

This broad overall picture, however, ignores considerable differences in the experience of individual countries. During this period, housing price growth was particularly strong in Ireland, the Netherlands and the United Kingdom, which experienced average annual growth rates in excess of 11%. This group is followed closely by Australia, Spain and a number of Nordic countries, where the pace of growth has accelerated in more recent years. Residential property prices are currently at record levels in the United States, after a number of years of steady growth. At the other end of the spectrum one finds Germany and Switzerland, where prices have remained rather flat recently even though the latter experienced a boom and bust cycle in the late 1980s and early 1990s. Similarly, there has been a downward trend in real house prices in Japan since the bursting of the so-called “bubble economy” in the early 1990s. In the rest of this section we will discuss the main drivers of house prices that can account for some of the differences in the experience across these countries, paying particular attention to those factors related to the structure of mortgage financing.

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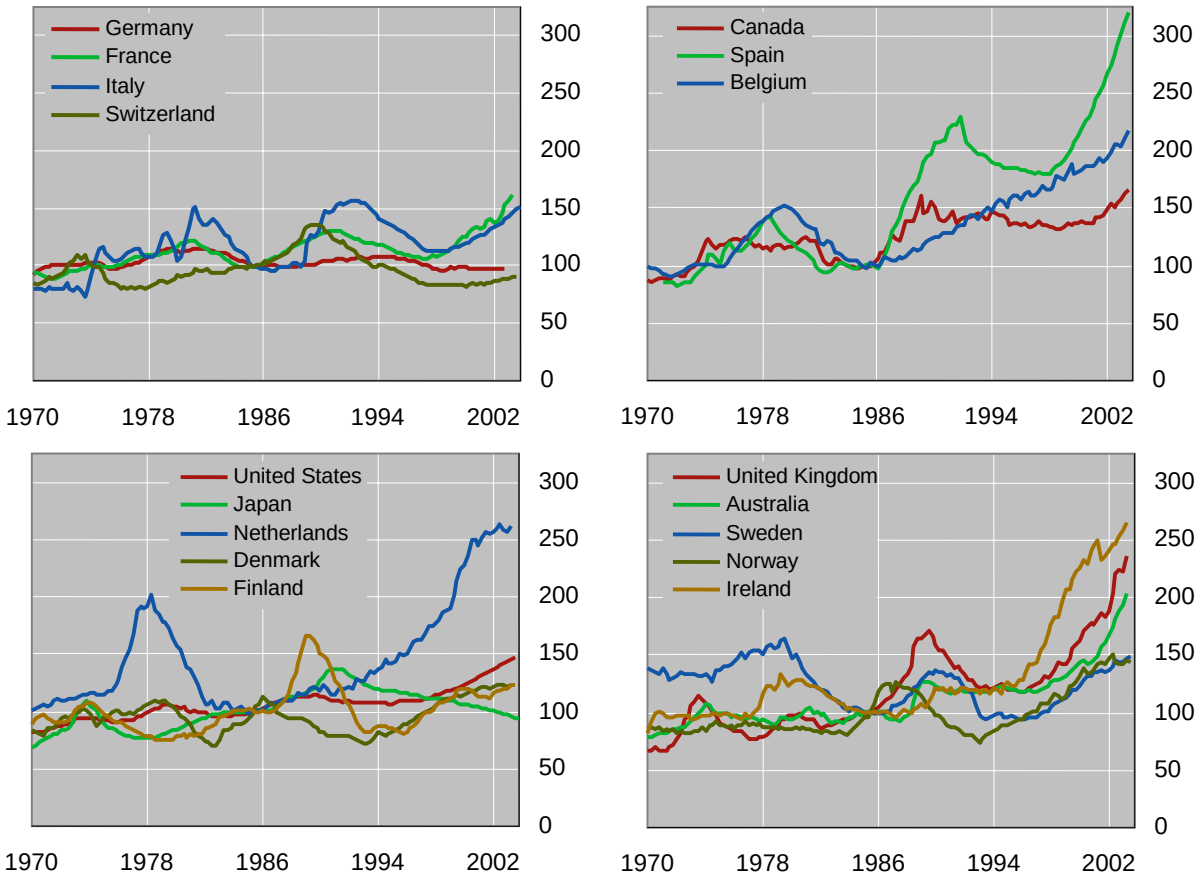
[2] The countries included in this study are: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States.

[3] For a more detailed analysis and discussion of the relationship between the turning points in the price cycles of equity and real estate markets, see Borio and McGuire (2004).

Inflation-adjusted house prices[1]

Quarterly data; 1985 = 100



[1] Nominal house prices deflated by the personal consumption deflator. For France, Germany, Italy and Japan, quarterly house price data are derived from lower-frequency data using Ginsburgh interpolation techniques.

Sources: Japan Real Estate Institute; Nomisma; national data; BIS calculations. Graph 1

The determinants of house prices

Long-term determinants ...

A useful distinction in the demand and supply factors that drive real housing prices is between those that have a longer-term influence and those that affect shorter-term dynamics. Factors that influence the demand for housing over longer horizons include growth in household disposable income, gradual shifts in demographics (such as the relative size of older and younger generations), permanent features of the tax system that might encourage home ownership as opposed to other forms of wealth accumulation, and the average level of interest rates (possibly related to the long-run behaviour of inflation). The availability and cost of land, the cost of construction and investments in the improvement of the quality of the existing housing stock are longer-term determinants of housing supply.

... and short-term factors

Housing markets, however, are intrinsically local in character. As such, the growth of the housing stock can be constrained in the short run as a result of a number of factors that include the length of the planning and construction phases and the inertia of existing land planning schemes. This suggests that idiosyncratic, national factors can lead to significant differences in the

dynamics of prices across countries.[4] One set of such factors relates to the prevailing conditions in the provision of financing for the purchase of housing. Another factor affecting the liquidity of the housing market is the specific transaction cost framework such as the level of VAT, stamp and registration duties and inheritance taxes. Finally, the uncertainty about future prospects that follows periods of heightened volatility in housing prices tends to lead to a more cautious response of housing construction to shifts in demand because of the inherent irreversibility of this type of investment.

Housing finance

Predominant reliance on debt financing

Housing investment decisions, more than any other category of household expenditure, depend critically on the availability, cost and flexibility of debt financing. These factors are likely to drive shifts in housing demand in the short term together with returns in other asset classes, which determine the opportunity cost of real estate investments. Given the sluggish response of housing supply, these drivers of demand play a key role in shaping the short-term dynamics of house prices.

The impact of interest rates …

A declining interest rate environment, which keeps servicing costs of ever larger mortgages within the household budget limits imposed by current income, typically boosts the demand for residential real estate. One distinction is between countries where mortgage loans are primarily extended on the basis of floating rate contracts, and hence payments are more sensitive to the gyrations of short-term rates (eg the United Kingdom), and those where fixed rate contracts dominate (eg the United States and many continental European countries).

… securitisation …

The residential real estate market has benefited from the increased reliance on market-based channels of financing. The spread of credit scoring methods and standardised mortgage contracts, coupled with a growing appetite for tradable instruments among portfolio institutional investors, has led to the growing securitisation of mortgage assets. Credit institutions that used to hold a large volume of mortgages on their balance sheets have the option to focus on their comparative advantage in origination and servicing and to sell any unwanted exposure in the secondary market. This market is most advanced in the United States, where the role of government-sponsored agencies, which were created for this purpose, has been instrumental. However, it is also growing rapidly in other countries, benefiting from advances in computing and financial technology and recent innovations in the legal framework that governs these transactions.

… home equity extraction …

Some of the benefits from the reduction in the cost of origination and the improved liquidity of mortgage assets have been passed on to households in the form of lower transaction fees and more flexible mortgage contract terms. A manifestation of this flexibility in the mortgage market has been the withdrawal of home equity by households to take advantage of low refinancing rates and

[4] Another implication is that the behaviour of national price averages obscures the existence of divergent trends in local residential markets within the same country. This analysis is, however, beyond the scope of the present article.

increased house values. The process has been particularly pronounced in the United States, the United Kingdom, the Netherlands and Australia, where house equity extraction has increased household financial resources relative to disposable income. This has recently helped to support aggregate consumption despite the marked slowdown in economic activity.

... and leverage and valuation

Finally, the details of mortgage accounting practices can influence creditors' appetite for exposure to the market and thus the potential feedback from house prices to the availability of finance. Important parameters in this respect are the existence and level of prudential ceilings on the loan-to-value (LTV) ratios that determine the ability of banks to lend against real estate collateral, and the valuation methods of property used in conjunction with these ceilings. Methods that base lending decisions on the current market value of the property would tend to increase the sensitivity of credit availability to market conditions and could possibly help to create a positive momentum in market demand. Conversely, valuations that are anchored to historical levels of prices would tend to lag current market trends, thus exerting a countercyclical influence on credit availability.

There is significant variation across countries in both business practices and the regulatory framework for mortgage finance. Table 1 shows the mortgage finance characteristics of the countries included in our analysis, as they apply to interest rate adjustability, the possibility of equity extraction, valuation and leverage practices, and the depth of the securitisation market.

Characteristics of mortgage markets in 17 industrialised countries

	Interest rate adjustment[1]	Mortgage equity withdrawal	Maximum LTV ratio (%)	Valuation method[2]	Securitisation (mortgage-backed)
Australia	V	Yes	80	OM	Yes
Belgium	F	No	80–85	OM	No
Canada	F	Unused	75	OM	Yes
Denmark	F	Yes	80	ML	No
Finland	V	Yes	75	OM	No[3]
France	F	No	80	OM	No[3]
Germany	F	No	60	ML	No[3]
Ireland	V	Yes	90	OM	Yes[3]
Italy	F	No	50	OM	No
Japan	F	Yes	80	OM	No
Netherlands	F	Yes	75	OM	Yes
Norway	V	Yes	80	OM	No
Spain	V	Unused	80	OM	Yes
Sweden	V	Yes	80	OM	No[3]
Switzerland	V	No	66	ML	No[3]
United Kingdom	V	Yes	90–100	OM	Yes
United States	F	Yes	75–80	OM	Yes

[1] F = fixed mortgage rates; V = variable mortgage rates. The classification is based on the majority of mortgage loans. It should be noted that the division is less clear in Japan and Sweden. Moreover, in the United States and Denmark, the very low cost of refinancing actually allows borrowers to adjust mortgage rates when interest rates fall. [2] OM = open market value; ML = mortgage lending value. [3] Securitisation was introduced at a certain stage but remained very limited.

Sources: Borio et al (2001); ECB (2003); HM Treasury (2003); OECD (2001). Table 1

In the next section we will exploit this diversity in explaining the cross-country variation in the importance of different economic variables in influencing house prices. For this purpose we classify countries into three groups on the basis of these characteristics. To do so, we rely on statistical classification techniques to form groups of countries that are broadly homogeneous with respect to those structural features of their mortgage finance markets.[5]

Three groups of countries

The analysis results in three groups of countries. Table 2 details the composition of the groups and their profiles in terms of mortgage finance characteristics. The first group mainly consists of continental European countries plus Canada and Ireland. In these countries, mortgage equity extraction is never used, and banks' lending practices (as measured by the relatively low LTV ratio and the use of historical property valuation) are more conservative. By contrast, in countries in the second and third groups the mechanisms that allow equity extraction are more developed and lending practices can be characterised as more "aggressive". This is particularly true in group 3, where the market value method is most popular and the maximum LTV ratios are all above 80%. The main attribute that distinguishes between groups 2 and 3 is the duration of mortgage debt. Interest rates are usually fixed for more than five years or until final maturity in the second group (eg the United States and Japan), whereas they are tied to market rates and subject to renegotiation on a regular basis in group 3 (represented by the United Kingdom and Australia).

Profiles of mortgage finance systems[1]

		Mortgage rate[2]	MEW[3]	Maximum LTV[4]	Valuation method[5]
Group 1	Belgium, Canada, France, Germany, Italy, Spain, Switzerland	0.29	0.00	0.43	0.71
Group 2	Denmark, Finland, Japan, Netherlands, United States	0.20	1.00	0.60	0.80
Group 3	Australia, Ireland, Norway, Sweden, United Kingdom	1.00	1.00	1.00	1.00
All countries		0.47	0.59	0.65	0.82

[1] Calculated based on the dummy variables defined below. [2] Floating mortgage rate arrangement = 1; fixed mortgage rate arrangement = 0. [3] Mortgage equity withdrawals. 0 = non-existence or negligible use of such an arrangement; 1 otherwise. [4] 1 = maximum LTV ratios above 75%; 0 otherwise. [5] 1 = use of market value; 0 = use of mortgage lending value.

Sources: BIS; authors' calculations. Table 2

[5] More specifically, we assign categorical numerical variables to each of those characteristics and use a statistical clustering algorithm, which determines the groups so as to maximise the commonality of characteristics for countries within each group and maximise the difference between countries that belong to different groups.

Measuring the impact of different factors: cross-country evidence

In this section we examine the impact of differences in the structure of national mortgage finance markets on the relationship between macroeconomic variables and housing prices. To this end, we employ a vector autoregression (VAR) model which allows us to capture the salient aspects of the dynamic interaction between inflation-adjusted housing prices and these selected mortgage variables on the basis of a minimal number of assumptions about the overall economic structure.

The empirical framework

Variables of interest …

The model includes five endogenous variables besides house price growth: (i) the growth rate of GDP, which provides a measure of the state of the business cycle and household income; (ii) the rate of inflation in consumer prices, which is the only nominal variable in the system; (iii) the real short-term interest rate, which is closely linked with the monetary policy stance; (iv) the term spread, defined as the difference in yield between a long-maturity government bond and the short rate; and (v) the growth rate in inflation-adjusted bank credit.

The economic motivation for the inclusion of these variables is fairly clear from the discussion in the previous section. What merits further discussion is the exclusion of some other factors that arguably have a bearing on the determination of house prices. We found that GDP growth summarises the information contained in other more direct measures of household income, such as unemployment and wages. We thus decided against including these variables on grounds of parsimony of specification. In addition, we experimented with the inclusion of equity market returns, a competing asset in household portfolios. This did not yield any significant coefficients. We interpret this as an indication that, in normal times, the co-movement between equity and housing prices is driven by their mutual link to business cycle dynamics and the yield curve. The regularities in the relationship between the peaks in the two markets obtained by Borio and McGuire (2004) relate to particular phases in their respective price cycles, which are quite distinct.

… and econometric technique

The estimated VAR is complemented by a number of identifying assumptions that allow us to attribute the observed dynamics of the six variables to movements (also referred to below as "innovations") in a set of six distinct factors, each associated with one of the endogenous variables. The full set of assumptions is discussed in the box on page 72. The "decomposition" of the observed variability of the endogenous variables over the sample to the six "innovations" provides a measure of their relative importance in the determination of the overall dynamics of the system. We present the results of this analysis in the next two sections.

What drives house prices?

We first discuss the general lessons that emerge from our empirical analysis, focusing on the commonalities across the 17 countries rather than their differences.

The SVAR (structural vector autoregression) framework

A VAR is a reduced-form linear dynamic simultaneous equation model in which all variables are treated as endogenous. A reduced form representation can be consistently estimated by regressing each variable on a number of lags of all endogenous variables. In this special feature, the variables of interest include house price inflation, the growth rate of GDP, the real short-term interest rate, the term spread, inflation and the growth rate of real bank credit to the private sector. The system is specified with four lags of the endogenous variables.

To examine the dynamic interactions among these variables, we adopt a number of assumptions about the structure of the economy in the form of implied relationships between a set of uncorrelated unobserved shocks (innovations) to the endogenous variables and the observed residuals from the estimated linear equations. Compared with other identification schemes, this method provides more flexibility and the results often turn out to be quite robust.

The constraints we impose are mainly derived from economic explanations of the contemporaneous effects among these variables. We consider output growth as the leading variable in the system, in the sense that its innovations immediately affect all other variables while the converse is not true. For house prices we have assumed the opposite: we allow for innovations in all other variables to have an immediate impact on prices. We further assume that monetary policy, and hence short-term real interest rates, respond to innovations in output growth and inflation, as suggested by a Taylor rule, while the slope of the yield curve is influenced by innovations in output growth and the short rate. Inflation is assumed to respond immediately only to changes in current economic conditions and to fluctuations in house prices since housing costs are an important component of the consumer basket. Finally, there are important connections between bank lending and house prices, which are often reinforced by the usage of real estate as collateral. Rising house prices strengthen the borrowing capacity of households and improve the performance of banks' mortgage portfolios. Conversely, changes in the lending attitudes of the banking sector influence housing demand and prices (see Zhu (2003)).

Based on these identifying assumptions, the key outputs of the structural VAR are the variance decomposition and impulse response functions. The variance decomposition enables the attribution of the observed variance of the forecast error for each endogenous variable to each of the identified structural innovations. Similarly, the estimated impulse responses refer to the dynamic response of the endogenous variables to standardised structural innovations and outline the propagation mechanism for these innovations through the estimated system. For example, in Graph 3 we show the response of house prices to a 1 percentage point change in the short-term interest rate over different horizons.

Overall, inflation is most important …

Our clearest result relates to the importance of inflation as a driver of housing prices. On average, across countries, inflation accounts for more than half of the total variation in house prices at the five-year horizon (Table 3, right-hand column). In the short run, the size of the impact is even larger. Its contribution nears 90% of the total price variation in the one-quarter horizon and drops to about two thirds over the one-year horizon. This strong influence of inflation is more important when one considers that house prices are measured in real terms.

There are two potential explanations for this finding. The first relates to the dual function of residential real estate as consumption good and investment vehicle. As such, it is often used by households as the main hedge against the risk that inflation might erode their wealth. The fact that the purchase of property is typically financed with nominal debt makes it more attractive in this respect. A high degree of inflation persistence (particularly over the sample period for our analysis) also suggests that the effects of innovations in inflation on house prices are likely to be felt over longer horizons. Higher uncertainty

levels about future expected returns on investments in bonds and equities associated with high inflation also contribute to the attractiveness of real estate as a vehicle for long-term savings.

The second explanation is linked to the impact of inflation on the cost of mortgage financing and generally suggests that higher inflation would have a negative impact on house prices. If financing decisions are more sensitive to the nominal yield curve than to real rates, one would expect housing demand, and thus real house prices, to respond to changes in inflation and to expected inflation. Given the specification of the VAR, some of this impact would be picked up by the inflation innovation since we include only real interest rates in the system.[6] In addition, inflation may also proxy for the prevailing financing conditions, which have an impact on the demand for real estate. High inflation and high nominal interest rates backload the repayment of the mortgage principal and increase the real value of repayment in the early part of the repayment period of the loan, thus dampening the demand for housing (see Debelle (2004) for a more elaborate exposition of this mechanism).

It is not easy to distinguish between these two hypotheses in the context of our framework. Our sample includes the 1970s, a period of high and variable inflation, as well as the low-inflation years since the early 1990s. Nevertheless, analysis over smaller samples reveals that both explanations might have been operational in different periods. The importance of inflation in explaining house price variance over the second half of the sample is considerably lower than during the earlier years. While inflation remains the single most important factor, its share in explaining the overall variance is halved, with the financing factors being the main beneficiaries.[7] Moreover, the sign and size of the associated impulse response functions confirm that the inflation hedge motive has not been a strong driver of housing demand over the past decade.

… followed by financing factors …

Second in importance among the drivers of house price dynamics are the three variables related to mortgage finance: bank credit, short-term interest rates and spreads. They are almost equally important, and together they explain about one third of the observed variance of house prices in the long run (Table 3). Regarding the direction of the impact, further results from impulse response function analysis indicate that decreases in real interest rates lead over time to increases in house prices. In particular, a negative 1 percentage point innovation in the real short-term interest rate leads to an increase of 1.2% in house prices over two years. Similarly, a flattening of the yield curve of that size has a positive cumulative impact on house prices in the range of 70–80 basis points over the course of the following two years. As discussed below, there are systematic differences in the impact of short and long rates across countries.

… while income explains little

A surprising result is that household income has a very small explanatory power over housing price movements. Its contribution over the long horizon is

[6] See also Borio and McGuire (2004).

[7] For the sample 1990–2003, inflation explains about 25% of the overall variance of house prices, and the shares of short-term rates and the spread rise to 15% and 18% respectively.

less than 10% of total housing price variability.[8] This sharp contrast with the role of interest rates suggests that purchasing decisions are more sensitive to the nominal amount of monthly payments than to the size of the loan in relation to household income. These results support the view (BIS (2003)) that, in recent years, the historically low interest rates have been the major contributor to the booming housing markets in most industrialised countries.

Mortgage finance arrangements and house price dynamics

Mortgage market structures matter …

While the results highlighted above are broadly shared across the different countries in our analysis, we discuss in this section systematic differences in their detail across the three groups identified on the basis of their mortgage finance structures. In the remainder of this article, we are particularly interested in whether these structural characteristics affect the dynamic interaction between housing prices and the other endogenous variables in our model.

The bottom row of Table 3 shows that the average growth of real house prices ranges between 1.5 and 2.4% per year, across the three groups. Likewise, the variability of this growth rate is roughly comparable with standard deviations hovering at about 5%. Graph 2 and the upper panel of Table 3 demonstrate, however, that the importance of innovations in different variables for the long-term variability of house prices differs substantially across the three groups. We discuss these differences below as they pertain to the relationship between housing prices, on the one hand, and inflation, the yield curve and bank credit, on the other.

Variance decomposition[1]

Impact on housing prices from a shock to:	Group 1	Group 2	Group 3	All countries
GDP	6.9	6.9	9.2	7.6
Bank credit	6.7	19.1	10.3	11.4
Housing prices	5.5	8.9	8.5	7.4
Short rate	10.3	8.7	13.8	10.8
Term spread	8.0	14.2	8.0	9.8
Inflation	62.5	42.3	50.3	53.0
Impact of a shock to housing prices on:	**Group 1**	**Group 2**	**Group 3**	**All countries**
GDP	5.4	3.8	7.7	5.6
Bank credit	6.9	5.2	15.1	8.8
Memo: Average growth rate of real house prices (annualised)[2]	*1.6% (4.9%)*	*1.5% (4.8%)*	*2.4% (5.6%)*	*2.0% (5.0%)*

[1] The numbers refer to the share of one variable's total variation that can be attributed to innovations in another variable, at the five-year horizon. The shares are calculated as averages for the group of countries identified in each column. [2] Standard deviation in parentheses.

Sources: BIS; authors' calculations. Table 3

[8] This result persists even if we use real wages instead of real GDP in the specification.

... for the importance of inflation ...

Our interpretation of the importance of property investments as a hedge to inflation is supported by the fact that the impact of inflation on housing prices is strongest for the first group of countries, which includes a number of countries that experienced long bouts of pronounced inflation rates during our sample. Innovations in inflation account for more than 60% of total house price variability for this group. This, coupled with the observation that the link between prices and credit is the weakest for these countries, suggests that housing values in these regions are more dependent on macroeconomic conditions. This could also be attributed to the fact that the almost exclusive reliance on non-funded pay-as-you-go pension systems in most countries has hampered the development of an equity investment culture among continental European households. Real estate investments offered, therefore, a reasonable defence against the erosion of the nominal value of household savings by inflation.[9]

... sensitivity to interest rates ...

The prevailing practice in the adjustment of mortgage rates is another factor that differentiates the three groups of countries. For those countries that use predominantly floating mortgage rates, the impact of short-term interest rates on house prices is much stronger. This is demonstrated most clearly by the comparison between the second and third groups of countries, which differ primarily on this aspect: floating rate contracts dominate in countries in the third group and fixed rate contracts in those in the second. The opposite is true for the effect of the term spread (and hence, the impact of the longer end of the yield curve) on housing prices. House prices in the group 2 countries, comprising primarily countries with a prevalence of fixed rate mortgages, show the highest sensitivity to innovations in the term spread. The level of the estimated average response of housing prices to innovations in the short-term rate (Graph 3) is also consistent with this analysis. In response to a 1% cut in real short-term interest rates, house price inflation would increase by 2.6% over five years in group 3 compared with only 1.8% in group 2.

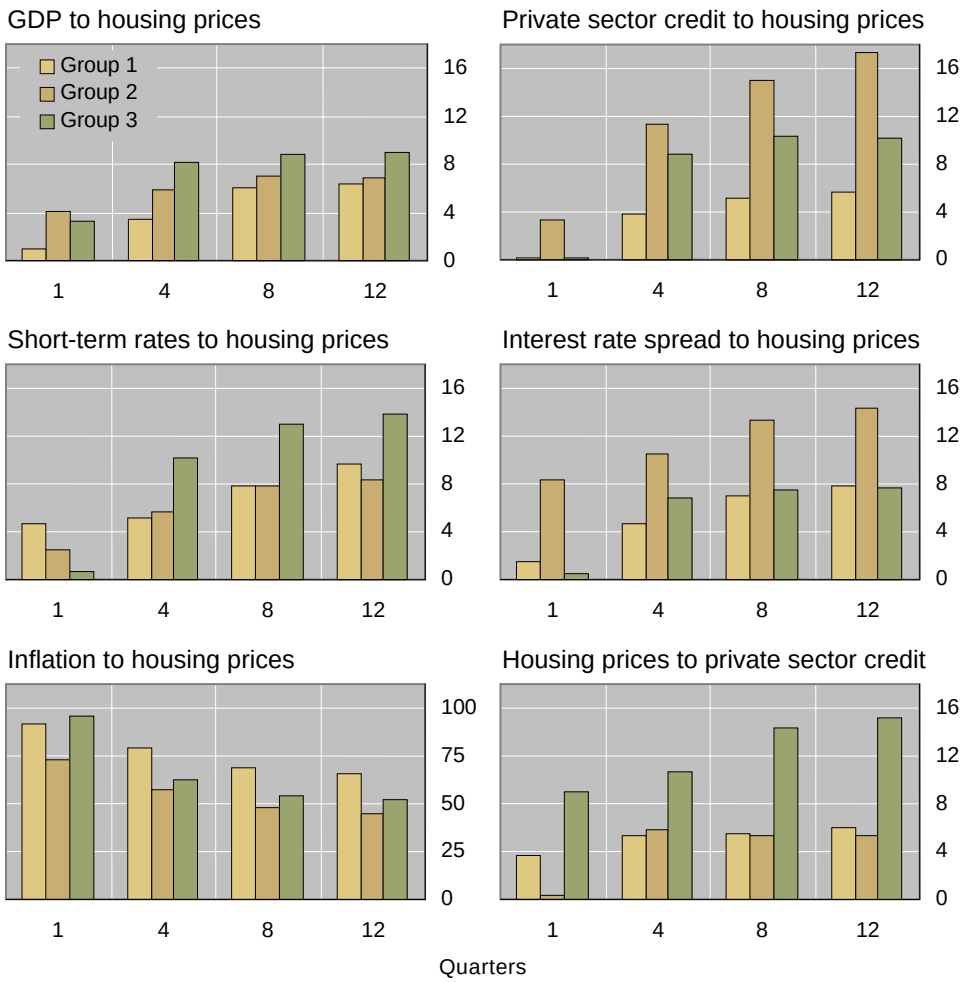
... the strength of the bank credit channel ...

Our results offer evidence that the interaction between bank credit and house prices is affected by the prevalent lending practice of mortgage lenders. The positive feedback between credit and property cycles is further reinforced when bank lending is highly dependent upon collateral values. Table 3 shows that for group 1 countries, where LTV ratios are lower and collateral valuation is more consistent with their long-term values, the links between bank credit and house prices, measured as the share of one variable's variance explained by the other, are the weakest at less than 7% in each direction. By contrast, innovations in credit are able to explain almost one fifth of house price variability for group 2 countries. In the third group, where approaches to valuation are most sensitive to market values and loan leverage is the highest, the amount of bank lending turns out to be most responsive to house price

[9] The analysis of the variance decomposition of house prices for the sample since 1990 shows that the three groups of countries do not differ with respect to the importance of inflation. This confirms our earlier assertion that the inflation hedge motive was stronger only during the high-inflation period of the earlier part of our sample.

Variance decomposition results

In percentages



Note: For a definition of the groups, refer to Table 2.

Source: Authors' calculations.

Graph 2

movements. Interestingly, such an impact occurs almost immediately (lower right-hand panel, Graph 2). This suggests that the risk of mutually reinforcing mechanisms between housing prices and credit giving rise to financial imbalances may be more pronounced for this group of countries.[10] We also conjecture that the relatively closer link between innovations in credit growth and housing prices for the second group of countries is also a factor that explains the greater responsiveness of the latter to interest rate movements. Arguably, lower real interest rates are typically associated with more abundant liquidity in the banking system and more liberal credit expansion.

… but not much for the wealth effect

Finally, our results can offer some suggestive evidence on the effects that structural aspects of national mortgage markets, such as the enhanced possibility of equity extraction and the development of markets for securitised

[10] For a general discussion of the procyclical mechanisms in the financial system which operate through the interaction of asset prices and credit growth, see Borio et al (2001).

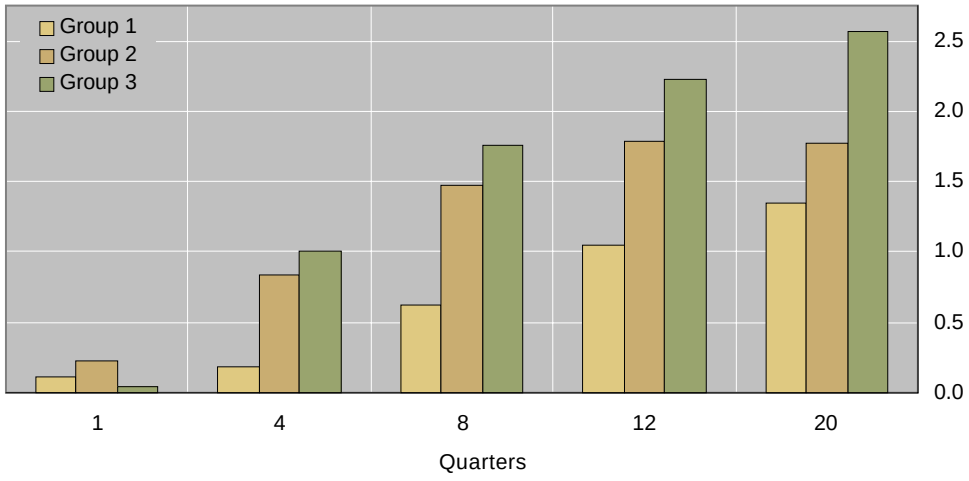
mortgages, have on house price dynamics. During the most recent downturn, the extraction of housing equity is considered to have been a major source of support for household expenditure in countries such as the United States, the United Kingdom and Australia (Deep and Domanski (2002), Debelle (2004)). Keeping in mind that these comparisons are based on sample data that pre-date the introduction of the possibility of equity extraction through mortgage refinancing, we find that the long-term impact of house prices on national income and bank lending does not seem different between countries with or without such arrangements. On the other hand, house price movements do generate more volatility in bank lending activity in the short run if mortgage equity withdrawal is used.[11]

Securitisation contributes to mortgage risk diversification

Regarding the impact of mortgage-backed securities (MBS) markets on the role of the banking sector in real estate cycles, we observe that countries with developed MBS markets (such as the United States, the United Kingdom, the Netherlands and Australia) show a lower effect of housing prices on bank credit.[12] This is consistent with the conjecture that mortgage securitisation allows banks to transfer some of the credit risk associated with mortgage loans to the capital market, hence reducing the sensitivity of the banking sector's lending capacity to the housing price cycle.

Cumulative response of house prices to a 1% fall in real short-term interest rates

In percentage points



Note: For a definition of the groups, refer to Table 2.

Source: Authors' calculations. Graph 3

[11] For countries where mortgage equity withdrawal is used, house price movements explain 8.3% of changes in bank credit over the next year. This number is 5.7% for the other countries.

[12] House price movements explain only 5.2% of the variation in bank credit in these four countries compared with 10% in the other countries.

Conclusions

In this article we have looked at the importance of a number of macroeconomic factors affecting the dynamics of residential real estate prices. Furthermore, we have linked cross-country differences in the intensity of these responses to structural features of the national markets for mortgage finance. While the level of generality of this discussion does not permit us to formulate precise policy recommendations, a number of general lessons emerge from these results.

The main lesson is related to the strong and long-lasting link between inflation and nominal interest rates on the one hand, and housing prices on the other. This link suggests that long periods of elevated inflation followed by a sharp deceleration of price growth may, in the shorter term, breed misalignments between house prices and longer-term determinants of residential real estate values. Situations like this might call for greater caution on the part of monetary authorities. Declines in the level of policy rates might encourage the momentum of house prices.

The second lesson relates to the implications of housing price growth for financial stability. The feedback from property prices to credit growth is strongest in countries with a greater prevalence of variable rate mortgages and more market-based property valuation practices for loan accounting. In these countries the risk of a build-up of mutually reinforcing imbalances in the real estate market and the financial sector is more pronounced, indicating that prudential authorities should closely monitor developments in property values.

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Twin peaks in equity and housing prices?[1]

The strength of housing markets around the world has helped to cushion the recent slowdown in global economic activity. How long should we expect this to continue? A sample of industrialised countries covering three decades allows us to explore this question through an analysis of major peaks in equity and housing prices, the associated booms and busts and the underlying credit conditions.

JEL classification: E300, E320.

Some three years after the global bust in equity markets, and despite a weak economic backdrop, housing prices have continued to rise in many countries. This remarkable buoyancy seems rather unusual by past experience and raises questions about the sustainability of current trends. Could housing prices falter any time soon? And if they do, could large declines be in store? Answers to these questions are particularly important at the current juncture, as the strength of housing markets has been a significant factor helping to cushion the slowdown in global economic activity that started in the autumn of 2000 and to underpin the subsequent recovery (BIS (2003)).

To cast light on these issues, we examine the evolution of housing prices in a sample of 13 industrial countries since the early 1970s in search of statistical regularities that might help us chart the future. We ask three questions. First, how often have major equity price peaks been followed by housing price peaks? Second, when they have, what has been the lag and what factors have affected it? Finally, what has determined the size of the subsequent fall in housing prices?

Methodologically, our analysis complements existing work in at least two ways. It focuses squarely on the relationship between housing and equity markets, the two asset classes that make up the bulk of private sector wealth. In addition, it pays particular attention to "extreme events", in the form of major peaks and troughs in the prices of these two assets, the associated booms and busts, and their link to unusually large fluctuations in credit. By contrast, much of the existing work analyses the average or typical relationship between

[1] We would like to thank Guy Debelle and Eli Remolona for useful comments and discussion. The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS.

housing prices and their determinants (eg Tsatsaronis and Zhu, in this *Quarterly Review*).[2]

We reach three main conclusions. First, over the period 1970–99, equity price peaks tended to be followed by housing price peaks, with an average lag of about two years. Econometric analysis indicates that equity price peaks heralded subsequent housing price peaks even after allowing for such traditional determinants of housing prices as interest rates, output growth and unemployment. Housing price peaks tended to occur in the wake of comparatively strong economic conditions, especially if these had been accompanied by unusually rapid and sustained credit and equity price growth ("financial imbalances"). Thus, on this evidence alone, the continued rise in housing prices since the equity price peak in 2001 does appear somewhat unusual. Second, movements in interest rates appear to have important implications for housing price dynamics. There is some evidence that reductions in interest rates following a peak in equity prices lengthen the lag while increases shorten it. The clearest link is with short-term nominal rates, regardless of country-specific characteristics of the housing market. This underscores the role of monetary policy. Finally, the subsequent decline in housing prices appears to have had a certain life of its own and to have been partly shaped by the characteristics of the previous expansion. Specifically, the size of the declines studied was closely and positively related to the size of the previous increases, as is typical of boom and bust cycles. And they were larger when preceded by a build-up of financial imbalances. These relationships are apparent over and above those with the evolution of economic activity during the decline in housing prices and with interest rates, which also seem to have exerted some influence.

In the next section we outline the relationship between housing and equity prices since the 1970s. In the following three sections we explore each of the key issues in turn, namely the predictive content of equity prices for subsequent housing price peaks, the determinants of the lag, and the factors that help explain the size of the subsequent decline. In the conclusion we infer some potential implications for the current cycle and outlook, paying attention to the statistical limitations of the exercise and to changes in the economic environment relative to previous episodes.

Cycles in equity and housing prices

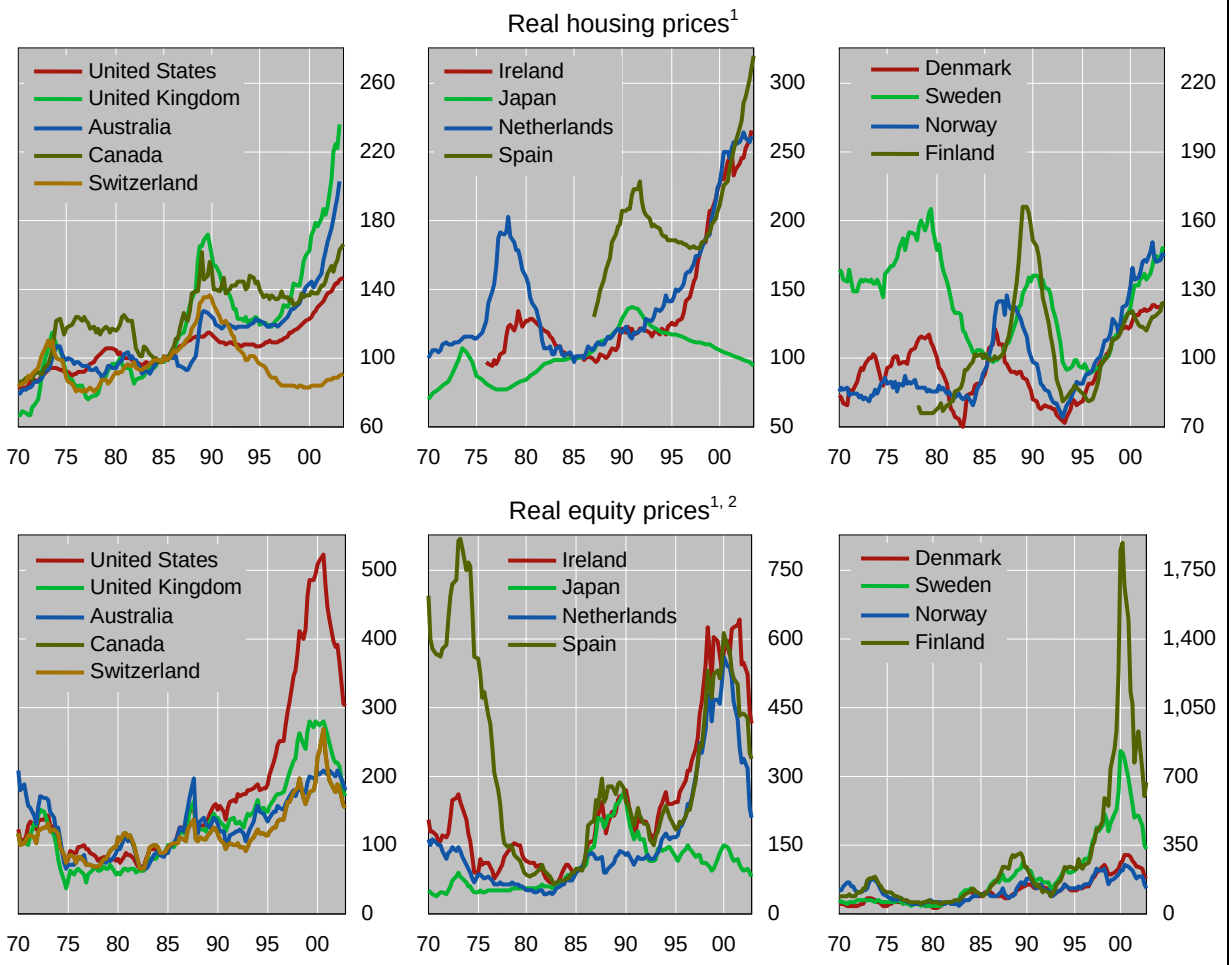
Since the early 1970s, a number of major cycles in both housing and equity prices (adjusted for inflation) have taken place in industrial countries, coinciding roughly with business fluctuations (Graph 1).[3] Visual inspection

[2] Exceptions include BIS (1993), Borio et al (1994) and, more recently, BIS (2003), IMF (2003) and Detken and Smets (2003).

[3] Throughout the rest of this paper, references to housing and equity prices imply inflation-adjusted prices. The sample of countries used in Graph 1 and in subsequent statistical analysis comprises Australia, Canada, Denmark, Finland, Ireland, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States. The housing

Equity and housing prices around the world

1985 = 100



[1] Nominal prices deflated by the personal consumption deflator. [2] National benchmark indices.

Sources: Japan Real Estate Institute; national data. Graph 1

indicates that these cycles have tended to cluster around four periods: the early to mid-1970s, the late 1970s to early 1980s, the late 1980s to early 1990s and, more recently, the late 1990s to early 2000s. The cycle in the late 1970s–early 1980s is smaller than the rest; the most recent one is not yet completed.

Peaks in housing and equity prices tend to occur in pairs

A closer look at the data reveals that there is a clear tendency for peaks in equity prices to precede peaks in housing prices (Table 1). To identify housing price peaks more formally, we consider a 13 quarter rolling window, intended to capture sizeable peaks broadly consistent with those that take place at business cycle frequencies.[4] Table 1 shows that most equity price peaks were

price series for Spain starts in 1987 Q1, that for Finland in 1978 Q2, and that for Ireland in 1976 Q1. For Japan, the semiannual land price series compiled by the Japan Real Estate Institute is used in place of housing prices. This is converted to quarterly data by taking the simple average of two adjacent periods.

[4] The corresponding rolling window for equity prices is 21 quarters. To ensure that only significant peaks are identified, the rise in the price since the trough following the previous peak must exceed a certain threshold. This threshold is set at the 10th percentile of all price

Housing and equity price peaks: stylised facts

Pairs of equity price and housing price peaks

Period[1]	Country	Housing price peak		Period[1]	Country	Housing price peak	
		Date	Lag			Date	Lag
1970–74	Denmark	1973 Q3	2	1985–91	Finland[2]	1985 Q1	45
	United Kingdom	1973 Q3	5		Denmark	1986 Q1	9
	Japan	1973 Q3	2		Norway[2]	1987 Q2	30
	United States	1973 Q4	4		Canada	1989 Q1	6
	Canada	1974 Q2	5		Australia	1989 Q2	7
	Norway	1974 Q4	5		Finland	1989 Q2	0
	Average lag length		3.8		United Kingdom	1989 Q3	8
1979–82	Denmark	1979 Q2	11		Switzerland	1989 Q4	9
	Ireland	1979 Q2	2		United States	1989 Q4	9
	United Kingdom	1980 Q3	5		Sweden	1990 Q1	2
	Canada	1981 Q1	1		Netherlands	1990 Q2	3
	Australia	1981 Q2	2		Ireland	1990 Q3	2
	Switzerland	1982 Q1	12		Japan	1991 Q1	5
	Average lag length		5.5		Spain	1991 Q4	17
					Average lag length		10.9

Note: The lag is the number of quarters between consecutive equity and housing price peaks. Independent equity price peaks, ie those followed by a second peak in equity prices prior to a peak in housing prices, occurred in the Netherlands (1986 Q3), Denmark (1990 Q1), Norway (1990 Q2), Australia (1994 Q1), Denmark (1994 Q1) and Spain (1994 Q1). An independent housing price peak, ie a peak where the previous peak in housing prices happened after the previous peak in equity prices, occurred in the United States (1979 Q2). Other peaks in housing prices are associated with equity price peaks which occurred prior to the start of the sample period. These include Switzerland (1973 Q3), Australia (1974 Q1), the Netherlands (1978 Q2) and Sweden (1979 Q3).

[1] Equity price peaks for the most recent cycle (1996–2002) are as follows: Japan (1996 Q2), Ireland (1998 Q2), the United Kingdom (1999 Q2), Japan (2000 Q1), the Netherlands (2000 Q1), Spain (2000 Q1), Sweden (2000 Q1), Finland (2000 Q2), Canada (2000 Q3), Norway (2000 Q3), Switzerland (2000 Q3), the United States (2000 Q3), Denmark (2000 Q4) and Australia (2002 Q1). [2] Equity prices in Norway spiked in 1987 Q3, one period following the peak in housing prices. However, this was not identified as a peak based on our algorithm settings. Housing price data for Finland start in 1978 Q1. Thus, it is possible that a peak in housing prices occurred in Finland after the peak in equity prices in 1973, but before the start of the housing price data, and that the reported 45 quarter lag is too long. In any case, this observation is not included in the regression analysis because of missing interest rate data for the early 1970s. Table 1

followed by housing price peaks. Indeed, we identify only five housing price peaks that were not preceded by equity price peaks.[5] The average lag has been some two years and has typically ranged between two and nine quarters. By comparison with the 1970s, the period surrounding the 1987 downturn in equity prices saw a relatively large number of equity-housing price peak pairs. Moreover, the average lag during this period was longer than that associated with the more inflationary 1970s–early 1980s, at seven quarters (once three

rises between peak and trough using the entire sample of countries and years. Admittedly, identifying precisely "true" housing price peaks is not that easy. Housing price series are not very homogeneous across countries in terms of coverage and methodological approaches. Moreover, for any given index, systematic changes in the composition of the stock of housing sold in the market at different points in the asset price cycle could bias the series. Even so, the broad picture is unlikely to be significantly affected.

[5] Because our equity data start in 1970, we are unable to identify clear peaks in equity prices for two housing price peaks which occur between 1970 and 1974. We err on the side of caution in classifying these housing price peaks as independent events.

outliers are removed) compared with close to four and 5.5 quarters respectively in the two preceding cases.

The lag between peaks in the current cycle is long by historical standards

Even compared with the 1987 period, however, the recent as yet unfinished cycle stands out. Three years after the global peak in equity prices and their subsequent collapse, real housing prices have continued to rise in many countries. By the second quarter of 2003, for instance, housing prices had appreciated by no less than 60% in the United Kingdom since the peak in equity prices in the second quarter of 1999. Similarly, they had increased by close to 50% in Spain, by around 20% in Australia, Canada and Sweden, and by 15% in the United States since the respective peaks in equity prices. The main exceptions to this sustained increase are countries where prices have not yet recovered from previous booms and busts, such as Japan and Switzerland. In these cases, prices have actually continued to fall or have risen only slightly recently. Moreover, although the rate of growth in housing prices has slowed in recent quarters in many countries, peaks generally still appear far away. Excluding Japan, housing prices continued to rise through the third quarter of 2003 in every country for which data are available. The year-over-year change in housing prices in the United States was approximately 4% per year in the third quarter, while that in Canada and Spain stood between 10 and 15% per year.

Why such an unusually long lag? A number of possible factors spring to mind. One possibility might be that, on balance, the slowdown in economic activity and the rise in unemployment have not been as large as on previous occasions, at least in comparison with the recessions of the 1970s and early 1980s. A related factor is that, contrary to the typical past experience, monetary policy was eased substantially following the most recent stock market bust and weakening in economic activity (Graph 2). This is because, in contrast to past cycles, the slowdown was not fundamentally triggered by a tightening of monetary policy to fend off rising inflation. Rather, it was ushered in by a largely spontaneous reversal in an investment and stock market boom which had been accompanied by rapid credit expansion. As a result, quiescent inflation has given central banks much more room for manoeuvre. While in the late 1980s the stock market crash elicited a qualitatively similar response, policy was subsequently tightened more quickly, as economic activity proved more resilient and inflationary pressures emerged in a number of countries.[6]

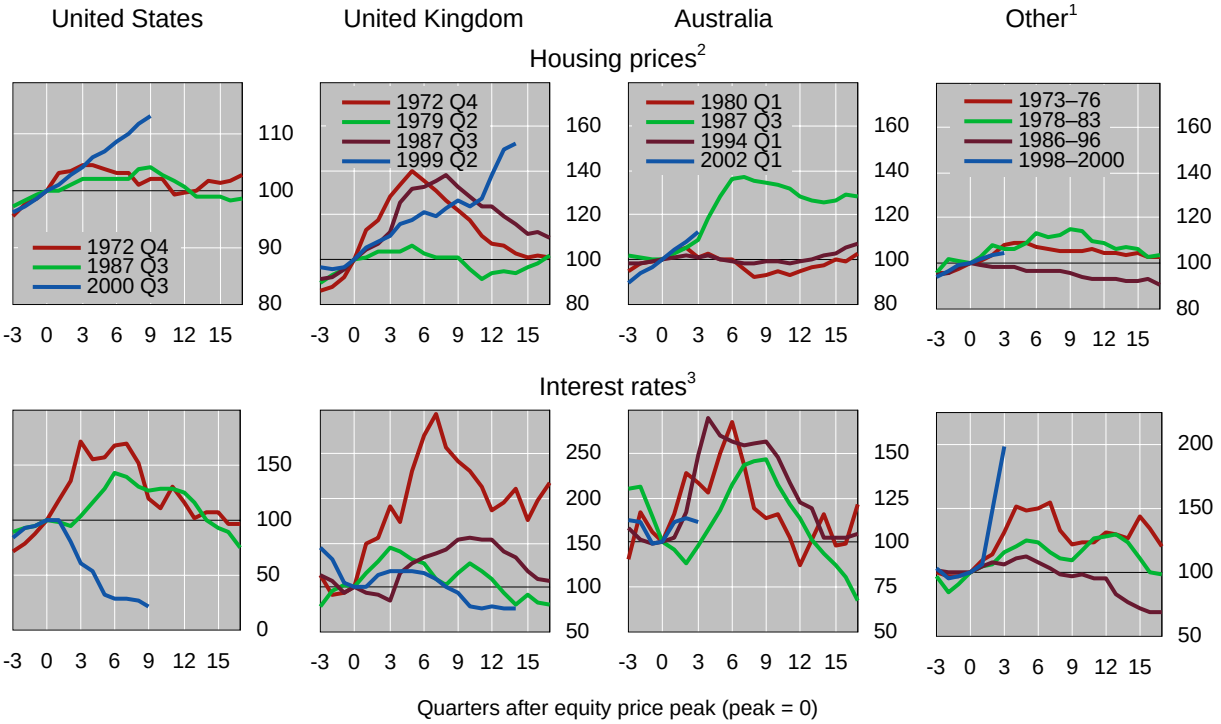
Not all equity price peaks are followed by housing price peaks

In fact, one might legitimately ask whether housing prices need fall at all. Indeed, the record shows that not all the equity price peaks picked by the algorithm have been followed by housing price peaks. And it is possible to envisage that, in a number of countries, prices may simply slow down as a strengthening of the economic recovery carries them along.

A closer look at the historical record will help to cast light on these issues. Specifically, we need to examine the past relationships between equity and housing prices, in addition to the economic circumstances against which they

[6] This episode is examined in more detail in Borio and Lowe (2003).

Housing prices and interest rates around equity price peaks



Note: In each panel, the blue line indicates the developments since the most recent equity price peak.

[1] Simple average in the periods indicated of Canada, Denmark, Finland, Ireland, Japan, the Netherlands, Norway, Spain and Sweden. [2] Housing price = 100 at each equity price peak. [3] Short-term nominal interest rates; in percentages.

Sources: Office of Federal Housing Enterprise Oversight; national data; BIS calculations. Graph 2

occurred. Our statistical analysis covers a set of 13 industrial countries and is carried out on quarterly data from 1970 Q1 to 1999 Q4. We purposefully leave out the most recent episode, which, as noted, has not yet fully unfolded. As before, all asset prices are in inflation-adjusted or "real" terms, and are deflated by the consumer price index.

Do equity price peaks predict housing price peaks?

We next consider sequentially whether equity prices help to predict peaks in housing prices (a) on their own, (b) after allowing for macroeconomic variables that have traditionally been found to explain housing price movements ("control variables") and (c) after taking into account financial imbalances built up during the boom.[7] The traditional variables include output growth and changes in unemployment, inflation and interest rates. We considered both nominal and inflation-adjusted interest rates, as well as short-term (three-month) and long-term rates, but report only the results for those interest rates with the highest explanatory power.[8] The financial imbalance proxy captures episodes of

[7] See the accompanying piece by Tsatsaronis and Zhu for references.

[8] Throughout the analysis presented here, short-term nominal interest rates tended to be more statistically significant. The combination of real short-term interest rates and separate inflation

"excessive" *simultaneous* expansion in credit and real equity prices. Specifically, a financial imbalance is said to exist if the deviations from trend ("gaps") in both the ratio of credit to GDP and in real equity prices exceed certain critical thresholds. The value of the thresholds has been calibrated to maximise the predictive content of the proxy variable for subsequent banking crises over a horizon of three to five years ahead.[9] This variable is included because, in previous work, it has also been found to help predict subsequent output weakness and disinflation (Borio and Lowe (2003)). By the same token, it may also help to predict housing price peaks.

The predictive power of the various variables is established through a series of probit regressions. These allow us to assess the increase in the probability of seeing a housing price peak given that an equity price peak has occurred, and given the prior behaviour in the control variables and the financial imbalance proxy. We look at predictive performance over different horizons. Four basic results deserve highlighting (Tables 2 and 3).

First, equity price peaks have considerable predictive content for subsequent housing price peaks (Table 2). The (unconditional) probability of a

Predicting housing price peaks based on equity price peaks[1]

Horizon of dependent variable	Combination of predictive variables					
	Equity peak[2]	Interest rates	GDP growth	Unemployment	Probability of peak	
					Unconditional	Conditional[3]
Four quarters	0.18***				0.09	0.27
	0.16***	0.02***				0.25
	0.12**	0.02***	0.01**	–0.10***		0.21
Eight quarters	0.33***				0.18	0.50
	0.30***	0.03***				0.48
	0.25***	0.02**	0.03***	–0.15***		0.43
Twelve quarters	0.38***				0.27	0.65
	0.36***	0.03***				0.63
	0.33***	0.01	0.04***	–0.18***		0.60

[1] Based on quarterly data (1971 to end-1999) for 13 developed countries. Control regressors include single lags of GDP growth, changes in short-term nominal interest rates and changes in unemployment. The coefficients on these controls can be interpreted as the change in the probability of a peak in housing prices given a marginal change in the regressor from its sample mean. One, two and three asterisks denote significance at the 10%, 5% and 1% level respectively. All regressions were run with four lags of these control variables, with qualitatively and quantitatively similar results. [2] The coefficient on the binary regressor capturing peaks in equity prices can be interpreted as the change in the probability of a housing price peak given a discrete change in the regressor. [3] The conditional probability given a peak in equity prices is the sum of the unconditional probability and the coefficient on the equity peak regressor. Table 2

rate regressors yielded qualitatively similar, but less robust, results. For brevity, we present only those results obtained using nominal rates.

[9] The thresholds correspond to a 4 and 60 percentage point deviation from trend for the private credit/GDP ratio and inflation-adjusted equity prices respectively. With these settings, the dummy variable is switched on for Japan in the early 1970s, and for more than half the other countries in the sample at some point in the early to mid-1980s. For further explanation of the construction of the proxy for financial imbalances and its predictive performance, see Borio and Lowe (2003). For a similar analysis on annual data, see Borio and Lowe (2002a,b).

Predicting housing price peaks based on financial imbalances[1]

	Change in the unconditional probability of a peak in housing prices				
Unconditional probability	Equity price peak[2]	Financial imbalance[2, 3]	Interest rates[4]	GDP growth[4]	Unemployment[4]
0.09	0.17***	0.21***			
0.09	0.11**	0.19***	0.02***	0.01**	–0.10***

[1] Results from probit regressions, with the dependent variable defined as a zero/one dummy corresponding to the occurrence/non-occurrence of a peak in housing prices within the next four quarters. One, two and three asterisks denote statistical significance at the 10%, 5% and 1% level respectively. The results are robust to changes in the horizon over which the peak in housing prices is predicted, eg eight and 12 quarters ahead. [2] The change in the probability of a peak in housing prices conditional on either a peak in equity prices or a financial imbalance having occurred. [3] The financial imbalance dummy is set to one if the credit gap is larger than 4 percentage points and the equity gap is larger than 60 percentage points eight quarters prior to the equity price peak. With no control variables, the coefficients on this variable under alternative lag specifications are 0.08**, 0.20*** and 0.15*** for four, six and 10 quarters prior to the equity price peak respectively. With controls, the corresponding coefficients are 0.05, 0.15*** and 0.14*** respectively. [4] Control regressors include single lags of GDP growth, the change in short-term nominal interest rates and the change in the unemployment rate. The coefficients on these controls can be interpreted as changes in the probability of a housing price peak given a marginal change in the corresponding regressor from its sample mean. All regressions were run with four lags of these control variables, with qualitatively and quantitatively similar results. Table 3

country experiencing a housing price peak in any one, two or three consecutive years (four adjacent quarters) is 9%, 18% and 27% respectively. These probabilities almost double in the periods following an equity price peak.[10] Moreover, the predictive content of equity price peaks is remarkably robust to the inclusion of other variables. The inclusion of output growth and changes in unemployment and in interest rates hardly affects the marginal increment in the probability of observing a housing price peak associated with an equity price peak or its statistical significance. Nor are these probabilities materially influenced by the build-up of financial imbalances during the preceding boom.[11]

Housing peaks are more likely after peaks in equity prices …

Second, housing price peaks have tended to follow periods of comparatively strong economic activity (Table 2). For example, the coefficients on the lag of GDP growth, while not always individually significant when multiple lags are included, indicate that the overall effect is positive and statistically significant. Similarly, the effect of unemployment is negative, implying that a fall in unemployment in the periods preceding a peak in equity

… following periods of strong economic growth …

[10] We also iterated through independent variables, holding the dependent variable constant at four quarters. This is equivalent to estimating the probability of a housing price peak within the *following* year (fixed time) given an equity price peak within the *previous* two quarters, four quarters, six quarters, etc. The results are consistent with those discussed above. For robustness, the regressions were also run in the reverse direction, where peaks in housing prices are used to predict peaks in equity prices. This exercise generally yields negative coefficients on the housing price dummy variable, indicating that the incidence of a housing price peak lowers the probability of experiencing an equity price peak.

[11] The close relationship between equity and housing price peaks is broadly consistent with theory. For instance, both equity and real estate are long-lived assets and, effectively, claims on real goods or services. As such, they should be expected to have a number of economic determinants in common. At the same time, share prices exhibit less inertia, not least as the market on which they are traded is much more liquid. In addition, initial declines in equity prices from a major peak can in turn induce portfolio shifts into real estate, driving a wedge between their movements. See below for a further discussion of factors affecting the observed lag given the physiological faster adjustment in equity prices.

prices leads to a higher probability of experiencing a peak in housing prices in the quarters ahead.

... and periods of monetary tightening

Third, increases in interest rates were a factor bringing the rise in housing prices to a halt. Somewhat surprisingly perhaps, it is nominal short-term rates that matter most amongst the control variables. While lags of nominal long-term interest rates also enter significantly in many instances, they do so with smaller and less significant coefficients. Moreover, real interest rates, whether short-term or not, are less statistically significant than their corresponding nominal rates, although they tend to perform better when lags of inflation rates are included in the regression. Changes in nominal rates may matter most because they are more closely related to changes in financing constraints in the short run, such as increases in the proportion of income absorbed by interest payments, and hence to both the ability to borrow and willingness to lend (see the special feature by Debelle in this *Quarterly Review*).[12] The greater relevance of short-term over long-term rates may reflect in part similar factors.[13] But, more generally, it may result from the broader influence exerted by monetary policy on economic agents' incentive and ability to spend, not least by affecting expectations about future income streams and attitudes towards risk.

The build-up of financial imbalances also plays a role

Finally, the occasional build-up of financial imbalances during the preceding boom has clear additional information content (Table 3). The predictive ability of the financial imbalance proxy is highest with a lag of eight quarters with respect to the equity price peak. The corresponding increase in the probability of observing a subsequent housing price peak is larger than that associated with the equity price peak itself.[14] This is true regardless of whether other control variables are included. In fact, although not listed in the table, the probability of experiencing a housing price peak within the next two years, given the *joint event* of an equity price peak and a financial imbalance eight quarters prior to this peak, increases by some 50 percentage points (pushing the conditional probability to close to 70%), considerably larger than if the two events took place in isolation. This evidence suggests that the build-up of excessive debt limits the shock absorption capacity of the system once equity prices reverse their course, thereby paving the way for a subsequent softening in housing prices too.

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[12] For corroborating evidence on the role of nominal, as opposed to real, interest rates in this context in the United States, see Brayton and Reifschneider (2003).

[13] If this was the only effect, however, one would expect to see greater variation across countries, given major differences in the proportion of mortgage financing at variable and fixed rates (Borio (1997)).

[14] Table 3 illustrates the case of observing a housing price peak over the subsequent four quarters. Similar results also hold when the horizon is extended further. For example, a financial imbalance eight quarters prior to an equity price peak raises the probability of a housing price peak within the two years following the equity price peak by 31 percentage points.

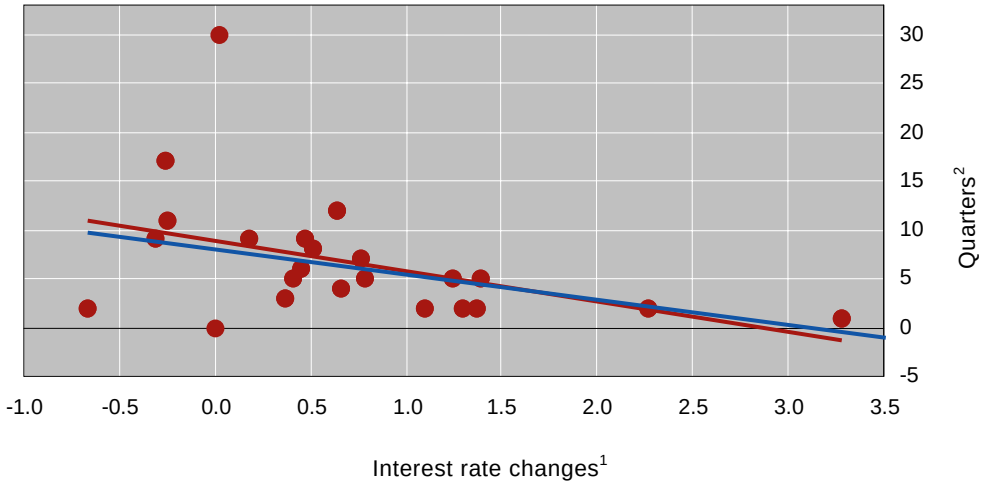
What explains the lag length?

Thus far the evidence indicates that equity price peaks, especially if preceded by large credit and equity price booms, by increases in short-term nominal rates and by strong economic activity, tended to herald peaks in housing prices over the period considered. To what extent do these factors also help to explain the length of the lag between the equity and housing price peaks?

Longer lags between equity and housing price peaks ...

To address this question, we consider a subsample of the overall data, namely all housing price peaks that are preceded by equity price peaks (ie the observations in Table 1).[15] We then regress the lag length between these peaks on our variables of interest, namely the average change in interest rates, output growth, unemployment, and our proxy for financial imbalances.[16]

Interest rate changes and the lag between equity and housing price peaks



Note: The blue line indicates the regression line when outliers are excluded. Outliers include observations with lag lengths greater than 20 or equal to zero.

[1] Average quarterly change in short-term nominal interest rates between the equity price peak and the subsequent housing price peak. [2] Number of quarters by which the housing price peak lags the preceding equity price peak.

Sources: National data; BIS calculations. Graph 3

[15] Interest rate data for Denmark, Finland and Norway are missing for the early years of our sample, leading to the loss of three observations from the list in Table 1.

[16] The average change in interest rates is calculated as the cumulative change from the peak in equity prices to the peak in housing prices divided by the lag length. This normalisation helps to control for the considerable heterogeneity in the length of the period over which interest rates move following an equity price peak. On the other hand, this introduces the dependent variable into the right-hand side of the estimating equation, possibly leading to endogeneity problems. An alternative is to calculate the change in these regressors over a fixed period after the peak in equity prices, and then iterate through various period lengths in separate regressions. This exercise yields coefficients on the interest rate variable which are of the expected sign but are imprecisely estimated (generally insignificant).

The results suggest that the variable that contains the most information about the lag length is the short-term nominal interest rate.[17] Increases in these rates shorten the lag, while reductions lengthen it in a statistically and economically significant way (Graph 3).[18] Across our sample of countries, the average quarterly change in interest rates between peaks in equity and housing prices was around 70 basis points, and was associated with a lag length of seven quarters. Taken at face value, the results indicate that, had the average quarterly change in interest rates been 25 basis points less, the lag length would have increased by about one quarter. Looking at the result from the opposite perspective, it is as if increases in interest rates helped to bring housing price booms to a halt. On this basis alone, actual declines in interest rates following an equity price peak could potentially be associated with considerably longer lags.

… are associated with monetary easing

The statistical association between average changes in interest rates and the lag between equity and housing price peaks is robust to a number of alternative econometric specifications. In particular, the inclusion of the change in GDP growth, itself not statistically significant, slightly reduces the size of the coefficient on the interest rate variable but does not alter the basic result. Other explanatory variables, namely various lags of the financial imbalance proxy and changes in unemployment, do not seem to have a statistically significant effect on the lag length. Likewise, the exclusion of outlier observations reduces the size of the coefficient on interest rate changes by about one third, implying that a fall in short-term rates has a smaller effect on lag length, but increases the accuracy of the estimated coefficient (higher level of statistical significance).

What explains the size of the decline?

So far, we have touched on the determinants of peaks in housing prices and their lag with respect to equity price peaks. But do the above variables tell us anything about the size of the bust too? After all, it is the size of the fall that is of greater significance for economic activity. As housing values are the largest component of household wealth, significant declines in those values can have strong wealth effects, leading to reductions in consumption, investment and overall economic activity. Indeed, it would appear that busts in housing prices have had a larger negative impact on these macroeconomic variables than have busts in equity prices (IMF (2003)).

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[17] The average change in interest rates between peaks ranges from a maximum of 3.27 percentage points per quarter during the Canadian equity-house price cycle in 1981 Q1 to a minimum of –0.66 percentage points per quarter for the Irish cycle in 1990 Q3.

[18] This statement implicitly assumes that interest rate changes have a *symmetric effect* on the lag length. That is, many of the 23 equity-housing price pairs included in the regression occur in the 1970s and 1980s, when inflation was relatively high. As a result, only four of these 23 observations are actually associated with a *fall* in interest rates following the equity price peak. Thus, a more accurate statement would be that the experience from the 1970s and 1980s implies that *smaller than average increases* in interest rates following a peak in equity prices are associated with longer lags between peaks.

The fact that, over the sample period, booms are not much smaller than busts adds urgency to this question. On average, housing prices fell by 20% from each peak, within a range of 3 to some 50%, while the rise from the previous trough averaged close to 40%. This actually means that if, say, housing prices started at a value of 100, the boom would, on average, take them to close to 140 and the subsequent decline back to around 110.

The severity of previous busts in housing prices …

In order to examine whether the size of the fall in housing prices can be explained by the characteristics of the economic slowdown and, more ambitiously, by those of the preceding boom, we proceed as follows. We relate the peak-to-trough decline in housing prices to two sets of variables, corresponding to the characteristics of the previous boom and the subsequent decline. As regards the boom, we include the trough-to-peak increases in equity prices and in housing prices; a variable capturing whether a financial imbalance was present or not; and the change in nominal interest rates in the four quarters prior to the housing price peak. As regards the bust, we include the peak-to-trough decline in equity prices as well as the change in output growth, unemployment and nominal short-term interest rates during the fall in housing prices. Three conclusions stand out (Table 4).

… is related to the size of the boom in housing prices …

First, the own dynamics component of housing prices is evident. Other things equal, the larger the boom in housing prices, the larger the bust (Graph 4). The coefficient on the trough-to-peak rise in housing prices indicates that a one standard deviation rise in the size of the boom in housing prices adds approximately 8 percentage points to the subsequent fall. Using the sample averages, and assuming a housing price index of 100 at the preceding trough, if housing prices rose by two thirds they would be up by only some 20–30% at the end of the bust. The size of the boom remains statistically significant even after the inclusion of other explanatory variables, with very little change in its impact. This own dynamics could reflect, for instance, the self-reinforcing interaction between rising and falling prices, extrapolative expectations of further price changes in the same direction and the demand for

Predicting the size of the housing price bust[1]

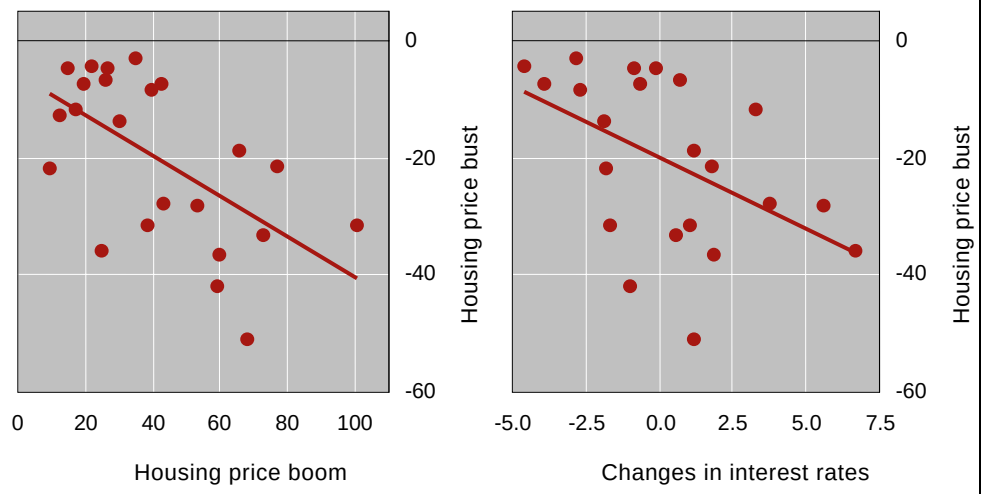
Dependent variable: percentage peak-to-trough fall in housing prices

Housing price boom	Equity price[2]		Financial imbalance[3]	Interest rate change[4]		Output growth[4]		R-squared
	Boom	Bust		To peak	After peak	To peak	After peak	
–0.34***								0.35
–0.31***	–0.02							0.38
–0.34***		0.16						0.39
–0.27***			–22.22***					0.54
–0.21**			–24.02***	–0.15	–2.12***			0.71
–0.21***			–27.18***	–0.51	–2.21***	–0.04	3.17***	0.80

[1] Results from OLS regressions of the peak-to-trough percentage change in housing prices on various regressors. [2] The equity price changes are calculated as the percentage variation in equity prices from the previous trough to the peak in equity prices, and from the peak in equity prices to the following trough. [3] The financial imbalance dummy is set to one if the credit and equity gaps (deviations from ex ante recursive trends) exceed 4 and 60 percentage points in the sixth quarter prior to the equity price peak. [4] The change in interest rates and GDP growth is calculated over four periods prior to and following the peak in housing prices. Neither the change in nor the level of the unemployment rate (before and after the peak in housing prices) entered significantly.

Table 4

Housing price booms and busts and changes in interest rates[1]



[1] The size of the bust in housing prices is calculated as the percentage change in prices from peak to trough. The size of the boom is the percentage change in prices from the preceding trough to the peak. The change in short-term nominal interest rates is calculated from the peak in housing prices to the following trough.

Sources: National data; BIS calculations. Graph 4

investment in housing, in combination with only lagged reactions in the supply of new housing.[19]

This result is supported by the relatively poor information content of several of our other variables of interest. Somewhat surprisingly perhaps, on its own, the size of the boom and bust in equity prices seems to have, at best, only marginal predictive power. The other variables capturing the degree of economic weakness do not fare much better. While output growth after the equity price peak does seem to temper the severity of the housing price bust, the change in unemployment (not shown) is not significant.

… and the build-up of financial imbalances

Second, confirming the importance of the characteristics of the preceding boom, financial imbalances during that phase do appear to help explain the subsequent bust in housing prices. Taken literally, our results imply that a financial imbalance six quarters prior to the peak in housing prices translates into a bust in housing prices some 20 percentage points more severe than would otherwise be the case.[20] Thus, it seems that what matters is not so much the size of the equity boom per se but, rather, whether unusually sustained and rapid increases in the ratio of private credit to GDP and equity prices occur simultaneously, pointing to the build-up of vulnerabilities in the system.

Finally, nominal interest rates do seem to have an effect (Graph 4). In particular, reductions in nominal rates following the housing price peak appear to help cushion the fall; the impact of changes prior to the peak, while working in the expected direction, is harder to discern statistically.

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[19] On this, see Case and Shiller (1989), Capozza et al (2002) and Zhu (2003).

[20] Financial imbalances that occur four or eight periods prior to the peak in housing prices have similar although smaller predictive content for the bust in housing prices.

Conclusion

The statistical regularities that emerge over the period from the early 1970s to the mid-1990s point to the following picture. On balance, housing price peaks tended to follow equity price peaks with a lag of at least one year and in the wake of relatively buoyant economic activity. This was especially the case if the peaks had been preceded by the build-up of financial imbalances, in the form of unusually rapid and sustained private credit expansion alongside equity price booms. Increases in interest rates seem to have played a role in bringing about the peak in housing prices. The subsequent bust in housing prices had a certain life of its own, driven to a considerable extent by the size of the previous boom and, occasionally, exacerbated by the build-up of financial imbalances during the boom phase. Declines in nominal interest rates, however, could help to cushion the fall to some extent.

What does this imply for the current juncture? In drawing inferences, due regard should be given to the limitations of the exercise. For one, the data set is rather small, as we are just looking at major episodes and the data on housing prices do not go back beyond the 1970s.[21] In addition, there have been some significant changes in the broad economic environment relative to the period for which the statistical regularities were uncovered. Lower and more stable inflation is the clearest such example. These should be taken into account when forming an overall judgment.

Even so, at least two broad inferences would seem warranted. First, looking back, the unusual strength of housing prices during the recent economic slowdown and subsequent recovery may well have been driven to some extent by own dynamics, as increases in prices feed onto themselves, and have been supported by the decline in nominal short-term interest rates associated with the sizeable monetary easing following the slowdown. In sharp contrast to most previous episodes, quiescent inflation has provided central banks with ample room for manoeuvre, which they have exploited. Second, it is hazardous to speculate on how long housing prices could continue to rise and, if they peaked, what the size of any subsequent fall might be. In particular, in the absence of clear inflationary pressures, policy rates could stay low for considerably longer than in the past, removing what appears to have been a significant trigger for declines in the past. At the same time, one cannot rule out entirely the possibility that, even in the absence of sharp increases in rates, own dynamics might, at some point, act as a drag on prices. And, if experience can be taken as a guide, other things equal, the countries most vulnerable to considerable declines would seem to be those where prices had risen the most and where other signs of the build-up of financial imbalances may have been present during the boom phase.

[21] Moreover, the data points may not quite be independent across countries, to the extent that they may be driven by common factors across countries. If so, the number of independent episodes in the cross-sectional analysis is smaller than assumed by the statistical techniques. This would increase the uncertainty of the corresponding estimates.

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The Danish mortgage market[1]

As housing finance evolves, are there reasons to follow the Danish model?

JEL classification: G180, G280, L890

This article is a case study of one of the world's most sophisticated housing finance markets, the Danish mortgage market.[2] With a standard Danish mortgage contract, it is possible to borrow long-term (up to 30 years) at fixed rates with an option to make penalty-free prepayments. This option is also embedded in the US mortgage contract. US and Danish mortgage markets are globally exceptional in this regard.

The main consequence of this option element in the US-Danish style contract is that investors are exposed to prepayment and thus reinvestment risk. On the one hand, over longer periods the risk characteristics of the typical callable mortgage bonds are found to be similar in the two markets. On the other hand, the Danish market's performance has not been much affected in periods with significant refinancing, which is a well documented characteristic of the US mortgage market. Indeed, position-taking in callable US mortgage securities has been identified as a source of an amplification effect on the volatility of US long-term interest rates during episodes of high rates of mortgage refinancing.[3]

The first purpose of this study is to identify elements that are important for the performance of the Danish market. This should be of interest to countries

[1] The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS, the National Bank of Denmark or Sveriges Riksbank. The authors would like to thank Danske Bank, Finanstilsynet, Nordea, Nykredit, PensionDanmark, Morten Bækmand, Jens Dalsskov and Eli Remolona.

[2] A mortgage is a collateralised loan. It is typically a financial contract between an institutional provider of funds and a household or commercial entity.

[3] See Packer and Wooldridge (2003), Perli and Sack (2003) and IMF (2003) pp 16–22 for discussions of the impact of mortgage refinancing and hedging on swap and other long-term interest rates.

considering modifying or developing local currency bond markets based on housing finance.[4]

The second purpose is to highlight policy choices and trade-offs involved in terms of institutional setup and sources of market volatility and financial stability when callable mortgage bonds are used for housing finance.

We identify two possible explanations for the observed differences between the Danish and US markets during periods of significant refinancing. First, the tight Danish regulation requires a matching of cash flows on the loan and funding side. As a consequence, mortgage banks do not bear market risk, and prepayment risk is assumed by buy and hold investors. Secondly, the fixed exchange rate policy for the Danish krone vis-à-vis the euro may have reduced volatility by giving investors in callable Danish mortgage bonds access to low-cost hedging of market risk in euro-based markets.

The Danish case also illustrates the institutional structure necessary for a small open economy to put in place a well performing local currency bond market.

We first discuss the performance of the Danish system. We then describe the regulation of credit and prepayment risk among lending institutions. This is followed by a description of how market liquidity is fostered in the Danish market. We go on to compare the character of the information used to price callable Danish mortgage bonds with that for comparable US mortgage-backed securities. The final section contains concluding remarks.

The performance of the Danish system

The Danish mortgage system has for many years offered nationwide standardised single-priced mortgages for households. The system was established as a cooperative system in which competition was severely restrained by regulation. Borrowers were offered only a limited range of products, with long-term fixed rate callable loans as the predominant product. However, in the course of the 1990s consolidation, deregulation and mortgage banks' adoption of new technologies gave rise to a wider range of loan types offered to borrowers and, thus, a much broader menu for borrowers to choose from when financing property.

Danes rely heavily on mortgages

The effectiveness of the Danish system is reflected in a high degree of reliance on mortgages relative to the size of the economy. Table 1, for example, shows that the ratio of mortgage loans outstanding to GDP exceeds 100% in Denmark, compared to 81% in the United States. This is the case even with a smaller share of owner-occupied dwellings in Denmark. The effectiveness of the system is further indicated by yields on the mortgage bonds issued by the lending institutions.

[4] The Danish mortgage market has already attracted attention among those interested in developing local currency bond markets. In particular, Mexico has recently considered the possibility of developing its capital markets through the introduction of Danish-style housing financing arrangements.

Summary statistics for the Danish and US mortgage markets

Data for 2003[1]

	Denmark	United States
Total volume of mortgage bonds in circulation[2]	232	5,129
Daily turnover in mortgage bonds[2]	2	219
Total volume of mortgage loans as % of GDP	101	81
Ratio of households' debt to disposable income	192	112
Number of residential loan originators	4	7,771
Share of owner-occupied dwellings	59	68

[1] For the United States, third quarter. [2] In billions of US dollars (exchange rate used: DKK 6 = USD 1).

Sources: Board of Governors of the Federal Reserve System; National Bank of Denmark; European Mortgage Federation; Federal Financial Institutions Examination Council; Realkreditrådet. Table 1

Spreads on Danish and US mortgage bonds are comparable

For Danish and US callable mortgage bonds the average yield has been around 150 and 140 basis points respectively above the yield on government bonds in recent years.[5] This yield spread reflects in part the premium investors demand as compensation for the borrowers' right to call at par (the call option). Thus, borrowers pay for their right to prepay. The exercise of the option is linked to interest rates. As illustrated in the box on page 98, this link changes the risk profile of a callable bond relative to a standard bond by creating uncertainty about the speed with which investors receive cash flows.

For a callable bond the option-adjusted spread (OAS) to a government bond is the pure yield spread to the government bond minus the estimated spread value of the prepayment option. This can be used to compare the yield a buy and hold investor would receive in addition to a government bond of the same maturity net of the cost of insuring against the embedded option.[6]

Graph 1 shows that the OASs are of the same magnitude for Danish and US bonds, providing a measure of the effectiveness of Danish securitisation efforts.[7] The modest difference in the premium is interesting. One might have expected a relatively lower spread in the US market given the extensively documented presence of a subsidy to US mortgage market participants originating from a widespread investor perception of an implicit government guarantee of US housing agencies.[8]

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[5] Spread to 10-year government bonds from August 2000 to September 2003. Based on 6% RD 2032 and the FNMA 30-year current coupon.

[6] The OAS is a computed number, with a level of uncertainty reflecting the level of uncertainty connected to forecasting prepayments. In recent years market participants' OAS estimates in both the US and Danish markets have varied by 10–20 basis points around the average OAS estimate.

[7] A recent survey of mortgage finance in Europe gave high marks to the Danish market for delivering its basic products to borrowers at low cost. It also highlighted that a number of different funding methods are available. See Mercer Oliver Wyman (2003).

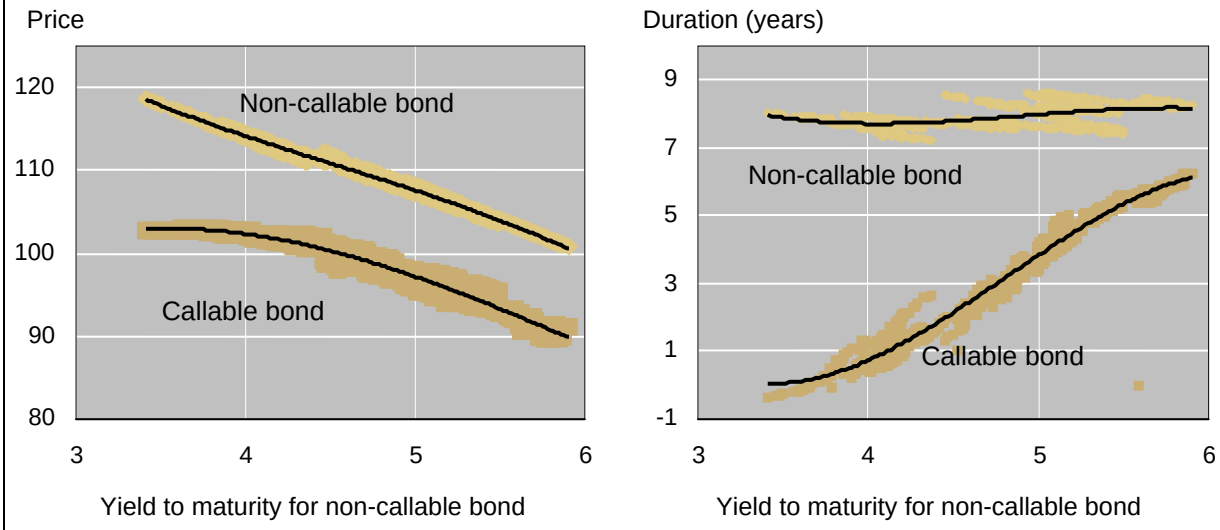
[8] See Passmore (2003).

Callable versus non-callable bonds

Callable fixed rate bonds are priced as a fixed rate non-callable bond with an embedded option to call. The call or prepayment option creates uncertainty about the speed with which investors receive cash flows. This affects the duration of the callable bond, thus reducing the market value of a callable bond relative to a similar non-callable bond.[①] As a result, callable mortgage bonds would trade at a premium to government bonds, even if judged to be identical in every other respect. Thus, assessing prepayment behaviour by borrowers plays an important part in pricing callable mortgage bonds. The differences between callable and non-callable bonds in terms of the relationship between interest rates and duration are illustrated in the graph. For non-callable bonds, duration, ie the slope of the price/yield curve, is nearly constant. For the callable bond, the yield/price relationship flattens as interest rates decrease, because mortgagors prepay their loans. Thus, duration is positively related to the level of interest rates, a relationship referred to as negative convexity.

Price and duration for callable versus non-callable bond

Empirical values for August 1999–September 2003



Note: The non-callable bond used is the 6% Danish Government bond 2011. The callable bond is the 6% Realkredit Danmark 2032.

Source: National Bank of Denmark.

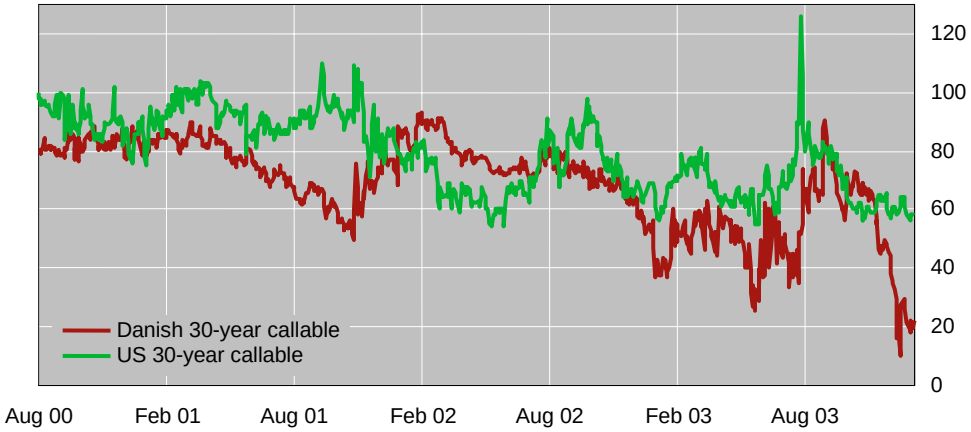
[①] Duration measures the price sensitivity of the bond with respect to interest rate changes. Convexity is a measure of the direction and rate of change in duration as the interest rate changes.

However, two elements may explain this. One is that the Danish mortgage finance system as a whole is seen by investors as benefiting from broad political commitment to its integrity.[9] The other is the perceived need to compensate US mortgage bond investors for bearing high levels of idiosyncratic risk present in individual US mortgage pools.

[9] This view was noted in interviews conducted when this paper was being researched.

Option-adjusted spread to government bonds

In basis points



Note: The Danish 30-year callable bond is the 6% Nykredit 2032. The US 30-year callable bond is the 30-year Fannie Mae Current Coupon.

Sources: Merrill Lynch; Danske Bank. Graph 1

Regulation of credit and prepayment risk

The credit risk borne by both US and Danish mortgage banks is to a large extent kept very low by regulation. These limits, combined with a strong legal infrastructure, virtually eliminate credit risk on Danish mortgage bonds. This is reflected in very low losses for mortgage banks, even in severe economic downturns.[10]

Underwriting standards and foreclosure processes keep credit risks low

Danish mortgage banks' credit risk is contained by the requirement that all loans must be secured by a mortgage on property and a loan-to-value ratio of a maximum of 80% for owner-occupied homes, and lower for other types of property. Mortgages have a strong legal position in Denmark owing to their registration in a central registry. Mortgage banks possess a senior claim on the proceeds from a property sale in the event of a borrower's default. The track record for Danish foreclosure processes is exceptionally good: timely execution at relatively low cost.[11] Strategic default by borrowers is discouraged by the fact that a Danish mortgage borrower remains liable for the full mortgage debt when falling property prices result in negative equity positions.

A key regulatory difference between the two markets is that Danish mortgage banks, unlike their US counterparts, cannot retain prepayment risk. All market risk, including prepayment risk, is passed on to investors in Danish mortgage bonds such as pension funds and commercial banks. Anecdotal

[10] Danish mortgage banks' maximum realised losses in the economic downturn in the early 1990s were 0.62% of total loans. Adding provisions for expected losses, a requirement introduced in the early 1990s, the total becomes 1.4% of total loans (see Realkreditrådet (1991)). However, the mortgage banks' losses were rapidly reduced during the 1990s and in 2002 they were only 0.01% of total loans.

[11] See Mercer Oliver Wyman (2003).

evidence gathered indicates that they, relative to US housing agencies, accept larger fluctuations in the duration measures of their bond portfolios.[12]

Prepayment risk is passed on to bondholders

That mortgage banks do not retain prepayment risk is due to regulation – the "balance principle", which requires all callable Danish mortgage bonds to be pass-through securities, ie mortgage banks fund their lending activities by issuing mortgage bonds with cash flows that fully match those of the underlying mortgage loans.[13] This means that innovations in mortgage loans will be reflected on the funding side, ie in bond markets.[14] Thus, the recent introduction of callable loans where the borrower has the option to defer instalments led to the introduction of so-called fixed rate callable deferred annuity bonds.[15]

Standardisation and liquidity

Highly standardised bonds …

Danish mortgage banks offer highly standardised and thus liquid bonds produced to be presumptively homogeneous in exposures to credit and market risks across issuers.[16] In contrast to the Danish market, which has very large pools, US securities pools are smaller and display large variations in terms of quality and size of the underlying loans, and new pools are created frequently. This reflects the large number of originators.

… issued by mortgage banks …

At present, there are seven Danish mortgage banks. Three of these specialise in mortgage finance for commercial sector borrowers. The remaining four account for nearly all household mortgage lending.[17] Three of the four cooperate closely with commercial banks, either as part of a financial group or as a result of a disclosed contractual arrangement. In contrast to the US system, Danish mortgage banks are one-stop shops for all aspects of mortgage

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[12] In a press conference last year, Fannie Mae's senior financial officer noted an intention to keep the firms duration gap within a range of plus-or-minus six months "substantially all of the time". See Fannie Mae (2003).

[13] All financial institutions, including commercial and mortgage banks, are regulated by an integrated financial services regulator, "Finanstilsynet". According to Danish law, mortgage banks are specialised institutions regulated as standalone entities. Other institutions, notably banks, may also offer loans secured by mortgages. However, only mortgage banks have the opportunity to fund mortgage loans by issuing mortgage bonds, called "Realkreditobligationer".

[14] Each time a borrower is granted a loan, bonds of equal size and characteristics are issued.

[15] See Nykredit (2003) for a description of the bonds.

[16] All bonds have ratings between Aa2/AA and Aaa/AAA. In addition, liquidity is supported by a market-making scheme. The market-makers are 10 commercial banks, which trade all mortgage bank bonds that are open for issuance at a common price. Pricing takes into account the presence of a cheapest-to-deliver option.

[17] The four large mortgage banks are: Realkredit Danmark (Danske Bank), Nordea, Nykredit (including Totalkredit) and BRF, accounting for 32, 11, 42 and 9% respectively of gross new mortgage loans in 2002; see Realkreditrådet (2003). Of the four mortgage banks, one owns a commercial bank, and two are owned by commercial banks. These three banks are all market-makers. The seven other market-makers are commercial banks not directly linked to a mortgage bank.

finance, including loan origination, loan securitisation and loan servicing. The process is described in the box on page 102.

Historically, US mortgages were originated, and subsequently held, by a very large number of specialised depository institutions (thrifts). Over time, the US mortgage industry has become more concentrated in terms of origination volumes, securitisation and servicing. Mortgages are still originated by a large number of specialised firms, but today these have ties with the few firms specialising in mortgage securities underwriting.[18]

... based on highly standardised loans

As in the United States, the typical callable Danish mortgage bond is backed by callable fixed coupon annuity loans, with all loans backing a particular bond having the same coupon and a common rate of amortisation.[19] However, Danish mortgage loans are highly standardised. Danish mortgage lending rates to households and associated fees and commissions are highly uniform. The uniform pricing is combined with almost full standardisation of loans, including the elimination of differences in credit risk among borrowers. This is achieved via a combination of regulation, in particular different loan-to-value ratios for households and commercial borrowers, an element of quantity rationing and to a limited extent through different fee charges for commercial borrowers.[20] Thus, even though all borrowers have access to market-based financing, the uniform pricing and standardisation of Danish home mortgages means that the market clears through credit rationing rather than risk-based pricing.

In addition, mortgage banks have come to a number of agreements governing primary and secondary market functioning, including the collection and sharing of information. These agreements support a liquid secondary bond market. This and other choices provide the infrastructure for a bond market with high liquidity and limited diversity.[21]

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[18] One measure of consolidation in US mortgage finance is the market share of mortgage servicing firms. LaCour-Little (2000) notes that the top 15 mortgage servicers had a combined market share of 16.3% in 1989 and the combined market share of the top 10 servicers was 46% by 2000. According to National Mortgage News (2003) the market share of the top five originators grew from 26.2% in 1999 to 42.8% in 2002.

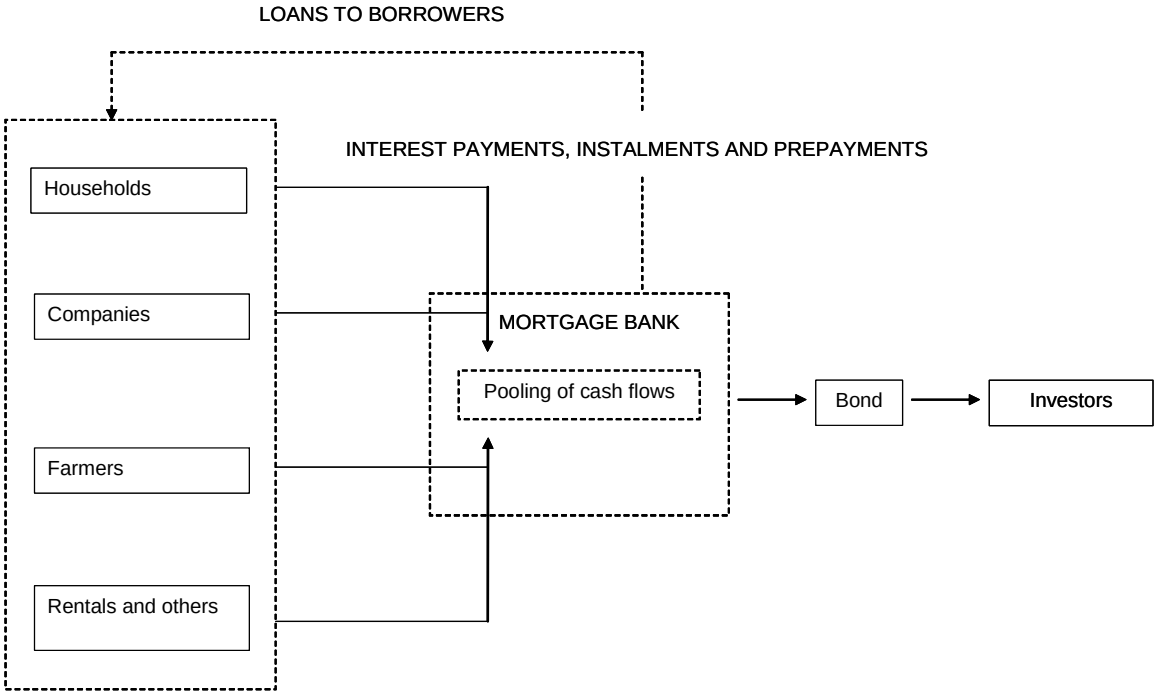
[19] Annuity loans account for more than 98% of the market for callable bonds. See Realkredit Danmark (2003).

[20] See Ladekarl (1998) for a discussion of how credit risk on Danish mortgage bonds is kept low.

[21] Mortgage banks open identical new bond series with different coupons, eg series of 5, 6 and 7% at the same time. These series are open for issuance up to three years. The size and liquidity of a bond series thus depends on where long-term interest rates move during the three-year period. The uniform pricing arrangements have focused on newly issued bonds, where prices are below par. For bonds with prices above par, there are price differences reflecting differences in prepayment speeds.

Origination, structuring, issuance and servicing of Danish mortgage bonds

The origination, structuring, issuance and servicing of Danish mortgage bonds take place in a fully integrated system. The process is illustrated below. First the mortgage bank grants a loan to the borrower based on collateral in the property. It then issues a bond to fund the loan. Following this the mortgage bank acts as the mortgage servicer, assuming the responsibility for collecting payments from borrowers and redistributing them to bondholders. The bond is a balance sheet liability of the mortgage bank, backed by the firm's own funds.



Bonds are issued on tap by the mortgage bank in individual "series" backed by a specific pool of loans. Loans to all types of borrowers serve as collateral for all bond issues. A standard 30-year callable bond is open for issuance for up to three years. Each bond series increases in size as loans are granted and matching tap issuance of bonds take place. The result of this process is very large tradable bond issues. The four banks' currently issued 30-year bonds which are part of the market-making (see below) have a total outstanding volume of more than DKK 215 billion (around USD 35 billion), with around DKK 50 billion (close to USD 10 billion) for individual bonds.[①]

The individual mortgage banks view themselves as jointly responsible for creating and maintaining a well functioning secondary market in Danish mortgage bonds. To achieve this objective, they have entered into a number of agreements covering market-making and the dissemination of common information on the characteristics of underlying mortgages of individual bonds and on prepayment speed statistics by bond issue. For each bond series, mortgage pool data are broken down into 20 categories covering loan type, nominal loan size and borrower type.[②] Of these 20 categories, only those covering loan size are viewed as informative for investors' prepayment forecasting.

[①] Based on an exchange rate of DKK 6 = USD 1. [②] See Realkreditrådet (2003), p 20.

In recent years, increases in Danish households' demand for risk management tools and competition from commercial banks have led to the introduction of a broader range of mortgage loan types by mortgage banks.[22] This has been accommodated by deregulation of the mortgage banks. The broader range of loan types has resulted in the funding of mortgage credit becoming less concentrated in the standard long-term fixed rate bonds.

The mortgage contract, prepayments and hedging

The Danish and US mortgage securities markets share the common problem that market participants, when pricing callable bonds, have to accurately capture empirical facts about "non-optimal" exercise of prepayment options by holders.[23]

Graph 2 illustrates that the huge drop in interest rates since the early 1990s has made market risks in the form of prepayments important for investors in both Danish and US callable mortgage bonds.

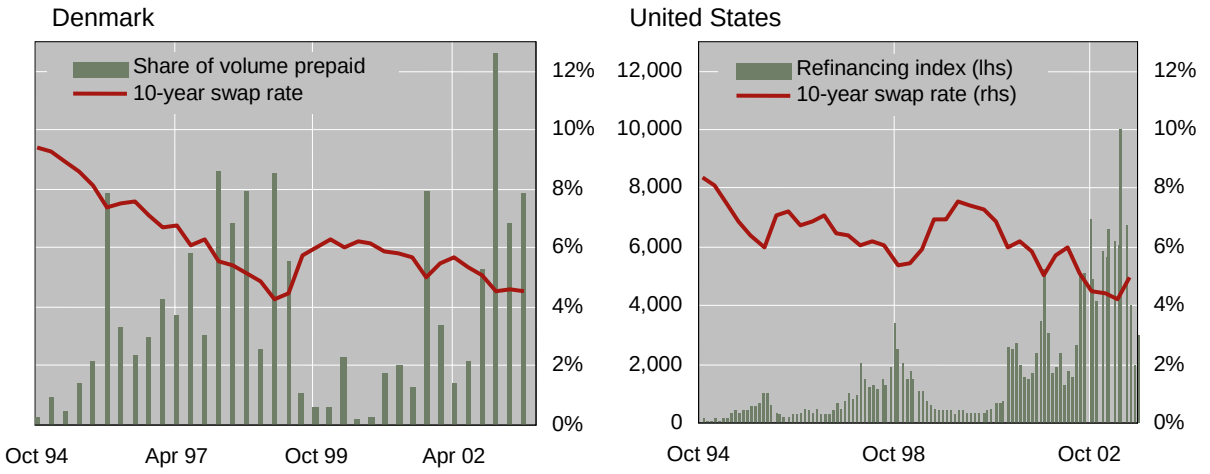
Buybacks

Danes may buy back their mortgages ...

A Danish mortgagor can (in addition to penalty-free prepayment) buy back his or her loan by purchasing corresponding bonds in the secondary market and delivering them to the mortgage bank. This is not possible in the United States.

In addition, the US contract has a due on sale clause, while the Danish contract does not. A due on sale clause in a mortgage contract means that the

Prepayment for Danish and US mortgage bonds



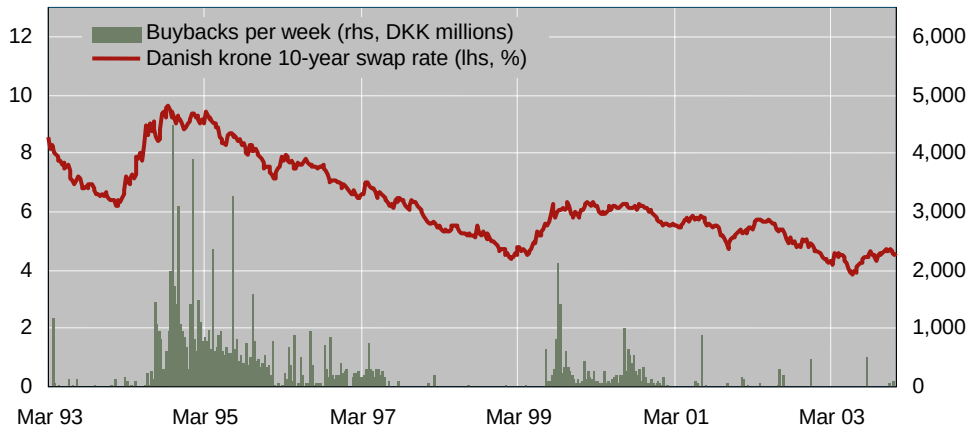
Source: Danske Bank.

Graph 2

[22] For a discussion of the linkages between monetary policy and household mortgage choices in Denmark, see Christensen and Kjeldsen (2002). For an overview of household mortgage choices and risk management, see Campbell and Cocco (2003).

[23] Non-optimal exercise reflects the observation that a number of holders of "in-the-money" prepayment options do not exercise the option, ie they do not automatically refinance their mortgage.

Buybacks of Danish mortgage bonds



Note: Shows buybacks of bonds where bond price is 90 or below.

Source: Danske Bank. Graph 3

mortgage must be repaid in the event of a house sale. Thus in the United States demographic events which involve house sales (eg job relocation) generate prepayments.

In Denmark such events do not generate prepayments. This is because a mortgagor has the right to buy back the loan or assign the existing loan to the new owner.[24] This means that, unlike in the US case, borrowers are never obliged to prepay when the current mortgage interest rate is above the mortgage contracted rate. That is, mortgage investors do not benefit from early repayment of mortgage loans for bonds trading below par. Apart from prepayments linked to house sales, borrowers may decide to buy back loans and refinance at a higher coupon, thereby reducing the size of the loan when interest rates rise.

Buyback opportunities have occurred only infrequently in recent years as interest rates have mainly moved downwards. However, as shown in Graph 3, mortgage holders have displayed a keen awareness of this possibility, and have used it when rates have increased.

… minimising the role of demographics in prepayments

The presence of the buyback option means that forecasters of prepayment rates for Danish mortgages need not concern themselves with demographic sources of prepayment.[25] Moreover, the buyback possibility is likely to smooth out prepayments over time. Consequently, investors in individual Danish mortgage securities are not exposed to risk elements present in US mortgage securities.[26]

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[24] For discussions focusing on the possible implications of the buyback possibility in the Danish system, see Svenstrup (2002) and Svenstrup and Nielsen (2003).

[25] Models of prepayments for Danish mortgages do not incorporate detailed demographic information, which is common for US models. See Hayre et al (2000) and Hayre (2001) for a description of the data used and the importance of non-economic factors for US prepayments.

[26] As an example, mortgages of non-prime borrowers have higher prepayment speeds because (1) an improvement in the borrower's circumstances will allow him or her to refinance at a lower credit spread and (2) a deterioration in the borrower's circumstances (eg job loss) will

Forecasting prepayments

There are Danish versions of standard models

To meet the risk management challenge due to prepayments, investors in Danish mortgage bonds, like US investors, have during the last 10–15 years developed financial-statistical models to forecast borrowers' prepayment behaviour so as to improve the accuracy of bond pricing. The outputs from these models are measures (based on common information) such as option-adjusted duration and option-adjusted spreads to government bonds and swaps. Forecasting of prepayment behaviour is typically done by estimating a prepayment function for borrowers which sets out the conditional prepayment rate as a function of a number of variables, for example borrowers' prepayment gain, loan size, the spread between long and short rates and historical prepayments as explanatory variables.

Loan size matters for prepayments

Table 2 shows the weighted average prepayment rates by loan size and coupon for bonds for the period 1997–2002. Underlying this table are data which show that there are no significant differences in prepayment behaviours across sectors once loan size and coupon are taken into account. Thus, as a result of the high degree of standardisation in the Danish market, the key feature of prepayment modelling for Danish mortgages, for a given coupon, is the relationship between prepayment rates and loan size. These data show, for a given coupon, that borrowers with large loans exercise their prepayment options more often. Thus, the standardisation of Danish mortgage contracts combined with uniform pricing results in the subsidising of larger loans (commercial and higher-income households) by borrowers with smaller loans.[27]

In periods with differences in prepayment rates between individual bonds the result has been price differences. However, mortgage banks are subject to

Prepayment rates by loan size and bond coupon

Percentage of mortgage loans prepaid, 1997–2002

	Loan size in DKK thousands				
	0–200	200–500	500–1,000	1,000–3,000	>3,000
6% coupon	3.24	2.55	3.35	4.33	8.13
7% coupon	5.14	4.82	8.20	13.61	23.20
8% coupon	5.83	7.91	15.37	22.47	30.55
9% coupon	8.07	11.21	18.07	25.53	37.92
10% coupon	11.17	18.55	28.14	36.11	45.40

Note: Weighted by the outstanding amount of bonds.

Source: Nykredit. Table 2

result in failure to make mortgage payments, which triggers prepayment by the institution that has provided credit insurance on the loans.

[27] Based on the analysis in Duffie and DeMarzo (1999), the current structure with very large pools may well be efficient, due to the higher liquidity of the bonds, despite differences in prepayment speeds among borrowers. However, if differences in prepayment propensities increase, it may be optimal for borrowers with large and small loans to issue separate securities. A similar argument applies to credit risk, but, as indicated, we presume that credit risk differences between borrowers are negligible in the Danish system.

powerful incentives to engage in "self-corrective behaviour" to maintain their presence in the unified pricing or market-making scheme. If a given bond is expected to prepay (significantly) faster than other bonds, this bond will fall in price. The consequence may be that borrowers will avoid new bond series from the issuer behind the bond. They may even buy back these bonds, funded by a loan at a lower interest rate from another issuer. From the issuer's perspective the result will be smaller and less liquid bonds. This provides an incentive for an issuer to align the aggregate prepayment behaviour of its borrowers with that of other issuers. Thus, the concentration of the industry is an incentive for strategic behaviour, undertaken in support of the unified pricing scheme.[28] For investors, the effectiveness of these incentives is important since they serve to support substitutability of bonds from different issuers.

Different contracts require different information to forecast prepayments

The differences in the prepayment risk of the contracts in the US and Danish mortgage markets are reflected in the richness of the information available to investors regarding borrowers and loans. In the Danish setup the information provided is limited. This may be because the relatively less risky Danish securities offer no, or at best very limited, incentives for separate production of information by individual issuers.[29] In contrast, not only is the information provided in the US market more detailed, it is becoming ever more so. New information recently made available to investors led to changes in prepayment models, which resulted in significant adjustments in the pricing of certain bonds.[30] Thus, the more complex nature of forecasting prepayments in the US setup appears to be (on average) matched by more disclosure of information relevant to the forecasting of borrowers' prepayment behaviour.

Hedging

Investors who manage the interest rate risk on their investments seek to take account of the fact that a change in interest rates can change the duration of callable bonds quite considerably. In order to maintain the interest rate risk at a given level when interest rates decline, investors must hedge by buying duration. This is typically done using government or other bonds with a higher duration. Another route taken by investors is to hedge both interest rate and prepayment risk using derivatives by creating an asset swap package.[31]

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[28] The introduction of ratings also influenced issuers' strategic behaviour, prompting them to align their business models further.

[29] One of the mortgage banks, Realkredit Danmark, recently introduced a facility whereby borrowers may postpone instalments on a 30-year loan in a more flexible way than with competing products from other mortgage banks. Reflecting this difference, Realkredit Danmark has since announced that it will publish more detailed information on how borrowers have chosen to exercise their rights to postpone instalments.

[30] For a description of these changes and their implications, see Hayre et al (2004).

[31] A package consists of three components: a mortgage bond, an interest rate swap and a cancellable Bermuda swaption. The interest rate swap is used to swap the bond's fixed rate payments into floating rate. The swaption gives the investor the option to swap (in full or in part) as prepayments occur on the underlying bond. The swaption is cancellable to prevent a mismatch between the balance on the swap and the balance on the bond in the event of prepayments. See Nordea (2002) for a more detailed description.

An important difference between the US and Danish mortgage markets is that investors in Danish mortgage bonds can hedge prepayment and interest rate risk in both Danish and euro area government bond and swap markets. Since the monetary policy commitment is to have a stable exchange rate between the Danish krone and the euro, market participants may use, without needing to hedge currency risks, the more liquid euro market to hedge their prepayment risk in kroner. In the absence of the monetary policy commitment, pricing of Danish mortgages would presumably incorporate considerably higher term swap spreads.[32]

Euro-based markets provide hedging alternatives

Concluding remarks

The Danish case is one of a small open economy which has a housing finance market with callable long-term fixed rate loans and bonds – similar to those used in the US market. In particular, US and Danish mortgage contracts share the important characteristic that the borrower can exercise a penalty-free prepayment option. The main consequence of this option element in the US-Danish style contract is that investors assume prepayment and thus reinvestment risk.

Stress in periods with significant refinancing is avoided …

However, in the Danish case the institutional structure, the regulatory approach and monetary policy together have resulted in a market which, relative to the US market, has shown little or no stress in periods with significant refinancing. Thus, differences between the institutional characteristics of the two markets appear to have important implications for borrowers, investors and policymakers. Our discussion points to a number of elements that provide possible explanations for the observed differences in market performance.

… in part because investors accept larger fluctuations in durations

One element is the tight Danish regulation, requiring a strict matching of cash flows on the loan and funding side. The result of this is that prepayment risk is held by investors who, relative to the US housing agencies, accept larger fluctuations in the duration measures of their bond portfolios. A second element is that Danish investors, due to the fixed exchange rate policy for the Danish krone vis-à-vis the euro, have ample capacity to hedge unwanted interest rate risk on the euro-based markets. The availability of this "outside" option supports the liquidity of the Danish mortgage bond market.[33]

Finally, the Danish case also illustrates the institutional structure necessary for a small open economy to put in place a well performing local currency bond market. It is our suspicion that there is a temptation to underestimate the institutional investments that have to be made.

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[32] Miles (2003), in a discussion of obstacles to the creation of a callable fixed rate mortgage market in the United Kingdom, compared the size of spreads between 10-year interest rate swaps and yields on 10-year government bonds for sterling-, euro- and US dollar-denominated contracts. It found that the spreads were larger for sterling and that they increased strongly with maturity.

[33] See Rebonato (2002) for a discussion of the importance of volatility structures for the pricing of interest-sensitive instruments.

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

Basel Committee on Banking Supervision

The BCBS issues a paper on compliance in banks

In October, the Basel Committee on Banking Supervision (BCBS) issued a consultative document entitled *The compliance function in banks*. The purpose of such a function is to assist a bank in managing its compliance risk – the risk of legal or regulatory sanctions, or financial or reputational loss that a bank may suffer as a result of its failure to comply with all applicable laws, rules and standards. Compliance risk management has become more formalised within the past few years and has emerged as a distinct risk management discipline. The document provides basic guidance for banks and sets out banking supervisors' views on compliance in banking organisations.

Committee on Payment and Settlement Systems

The CPSS publishes statistics on payment systems

In November, the Committee on Payment and Settlement Systems (CPSS) published a new document providing statistical data on payments and payment systems in the 13 CPSS member countries. This most recent version of *Statistics on payment and settlement systems in selected countries* (otherwise known as the "Red Book") contains data for 2002 and earlier years. The data are presented in detailed tables for each individual country as well as a number of comparative tables.

Financial Stability Forum

The FSF holds its third Latin American meeting

In November, the Financial Stability Forum (FSF) held its third Latin American Regional Meeting, hosted on this occasion by the Central Bank of Chile. Senior representatives from finance ministries, central banks, and supervisory and regulatory authorities from four FSF member countries and 10 regional non-member countries attended the meeting. Senior officials from international institutions represented on the FSF also took part.

Participants exchanged views on strengths and vulnerabilities in international and regional financial systems. They shared the opinion that the

The latest on the New Basel Capital Accord

On 14–15 January, the members of the BCBS met in Basel to discuss responses to public comments received on the New Basel Capital Accord and review progress since the agenda was established in Madrid in October 2003. The BCBS reaffirmed its commitment to finalising the New Accord by mid-2004 and took decisions on a number of key issues.

Public comments supported the BCBS's proposal on credit-related losses

The BCBS received 52 letters of comment from institutions and industry associations on its October 2003 proposal to revise the capital treatment for expected and unexpected credit losses. Respondents generally welcomed the Committee's solution and agreed that it would align regulatory capital more closely with the concepts underpinning leading banks' economic capital modelling processes. The Committee believes that these comments will be instrumental in strengthening the quality of the New Accord. Moreover, it agrees with industry comments that the cap on the recognition of excess provisions should not be based on Tier 2 capital components. Instead, it has decided to convert the cap to a percentage (to be determined) of credit risk-weighted assets. A technical note outlining the concrete modifications necessary to implement this decision was published on 30 January (see *Modifications to the capital treatment for expected and unexpected credit losses*).

Significant progress achieved on the treatment of securitisation exposures

In response to public comments on the third consultative paper (CP 3) on the New Accord, the Committee agreed to simplify the treatment of securitisation-related exposures and align it more closely with industry practice. Under the new treatment, banks will be allowed to derive the risk weights on unrated exposures to asset-backed commercial paper conduits (mainly liquidity facilities) by mapping their internal risk assessments to external credit ratings; a less complex "supervisory formula" will be available for determining capital for unrated securitisation exposures; and both originating and investing banks will be able to make equivalent use of the "ratings-based approach" (RBA) for rated securitisation exposures. Finally, the Committee reviewed the calibration of the securitisation RBA risk weights to ensure a closer alignment with the level of risk inherent in the positions.

The main points are set out in Attachment A of the press release of 15 January entitled "Continued progress toward Basel II" and in a more detailed technical note specifying the revisions to the securitisation proposals published on 30 January (see *Changes to the securitisation framework*).

Advances on credit risk mitigation techniques and related issues

In response to industry comments, the BCBS agreed to refine the rules for recognising credit risk mitigation techniques. It likewise recognises that the existing treatment of credit risk mitigation must continue to evolve in order to reflect industry practices, particularly as they relate to double default effects. The Committee believes that recognition of these effects is necessary, though it is essential to consider all of the implications, especially those related to measurement, before deciding on a solution. It will continue to work on this topic with the intention of finding a prudentially sound solution as promptly as possible prior to implementation of the New Accord.

Alongside this work, the Committee plans to undertake a review of counterparty credit risk and trading book issues in coordination with the International Organization of Securities Commissions.

Pillar 2 implementation clarified

In response to recent discussions with banking organisations, the Committee agreed on clarifications for implementing the supervisory review of capital, or Pillar 2 of the New Accord. These clarifications are appended as Attachment B to the press release of 15 January entitled "Continued progress toward Basel II".

Cooperation between home and host supervisors

Building on the principles published in August 2003 (*High-level principles for the cross-border implementation of the New Accord*), the Accord Implementation Group (AIG) of the Committee has been evaluating several actual case studies. This exercise is contributing significantly to member authorities' understanding of practical aspects of cross-border implementation.

The Committee has agreed on principles for the cross-border implementation of the advanced measurement approaches (AMAs) for operational risk requirements. These principles balance the need for the adequate capitalisation and sound risk management of significant internationally active entities in cross-border banking groups with the need for the practical application of the AMAs within these groups. The details of the proposal and related principles were published on 30 January (see *Principles for the home-host recognition of AMA operational risk capital*).

Schedule

Working groups will make recommendations on the outstanding issues at the next meeting of the BCBS in May 2004, where the Committee will additionally address the calibration of capital requirements. Both efforts will allow the Committee to achieve its mid-2004 goal and to ensure that the text will provide a solid basis for national implementation processes and allow the industry's preparations to proceed. In accordance with the decisions announced in October 2003, the Committee will again evaluate the New Accord's calibration prior to implementation.

The BCBS has reaffirmed its objective to maintain broadly the aggregate level of regulatory capital in the banking system. It intends the simpler approaches to produce overall capital requirements that are by and large equivalent to those of the existing rules, while establishing incentives to adopt the more advanced approaches. The Committee will, moreover, continue to work to ensure that the Accord remains up to date with the best practices in risk measurement and management.

economies in the Latin American region were generally showing signs of recovery, reflecting policy improvements among other factors, but that the region continues to face vulnerabilities.

Participants exchange views on debt management ...

Participants discussed the sustainability of current and expected levels of public debt, pointing to the need to manage debt in such a way as to reduce the impact of market shocks. In that regard, it was noted that some countries in the region have taken advantage of the favourable external financing environment to consolidate their debt position. A continuation of favourable financial and economic conditions should be used to improve fiscal positions. Participants also pointed to the reforms already implemented and those still needed to enhance domestic securities markets, in order to facilitate public sector debt management and to provide alternative sources of funding and risk management for the private sector. They discussed the risks posed by currency mismatches and partial dollarisation and considered ways to reduce those risks, including the maintenance of good macroeconomic policies, a floating exchange rate regime and an adequate prudential framework. They also noted the value of foreign direct investment in the financial sector and agreed that a sound and predictable regulatory and legal environment is needed to address the concerns of both parent institutions and host authorities.

... crisis prevention ...

Participants exchanged views on international crisis prevention and resolution, pointing in particular to the successful incorporation of collective action clauses in recent bond issues by countries in the region.

They also shared views on the New Basel Capital Accord, the framework of which is expected to be completed by mid-2004 (see the box on page 112). They agreed that national supervisors will need to review carefully whether the preconditions for implementation of the New Accord are satisfied and, if not, what steps they should be taking to enhance their regulatory, supervisory and risk management capacity.

... and the New Basel Accord ...

Participants reviewed initiatives currently under way to strengthen corporate governance. A number of measures have been taken and laws enacted, but enforcement of the rules is a key problem. In that regard, enhancement of judicial and legal systems is warranted. Participants pointed to the implementation of a number of national and international auditor oversight mechanisms, as well as efforts to reach an international consensus on accounting standards, to strengthen financial reporting frameworks. They also considered the issues of conflicts of interest affecting financial analysts and the integrity of the credit rating process. In all of these areas, participants stressed that further progress is desirable – in Latin America as in other regions – to improve efficiency, transparency and investor confidence.

... and review initiatives on corporate governance