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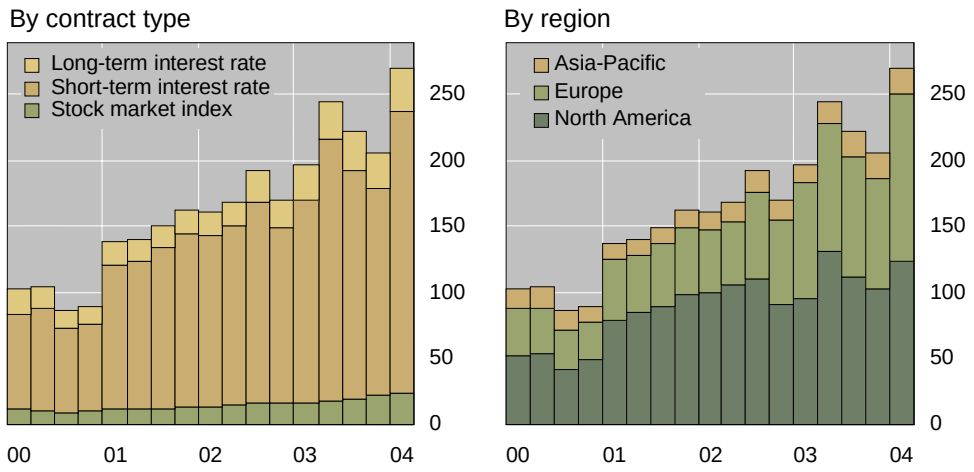
4. Derivatives markets

The aggregate turnover of exchange-traded financial derivatives contracts monitored regularly by the BIS returned to growth in the first quarter of 2004. The combined value of trading in interest rate, stock index and currency contracts amounted to $272 trillion, a 31% rise from the fourth quarter of 2003 (Graph 4.1). This was the strongest percentage increase since the first quarter of 2001, when business expanded by 55%. Fixed income and currency contracts were notably buoyant, with turnover in both types of instruments growing by about 35%. Business in stock index contracts was comparatively subdued, as volumes rose by only 9%. Global turnover was boosted in the first quarter by a marked resurgence of activity in March, with many exchanges witnessing new daily trading records. Trading in options on short-term European interest rates and German government bond futures was unusually brisk as market participants became increasingly convinced that weak economic data would prompt a cut in ECB policy rates. For the first time, the overall value of transactions in fixed income instruments on European exchanges exceeded that of similar trades on North American exchanges.

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

The most recent BIS semiannual survey data on aggregate positions in the over-the-counter (OTC) derivatives market show sustained activity in the second half of 2003, with the notional amount of outstanding contracts up 16% to almost $200 trillion. This expansion, which followed a 20% increase in the first half of last year, appears particularly healthy when compared with the 3.8% drop in open interest on organised exchanges. Unlike notional amounts, gross market values in the OTC market fell by 12% in the second half of 2003, after the positive growth dynamics exhibited since 2001. Most of the decline came from the interest rate swap segment, following the relative stability of yields over the reference period.

Signs of faltering growth in Europe fuel fixed income business

Activity in fixed income contracts rises sharply ...

The aggregate turnover of exchange-traded fixed income contracts rose sharply in the first quarter of 2004. The volume of transactions grew by 34% to $247 trillion, compared with a decline of 9% in the fourth quarter of last year. This overall increase in activity resulted from buoyant trading in the two major market segments, namely money market and government bond contracts. Turnover in short-term interest rate contracts, including on eurodollar, Euribor and euroyen rates, expanded by 35% to $213 trillion, while business in longer-term instruments, including US Treasury notes, German government bonds and Japanese government bonds, rose by 25% to $33 trillion.

... particularly in March ...

A notable feature of activity in fixed income products in the first quarter was the unprecedented volume of transactions in March. Global turnover in such products climbed to $98 trillion in that month, an increase of 40% compared to February 2004 and 49% relative to the monthly average for 2003.

Trading in fixed income contracts was brisk across all the major geographical regions. The most pronounced increase took place in Europe, with quarterly turnover soaring by 53% to $122 trillion, compared with a rise of 20% in North America, to $112 trillion, and growth of 8% in the Asia-Pacific region, to $11 trillion. As a result of this sharp rise, the volume of fixed income business on European exchanges exceeded that of similar activity on North American exchanges for the first time.

... in European money market contracts

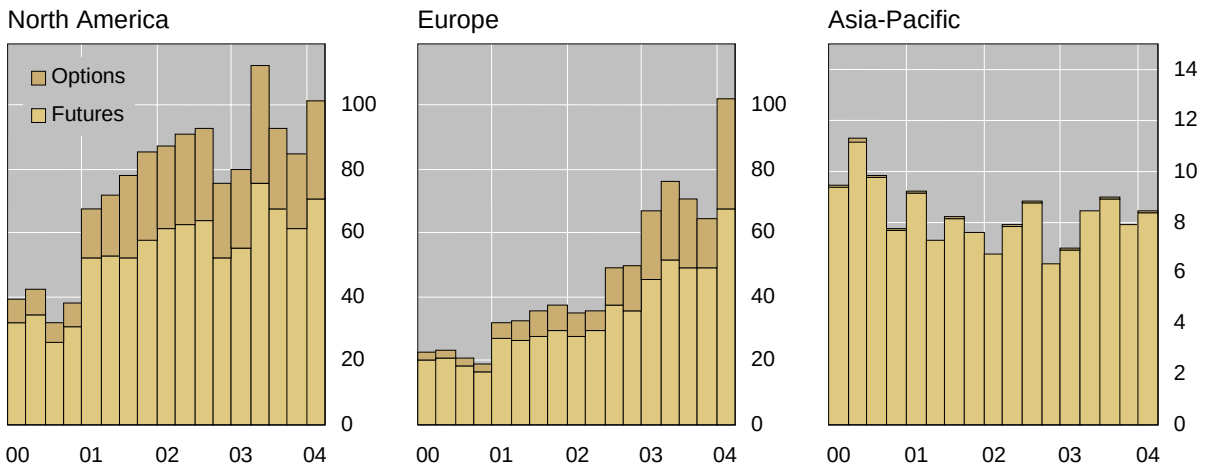
The percentage increase in European fixed income business was the second largest recorded since 1993, when the BIS began to collect quarterly data on activity in exchange-traded derivatives contracts.[1] European money market contracts were unusually buoyant, with turnover rising by nearly 60% to $102 trillion (Graph 4.2). Within this total, futures rose by 38% to $68 trillion, while related options surged by 126% to $34 trillion. Trading in longer-term European instruments, mainly German government bonds, was also lively, rising by 29% to $20 trillion (Graph 4.3). Business in such futures expanded by 29% to $18 trillion, while that in related options grew by 40% to $2 trillion. The growth of European fixed income business reflected macroeconomic developments, particularly changes in financial markets' monetary policy

Macroeconomic factors play a role in Europe

[1] The greatest percentage increase on record took place in March 2001, when turnover rose by 65%.

Turnover of short-term interest rate contracts

Quarterly contract turnover, in trillions of US dollars



Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 4.2

expectations (see below), but other, longer-term trends may have contributed to boosting activity in this area. Fixed income markets in the euro area have become increasingly liquid since the introduction of the euro at the beginning of 1999, which is likely to have facilitated hedging and position-taking in derivatives markets.

Surge in European money market business ...

Aggregate trading in European fixed income instruments reached a new peak in March. Conditions in euro area money markets were relatively calm during much of the first quarter but this changed abruptly in the last week of March. On 24 March, the price of futures and options on Euribor rates jumped sharply to a nine-month high and combined trading in futures and options on Euronext.liffe rose to record levels after ECB officials noted that consumer confidence in the euro area was not as strong as it should have been at that point of the recovery and that the ECB had room for manoeuvre on monetary policy. Such declarations reinforced market participants' expectations of a forthcoming cut in policy rates. On 24 and 25 March, the volume of option transactions involving Euribor futures was unusually large, exceeding that in futures by a significant margin. Trading in options on money market rates often tends to rise relative to that in futures when market participants revise their expectations for short-term rates or entertain divergent opinions about the course of monetary policy. On 25, 26 and 30 March, the price of Euribor futures scaled new heights but trading returned to more "normal" volumes.

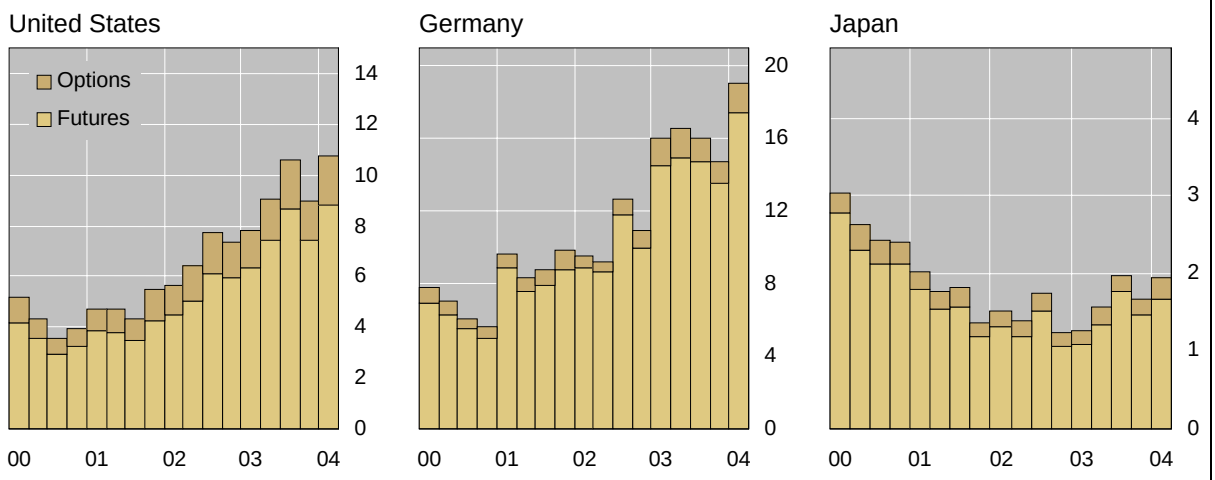
... particularly in options ...

... and in German government bond contracts

The pattern of activity in German government bond contracts was somewhat different from that in money markets. Bond markets in euro area countries evolved within a fairly narrow range during the first two months of the year, tending to react in a somewhat muted fashion to US macroeconomic announcements. However, this changed dramatically in early March. On 5 March in particular, trading achieved record levels on Eurex when global financial markets reacted strongly to much weaker than expected US non-farm payroll figures for February. Activity also surged on 29 March when the euro dropped to its lowest level of the year against the dollar, leading to sales of

Turnover in government bond contracts

Quarterly contract turnover, in trillions of US dollars



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

euro area bonds. Some market participants noted that turnover in German government bonds may have been boosted by adjustments to carry trades involving short dollar and long euro positions. With the weak US non-farm payroll numbers softening expectations of a hike in US policy rates and with continuing economic weakness in Europe, such speculative strategies had been considered attractive by market participants in the early part of the month.

Fairly robust fixed income business in North America ...

Trading in fixed income products expanded at a weaker pace in North America than in Europe. Activity was nevertheless fairly robust, with business in money market and longer-term instruments increasing at a comparable rate, by 20%, to $101 trillion and $11 trillion respectively. As was the case in Europe, futures contracts on US money market rates grew more slowly than those for related options, by 15% to $71 trillion versus 32% to $31 trillion. This pattern was also evident for US Treasury note and bond contracts: the turnover of futures expanded by 18% to $88 trillion and that of options by 28% to $20 trillion. Apart from a few days in March (see below), market conditions in North America were not particularly volatile during the quarter (Graph 4.4).

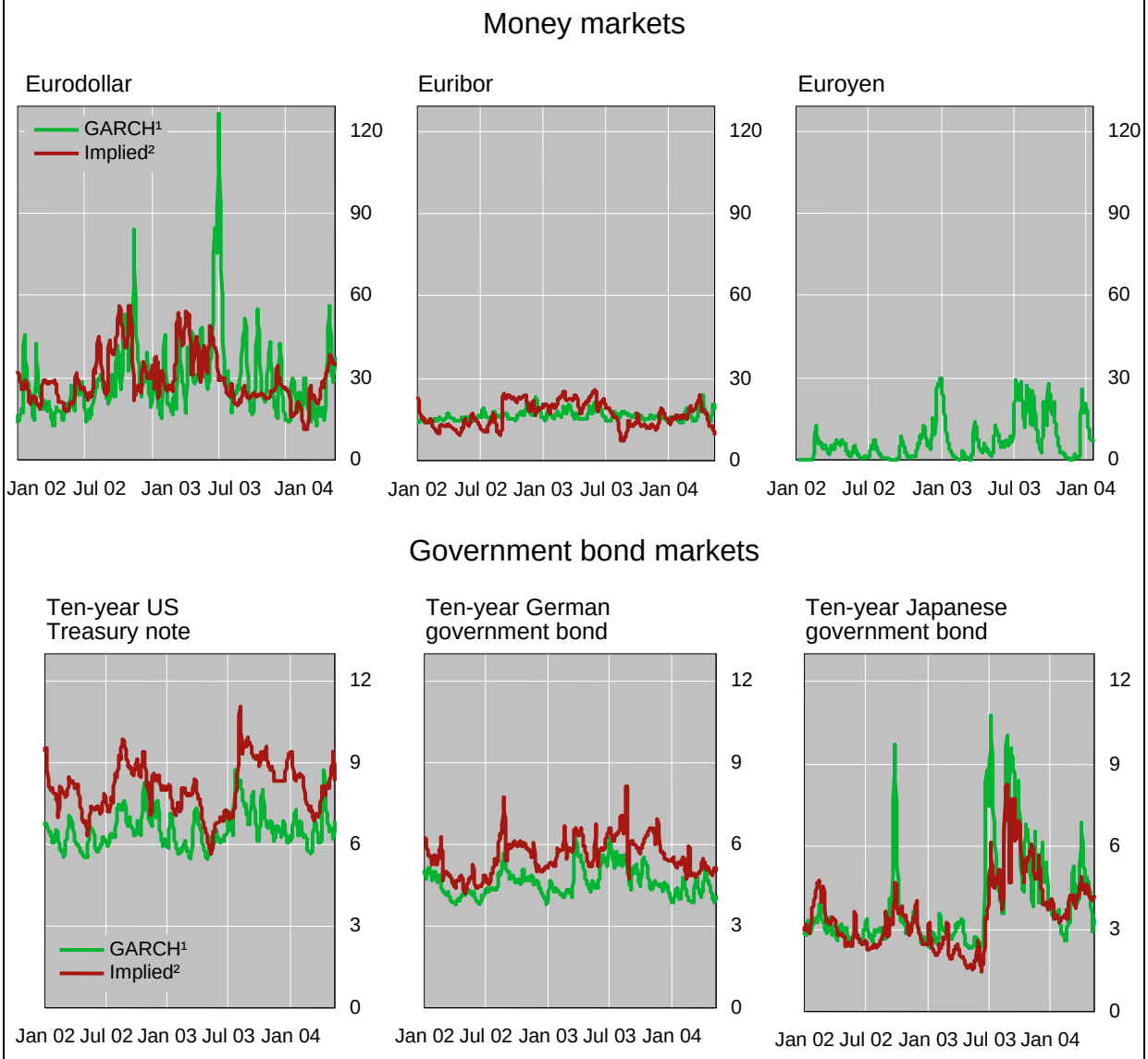
... on evolving risk management practices ...

Market sources suggested that activity in the region may have been supported by changes in the risk management practices of intermediaries. Some of the most active users of derivatives markets, including those involved in the large US mortgage market, were reported to have reacted to the market dislocation of last summer by frequently adjusting their hedges in the cash and futures markets, and by making greater use of options. Such changes in risk management are aimed at reducing the potential strains on balance sheets resulting from sharp shifts in market conditions. The rise in US fixed income business may also have been related to the vigorous response of the Chicago exchanges to the competitive challenge posed by the launch in February of Eurex US, the local fully electronic subsidiary of the German-Swiss exchange

... and stronger competition between exchanges

Volatility of major fixed income rates

Five-day moving averages



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

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

Eurex AG.[2] The Chicago Mercantile Exchange (CME) and the Chicago Board of Trade (CBOT) responded to the arrival of the new exchange by offering additional financial incentives to various groups of traders, particularly for the use of their electronic trading platforms.

[2] Eurex US began trading futures and options on US Treasury notes and bonds. It intends to expand its offering to include futures and options on German government bonds as well as futures on the European DAX and Dow Jones Euro STOXX 50 SM stock indices. The Chicago-based Clearing Corporation is acting as the clearing organisation for Eurex US in the United States. Pending approval by the US Commodity Futures Trading Commission, a global clearing link will be established between the Clearing Corporation and Eurex Clearing AG.

March also sees record US fixed income trading

Aggregate trading in US fixed income instruments also reached a new peak in March. Although business in eurodollar contracts on the CME set a new daily record after the release of the US non-farm payroll data on 5 March and volumes rose substantially for the month as a whole, activity remained below the all-time peak established in June 2003. By contrast, trading in US Treasury note and bond contracts on the CBOT attained a new monthly record. Activity in such contracts jumped to a new daily maximum on 5 March and was also brisk in the last week of the month, particularly on 26 March, when US fixed income markets were weakened by stronger than expected personal income and business confidence data.

Offsetting trends in fixed income activity in Asia-Pacific

In the Asia-Pacific region, the 8% expansion observed over the first quarter reflected conflicting influences. On Asian exchanges, an 11% drop in Singapore more than offset a 14% increase in Japan, leaving transactions in the subregion 2% lower overall, at $7 trillion. In Australia and New Zealand activity grew smartly, with total turnover up by 37% to $4 trillion. Trading in Australia has experienced a remarkable recovery since the trough reached in the fourth quarter of 2002. Some of the factors underlying this recovery, including the use of derivatives contracts for the hedging of corporate bond issuance, are discussed in the March 2004 issue of the *BIS Quarterly Review*.

Dollar weakness continues to boost currency contracts

Rise in turnover of currency derivatives ...

Turnover of exchange-traded currency derivatives, the value of which represents only a small fraction of exchange-traded financial derivatives surveyed by the BIS, amounted to $2 trillion in the first quarter of 2004, a 35% increase from the last quarter of 2003.

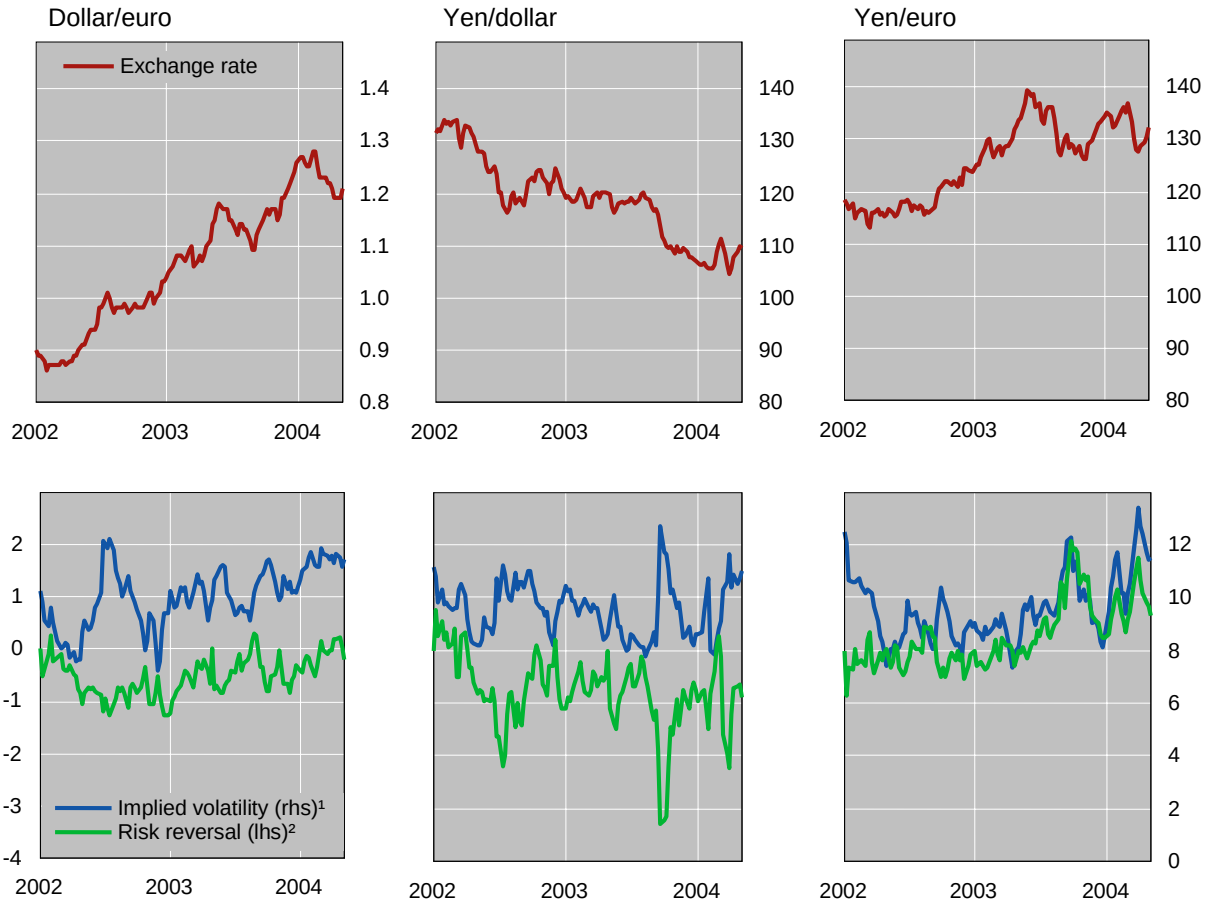
... on a reversal of trend

Market activity was influenced by the movement of the dollar, which declined further against most other major currencies between early and mid-February but then recovered strongly until early March (Graph 4.5). As is often the case when market trends are reversed, the aggregate volume of transactions surged, posting a new record in March. In that month, contracts involving the dollar and the euro, the most actively traded currency pair, rose by 25% to $290 billion. Trading in other major currency contracts expanded at an even stronger pace. Transactions involving the dollar and the yen, sterling, the Canadian dollar and the Swiss franc grew by 53%, 61%, 57% and 56% respectively.

Recovery of currency contracts since early 2003

Since the first quarter of 2003, trading in currency contracts has recovered steadily from a long period of decline. This recovery is mainly due to a significant increase in the turnover of dollar/euro futures on the CME, the largest marketplace in the world for exchange-traded currency contracts. Trading in the CME's major European "legacy" contracts (dollar/Deutsche mark and dollar/French franc) had dropped sharply ahead of the introduction of the euro at the beginning of 1999, but the new dollar/euro contract has since replaced the legacy contracts, and its turnover now exceeds by a wide margin the volumes achieved by them in the early to mid-1990s. Market participants have noted that the introduction by the CME of round-the-clock trading for its

Exchange rates, implied volatilities and risk reversals



[1] One-month horizon, in per cent. [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

currency contracts in April 2001, combined with the dollar's recent swings against the euro, have helped enlarge the pool of traders in such contracts.

Declining Korean business dampens global stock index turnover

Uneven activity in stock index contracts ...

Trading in stock index contracts was somewhat lacklustre compared to that in fixed income and currency contracts in the first quarter of 2004. Turnover rose by only 9% to $24 trillion. Activity was uneven across the major geographical areas. Trading in the Asia-Pacific region, principally in options on the Korea Stock Exchange's KOSPI 200 index, declined by 10% to $8 trillion. Korean stock index options, introduced in October 1997, have been one of the main drivers of global stock index activity since 2001. The recent slowdown could indicate either that activity in previous periods experienced some cyclically related overshooting or that business has now entered the "mature" stage of its life cycle.

Issues in the clearing of cross-border derivatives transactions

The rapid growth of exchange-traded derivatives markets has been accompanied by an increasing internationalisation of marketplaces and clearing arrangements.[1] Such clearing arrangements attempt to provide market participants with secure and efficient means of executing and settling contracts across borders. This box provides a brief description of the various types of clearing links and discusses some of the systemic issues they raise.

Key role of clearing house in derivatives markets

In exchange-traded derivatives markets, the clearing house plays the role of central counterparty (CCP). It places itself between two parties to a transaction, acting as the seller to each buyer and the buyer to each seller, on terms agreed by the original parties. The CCP tries to ensure the financial integrity of derivatives markets through a system of daily revaluation and settlement of contracts. This process is supported by a collateralisation of clearing members' exposure in the form of an initial margin payment based on the volatility of the particular contract traded.

Since exchange-traded contracts are standardised, obligations undertaken can in effect easily be transferred from one party to another. A trader holding a short (or long) position in a particular contract can cancel the obligation by taking a new long (or short) position in that contract, a process know as "offsetting" or "closing out". This is what happens in practice, with most contracts tending to be closed before they reach maturity. The role of the clearing house as CCP makes it possible to net any positions in a simple fashion, which means that a high volume of transactions can be carried out without creating further counterparty relationships. This allows for a substantial reduction in counterparty credit risk.

Typology of clearing links

There are a variety of trading and clearing links, which can be divided into two broad types: clearing links and mutual offset systems (MOS).

Clearing links usually involve a "home" CCP which supports the primary exchange and an "away" CCP or exchange, whose members may also trade the contract. In the simplest and most common type of clearing link, contracts executed on the away exchange are cleared by the home CCP, in accordance with the rules of the home CCP. Such links tend to operate during the business hours of the home clearing house but extended trading hours are also possible (with the away CCP assuming counterparty risk for a limited time).

In contrast to a clearing link, an MOS allows market participants to choose which CCP will clear, margin and guarantee their positions.[2] In an MOS, positions may be transferred between one CCP and the other on the trade date and at the trade price. Traders can take advantage of the inter-exchange transfer by designating a trade as an MOS transaction prior to its execution. This enables them to open a position on one exchange and liquidate it on the other through an offsetting transaction, and thus better manage their overnight risk. Each CCP acts as counterparty to a contract with one of its own clearing members and to an offsetting contract with the other CCP. Both CCPs in an MOS are exposed to risks vis-à-vis each other arising from these arrangements. The very first link between derivatives exchanges, established in 1984 by the CME and SIMEX (now named SGX), was an MOS. A planned global clearing link between Eurex AG and Eurex US would be akin to this type of arrangement.

Special risks involved in cross-border clearing

A CCP involved in cross-border clearing faces a number of special risks, which need to be managed carefully.

Default risk. In any clearing link, the away CCP guarantees the contracts of its clearing members and bears the risk of default until the positions are transferred. A CCP may encounter difficulties either if the other CCP accepts transferred positions for one of its clearing members in default or if it seeks to transfer positions to a defaulting clearing member at the other CCP.

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[1] For a more detailed treatment of some of the issues discussed in this box, see the report prepared by the Committee on Payment and Settlement Systems, *Clearing arrangements for exchange-traded derivatives*, Basel, March 1997. [2] See J McPartland, "Open architecture clearing", *Outlook 03*, 2002, pp 18–22; available at www.futuresindustry.org.

Selected links between clearing houses

Clearing house	Type of link	Year of introduction	Contracts covered
CME-SIMEX/SGX	MOS	1984	Eurodollar and euroyen contracts
Euronext.liffe/TIFFE	Automatic open interest transfer	1995	Euroyen contracts
CME-MEFF RV	Clearing link	2001	Stock index contracts based on various S&P European indices
Eurex AG-Eurex US	Global clearing link	Planned	US government bond and stock index contracts and German government bond and European stock index contracts

Sources: ECB; derivatives exchanges; BIS.

In an MOS, the CCPs are exposed to each other as clearing members. A financial problem at one CCP may immediately "spill over" to the other.

Delivery risk. Delivery risk may also exist if derivatives contracts provide for delivery of the underlying asset (rather than cash settlement). As a special clearing member of the opposite CCP, a CCP may be paired with a clearing member on the opposite exchange to make or take delivery of the underlying instrument as agent for its own clearing member. Doing so in another time zone, in another currency and with potentially non-harmonised national bank holidays can be challenging.

Foreign exchange settlement risk. Many of the products subject to clearing links are denominated in a foreign currency. When initiating settlement-related payments, CCPs often use foreign currency accounts at domestic banks, which in turn depend on their correspondent banking relationships abroad to complete any interbank transfers on behalf of the CCP. Time zone differences, non-harmonised national bank holidays and the need for banks to confirm receipt of payments by their correspondents abroad may result in longer delays before foreign currency payments become final than is the case for domestic currency payments. These issues mean that CCPs must adapt their risk management arrangements and procedures to cover settlements in foreign currencies.

Legal risks. The legal framework for the clearing of derivatives is generally not the same in all countries where a contract is cleared or settled across borders. Any transaction conducted via a chain of intermediaries and/or CCPs raises questions about the relevant legal regime. When a defaulting participant holds the bulk of its assets in a foreign jurisdiction, conflicts of law may arise that could cause difficulties for a CCP, intermediaries and other market participants.

Custody and intermediary risks. The use of intermediaries to clear derivatives contracts potentially exposes participants to loss in the case of insolvency, negligence or fraud of such intermediaries. Regulators generally require intermediaries to segregate the assets and derivatives positions of their customers from their own assets. The most common regime is one in which customer positions and assets are aggregated into a joint account but segregated from clearing members' proprietary positions and assets.

Operational risks. CCPs face operational risks related to the technology that supports the trading links, including outages, information technology problems, version control of software or the failure of telecommunications networks. An operational interruption in one system could delay clearing in the other.

By contrast, transactions on North American marketplaces expanded by 16% to $9.7 trillion, while those on European exchanges grew by 34% to $6 trillion. Trading in Germany, the largest European market for stock index

derivatives, rose by 33% to $3 trillion. Activity in the United Kingdom, the second largest market in the region, increased by $57% to $1 trillion. While trading on Euronext.liffe was buoyant, UK business was also boosted by burgeoning activity on EDX London, an exchange that began operations in June 2003.[3]

... but new trading records in March

As in the fixed income and currency segments, aggregate trading in stock index contracts posted a new record in March. The sharp drop in North American and European equity markets from the beginning of March, apparently on a belief that the bull market that had begun in March 2003 was coming to an end, probably prompted investors to seek protection in derivatives markets. Such a need for protection was illustrated by some reduction in risk tolerance among equity investors, following a long-term rise in such tolerance (see the Overview and Graph 1.7).

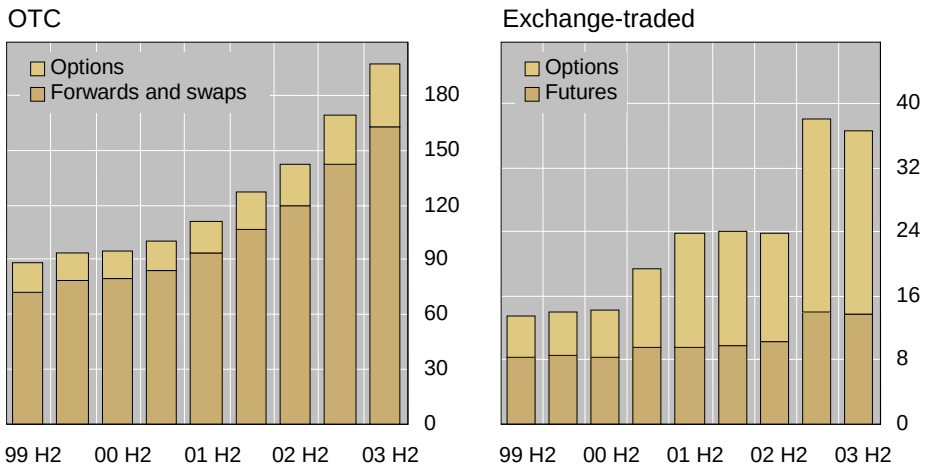
Growth in the OTC segment remains solid through the second half of the year

OTC markets grow in the second half of 2003 ...

After growing by 20% in the first half of 2003, notional amounts outstanding in the OTC derivatives market expanded by a further 16% in the remaining part of the year. By the end of December, the total amount stood at $197 trillion (Table 4.1). In the first six months of 2003, changes in OTC notional amounts went along with a large increase in activity on exchange-traded markets (60%); in the second half, however, the growth in OTC business was accompanied by a decline in open interest on exchanges (–3.8%) (Graph 4.6).

Global derivatives positions

Amounts outstanding, in trillions of US dollars



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

[3] EDX London was built on the foundations of the securities derivatives business of the OM London Exchange (which began operations in 1989). It is jointly owned by the London Stock Exchange and OM AB.

Global OTC derivatives market[1]

Amounts outstanding, in billions of US dollars

	Notional amounts				Gross market values			
	End-Jun 2002	End-Dec 2002	End-Jun 2003	End-Dec 2003	End-Jun 2002	End-Dec 2002	End-Jun 2003	End-Dec 2003
Grand total	127,509	141,679	169,678	197,177	4,450	6,360	7,908	6,987
A. Foreign exchange contracts	18,068	18,460	22,088	24,484	1,052	881	996	1,301
Outright forwards and forex swaps	10,426	10,719	12,332	12,387	615	468	476	607
Currency swaps	4,215	4,503	5,159	6,371	340	337	419	557
Options	3,427	3,238	4,597	5,726	97	76	101	136
B. Interest rate contracts[2]	89,955	101,658	121,799	141,991	2,467	4,266	5,459	4,328
Forward rate agreements	9,146	8,792	10,270	10,769	19	22	20	19
Swaps	68,234	79,120	94,583	111,209	2,213	3,864	5,004	3,918
Options	12,575	13,746	16,946	20,012	235	381	434	391
C. Equity-linked contracts	2,214	2,309	2,799	3,787	243	255	260	274
Forwards and swaps	386	364	488	601	62	61	67	57
Options	1,828	1,944	2,311	3,186	181	194	193	217
D. Commodity contracts[3]	777	923	1,040	1,406	79	86	110	128
Gold	279	315	304	344	28	28	22	39
Other	498	608	736	1,062	51	58	88	88
Forwards and swaps	290	402	458	420	…	…	…	…
Options	208	206	279	642	…	…	…	…
E. Other[4]	16,496	18,330	21,952	25,510	609	871	1,083	957
Gross credit exposure[5]	.	.	.	.	1,317	1,511	1,750	1,986

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

... with solid activity in all segments

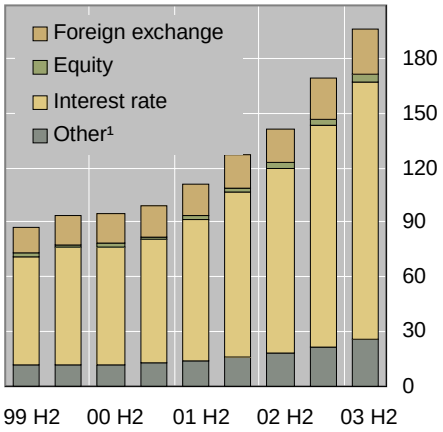
Activity in OTC contracts was solid in all the main segments of the market. The amounts outstanding in equity products and interest rate and currency derivatives grew by 35.3%, 16.6% and 10.8% respectively (Graph 4.7). Compared to the first half of the year, growth accelerated strongly in equity-related instruments, while it slowed in currency derivatives and interest rate contracts. An exception in interest rate contracts was yen-denominated swaps, which rose by 29% in notional amounts on an improving outlook for the Japanese economy (Graph 4.8). The growth recorded by the OTC market in 2003 resulted in an even greater dominance for interest rate products, which by the end of December accounted for 72% of the overall notional amounts.

Gross market values, which measure the cost of replacing outstanding contracts had they been settled on the last day of each reporting period, amounted to $7 trillion, a 12% decline. These values had increased sharply in the previous two reporting periods, by 43% and 24% respectively. The decline in gross market values occurred largely in interest rate swaps, for which these

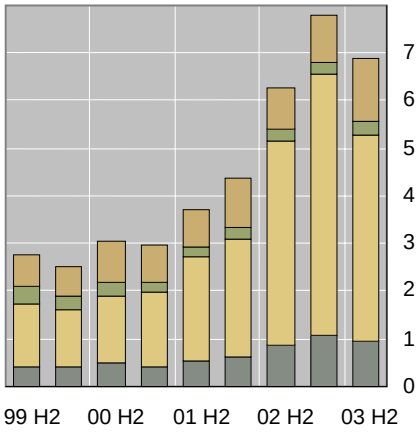
Global OTC derivatives

In trillions of US dollars

Notional amounts outstanding by broad risk category



Gross market values by broad risk category



[1] Estimated positions of non-regular reporting institutions.

Source: BIS. Graph 4.7

values decreased from $5.0 trillion at end-June to $3.9 trillion at end-December. The reduced cost of replacement in this segment of the OTC derivatives market stemmed from the relative stability in interest rates worldwide after the brief period of turbulence in the first two months of the half-year.

For 2003 as a whole, interest rate derivatives expanded at a pace unseen since 1998. Interest rate swaps represented the vast majority of this segment and at end-December their share stood at 90% of the total. Beyond the contribution of the structural growth which has characterised the OTC derivatives segment since 2001, the growth in interest rate derivatives in the second half of 2003 appears to have been driven by both a directional effect and a volatility effect. The directional effect was the reaction of investors to the sharp rise in interest rates during the summer, while the volatility effect reflected concerns about potential future movements in yields as indicated by high implied volatilities.

OTC interest rate activity driven by hedging of MBSs ...

The directional effect was driven specifically by the dramatic increase in US bond yields between mid-June and end-August. This movement in yields led to a large hedging demand for mortgage-backed securities (MBSs). The rise in rates reduced the incentives of US homeowners to refinance their mortgages, which resulted in an extension of the duration of MBSs. Indeed, the Lehman Brothers mortgage index indicated a lengthening of duration from about half a year in mid-June to over three years in early August. Holders of such securities acted to restore their original durations by taking short positions in long-term interest rates. The instrument of choice for such hedging was the five-year swap contract, with which investors opted to pay fixed and receive floating.

Credit exposure in derivatives markets: some indications from ISDA surveys

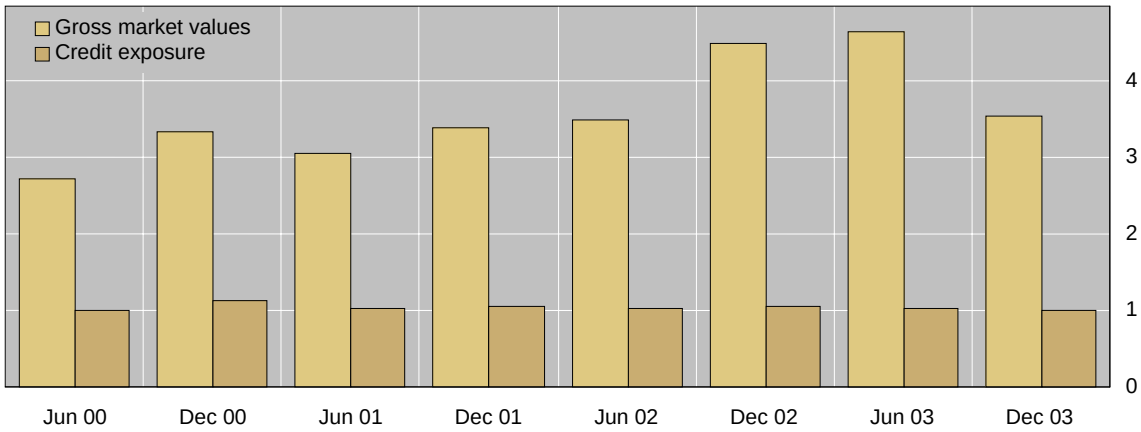
Gross market values provide a more accurate indication of credit exposures in derivatives markets than notional amounts outstanding. These values measure the replacement cost of contracts on the last day of a given reporting period. To the extent that a contract has a positive replacement cost, one of the counterparties will be exposed to default by the other counterparty unless the exposure is covered by collateral or other risk-mitigating practices. Gross market values have been recording large increases since 2001, reflecting the interest rate changes associated with vigorous monetary easing in the major economies, the sharp declines in equity prices and the depreciation of the dollar. In the last half-year of 2003, however, gross market values dropped significantly, by 12%, following the stabilisation of interest rates around historically low values and a less volatile phase of recovery displayed by equities.

Gross market values, however, are only a rough measure of credit risk. In fact, they tend to overestimate actual exposures, since bilateral netting and other risk-reducing arrangements, such as collateralisation, are not considered in their calculation. Taking these items into account brings the derivatives-related credit exposure of reporting institutions at the end of 2003 down from the $7 trillion indicated by gross market values to $2 trillion, this last figure representing 1% of outstanding notional amounts. In addition, while the ratio of gross market values to notional amounts grew from 2.7% to 4.7% between 1998 and June 2003, the same ratio calculated for credit exposure remained fairly constant at around 1% (see graph below). The existence of a sizeable difference between gross market values and credit exposures, both in absolute terms and as a ratio of outstanding notional amounts, may indicate that the increasing use of OTC derivatives has been associated with the adoption of more sophisticated risk management techniques. This development has perhaps been fostered by the large losses occurred during the numerous episodes of financial turbulence in the last decade.

A survey[①] carried out recently by ISDA (International Swaps and Derivatives Association) indicates that firms depend heavily on derivatives. The survey covered the world's 500 largest companies, located in 26 countries and representing a well diversified sample of industrial sectors. Of these firms, 92% reported the use of derivatives to hedge financial risks, with interest rate (85%) and currency exposures (78%) their major concerns. As for other risk categories, only 24% of the firms take out insurance against commodity-related risk and 11% against equity risk. Quite interestingly, there is no geographical pattern in the use of derivatives, with the proportion of firms employing derivatives nearly identical across major economies.

Gross market values and credit exposures as a ratio of OTC notional amounts

In per cent



Source: BIS.

[①] The discussion in this box relies on the results of the following surveys recently presented by ISDA: *Derivatives usage by the world's 500 largest companies*, *Counterparty credit exposure among major derivatives dealers* and *ISDA margin survey 2004*. They are all available from the ISDA website.

Beyond employing derivatives, firms are also aware of the market risks associated with positions based on such instruments. Another survey carried out by ISDA reports on the use of collateral in a sample of 97 firms. Based on the responses, it is estimated that just over $1 trillion of collateral was employed at the end of 2003, 40% more than one year earlier. Among respondents, the number of collateral agreements in place was close to 55,000, an increase of 29% over the year before. Cash is the most frequently used type of collateral, and the main currencies involved are the US dollar and the euro; US government securities represent the second most common type of collateral. Over half of the counterparties are located in the United States and in Canada, and 22% in Europe; only 3% are resident in emerging countries.

The survey also sought to determine the extent of protection guaranteed by collateral, requesting firms to disclose the percentage of trading volumes and credit exposures covered by collateral. Overall, coverage increased from 30% at the end of 2002 to 50% at the end of last year. The highest coverage, in terms of both trading volumes and exposure, is for interest rate products. Significant increases have taken place in the equity and credit derivatives segments. Among respondents, nearly 50% secure their derivatives transactions through collateral arrangements, which represents a 20 percentage point rise from the 2003 survey (see table). While collateral employed to secure interest rate-related transactions remained stable, the coverage for equity and credit derivatives has increased.

Although it is generally true that derivatives help manage financial risk, there are other types of risks associated with these instruments. Among other concerns, policymakers and regulators have often been worried by the structure of the OTC market, where the high concentration of market-making could result in a concentration of credit risks in a few dealers. In such conditions, failure of one dealer could result in large losses for its counterparties and end in a chain of defaults. According to the results of other two surveys by ISDA (see footnote), market-makers appear to be conscious of the risks involved in their activities and measures seem to have been put in place to limit the impact of financial volatility on the values of their portfolios. An ISDA survey of 17 dealers shows that collateral coverage of the five largest exposures averages 81%, so that less than 20% of the original exposure is left uncovered. Considering only the 10 largest dealers, the average collateralisation rises to 91%, and just 9% of the initial exposure is unsecured. The significance of the risk reduction permitted by collateralisation can be gleaned from the ratio of credit exposures, before and after collateralisation, to the total amount of counterparty credit exposure. For the 10 largest dealers, the mean ratio before collateral is 14.5%, a number which drops to just 1.2% when collateral is considered. On average, the concentration of net exposures, calculated as the sum across the 10 largest dealers of their five largest net exposures after collateral, is close to 2%. This suggests that dealers pay attention to counterparty exposures and try to put a cap on them by means of collateralisation.

Trade volumes and exposures collateralised by surveyed firms

	Percentage of trade volumes		Percentage of exposure	
	2003	2004	2003	2004
All OTC derivatives	30	51	29	52
Interest rate	53	58	48	55
Foreign exchange	21	24	28	37
Equities	27	45	24	52
Metals	18	24	18	40
Energy	16	26	15	30
Credit	30	45	25	39

Source: *ISDA margin survey 2004*.

... and high market volatility ...

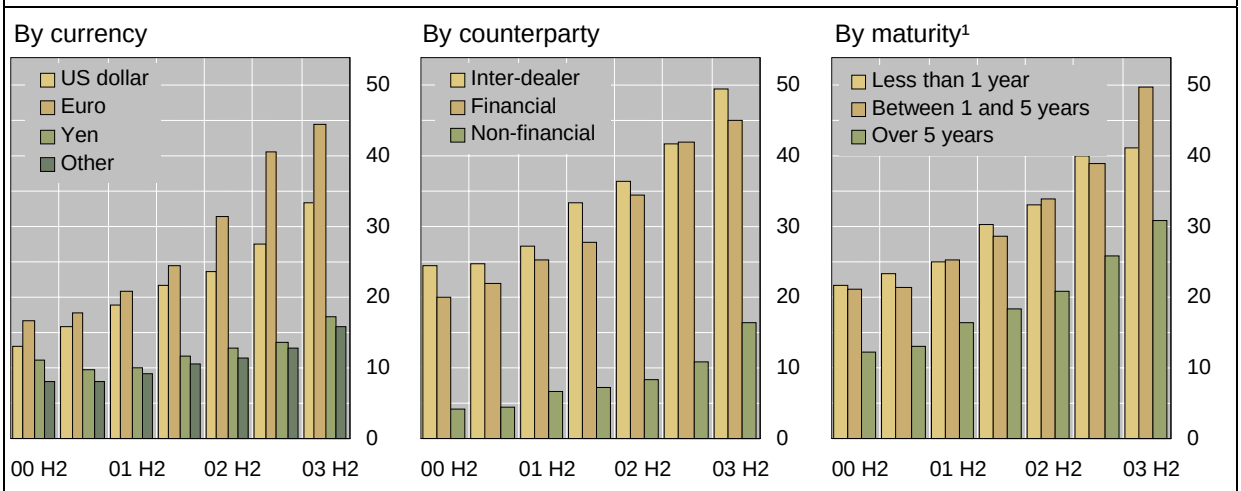
The importance of the volatility effect is suggested by a high correlation between the growth in OTC interest rate derivatives and the level of volatility implied in the prices of options written on Libor rates. At the semiannual frequency, the association between volatility and derivatives activity has been significant and positive since 1995, and the correlation increased sharply after 1999 to reach nearly 80%.[4] High implied volatilities are a sign that investors are more concerned than usual about large potential movements in interest rates. This concern tends to boost notional amounts of both interest rate swaps and interest rate options. In the first case, notional amounts rise because the uncertainty over interest rates leads investors to more actively maintain their hedges, for which they often turn to interest rate swaps. In the second case, notional amounts rise because some market participants act to protect themselves against swings in interest rates by means of various options, such as swaptions, caps and floors. In the second half of 2003, when volatility was unusually high, interest rate options grew by 18%, so that over the year as a whole their notional amount increased by 50%.

... in contrast to exchange-traded derivatives

The positive association between the growth of OTC derivatives in notional amounts and volatility is the opposite of what is typically observed for exchange-traded derivatives. In exchange-traded markets, while a positive correlation between volumes and volatility is detected at the daily frequency, a negative or negligible one emerges when volumes are aggregated at monthly or quarterly frequencies.[5] Since exchange-traded derivatives tend to be highly

Interest rate swaps

Notional amounts outstanding, in trillions of US dollars



¹ Includes forward rate agreements, which in December 2003 accounted for approximately 8% of the total notional amount outstanding.

Source: BIS. Graph 4.8

[4] The BIS began collecting data on OTC derivatives markets in 1998. The calculation of such a correlation uses previous data collected by ISDA.

[5] See M Micu and S Jeanneau: "Volatility and derivatives turnover: a tenuous relationship", *BIS Quarterly Review*, March 2003.

liquid instruments, investors turn to them when initially responding to volatility. Over time, however, they complement these derivatives with OTC contracts, which, while less liquid, can be tailored for more precise positions.

Currency derivatives grow on expectations of a weaker dollar

Currency derivatives also expanded robustly in the second half of 2003. By the end of the period, these OTC contracts stood at $24 trillion in notional amounts, a rise of 11%. Outright forwards and currency swaps, however, showed little change, with notional amounts remaining close to $12 trillion. Currency options accounted for much of the growth, reaching a notional amount of $5.7 trillion, an increase of nearly 25% after an exceptional 42% rise in the first six months of 2003. The strong activity recorded for options came with expectations about a depreciation of the dollar vis-à-vis both the euro and the yen. These expectations persisted throughout 2003, as highlighted by the risk reversal indicator (Graph 4.5). They were heightened by the release of weaker than expected economic data over the summer and, in September, by the official statement following the meeting of the G7 finance ministers and central bank governors in Dubai, which was perceived by market participants as a call for a weaker dollar.