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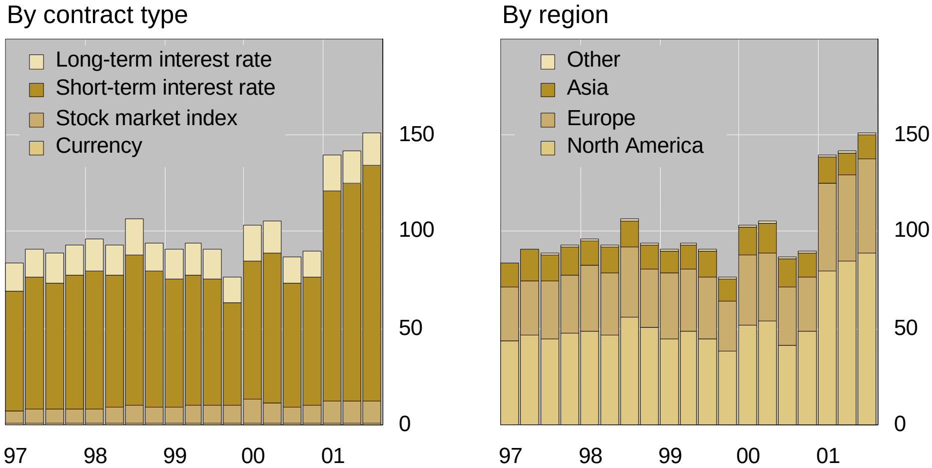
# 4. Derivatives markets

Aggregate turnover of exchange-traded derivatives contracts reached a new record in the third quarter of 2001, with the notional value of contracts monitored by the BIS rising by 6% to $150 trillion. Although overall business was somewhat subdued in July and August, the terrorist attacks of 11 September on landmark sites in the United States were followed by an upsurge in activity. Moreover, a number of trends observed in recent periods remained in evidence. Thus, trading in US money market contracts, which had been exceptionally buoyant in the previous two quarters against a background of monetary policy easing and changes in risk management practices, continued to be robust. By contrast, business in other types of contract, such as those on government bonds and stock indices, remained generally lacklustre.

The latest BIS semiannual data on aggregate positions in the global over-the-counter (OTC) derivatives market point to a modest rebound in business during the first half of 2001, with the stock of contracts rising by 4% to $98.8 trillion. While the pace of expansion of the OTC market has slowed over

**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 past year, some segments, such as US dollar interest rate swaps, remain vigorous.

## Money market business shifts to options as mortgage refinancing accelerates

The pace of activity in exchange-traded interest rate contracts accelerated in the third quarter of 2001. Total turnover expanded by 7% to $137.9 trillion, compared with an increase of 1% in the previous quarter. Once again, business in money market futures and options drove activity, with transactions rising by 9% to $122.1 trillion.

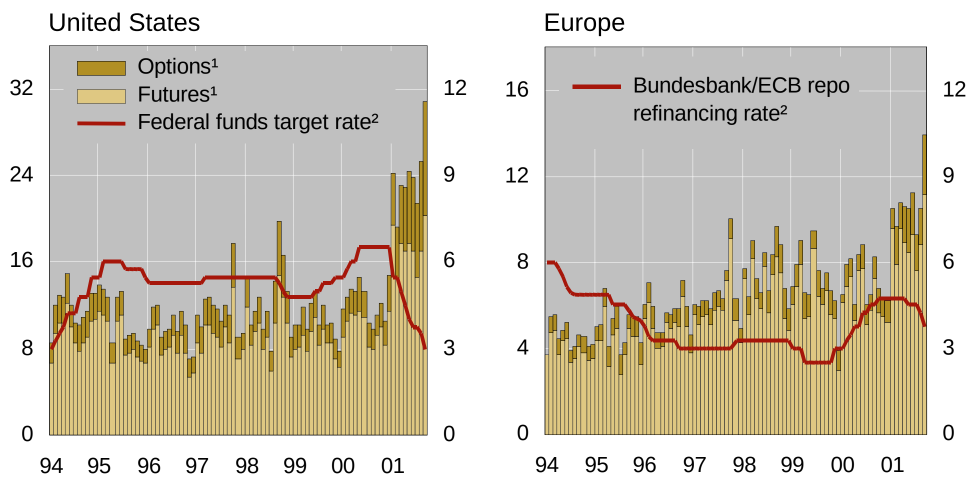
Activity in short-term futures is supported by policy rate cuts ...

Trading in money market futures increased by 2% to $88.5 trillion. The volume of transactions in such instruments, which has been exceptionally high since the beginning of the year, can be explained by a number of conjunctural and structural factors. One of the most significant conjunctural elements was the easing of US monetary policy. Fading hopes of a US recovery fostered increasingly strong expectations of policy rate cuts, sustaining business in short-term US instruments. At the same time, mounting signs of economic weakness in other regions encouraged similar expectations, lifting business in money market contracts. Indeed, the pattern of activity on euro zone and sterling short-term interest rates has been similar to, if less pronounced than, that on US short-term rates.

... and turmoil resulting from 11 September attacks

Trading in short-term instruments was also boosted by the terrorist attacks of 11 September, which led to pronounced market uncertainty. The ample injection of liquidity by central banks further intensified expectations of reductions in policy rates, fuelling money market business. With the major US futures exchanges being located in Chicago, fewer operational difficulties were experienced in futures markets than in cash markets, and some hedging and

**Short-term interest rate contracts and central bank target rates**




[1] Notional amounts; monthly turnover in trillions of US dollars (lhs). [2] In percentages (rhs).

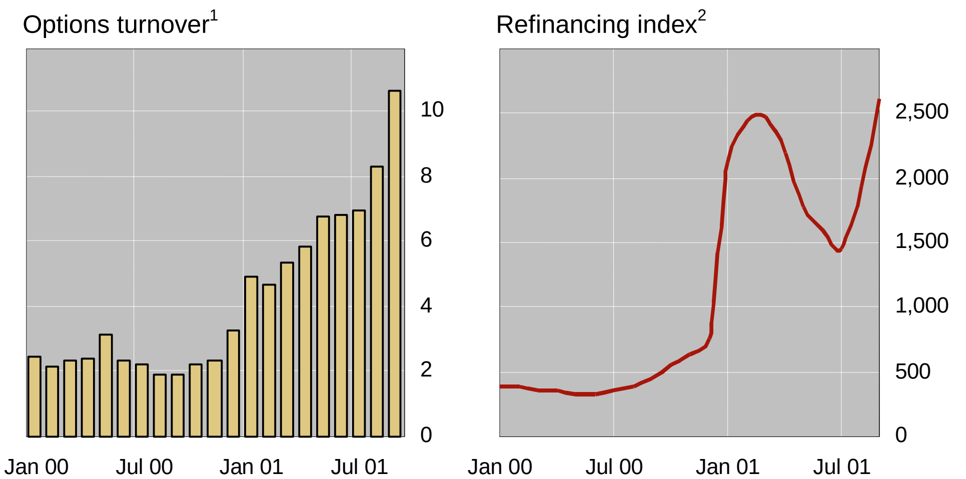
Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 4.2

position-taking transactions on money market rates may even have shifted from the cash to the futures markets.[1]

Mortgage refinancing leads to robust trading in US money market options

Another notable development in the third quarter was the very rapid increase in the trading of options on money market futures (by 33%, to $33.6 trillion). Trading in such options, which has been particularly robust on US markets since the beginning of 2001, appears to have been driven by some of the same factors as those supporting money market futures. In addition, it seems to have been closely related to developments in the US mortgage market. Concerns among mortgage banks and holders of mortgage-backed securities (MBSs) that mortgage prepayments could accelerate in the event of a further decline in long-term rates had led to a gradual increase in the demand for receiver swaptions (options to receive fixed rate payments against floating rate payments in interest rate swaps) since the beginning of the year.[2] The intermediaries offering such swaptions then hedged their short option positions in the OTC and exchange-traded options markets. The pattern of activity in short-term interest rate options seems to have been broadly consistent with

**Options turnover on US short-term interest rates and US mortgage refinancing index**




[1] In trillions of US dollars. [2] Four-month moving average, 16 March 1990 = 100.

Sources: FOW TRADEdata; Futures Industry Association; Financial Oxygen, Mortgage Bankers Association; BIS calculations. Graph 4.3

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[1] The CBOT and CME suspended trading in fixed income products on 11 September and closed their operations on 12 September. Trading resumed on 13 September but with shorter trading hours.

[2] Investors in MBSs face significant prepayment (or convexity) risks since the holders of the underlying mortgages enjoy certain prepayment privileges such as the ability to refinance the mortgages on more favourable terms when long-term interest rates decline. Such early repayments in turn lead issuers to call MBSs as the underlying pool of mortgages shrinks. In order to protect themselves from a shortening of their portfolios' duration and from a loss of interest income, holders of MBSs can purchase receiver (or call) swaptions enabling them to receive fixed rate payments on pre-agreed terms if their securities are called.

developments in the US mortgage market, where refinancing applications reached a record high towards the end of the third quarter.

Leveraged players are more active in short-term instruments ...

The high turnover of US money market instruments may also have reflected other temporary factors. Some market participants noted that leveraged players, particularly those following momentum trading strategies, had been highly active in the short-term segment in recent months as they purchased eurodollar contracts on market rallies.[3] Such players typically find futures more appealing than cash market securities since they enable them to (a) minimise their on-balance sheet exposures; (b) reduce the financing risks associated with possible cutbacks in credit lines on repurchase agreements; and (c) avoid the idiosyncratic risks related to the "specialness" of interest rates on repurchase agreements.[4]

... but buoyancy of short-term market also reflects deeper forces

The buoyancy of the short-term market probably also reflects deeper underlying factors, such as a movement of hedgers and traders away from the US Treasury yield curve and towards the Libor-based money market and swap curves (see "The emergence of new benchmark yield curves" on page 48). Earlier issues of the *BIS Quarterly Review* have emphasised the role played by the global issuance of fixed income securities in the expansion of the interest rate swap market and, in turn, in that of eurodollar futures. The ongoing buoyancy of eurodollar futures against a contraction in the global issuance of fixed income securities in the third quarter (see "The international debt securities market" on page 22) would seem to point to longer-term changes in the risk management behaviour of market participants or, perhaps, to the entry of new market participants.[5] In that context, market sources observed that mortgage banks and investors had recently become increasingly active users of interest rate swaps in managing the duration of their MBS portfolios.[6]

## Overall trading in bond contracts sees another contraction

In contrast to the sustained buoyancy of money market business, aggregate activity in longer-term instruments declined for the second consecutive quarter, although only slightly. Trading in bond contracts fell by 2% to \$15.9 trillion. The narrow range within which long-term rates evolved during the third quarter

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3 These issues are discussed in detail in Gerald Lucas and Joseph Schatz, "Futures vs cash volumes", *Merrill Lynch Fixed Income Strategy*, 24 August 2001.

4 The term "special" is used in the repo market to characterise below market overnight or term lending rates on loans collateralised by securities that are in short supply. Financial market participants willing to supply such securities can benefit from a significant reduction in funding costs.

5 The issuance of fixed income securities is generally associated with a hedging demand for short-dated interest rate swaps. Weaker demand for such swaps would lead to a corresponding decline in the turnover of money market futures since such instruments are commonly used in the hedging of short-dated swaps.

6 This issue is analysed in various issues of Credit Suisse First Boston's bimonthly review *The global credit strategist*.

probably explains this lacklustre evolution. Indeed, even in the weeks immediately after the 11 September attacks yields on government bonds declined by much less than those on money market liabilities. This probably reflected expectations of a recovery in the latter part of the year and concerns that US fiscal loosening would lead to higher budget deficits and, in turn, to a resumption of net government borrowing.

Turnover of US government bond contracts continues to decline ...

Whereas in the second quarter business on Eurex had experienced the most pronounced contraction (–14%), in the third quarter the CBOT accounted for much of the decline (–8%). US turnover was particularly weak in July but recovered somewhat in August on an increase in volatility. While the 11 September events boosted business in the second half of September, total turnover for the month was undercut by a two-day closure of the CBOT. Overall, except for the two-year Treasury note contract, which expanded by 5% during the quarter, all the other US government bond and note contracts witnessed a lower volume of transactions. The two-year Treasury note contract is widely used for position-taking on expected Federal Reserve actions.

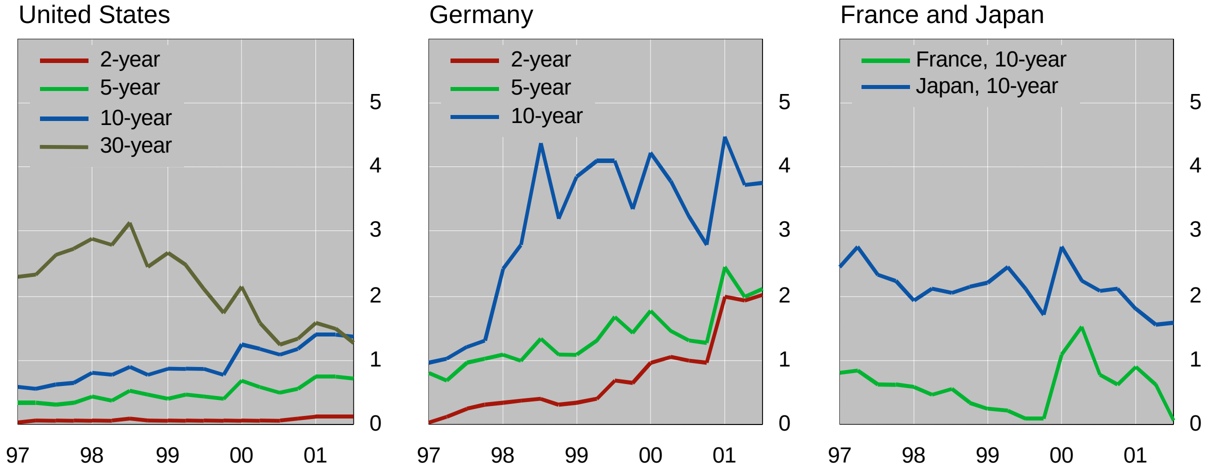
Despite the disruption faced by the US Treasury market, some of the trends seen in the market for longer-term US derivatives continued to assert themselves. Uncertainty concerning the status of 30-year Treasury bonds continued to affect trading in the cash and futures markets. Following a brief recovery in the first and second quarters, the Treasury bond contract resumed its descent (–15%). With activity in 10-year Treasury note futures declining by much less (–2%), that instrument displaced Treasury bond futures as the most actively traded long-term contract in the United States.

... while trading in two- and five-year German bond contracts rises

Trading in German government bond contracts on Eurex increased by 5%. Turnover rose strongly in the wake of the attacks on the United States, with some market observers attributing part of the rise to a shift of trading on

## Turnover in government bond contracts

Quarterly futures contract turnover, in trillions of US dollars




Sources: FOW TRADEdata; Futures Industry Association; BIS calculations. Graph 4.4

government bond rates from US benchmark contracts to German ones. The expansion was concentrated in the two-year and five-year maturities (Euro Schatz and Euro Bobl), furthering a trend that reflects the growing acceptance of intermediate German government securities as European benchmarks. At the same time, position limits set by Eurex on its government bond contracts combined with statements by Finanzagentur, the German government's new debt management agency, that it would act to prevent squeezes seem to have been successful in preventing the occurrence of such market disruption.

Trading in the French Euro Notional contract dries up

By contrast, Matif (Euronext Paris) saw a further drastic decline in the trading of the Euro Notional contract (–90%), for many years its flagship fixed income market instrument. Market commentators have attributed this contraction to the winding-down in September of Matif Intervention Bancaire (MIB), a market support operation established at the end of 1999. The introduction of MIB had led to a revival of trading in 2000 but the shift of liquidity to German government bond futures on Eurex made it increasingly difficult to trade in size on the French exchange. This once again confirms that liquidity tends to concentrate in a few instruments and that there is in general little room for more than one contract of a particular maturity in any time zone. Matif has set up a market-making structure for its revamped five-year government bond contract. This instrument is deemed to have better prospects in an environment where the maturity structure of French government debt is expected to shorten.

Lastly, trading in LIFFE's recently introduced euro-denominated Swapnote contracts continued to grow in the third quarter, with an expansion of nearly 30% (see the previous issue of the *BIS Quarterly Review* for a more detailed discussion). It should be noted, however, that activity in such contracts remains marginal, accounting for less than 2% of the value of turnover in German government bond futures.

## Transactions in equity index contracts decline despite market turbulence

Stock index trading declines in the third quarter ...

The value of turnover in stock index contracts declined by 4% to $11.6 trillion in the third quarter of 2001. Business proceeded at a brisk pace in Europe and the Asia-Pacific region (up by 13% and 18% respectively) but dropped sharply in North America (–15%). For the second consecutive quarter, options on stock market indices traded more actively than related futures.

Trading largely reflected the prevailing pattern of market volatility, gradually rising over the course of the quarter as disappointing macroeconomic announcements and profit warnings took their toll on equity markets. Market volatility increased significantly at the end of August, when warnings from Sun Microsystems and Corning brought the Dow Jones Industrial Index below 10,000 for the first time since April. The attacks on 11 September then created profound uncertainty. As activity in US equity index contracts was interrupted for the remainder of the week, turnover in other countries jumped abruptly, with

... despite record activity following the events of 11 September

several European exchanges reaching new daily trading records. The resumption of trading on US derivatives markets on the morning of 17 September led to an unprecedented burst of activity as the overhang of sell orders worked its way through the markets. The 15% quarterly drop in business on North American exchanges did not result solely from the hiatus that followed the 11 September attacks since turnover in July and August was well below that seen in the second quarter. Had US equity markets not been closed for four days, transactions in equity index contracts would have reached a higher quarterly volume but it is unlikely that this would have prevented an overall contraction of business.

## OTC market expands slightly in the first half of 2001

Preliminary data from the BIS semiannual survey on positions in the global OTC derivatives market point to a slight rebound in market activity in the first half of 2001. The total estimated notional amount of outstanding OTC contracts stood at $98.8 trillion at end-June 2001, a 4% increase over end-December 2000. The OTC market has expanded at a slower pace over the past year but some of its segments remain highly active.

Divergence between OTC and exchange-traded activity

In terms of broad risk categories, the stock of foreign exchange and interest rate contracts expanded by 8% and 4% respectively, while that of equity-linked contracts remained stable. A comparison of activity on OTC markets with that on exchange-traded markets shows a divergence in the pace of business on the two in the first half of 2001. Open interest in interest rate and stock index contracts, the most active financial contracts traded on derivatives exchanges, increased by 39% and 28% respectively relative to end-December 2000. If sustained, such a rapid increase would represent a significant departure from previous patterns of activity since the growth of OTC business has generally outpaced that on exchanges for much of the last decade.

Financial industry consolidation affects distribution of transactions across users

The most recent numbers also suggest that financial industry consolidation is having a less significant impact on overall business than on the distribution of activity across counterparties. Indeed, some market participants had expected the merger of JP Morgan and Chase at the end of 2000 to have a contractionary effect on the total stock of US dollar positions.[7] This has not been the case, with outstandings involving the US currency rising sharply. However, financial industry consolidation probably accounts for the weaker growth of inter-dealer exposures in both the interest rate and foreign exchange market segments.

Interest rate swaps return to growth ...

The market for *interest rate products* expanded by 4% to $67.5 trillion in the first half of 2001. Three significant developments are worth highlighting.

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[7] Mergers and acquisitions lead to a consolidation of bilateral transactions and, consequently, to a reduction in outstanding contracts.

## The global over-the-counter (OTC) derivatives markets[1]

Amounts outstanding, in billions of US dollars

| | Notional amounts | | | | Gross market values | | | |
|---|---|---|---|---|---|---|---|---|
| | End-Dec 1999 | End-Jun 2000 | End-Dec 2000 | End-Jun 2001 | End-Dec 1999 | End-Jun 2000 | End-Dec 2000 | End-Jun 2001 |
| Grand total | 88,202 | 94,008 | 95,199 | 98,835 | 2,813 | 2,572 | 3,180 | 3,114 |
| A. Foreign exchange contracts | 14,344 | 15,494 | 15,666 | 16,910 | 662 | 578 | 849 | 773 |
| Outright forwards and forex swaps | 9,593 | 10,504 | 10,134 | 10,582 | 352 | 283 | 469 | 395 |
| Currency swaps | 2,444 | 2,605 | 3,194 | 3,832 | 250 | 239 | 313 | 314 |
| Options | 2,307 | 2,385 | 2,338 | 2,496 | 60 | 55 | 67 | 63 |
| B. Interest rate contracts[2] | 60,091 | 64,125 | 64,668 | 67,465 | 1,304 | 1,230 | 1,426 | 1,573 |
| FRAs | 6,775 | 6,771 | 6,423 | 6,537 | 12 | 13 | 12 | 15 |
| Swaps | 43,936 | 47,993 | 48,768 | 51,407 | 1,150 | 1,072 | 1,260 | 1,404 |
| Options | 9,380 | 9,361 | 9,476 | 9,521 | 141 | 145 | 154 | 154 |
| C. Equity-linked contracts | 1,809 | 1,645 | 1,891 | 1,884 | 359 | 293 | 289 | 199 |
| Forwards and swaps | 283 | 340 | 335 | 329 | 71 | 62 | 61 | 49 |
| Options | 1,527 | 1,306 | 1,555 | 1,556 | 288 | 231 | 229 | 150 |
| D. Commodity contracts[3] | 548 | 584 | 662 | 590 | 59 | 80 | 133 | 83 |
| Gold | 243 | 261 | 218 | 203 | 23 | 19 | 17 | 21 |
| Other | 305 | 323 | 445 | 387 | 37 | 61 | 116 | 62 |
| Forwards and swaps | 163 | 168 | 248 | 229 | ... | ... | ... | ... |
| Options | 143 | 155 | 196 | 158 | ... | ... | ... | ... |
| E. Other[4] | 11,408 | 12,159 | 12,313 | 11,986 | 429 | 392 | 483 | 486 |
| Gross credit exposure[5] | | | | | 1,023 | 937 | 1,080 | 1,019 |

[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 absolute value of 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

First, activity was driven by a return to growth of the interest rate swaps market, by far the largest segment of the OTC market, with outstandings rising by 5% to $51.4 trillion. By contrast, business in forward rate agreements and interest rate options continued to be lethargic, barely increasing over the review period. Second, the market for interest rate products appears to be accommodating a widening range of financial market participants, as illustrated by the steady growth in positions held by non-reporting financial institutions since 1998. Such a growth pattern should be set against weakening activity by reporting dealers and lacklustre business involving non-financial customers. Third, instruments involving the US dollar are rapidly catching up with euro-denominated ones (see the graph on page 55).

… with a widening range of participants

Indeed, activity in the US dollar-denominated swap market was particularly brisk in the first half of 2001, with the stock of contracts rising by 22% to $15.9 trillion. The US dollar swap market has grown at a rapid pace in

US dollar swap market grows rapidly as hedging and trading practices evolve recent years on the back of a shift in hedging and trading practices. The reduced liquidity of long-term US government bonds encouraged market participants to search for alternative hedging and trading instruments, such as interest rate swaps. In addition, the range of participants active in the swaps market has broadened to include, for example, US mortgage banks and investors in mortgage-backed securities (as discussed in the section on exchange-traded activity). US monetary easing also fuelled hedging and position-taking in the dollar swap market.

Slower growth in euro-denominated swap market

The market for euro-denominated interest rate swaps returned to expansion following a marked contraction in the second half of 2000, with the outstanding stock of contracts rising by 7% to $17.6 trillion. Euro-denominated swaps had expanded rapidly after the introduction of the single currency, as swaps became an attractive benchmark for European fixed income markets. The slowdown in market growth since mid-2000 suggests that this stock adjustment process may be reaching completion.

The outstanding stock of yen-denominated interest rate swaps contracted by 12% to $9.7 trillion. This contraction probably reflects the view at the time that Japanese interest rates would evolve in a narrow range. Moreover, it does not seem consistent with recent press reports of Japanese banks taking large one-sided fixed rate receiver positions.

In the area of *currency instruments*, the value of contracts outstanding rose by 8% to $16.9 trillion. The stock of outright forwards and forex swaps, the largest currency market segment, expanded by 4%, that of currency options by 7% and that of cross-currency swaps by 20%. Cross-currency swaps have expanded steadily since the BIS began collecting data on the OTC market. Business has been fuelled by the large global volume of syndicated loans and securities issues.

Activity in the *equity-linked sector* remained stable at $1.9 trillion, following rapid expansion in the previous reporting period. Business in *commodity contracts*, the smallest market segment, contracted by 11% to $0.6 trillion.

Estimated *gross market values* declined marginally, to $3.1 trillion, following an unusually large increase of 24% in the second half of 2000. The ratio of gross market values to notional amounts declined from 3.3% to 3.1%.

Additional results of triennial survey to be released

More detailed results on the global stock of OTC contracts from the Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity will be released separately later in December 2001. The new triennial series, which cover a broader universe of market participants, will also provide information on credit derivatives.[8]

[8] Such instruments are not included in the regular semiannual survey of OTC derivatives markets.

## Central bank survey of foreign exchange and derivatives market activity

*Gabriele Galati and Serge Jeanneau*

In April this year, 48 central banks and monetary authorities participated in the Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity. They collected data on turnover in traditional foreign exchange markets – spot, outright forwards and foreign exchange swaps – and in over-the-counter (OTC) currency and interest rate derivatives.[①] In October, the BIS and participating central banks released preliminary global statistics from the survey.[②] The BIS plans to publish the final global results on foreign exchange market turnover and the final statistics on OTC derivatives market turnover and amounts outstanding in early 2002.

The survey shows that in April 2001 foreign exchange market turnover stood at $1,210 billion, compared to $1,490 billion in April 1998, a 19% decline at current exchange rates. This contrasts with the findings of previous surveys, which had reported a rapid rise in forex market activity. Among the different instruments, the decline was most pronounced in spot trading. In terms of activity between different counterparties, trading in the interbank market and between banks and non-financial customers fell markedly, while transactions between banks and financial customers rose. A special feature on page 39 examines factors that may have contributed to the decline in foreign exchange market turnover.

In the OTC derivatives market, average daily turnover amounted to $575 billion, exceeding that in April 1998 by 53%.[③] The survey showed a contrast between interest rate and foreign exchange contracts, with the former continuing to grow at a rapid pace (by 85%, to $489 billion) and the latter contracting (by 31%, to $67 billion). Expansion in the interest rate segment was largely driven by the buoyancy of interest rate swaps, with turnover rising by 114% to $331 billion. This rapid expansion mainly reflected a deepening of the US dollar- and euro-denominated swap markets.

### Global foreign exchange and OTC derivatives market turnover[1]

Daily averages in April, in billions of US dollars

| | 1995 | 1998 | 2001 |
|---|---|---|---|
| A. Foreign exchange turnover | 1,190 | 1,490 | 1,210 |
| Spot transactions | 494 | 568 | 387 |
| Outright forwards | 97 | 128 | 131 |
| Foreign exchange swaps | 546 | 734 | 656 |
| B. OTC derivatives turnover | 200 | 375 | 575 |
| Currency swaps | 4 | 10 | 7 |
| Currency options | 41 | 87 | 60 |
| FRAs | 66 | 74 | 129 |
| Interest rate swaps | 63 | 155 | 331 |
| Interest rate options | 21 | 36 | 29 |

[1] Adjusted for local and cross-border double-counting.

① Data on outstanding amounts of OTC derivatives were collected at end-June 2001. Preliminary results will be published in December 2001. ② National results are adjusted for local inter-dealer double-counting while global results are adjusted for both local and cross-border inter-dealer double-counting and for estimated gaps in reporting. ③ The OTC market consists of “non-traditional” foreign exchange derivatives – such as cross-currency swaps and options – and all interest rate derivatives contracts.