Serge Jeanneau

+41 61 280 8416
serge.jeanneau@bis.org

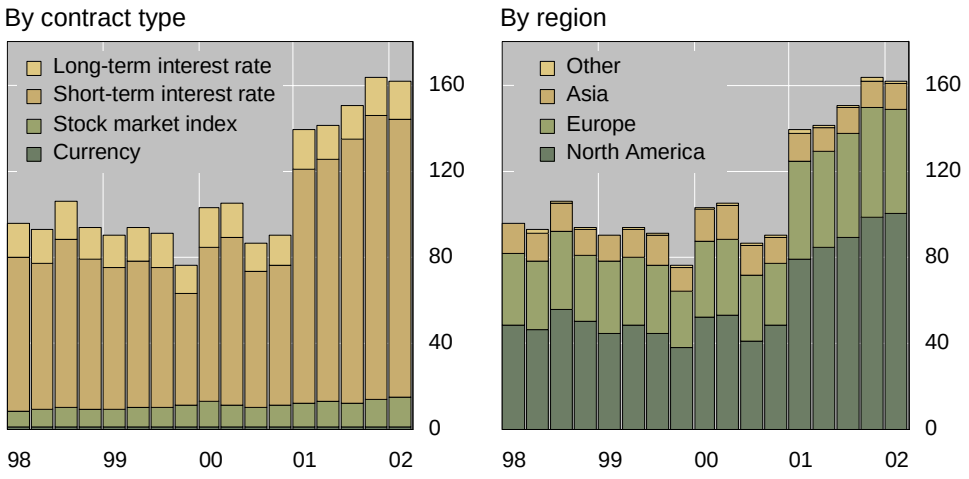
4. Derivatives markets

Following a record volume of activity in the fourth quarter of 2001, the aggregate turnover of exchange-traded derivatives contracts monitored by the BIS declined slightly in the first quarter of 2002. Conditions in fixed income markets were somewhat calmer than in the last quarter of 2001, which probably accounts for the 1% decline in transactions to $162 trillion. A modest increase in the turnover of futures contracts on short- and long-term interest rates was more than offset by a marked drop in related options.

The latest BIS semiannual data on aggregate positions in the global over-the-counter (OTC) derivatives market point to a further recovery of activity in the second half of 2001. The total estimated notional amount of outstanding OTC contracts stood at $111 trillion at end-December 2001, an 11% increase over end-June 2001. Growth was largely driven by interest rate instruments, as vigorous US monetary easing fuelled hedging and position-taking. Even so, the acceleration of activity observed in OTC markets over the whole of 2001 was less pronounced than that seen in exchange-traded markets over the same period.

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

Slowdown in exchange-traded fixed income derivatives

Activity in exchange-traded interest rate contracts moderated in the first quarter of 2002. Total turnover contracted by 2% to $147.3 trillion compared with an increase of 8% in the last quarter of 2001. Much of the decline resulted from weaker activity in contracts on short-term interest rates, with transactions falling by 2% to $129.7 trillion. A 9% contraction in options on short-term rates (to $33 trillion) more than offset a 1% increase in related futures (to $96.7 trillion). The narrow range within which US short-term interest rates evolved probably exerted a dampening impact on mortgage refinancing, which often leads to a second round of transactions in short-term options and swaptions.[1]

Drop in options on short-term rates offsets increase in related futures

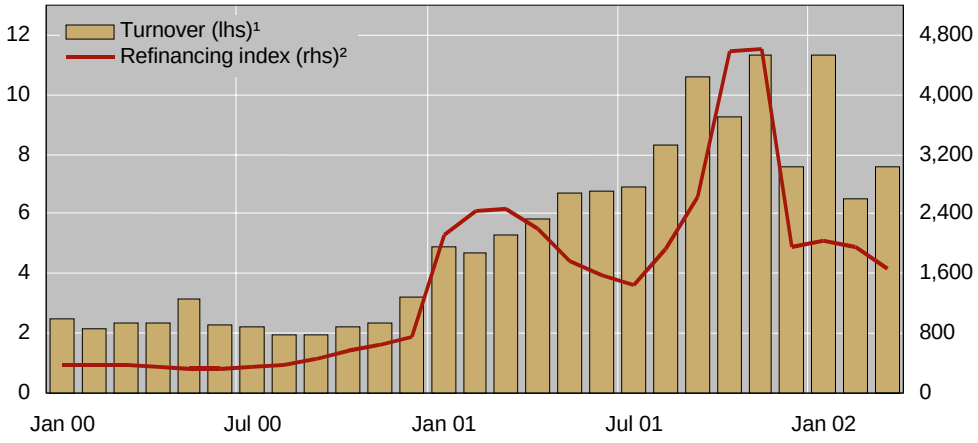
There was also a slight decrease in the aggregate turnover of contracts on government bonds, by 1% to $17.6 trillion. As was the case with contracts on short-term rates, activity in government bond futures and options followed divergent paths, with a 23% decline in options (to $1.9 trillion) offsetting a 3% increase in futures (to $15.6 trillion). The drop in options trading was largely concentrated in options on German government bonds (from $1.1 trillion to $0.6 trillion). Surprisingly strong macroeconomic data in late February and early March, combined with concerns about a potential resurgence of inflation, created some upward pressure on US and European bond yields but otherwise government bond markets tended to trade in a fairly narrow range.

A similar pattern is observed in bond contracts

The 3% overall increase in government bond futures trading was localised in the United States (+5%) and Japan (+12%). In the United States, five- and 10-year Treasury note futures continued to gain market share at the expense of Treasury bond contracts. At the same time, Japanese government bonds

US Treasury note contracts gain market share ...

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



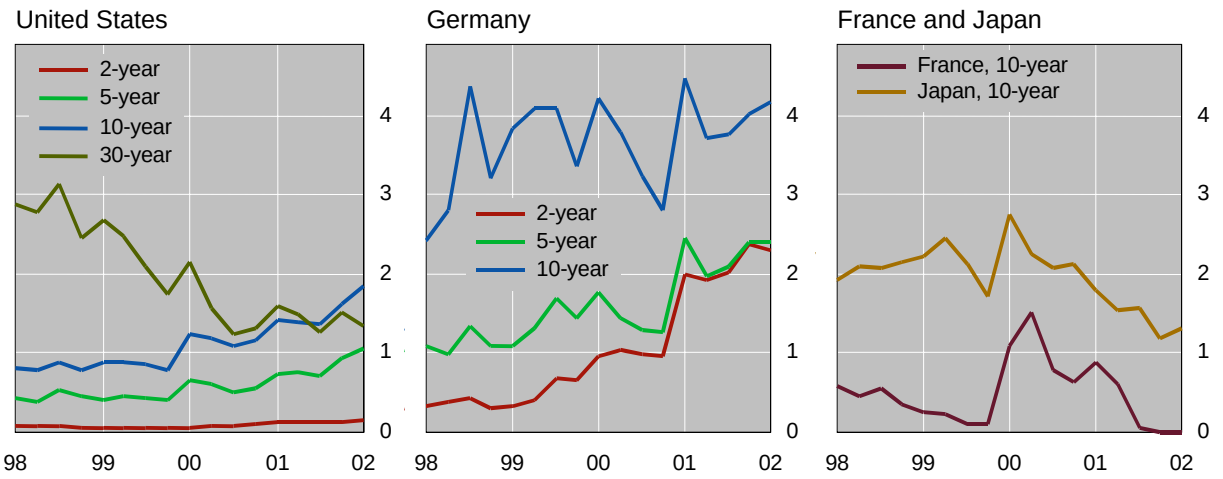
[1] In trillions of US dollars. [2] Four-week moving average, 16 March 1990 = 100.

Sources: Financial Oxygen; FOW TRADEdata; Futures Industry Association; Mortgage Bankers Association; BIS calculations. Graph 4.2

[1] The mechanics of which have been discussed in recent issues of the *BIS Quarterly Review*.

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

... while trading in JGB futures recovers

exhibited significant volatility as investors reacted to poor economic data releases and disagreed about the consequences of the lack of progress in resolving the country's banking crisis. Moreover, investors were concerned that Japanese government debt would increase further, with possible negative implications for the country's credit rating. These various factors probably accounted for the recovery in trading.

Trading in stock index contracts boosted by expansion in Asia

Sustained development of Korean index contracts

Overall activity in equity index contracts expanded by 5% to $13.8 trillion in the first quarter of 2002. Much of this increase resulted from the sustained development of stock index trading in Korea. Trading in such instruments, particularly options, rose by 20% in the first quarter, to $2.9 trillion. As a result, the Korean marketplace is now the second most active after that of the United States ($7 trillion). Trading in Korean contracts has been fuelled by strong inflows of foreign capital to the Korean stock market, which have boosted the KOSPI index to record highs.

Upswing in Japanese index business

The first quarter of 2002 also saw an upswing in the trading of Japanese index contracts, with turnover rebounding in March from a near record low in January. While the upsurge in index trading may have been related to the recovery of underlying equity markets, it may also have been the result of a displacement of activity to futures exchanges following the introduction in Japan of new rules on the short selling of shares.[2]

[2] In early March, the Japanese regulatory authorities introduced new "uptick" rules, which prohibit the short selling of listed equities without a prior increase in stock prices.

Playing cat and mouse in market squeezes

Serge Jeanneau and Robert Scott

Regulatory authorities and participants in financial markets often play a cat and mouse game, whereby the introduction of new rules leads agents to alter their behaviour in an attempt to circumvent the new rules. This seems to have happened in March 2002, when some market participants were reported to have attempted to corner, or squeeze in market parlance, a segment of the German government bond market.

The instruments involved were the two-year German government notes, otherwise known as "schatz" for Bundesschatzanweisungen. In its latest manifestation, the squeeze seems to have resulted from efforts by speculators to find a way around recent measures by Eurex, the German-Swiss derivatives exchange, to counter such practices. The measures included position limits on participants in the futures market. When it became difficult for speculators to corner specific futures contracts, they migrated to the cash market.

A squeeze occurs when holders of short positions cannot acquire or borrow the securities required for delivery under the terms of a futures contract. Delivery does not ordinarily pose a problem for traders because the majority of them close their positions with offsetting transactions prior to contract expiry. However, a trader who remains short at the expiration of a futures contract is obliged to deliver the specified securities, just as one who remains long must take delivery. Physical delivery is based on a specified range of eligible securities and a price adjustment to turn the different securities into equivalent assets. Depending on the level of market interest rates and the slope of the yield curve, one of the securities will always turn out to be the "cheapest-to-deliver" (CTD).[①]

Futures trading usually creates a wedge between the price of the CTD security and other similar securities that are not deliverable, with the CTD becoming more expensive. However, once the CTD moves out of the deliverable basket, it loses this "excess" demand and, as a result, its value tends to decline. This pattern is illustrated by the graph on the following page, which shows the evolution in the yields of a variety of CTD schatz notes before and after delivery of the relevant futures contracts on Eurex. Such issues, with the exception of the note deliverable into the March 2002 contract, have tended to range from as expensive as –10 basis points relative to "fair value" before maturity of the futures to as cheap as +10 basis points after expiry.[②]

Some investors try on occasion to take advantage of this predictable feature by selling the bond short when it is the CTD and then buying it back for a lower price once the futures contract has expired (or once it has fallen out of the deliverable basket). To do this, the investor must first borrow the security in the repo market, sell it, and then return it at an agreed date after it has been purchased in the market (hopefully at a lower price).

Market participants undertaking such short selling can at times face significant risks. Indeed, if one or more market participants were to accumulate most of the bonds available in the market, the short sellers would probably have to pay a high premium to buy back the bond. This appears to have happened to the 3.5% schatz note maturing in December 2003, which was the CTD bond of the March 2002 schatz contract.

Although the stock of outstanding 3.5% schatz securities maturing in December 2003 amounted to €10 billion, some market participants appear to have been able to take hold of a large portion of the supply, causing a squeeze in the cash market. Instead of becoming cheaper after expiry of the March 2002 schatz futures, the 3.5% schatz note increased substantially in value a full month after it had lost its eligibility for delivery. Indeed, its spread widened to –20 basis points one month after having rolled out of the deliverable basket, compared with a more normal +5 basis points for similar bonds. The above discussion shows that a statistical regularity does not guarantee "free money" to market participants following short selling strategies.

[①] The technical aspects of this phenomenon are explained in greater length in an earlier box published on page 32 of the June 2001 *BIS Quarterly Review*. [②] The fair value of a bond can be expressed as a yield spread relative to other bonds of similar maturity. One accepted market practice is to use a static spread (also called an option-adjusted spread). A negative spread means that a bond is more expensive than on average, and conversely, a positive spread indicates that a bond is cheaper.

A possibly more significant development is that the latest squeeze did not take place directly on the CTD before delivery, as had been the case in previous instances. This was illustrated by the fact that the CTD did not decline in value as the contract went through its normal delivery cycle.

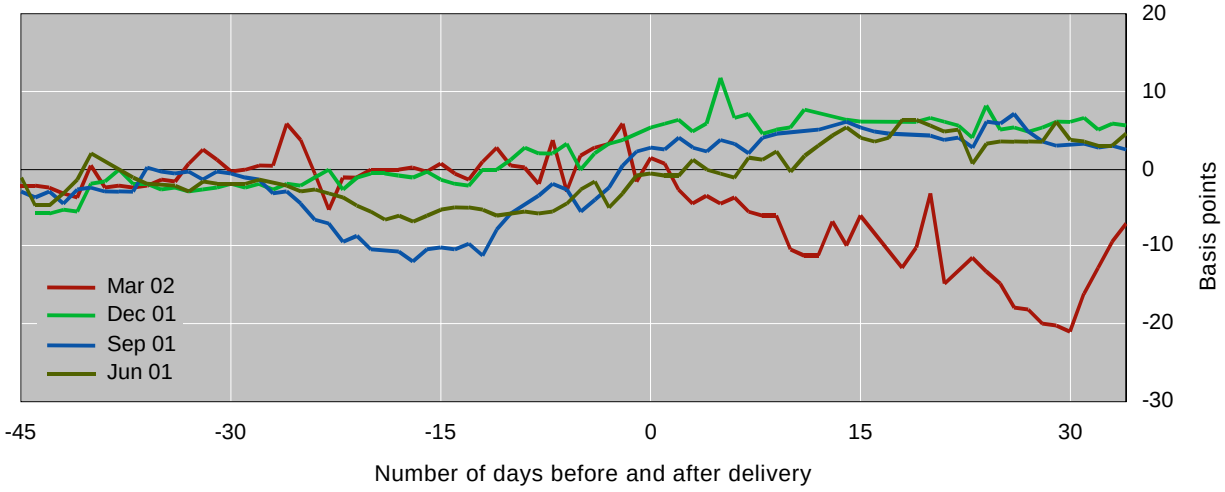
This change in the price behaviour of the schatz notes seems to be the result of a measure taken by Eurex in June 2001 to address the problems created by squeezes in the futures market. Following the debate surrounding a squeeze on the five-year German government bond contract ("bobl") in March 2001, Eurex introduced limits on the open positions of market participants. This measure seems to have been reasonably effective in deterring market manipulation in the futures market since the 3.5% schatz notes were delivered into the March 2002 futures contract without any particular difficulties.

To circumvent the restriction on open positions, market participants intent on creating a squeeze appear to have shifted their speculative transactions to the cash market. One market participant was reported to have acquired €7 billion of the 3.5% schatz notes. By comparison, the number of open positions on the March 2002 futures contract amounted to 500,000 contracts, equivalent to €50 billion or 17 times the amount of notes freely available for delivery. Of course, very few of these open positions would effectively have come to delivery since market participants prefer to avoid the complications associated with delivery by reversing their positions ahead of contract expiry.

The recent squeezes show that while German financial markets have been remarkably successful in recent years, they have also experienced growing pains. The use of futures and options on German government bonds has expanded rapidly as the underlying securities gained acceptance as benchmarks for hedging and position-taking on euro zone interest rates. As a result, the amount of exposures in futures and repos has become substantially larger than the available amount of underlying securities. This has created favourable conditions for squeezes.

Such manipulation is prohibited in a number of jurisdictions. In Germany, the forthcoming introduction of the Financial Market Promotion Act should provide regulators with greater power to fine investors who try to manipulate markets. The new legislation will complement the recent measures introduced by Eurex. In addition, the German federal government financing agency (Finanzagentur) has recently indicated that it stands ready to increase the volume of securities affected by squeezes.

Price pressures on CTD schatz notes before and after futures delivery



Note: The spread is calculated as a static spread of the deliverable bond relative to a fair-valued yield curve. A negative spread indicates that the bond is expensive relative to other similar bonds. Conversely, a positive spread indicates that it is cheaper than similar bonds.

Source: Bloomberg.

Rapid expansion of OTC derivatives in the second half of 2001

Data from the BIS survey on positions in the global OTC derivatives market at the end of December 2001 point to a sizeable increase in activity in the second half of last year. The total estimated notional amount of outstanding OTC contracts stood at $111 trillion at end-December 2001, an 11% increase over end-June 2001. This compares with a 5% increase in the previous half-year period. Gross market values grew by 24% to $3.8 trillion.

Growth driven by activity in interest rate products

Growth was driven by interest rate instruments, the largest of the broad market risk categories, with outstanding contracts rising by 15%. Activity was equally buoyant in all three main groups of interest rate products, namely forward rate agreements (FRAs), interest rate swaps and interest rate options. By contrast, the stock of foreign exchange contracts, the second largest broad market risk category, declined by 1%. Activity in equity-linked contracts was also subdued, with a similar percentage decline in amounts outstanding.

Buoyancy of dollar and euro interest rate swap markets

Most significant increase in interest rate swaps

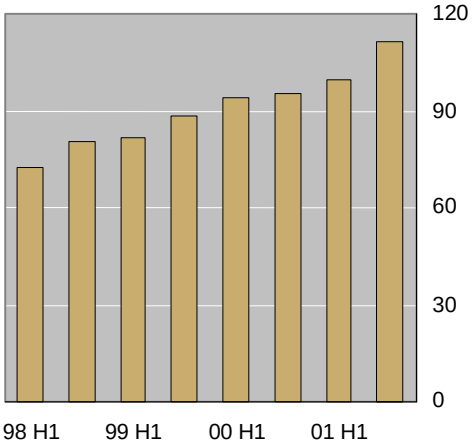
Business in interest rate products was brisk in the second half of 2001, with a 15% rise in outstanding contracts to $78 trillion. This buoyancy was evident in all market segments but the most significant increase in absolute terms took place in the interest rate swap market. With $59 trillion in outstanding contracts, interest rate swaps remain by far the largest single group of products in the OTC market.

US dollar swaps benefit from shift in trading practices ...

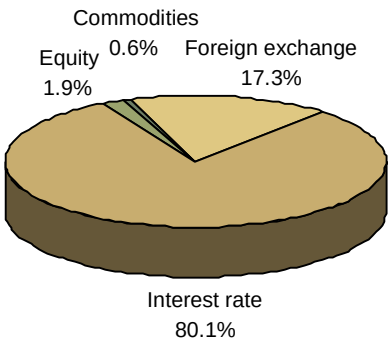
The US dollar and euro swap markets grew particularly rapidly. Dollar-denominated swaps expanded by 19% to $19 trillion. That market segment has grown at a steady and robust pace in recent years following a shift in hedging and trading practices.[3] The rapid increase in dollar-denominated swap

Global OTC derivatives

Total notional amounts outstanding in trillions of US dollars



Breakdown by broad risk category at end-2001

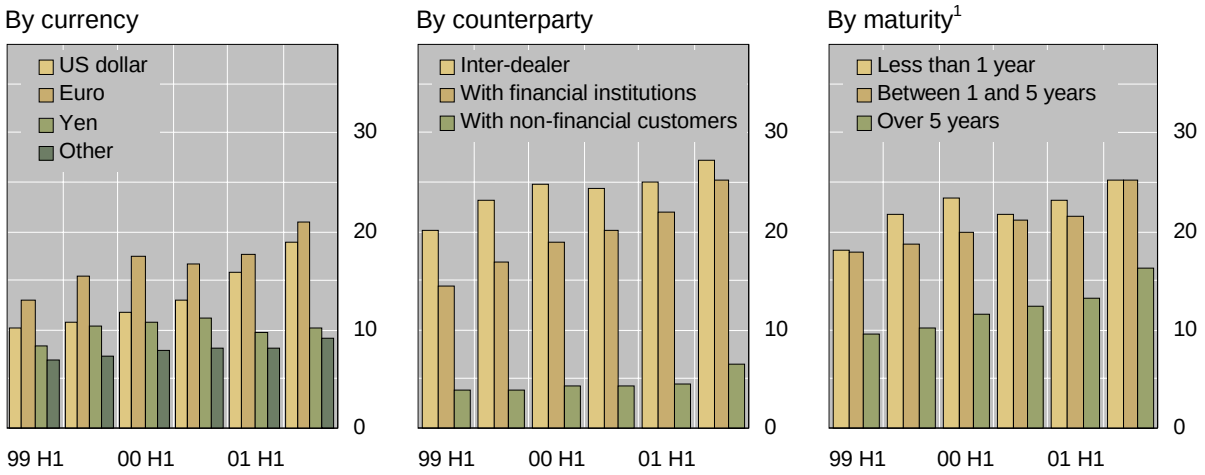


Source: BIS. Graph 4.4

[3] The factors underlying this long-term shift have been discussed in recent issues of the *BIS Quarterly Review*.

Interest rate swaps

Notional amounts outstanding, in trillions of US dollars



[1] Includes forward rate agreements, which account for approximately 15% of the total notional amount outstanding.

Source: BIS. Graph 4.5

contracts in the latter half of last year suggests that US derivatives trading has been sufficiently buoyant to offset the possible contractionary impact of market consolidation.[4] Vigorous monetary easing by the United States, in the wake of a pronounced deceleration of US economic growth and the terrorist attacks of 11 September 2001, probably fuelled hedging and position-taking activity in dollar-denominated derivatives.

... monetary easing ...

Moreover, the range of participants active in dollar derivatives markets appears to have broadened in recent periods to include, for example, mortgage banks and investors in mortgage-backed securities (MBSs). As long-term interest rates declined sharply between June and early November, such market participants were reported to have turned in increasing numbers to the swap and swaption markets in order to hedge the prepayment risk of their holdings of MBSs (Graph 4.2).[5]

... and a widening range of market participants

[4] Some market participants had expected the merger of JP Morgan and Chase, announced at the end of 2000, to have a contractionary effect on the total stock of US dollar positions in 2001. These two financial institutions began to report their derivatives positions to the BIS (through the Federal Reserve) on a consolidated basis in the first half of 2001 but this did not result in a decline of aggregate positions held by US entities. This was in contrast to data published by the US Office of the Comptroller of the Currency, which showed that, as a result of the merger, the notional amount of exchange-traded and OTC derivatives held by US commercial banks decreased by 12% to $45.4 trillion in the fourth quarter of 2001.

[5] 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 their 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.

Global over-the-counter (OTC) derivatives markets[1]

Amounts outstanding, in billions of US dollars

	Notional amounts				Gross market values			
	End-Jun 2000	End-Dec 2000	End-Jun 2001	End-Dec 2001	End-Jun 2000	End-Dec 2000	End-Jun 2001	End-Dec 2001
Grand total	94,008	95,199	99,755	111,115	2,572	3,180	3,045	3,778
A. Foreign exchange contracts	15,494	15,666	16,910	16,748	578	849	773	779
Outright forwards and forex swaps	10,504	10,134	10,582	10,336	283	469	395	374
Currency swaps	2,605	3,194	3,832	3,942	239	313	314	335
Options	2,385	2,338	2,496	2,470	55	67	63	70
B. Interest rate contracts[2]	64,125	64,668	67,465	77,513	1,230	1,426	1,573	2,210
FRAs	6,771	6,423	6,537	7,737	13	12	15	19
Swaps	47,993	48,768	51,407	58,897	1,072	1,260	1,404	1,969
Options	9,361	9,476	9,521	10,879	145	154	154	222
C. Equity-linked contracts	1,645	1,891	1,884	1,881	293	289	199	205
Forwards and swaps	340	335	329	320	62	61	49	58
Options	1,306	1,555	1,556	1,561	231	229	150	147
D. Commodity contracts[3]	584	662	590	598	80	133	83	75
Gold	261	218	203	231	19	17	21	20
Other	323	445	387	367	61	116	62	55
Forwards and swaps	168	248	229	217	...	...	...	...
Options	155	196	158	150	...	...	...	...
E. Other[4]	12,159	12,313	12,906	14,375	392	483	417	519
Gross credit exposure[5]	.	.	.	.	937	1,080	1,019	1,171

[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

Euro-denominated interest rate swaps return to growth

Euro-denominated contracts returned to rapid growth following a slowdown in the previous two half-year periods. Here again, interest rate swaps provided much of the impetus behind market expansion, with the stock of contracts rising by 18% to $21 trillion. The market for euro-denominated swaps has developed at an uneven pace in recent years, accounting for much of the variability in the expansion of the OTC market. The stock of euro-denominated swaps grew rapidly in the wake of the introduction of the single European currency, as such instruments became new benchmarks for European fixed income markets. However, this growth slowed considerably in 2000. The slowdown may have reflected the completion of a stock adjustment process to the new integrated euro zone market. The resumption of growth in the second half of 2001 could thus represent a return to more "normal" market activity.

Modest expansion of yen swaps

By contrast, the market for yen-denominated interest rate swaps expanded at a slower pace, with the stock of contracts rising by 4% to $10 trillion. The weakness of overall economic conditions in Japan probably led

market participants to believe that Japanese interest rates would evolve in a narrow range in the foreseeable future, reducing the need to hedge balance sheets and depriving market participants of trading opportunities.

OTC business less active than that on exchanges in 2001

In spite of the recovery observed in OTC markets in 2001, business in such markets remained somewhat subdued compared with that conducted on derivatives exchanges over the same period.[6] The stock of OTC contracts expanded by 11% in the second half of 2001, while open positions in exchange-traded contracts grew by 21%. In the previous half-year period, the stock of OTC contracts had only increased by 5%, while that of exchange-traded contracts had risen by nearly 40%. If sustained, such a rapid rise in exchange-traded activity would represent a significant departure from previous patterns, since the growth of OTC business had outpaced that on exchanges during the previous decade.

Buoyancy of exchange-traded business contrasts with earlier patterns

Sharp rise in gross market values

Estimated gross market values increased by 24% to $3.8 trillion, following a slight contraction in the first half of 2001.[7] At the same time, the ratio of gross market values to notional amounts rose from 3.1% to 3.4%. Allowing for netting, the derivatives-related credit exposures of reporting institutions stood at $1.2 trillion in the most recent half-year.[8]

Eventful period for the credit derivatives market

Recent months have been eventful for the credit derivatives markets, with the default of Argentina and the collapse of Enron leading investors to attach greater importance to the availability of liquid instruments for the hedging and trading of sovereign and corporate risk.

Credit derivatives face teething problems

As is often the case with markets for innovative instruments, credit derivatives were affected by teething problems. In particular, the financial difficulties faced by Argentina, which culminated in the country's default at the end of December 2001, highlighted the need for more precise contract documentation. While Argentina's debt repudiation at the end of last year was a

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[6] It should be noted, however, that activity in the two types of market cannot be directly compared owing to inherent differences in the characteristics and uses of products.

[7] While notional amounts provide a reference from which contractual payments are determined in derivatives markets, such amounts are generally not those truly at risk. The amounts at risk in derivatives contracts are a function of the price level and/or volatility of the financial reference index used in the determination of contract payments, the duration and liquidity of contracts and the creditworthiness of counterparties. Gross market values provide a more accurate measure of the scale of financial risk transfer taking place in derivatives markets.

[8] Gross market values tend to overstate the actual credit exposures faced by counterparties because they do not take into account the availability of legally enforceable bilateral netting arrangements and other risk reduction measures.

A comparison of data sources on credit derivatives

The apparent growth of the market for credit derivatives has generated interest in data shedding light on the evolution of the market. There are a variety of sources for such data, including the BIS, the British Bankers' Association (BBA), the International Swaps and Derivatives Association (ISDA), the US Office of the Comptroller of the Currency (OCC) and a number of trade publications, such as *Risk*. The table below provides information on the various sources of positions data in the credit derivatives market.

Data from these sources cannot be directly compared owing to significant differences in collection methodologies, coverage and frequency. One of the key differences between the various surveys is whether the positions data are adjusted for double-counting. Such an adjustment relies on counterparty information since inter-dealer positions must be halved to avoid double-counting. Obviously, surveys that do not adjust for double-counting tend to show inflated positions relative to those for which such an adjustment is made.

Another important distinction relates to market coverage, in terms of counterparties, geographical areas and products. The coverage by counterparty varies widely, with some sources reporting data for positions held by banks in a given country (such as the OCC for US banks) and others purporting to achieve global coverage (such as the BIS data, which cover activity by a broad range of market participants in almost 50 countries).

Perhaps owing to varying definitions of what constitutes a credit derivative, few data sources publish detailed information on the products covered. Except for the survey conducted by the British Bankers' Association and *Risk*, survey results tend to be highly aggregated.

The frequency with which data are collected varies greatly, ranging from quarterly in the case of the OCC data to triennial in the case of the BIS.

It should be noted that the BIS does not collect data on credit derivatives in its regular semiannual survey of the OTC market. However, aggregate data collected as part of the 2001 Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity showed that positions in credit derivatives rose to $693 billion at the end of June 2001 from $118 billion at the end of June 1998. With growing demand for information on credit derivatives, central banks are considering a more frequent collection of data in the context of the BIS semiannual survey.

Features of various data on credit derivatives

	BBA	BIS	ISDA	OCC	*Risk*
Frequency	Annual	Triennial	Semiannual	Quarterly	Annual
Elimination of double-counting	No	Yes[1]	No	Yes[2]	No
Source of data	BBA member banks	Banks and dealers in nearly 50 countries	ISDA members	US-chartered and insured banks	Large dealers
Beginning of data collection	1997	1998 H1	2001 H1	1997 Q1	1998
Latest period	2000	2001 H1	2001 H2	2001 Q4	2001
Total contracts outstanding in first period	$180 billion	$118 billion	$632 billion	$19 billion	N/A
Total contracts outstanding in latest period	$893 billion	$693 billion	$919 billion	$395 billion	$810 billion

[1] At holding company level. [2] At bank level.

clear triggering event for credit default swaps written under ISDA's 1999 credit derivatives definitions, there was less agreement concerning a $50 billion debt exchange conducted by that country in November 2001.[9] At that time, local investors and financial institutions were offered the possibility of exchanging bonds paying an average interest rate of about 11% for longer-dated securities paying a rate of interest of about 7%. Although the exchange was considered to have constituted a "selective" default by two of the major rating agencies, buyers and sellers of credit default protection came to conflicting interpretations of such a credit event, leading to legal disputes.[10]

Narrower list of credit events

Market participants have recently attempted to further narrow the list of events that could trigger payouts by eliminating so-called "soft" credit events. Such events, which are more akin to credit deterioration than default, have also often been the subject of competing interpretation. In April 2002 European market participants followed the lead taken by US dealers and abandoned two such potential credit events (obligation acceleration and repudiation/ moratorium).

Disagreement remains on restructuring

In spite of these amendments, significant disagreement remains over the issue of debt restructuring. Although credit default swaps can be traded both with and without restructuring clauses, European banks have tended to offer contracts with ISDA's 1999 terminology, while since May 2001 US dealers have been offering contracts with a narrower definition of restructuring.[11]

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[9] ISDA's 1999 definitions set out six credit events that can trigger payment on a credit default swap, namely bankruptcy, failure to pay, obligation default, obligation acceleration, repudiation/moratorium and restructuring.

[10] Some of the transactions, entered into prior to the development of ISDA's 1999 documentation, contained a broad definition of restructuring, which, according to the purchasers of protection, should have triggered a payout. Other transactions were governed by ISDA's 1999 definitions, which included a narrower definition of restructuring, and, according to sellers of protection, should not have given rise to a payout.

[11] The modified clause essentially limits the maturity and type of obligations that are deliverable after the occurrence of a restructuring, thereby reducing the opportunity for buyers of protection to exercise the "cheapest-to-deliver" option under physically settled credit default swaps (the standard delivery procedure in this market).