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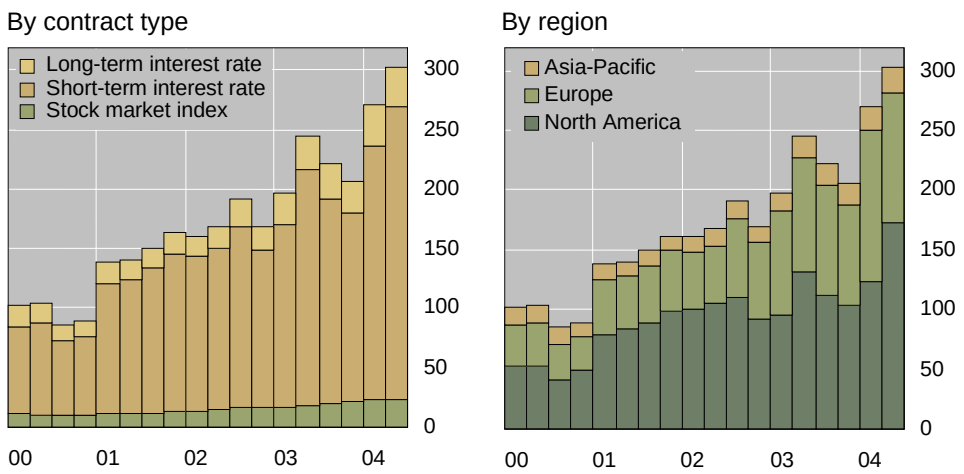
4. Derivatives markets

The aggregate turnover of exchange-traded financial derivatives contracts expanded strongly in the second quarter of 2004. The combined value of trading in interest rate, stock index and currency contracts amounted to $304 trillion, a 12% rise from the first quarter of the year (Graph 4.1). The busy quarter followed an even more active first quarter, resulting in 43% growth for the first half of the year. This represented a remarkable recovery from the second half of 2003, when turnover had fallen by 16%.

However, the expansion was not shared by all risk categories and was uneven across geographical areas. Indeed, activity fell for currency contracts and stagnated for stock indices. Turnover in currency derivatives contracted by 8%, a striking reversal of the 35% rise in the previous quarter. Even for interest rate contracts, the increase in trading for bond futures and options was slight, with money market contracts accounting for most of the growth. Geographically, turnover was weak across the board in Europe, with trading in currencies dropping by nearly 50% and that in interest rates and stock indices by 14%. In the United States, activity declined for currencies and stock indices (by 9% and 4% respectively) but was very strong for interest rates, especially short-term contracts, trading in which grew by nearly 50%.

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

Signs of US growth boost money market derivatives

The aggregate turnover of exchange-traded fixed income contracts continued to rise in the second quarter of 2004. The volume of transactions reached $280 trillion, a quarterly growth of 13% over the first quarter. This increased activity is especially striking considering that turnover had already grown by 34% in the quarter before. Nonetheless, such activity in exchange-traded derivatives is not surprising. Long-term interest rates had started to rise in the first quarter, and surprisingly strong US labour market data in the second quarter led market participants to expect Federal Reserve policy rates to rise sooner than they had thought. In response, market participants relied heavily on the derivatives markets, some to change their positions and others to hedge.

Strong activity in interest rate derivatives ...

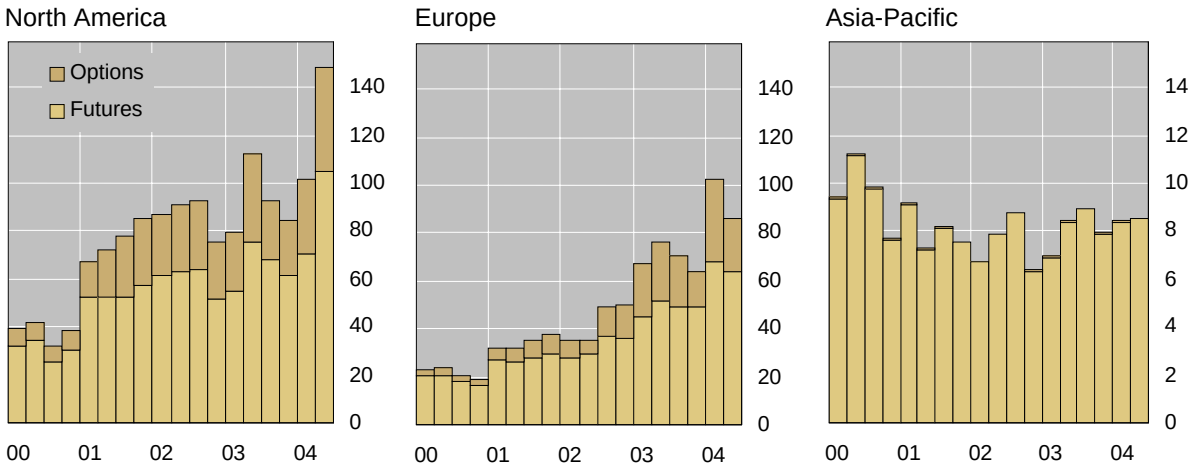
Unlike in the previous quarter, when the increase in activity was equally strong for money market and government bond contracts, overall turnover in the most recent period was boosted largely by derivatives on short-term interest rates. Trading in money market contracts, including those on eurodollar, Euribor and euroyen rates, was $245 trillion, a 15% expansion. However, business in derivatives on longer-term instruments, including US Treasury notes, German government bonds and Japanese government bonds, rose by only 1.5%. At an aggregate level, the 15% increase in trading in short-term contracts mainly reflected activity in futures, where turnover was up 21%, while options turnover was virtually unchanged. By contrast, for government bonds, activity in futures was almost the same as for the previous quarter, while that in options grew by 11%.

... especially money market contracts

Activity varied significantly across geographical regions. Business fell by 14% in Europe, mainly due to options on short-term rates; by contrast, it expanded by 44% in the United States, exceeding the high reached one year ago (Graphs 4.2 and 4.3). Such a divergence in both the sign and the size of activity in interest rate derivatives across the two main geographical areas had not been seen since the last quarter of 2000.

Turnover of short-term interest rate contracts

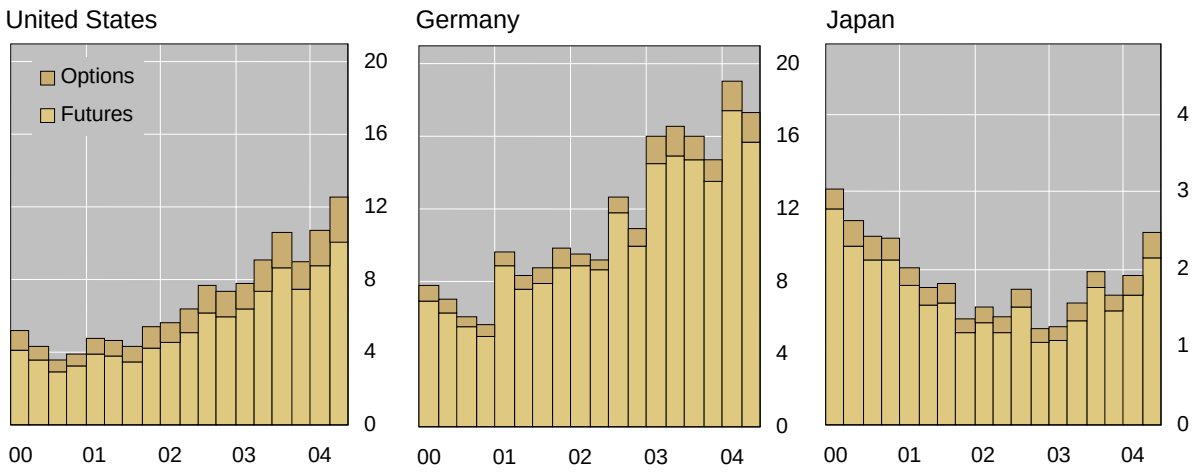
Quarterly contract turnover, in trillions of US dollars



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

Turnover in government bond contracts

Quarterly contract turnover, in trillions of US dollars



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

High US turnover despite lower implied volatility ...

The US market saw strong activity in money market derivatives despite a marked decline in implied short-term interest rate volatility (Graph 4.4). This is not surprising. At monthly and quarterly frequencies, the relationship between the turnover of exchange-traded instruments and the volatility in underlying market returns has always been quite weak. One reason for this empirical regularity is the fact that volatility is only one of two components of the risk premium, the variable to which turnover might be ultimately related, the other being the coefficient of risk aversion.[1] Evidence derived from the prices of equity index options suggests that the risk aversion coefficient has recently risen in the United States (see Graph 1.7 on p 6 of the June 2004 *BIS Quarterly Review*). As a result, despite falling expected volatility, the risk premium demanded by economic agents may have remained high, accounting for the substantial demand for financial protection.

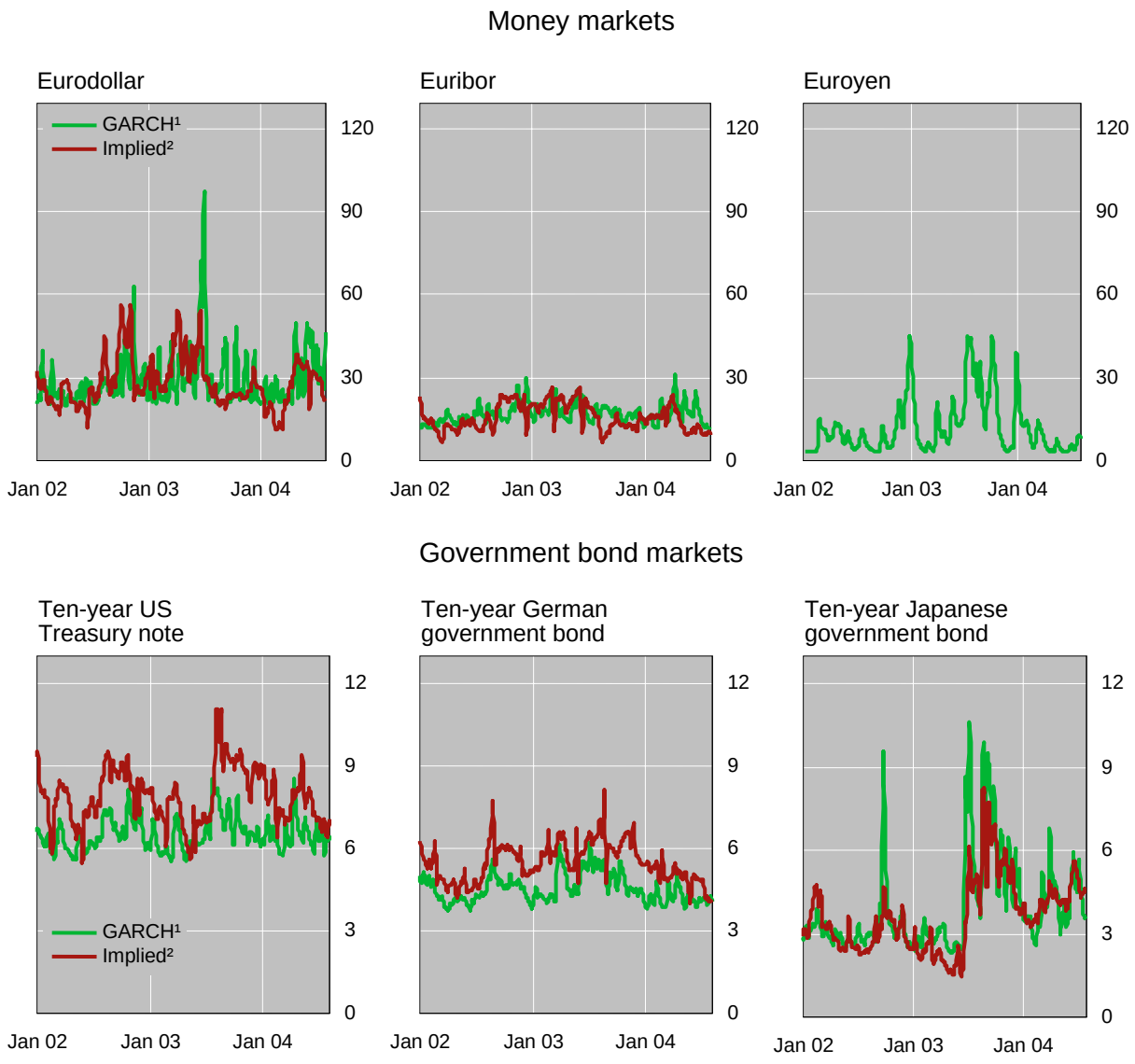
... perhaps boosted by risk aversion

The highly negative correlation between trading in derivatives on short-term rates in the United States and Europe in the second quarter of 2004 is a tendency that first emerged at the end of 2000. Correlation in activity growth rates, measured over rolling intervals of 12 months, has in fact been gradually falling over time, from 90% at the beginning of 2001 to less than 50% as of last June. Over the same time interval, the diverging growth rates have been accompanied by diverging implied volatilities of US and euro area short-term rates. At the end of 2000 the two volatilities were both close to 15%. Subsequently, the implied volatility of US rates has risen sharply, averaging 50% in the last two years. In the euro area, implied volatility has also been rising but the trend has been less pronounced, remaining on average around

[1] The product of risk aversion (the price of risk) and volatility (the quantity of risk) defines the risk premium.

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

25%. However, the decreasing correlation between trading in the two areas does not seem to derive from the different perceptions of risk in the two markets. The correlation between the differential in monthly changes in US and European turnover of short-term interest rate derivatives and the corresponding differential in the implied volatility of such rates has in fact been rather low; 12% for futures and –8% for options. However, as is the case with the link between turnover and volatility, monthly figures may hide the existence of a significant relationship between the two variables at a higher frequency.

Strength in US bond derivatives ...

In the United States, activity was also particularly robust for long-term bond contracts. Turnover in these contracts reached $34 trillion, up by 17%

(15% for futures and 24% for options). In European exchanges, on the other hand, overall business dropped by 9% (10% for futures and 4% for options). The heightened activity in derivatives on US long-term instruments may reflect the size of the market decline which took place over the quarter, with yields increasing by more than 100 basis points in two months after the strong labour market statistics of April and May. In Europe, where trading in long-term instruments fell, the bond market recorded much smaller losses than in similar episodes of rising US yields. In April and May yields in Europe posted gains of less than half those recorded in the comparable US episode of last summer.

The strong activity recorded in the US long-term interest rate segment could also be linked to long-term yields becoming relatively more volatile compared to short rates. The differential between the volatilities implied in US short-maturity interest rate swaptions written on the one-year and the 10-year rates fell from 22% to 15% between the first and second quarter of 2004. Finally, the growth in activity for US long-term interest rate derivatives may also reflect a change in the behaviour of the most active participants in the derivatives market, especially investors in mortgage-backed securities. Investors and dealers in this market now seem to react to rising yields by adjusting their hedges in the cash and futures markets more frequently than in the past and by making greater use of options.

... may reflect mortgage hedging activity

In the Asia-Pacific region, turnover expanded by 5%. Most of the increase was concentrated in the long-term segment, which rose 18%, while short-term interest rate contracts grew by just 1%. This activity derived entirely from a spike recorded in the Japanese market following the emergence of more solid signs of business cycle strength. Business in Japanese interest rate futures surged by 43%, with short-term rates up 60% and long-term rates up 29%. Activity also expanded for Japanese long-term rate options, by nearly 20%. Turnover in Singapore, the other major Asian marketplace for short-term interest rate futures (together they represent 97% of overall Asian business), fell by 7.6%. In Australia and New Zealand, activity contracted by 13% in the second quarter, after having grown by 37% in the first.

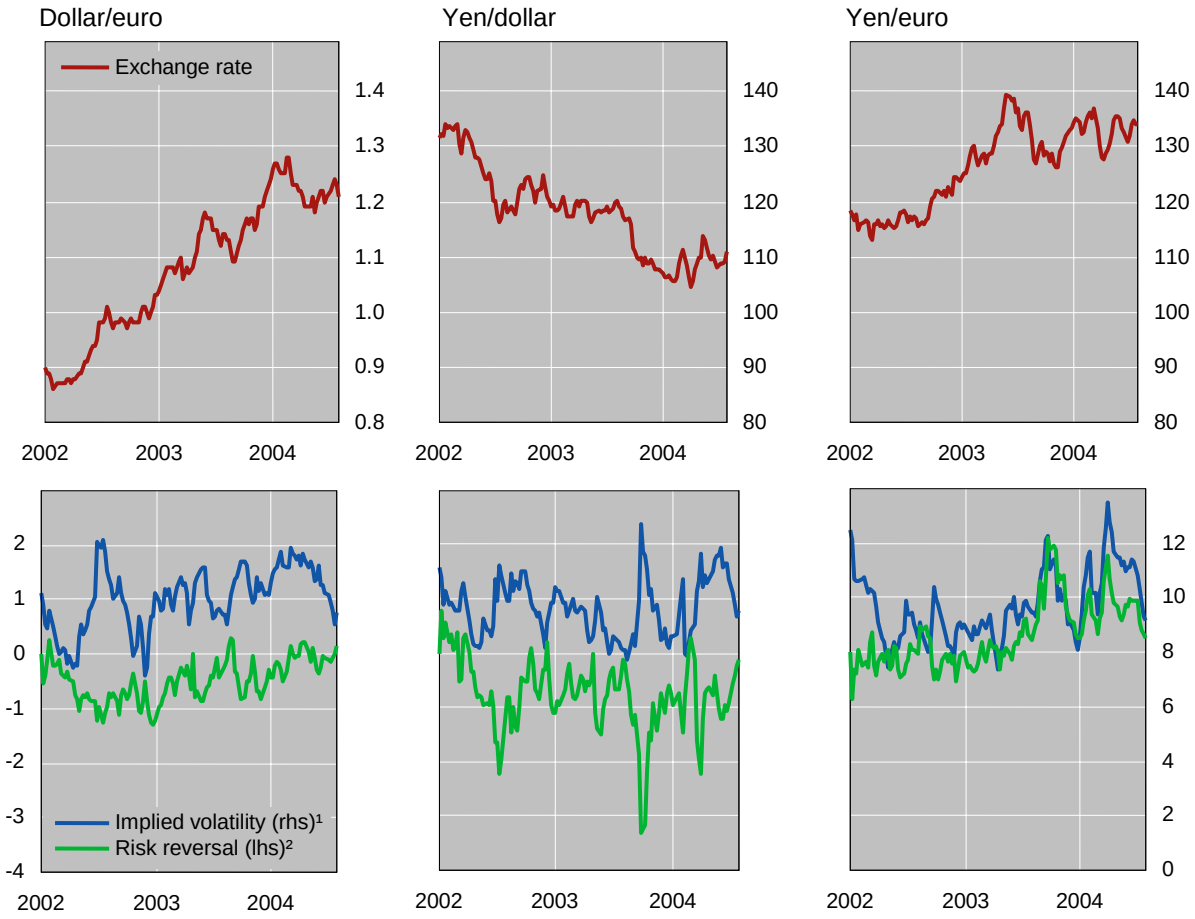
Business in currency contracts slows despite large swings in exchange rates

Currency turnover drops, especially in Europe

Turnover of exchange-traded currency derivatives amounted to $1.5 trillion in the second quarter of 2004, a drop of 8% from the first quarter of the year. Most of the decline in activity came from Europe, with futures and options down 50% and 40%, respectively; the corresponding changes in the United States were –9% and –18%.

After growing strongly in the first quarter, particularly in March, trading on the dollar/euro and other major currency contracts turned subdued in the second. Overall, transactions involving the dollar and the yen remained unchanged, while those on the euro, sterling and the Canadian dollar fell by 21%, 10% and 4%, respectively. At regional level, transactions involving the dollar remained substantial on US exchanges, with turnover rising by nearly 17%; those involving the euro, by contrast, were weak on both US and

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

European exchanges, down by 20% and 64%, respectively. The decline in activity from the first to the second quarter conceals large monthly swings. Transactions were sharply down in April (by between 28% and 38%) and, to a lesser extent, in May (by between 1% and 20%). Business surged again in June (by between 27% and 65%), probably reflecting the changes in expected interest rate differentials induced by the surprisingly strong macroeconomic data on the US economy.

Reduced activity may reflect stability in implied volatilities

Market activity seems to have been influenced less by currency movements than by the relative stability of market uncertainty as measured by implied volatilities. In the second quarter, the shifts in the dollar with respect to the other two major currencies were even more substantial than in the first quarter (Graph 4.5). Generally, large market movements, especially when accompanied by reversals of market trends such as those that took place in the second part of the last two quarters, give rise to a surge in the aggregate volume of transactions. While this occurred in the first quarter, in the second economic agents may have regarded the swing in exchange rates and their high historical volatilities as transitory effects related to the changed macroeconomic scenario after the strong US data of April and May. Consistent

with this, despite the high historical volatility generated by the large exchange rate movements, implied volatilities remained rather flat or even fell slightly during the second quarter, oscillating between 10 and 12% on an annualised basis (Graph 4.5). In the first quarter, by contrast, high historical volatilities had gone hand in hand with larger and more persistent swings in implied volatilities.

Activity stagnates for stock indices

After four quarters of growth, stock index contracts stagnated in the second quarter. Global turnover remained unchanged from the previous quarter at close to $24 trillion. Despite this, there were significant differences across the major geographical areas. Trading in the Asia-Pacific region, mainly dominated by options on the Korea Stock Exchange's KOSPI 200 index introduced in October 1997, went up by 14% to $9 trillion. Transactions on North American marketplaces declined by 4% to $9 trillion, while on European exchanges they dropped by 13% to $4.8 trillion. Trading fell almost uniformly in Europe, by between 11 and 14% in Germany, the United Kingdom and France. The contraction was sharper for options than for futures in France and Germany; the opposite was true for the United Kingdom.

Only in Asia is there more activity

The overall stability in stock index business in the second quarter probably reflected the lack of significant movements in the underlying market. It may also have been due to the unusually low levels of market uncertainty as measured by the volatility implied in index options. Indeed, implied volatilities were close to historical lows in both the United States and the euro area. Other, more forward-looking considerations may also have dampened activity. Although US firms recorded positive earnings during the second quarter, markets grew increasingly concerned about a rise in policy rates, a factor which probably offset the positive effect of higher earnings and limited position-taking activity through derivatives.