

## Box 2

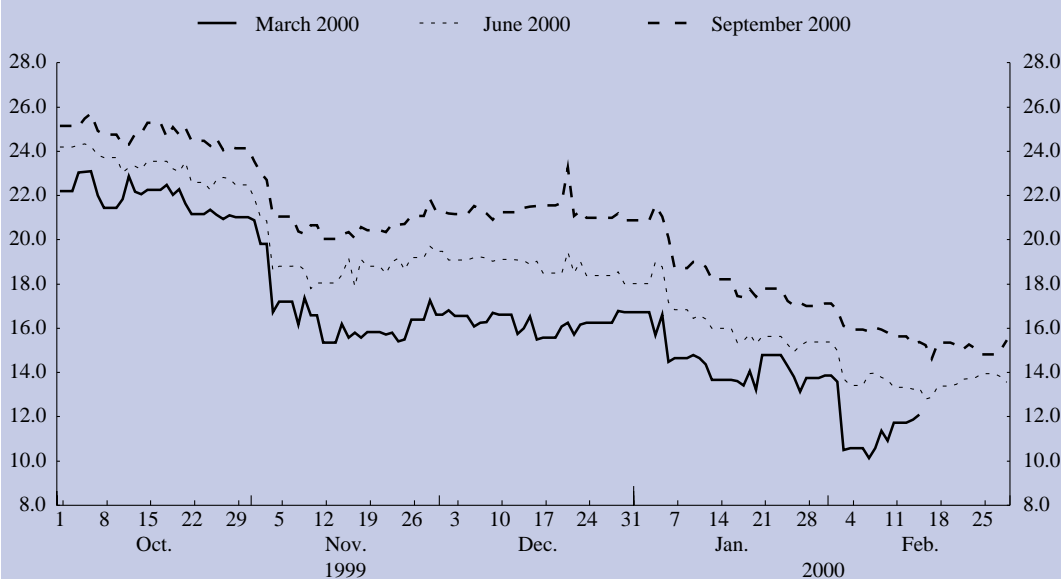
### Recent developments in implied interest rate volatility

Developments in the expected volatility of short-term and long-term interest rates, as measured by the implied volatility extracted from options prices, provide an indication of the evolution of the degree of uncertainty surrounding market expectations of future interest rate developments (see Box 4 on pages 23 to 25 of the December 1999 issue of the ECB Monthly Bulletin).

With regard to the recent evolution of short-term interest rate volatility, the three-month EURIBOR interest rate volatility implied by options maturing in December 1999 and in March and June 2000 declined sharply following the increase in ECB interest rates in November 1999. It subsequently remained almost stable until the beginning of 2000, even in the presence of mounting market expectations of increases in ECB interest rates in the year 2000. In the first week of January 2000 a downward trend developed in the implied volatility at all available maturities. This may have been due in part to the disappearance of market concerns regarding the impact of the transition to the year 2000. A second factor which could have affected the reduced dispersion of expectations was the declining uncertainty regarding the prospects for economic growth in the euro area. This, in turn, could have contributed to reducing the uncertainty surrounding market expectations regarding a future path of gradually rising short-term interest rates in the euro area.

#### Implied volatility from options on three-month EURIBOR futures

(traded on LIFFE)



Source: Bloomberg.

Following the increase in ECB interest rates on 3 February 2000 expected short-term interest rate volatility declined at all available maturities. However, in comparison with the evolution following the previous interest rate increase in November 1999, the decline in volatility implied by options was less marked, especially for options on futures at the shortest maturities. For example, while in November 1999 the volatility implied by options on futures maturing in December 1999 declined by around 10 percentage points, in February 2000 the decline observed in the volatility implied by options on futures maturing in March 2000 was approximately 3 percentage points. This difference could be attributed to the fact that the uncertainty prevailing prior to the decision of 3 February 2000 was lower than that prevailing at the beginning of November 1999. In addition, after the pronounced drop in volatility which occurred in November 1999, market uncertainty regarding the evolution of short-term interest rates, especially for maturities over one month, was higher at the end of 1999 than in the period following the interest rate increase on 3 February 2000.

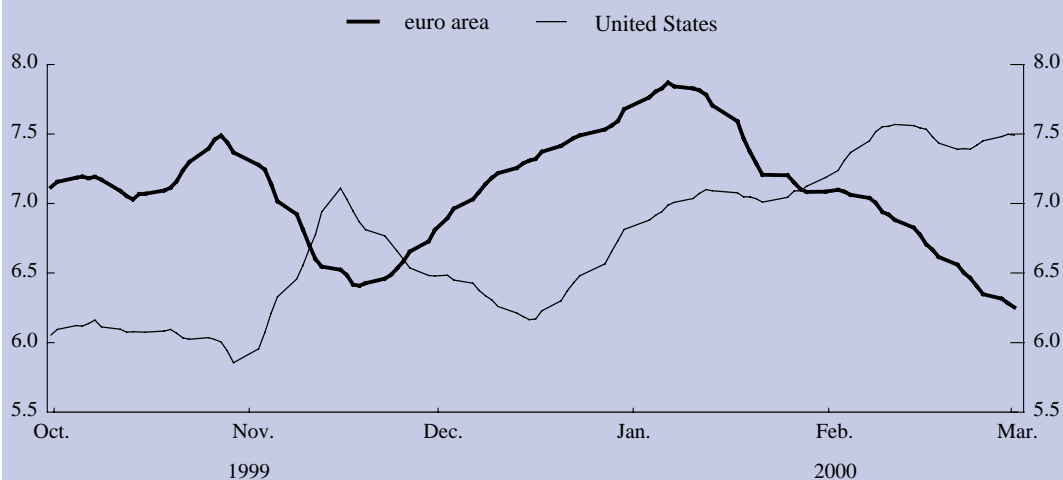
The implied volatility extracted from options contracts on long-term bonds typically provides an indication of the degree of uncertainty regarding the long-term real interest rate, the average inflation rate and risk premia perceived by market participants up to the expiry of the options contracts. With regard to developments since end-October 1999, it appears that three separate periods can be identified in respect of movements in the implied volatility of the ten-year German Bund contract (which appears to be the best proxy for the euro area in terms of liquidity). First, as illustrated in the chart below, between late October and mid-November 1999 implied volatility declined, initially following growing market expectations of an ECB interest rate increase, and subsequently after the announcement of the decision on 4 November.

In the second period, which started around mid-November 1999, the downward movement in the implied volatility of the German Bund contract was reversed, and an increasing trend in this direction was seen throughout the remainder of the year. This coincided with renewed upward pressure on euro area long-term bond yields, which seemed to be mainly a result of a combination of spillovers stemming from rising US bond yields and increasing optimism on the part of market participants with regard to euro area growth prospects. These revisions to expectations may have introduced increased market uncertainty regarding the future level of real interest rates and possibly also concerning future price developments and may therefore explain in part the increase in implied volatility during this period.

In the third period, covering the first two months of 2000, the implied volatility of the ten-year German Bund contract again displayed a broadly declining trend. It is notable that this development took place in an environment in which US implied volatility increased. One factor behind the decline in the expected volatility in the euro area may have been the disappearance of uncertainty relating to the transition to the year 2000, although developments in the United States would suggest that this may have had only a relatively limited impact. Seen in this light a factor that may have played a more important role was therefore probably the growing expectations in the markets that the Governing Council of the ECB would increase interest rates early in 2000, thereby reducing uncertainty about future price stability. In fact, developments after the decision on 3 February 2000 to increase ECB interest rates indicated a further reduction in the degree of uncertainty with regard to the evolution of long-term bond yields in the near future.

### Implied volatility for futures contracts on the ten-year German Bund and the ten-year US Treasury note

(percentages per annum; ten-day moving average of daily data)



Source: Bloomberg.

Note: The implied volatility series in the above chart represent the nearby implied volatility on the near contract generic future, rolled over 20 days prior to expiry, as defined by Bloomberg. This means that 20 days prior to expiry of the contracts, a change in the choice of contract used to obtain the implied volatility is made, from the contract closest to maturity to the next contract.