

Box 2**THE VOLATILITY OF THE OVERNIGHT INTEREST RATE FROM A MEDIUM-TERM PERSPECTIVE**

One of the main rationales for introducing changes to the Eurosystem's operational framework for monetary policy implementation in March 2004 was the elimination of underbidding episodes in the weekly main refinancing operations. Underbidding created unbalanced liquidity conditions and led to greater volatility of the overnight interest rate. Underbidding took place during periods when market participants expected key ECB interest rates to be cut. In this context, banks delayed their accumulation of reserve holdings to meet reserve requirements in anticipation of being able to accumulate holdings later in the maintenance period at a lower interest rate.

On 10 March 2004, a number of changes were implemented to the Eurosystem's operational framework. First, the timing of the reserve maintenance period was changed so that a maintenance period always starts on the settlement day of the main refinancing operation following the Governing Council meeting at which the monthly assessment of the monetary policy stance is pre-scheduled. Second, changes to the standing facility rates are implemented at the start of the new reserve maintenance period. Finally, the maturity of the main refinancing operations was shortened from two weeks to one week. The changes have led to a situation in which expectations of key ECB interest rates are flat over the entire maintenance period, and there are thus no incentives for underbidding. The changes were introduced smoothly and overall the framework has worked well.¹

One year after the introduction of the changes, this box analyses the evolution of the volatility of the overnight interest rate from a medium-term perspective. This analysis is based on a specific measure of interest rate volatility, which is described below.

A measure of volatility: realised volatility

Volatility is measured on the basis of realised volatility. This measure is constructed by summing the squared changes in the overnight interest rate calculated for each five minute interval between 9 a.m. and 6 p.m. For technical reasons, the exercise focuses on the logarithm of this measure. Unlike measures of implied volatility derived from options prices, realised volatility does not impose restrictive assumptions on the distribution of volatility, and, unlike other possible measures of volatility, it is independent of the mean level of the overnight interest rate.²

The results

The evolution of the volatility of the overnight interest rate is shown in the chart, which displays the log realised volatility of the overnight rate between 4 December 2000 and 7 February 2005. A smoothed series (the moving average over 21 business days) is also shown in the chart, together with the average level of volatility of this measure computed before and after the changes to the operational framework.

In general, the realised volatility of the overnight interest rate has followed a downward trend over the entire sample period, which has become more pronounced since the introduction of the changes to the operational framework. After August 2004, volatility increased again but has remained fairly low. Overall, volatility since March 2004 has been consistently lower than prior to the introduction of the changes to the framework.

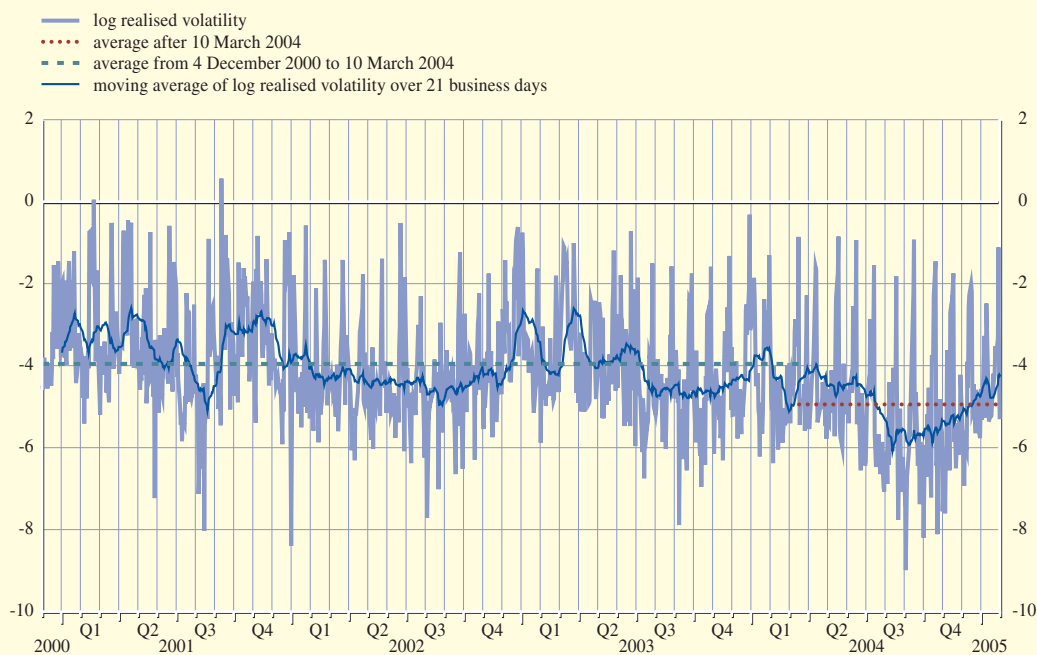
Standard statistical tests confirm that the average realised volatility has been significantly lower after the changes to the operational framework were introduced (see table). Moreover, in the last days of the maintenance periods, i.e. the days between the last main refinancing

1 For a more detailed analysis and a comprehensive assessment of the changes introduced in the Eurosystem's operational framework, see the article entitled "First experience with the changes to the Eurosystem's operational framework for monetary policy implementation", published in the February 2005 issue of the Monthly Bulletin.

2 For more details on realised volatility, see Andersen, T. G., Bollerslev, T. (1997), "Intraday periodicity and volatility persistence in financial markets", *Journal of Empirical Finance*, 4, pp. 115-158, and Andersen, T. G., Bollerslev, T. (1998), "Answering the skeptics: yes, standard volatility models do provide accurate forecasts", *International Economic Review*, 39, pp. 885-905.

Log realised volatility of the overnight interest rate

(from 4 December 2000 to 7 February 2005)



operation and the end of the maintenance period, statistical evidence also suggests that the realised volatility of the overnight interest rate has been significantly lower since March 2004.

When interpreting these results, however, some caveats should be considered. First, the evidence available since March 2004 is rather limited, especially compared with the relatively long experience prior to the changes to the operational framework. Second, some events which may increase the volatility of the overnight interest rate, such as changes to the key ECB interest rates, have not occurred since March 2004. Against this background, any conclusions on the change in the volatility of the overnight interest rate should be regarded as preliminary.

Descriptive statistics and t-test for the difference between the means of log realised volatility before and after the changes to the operational framework

	All days		Days between last allotment and end of the maintenance period	
	before 10 March 2004	after 10 March 2004	before 10 March 2004	after 10 March 2004
Mean	-3.96	-4.94	-2.84	-3.46
Standard deviation	1.72	2.11	1.87	2.05
Number of observations	831	235	158	63
t-statistics (difference in means)		9.41 (349 degrees of freedom)		2.97 (110 degrees of freedom)

Sources: Reuters and ECB calculations.