

Box 2

VOLATILITY OF THE OVERNIGHT INTEREST RATE AND ITS TRANSMISSION ALONG THE MONEY MARKET YIELD CURVE

A box in the August 2005 issue of the Monthly Bulletin addressed the question of the extent to which volatility in the overnight interest rate is transmitted to longer-term money market interest rates in the euro area.¹ A specific measure of volatility (namely “realised volatility”) was employed, constructed on the basis of high-frequency intraday data (known as “tick data”).² Among other things, the box showed that there was “no evidence of a transmission of volatility along the money market yield curve” and thus that “episodes of a more marked volatility of the overnight interest rate – especially at the end of the reserve maintenance period – have not had any significant impact on longer-maturity rates”. On the basis of this and other evidence, the box concluded that the Eurosystem’s operational framework has functioned well from a monetary policy perspective and that the changes made to the framework in March 2004 had not impaired its performance.

As documented in the Monthly Bulletin, over the past two years the ECB’s implementation of monetary policy has evolved.³ In particular, two elements stand out: first, the almost systematic conduct of fine-tuning operations (FTOs) at the end of reserve maintenance periods from October 2004;⁴ second, the implementation, since October 2005, of a policy of allotting slightly more liquidity than the benchmark amount in the Eurosystem’s regular main refinancing operations.⁵ Against this background, this box updates previous analysis using data up to July 2007.

The new results confirm previous findings and lead to the conclusion that the further evolution of the ECB’s implementation of monetary policy has not altered the correct and efficient functioning of the operational framework.

- 1 See Box 3 entitled “The transmission of overnight interest rate volatility to longer-term interest rates in the euro area money market” in the August 2005 issue of the Monthly Bulletin.
- 2 This measure was chosen in line with previous results presented in the ECB Monthly Bulletin. For a detailed definition of realised volatility together with relevant literature, see Box 2 in the March 2005 issue of the Monthly Bulletin.
- 3 For a comprehensive review of the changes to the Eurosystem’s operational framework, see the article entitled “Initial experience with the changes to the Eurosystem’s operational framework for monetary policy implementation” in the February 2005 issue of the Monthly Bulletin.
- 4 On the increased frequency of FTOs, see the article entitled “The Eurosystem’s experience with fine-tuning operations at the end of the reserve maintenance period” in the November 2006 issue of the Monthly Bulletin.
- 5 For more details on how the benchmark amount is calculated, see the annex to the article entitled “The liquidity management of the ECB” in the May 2002 issue of the Monthly Bulletin and Box 1, entitled “Publication of the benchmark allotment in the main refinancing operations”, in the April 2004 issue of the Monthly Bulletin.

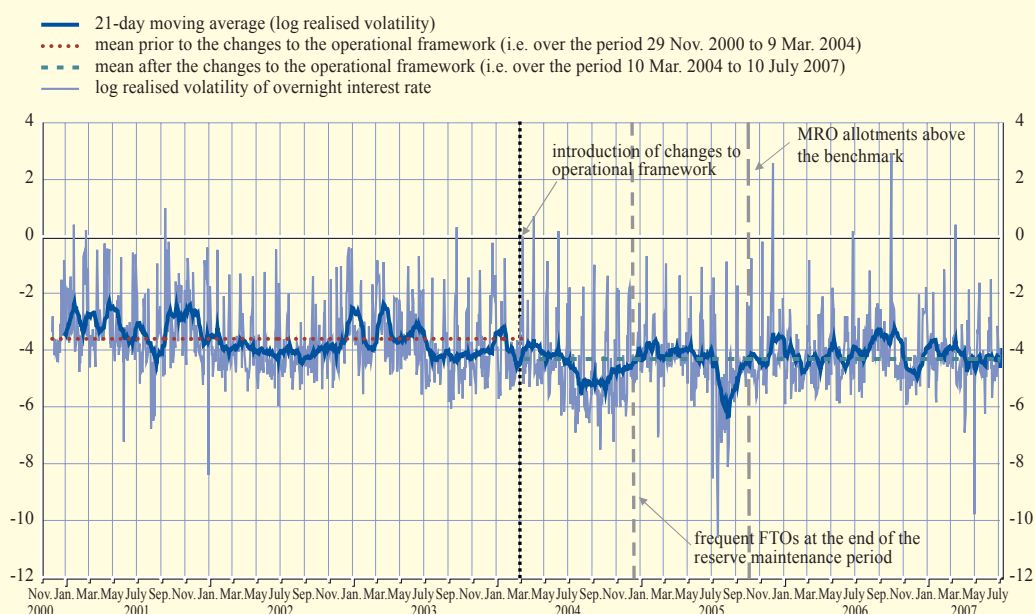
The historical evolution of realised volatility

Chart A displays a measure of the realised volatility calculated for the overnight interest rate between 29 November 2000 and 10 July 2007.⁶ This measure is derived by summing the (logarithm of) squared changes in the overnight interest rate for each five-minute interval between 9 a.m. and 6 p.m. over each trading day. To have a clearer picture of the dynamics of this series, a 21-day moving average of the daily measure is also shown in the chart.

As shown in Chart A, the volatility in the overnight interest rate has shown pronounced fluctuations over time. However, some general facts emerge. First, since the changes in the Eurosystem's operational framework were introduced in March 2004 the level of (log) realised volatility has on average been lower than was the case for the period prior to the changes. Second, despite some occasional peaks, (log) realised volatility since March 2004 has generally remained below the average level observed prior to the changes, with exceptions on only very few occasions. Third, the evolution of realised volatility since March 2004 appears to have been reasonably stable, with the occasional drops showing only little persistence. Finally, the two measures referred to in the introduction to this box do not appear to be associated with any change in the regular dynamics of realised volatility; by contrast, they both appear to have stabilised, at least temporarily, the volatility of the overnight interest rate.

⁶ High-frequency data have been available since 29 November 2000. The sample was cut on 10 July 2007 in order to cover a full maintenance period.

Chart A Realised volatility of the overnight interest rate (in logarithms)



Source: ECB.

An assessment of volatility transmission

Analysing historical developments in the overnight segment of the money market is only one of the relevant dimensions when assessing the performance of the operational framework from a monetary policy perspective. Another important dimension is to check whether data show any evidence of volatility transmission from the overnight interest rate to longer maturities.

From a monetary policy perspective, it is desirable that any volatility in the overnight interest rate – i.e. the rate most sensitive to liquidity conditions – should reflect only operational factors (i.e. technical factors related, on the one hand, to the design of refinancing mechanisms and reserve requirements and, on the other hand, to the ordinary functioning of banks) and have no impact on longer-term interest rates, which should only react to macroeconomic fundamentals.

In order to check this, an update of the exercise performed in Box 3 of the August 2005 Monthly Bulletin was carried out. More specifically, realised volatility measures were calculated not only for the overnight maturity, but also for one, three and twelve-month interest rates. Using these measures within a vector autoregression (VAR) model with five lags, the dynamic relationships between interest rate volatilities at various maturities were analysed in a simple way.⁷

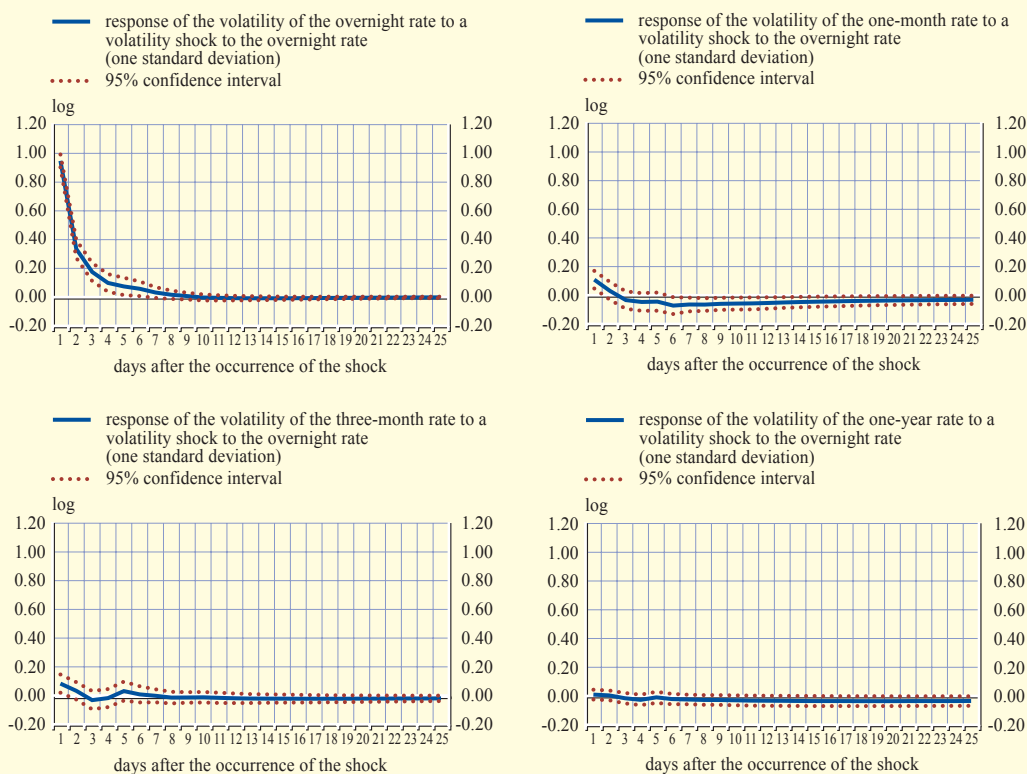
Consistent with the results presented in the August 2005 Box, the transmission of volatility along the yield curve is assessed on the basis of impulse response functions derived from the estimated VAR. These functions illustrate the dynamic effects of an unanticipated movement in (or “shock” to) one variable at a specific point in time on that variable itself and on the other variables in the model in subsequent periods. In order to focus on the question of interest, only the response of the volatility in interest rates with maturities ranging from overnight to one year to shocks to the volatility of the overnight interest rate is reported in Chart B. For each maturity, impulse response functions are computed over a period of 25 days – i.e. slightly longer than one business month – and are displayed together with a confidence interval of 95%.

Chart B shows the results obtained using the extended sample. The response to a one standard-deviation shock to the volatility of the overnight interest rate is statistically significant for the overnight maturity, but this response is limited to a relatively short period of time (approximately five days) following the incidence of the shock. The impact on the volatility of longer-maturity interest rates is extremely modest in size and, at best, of questionable statistical significance compared with the response of the overnight interest rate volatility to its own shock.

It can be thus concluded that episodes of a more marked volatility of the overnight interest rate have had no noticeable impact on longer-maturity rates. Moreover, as this result confirms previous findings on the absence of a transmission of volatility along the money market yield curve, it can be concluded that the recent evolution of the ECB’s monetary policy implementation has not altered the efficient functioning of the Eurosystem’s operational framework.

⁷ More details on the specification of the VAR models are provided in Box 3 of the August 2005 issue of the Monthly Bulletin.

Chart B Impulse response functions of the overnight, one-month, three-month and one-year interest rates with respect to the overnight interest rate over 25 days



Source: ECB.