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

Overnight interest rate volatility and its transmission along the euro area money market yield curve

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Introduction

Stabilising very short-term interest rates is one of the goals that inspires the design of the operational framework of the monetary policy applied by most central banks. The reason is that high volatility can obstruct the signalling of monetary policy stance, hinder the liquidity management of financial institutions and have adverse macroeconomic effects if the volatility is transmitted to the longer-term rates relevant to agents' spending decisions.

To achieve the aim of stabilising very short-term interest rates, there are basically two alternative procedures: more or less continuous intervention in the markets and setting minimum reserve requirements that oblige credit institutions to maintain a certain average amount of reserves on deposit with the central bank over a certain period. These reserves act as a buffer that helps to neutralise the impact that unforeseen shocks to the system's liquidity have on market interest rates. Thus when liquidity is scarce and its price tends to rise, the institutions have an incentive to reduce deposits temporarily below the required average level and lend funds on the inter-bank market, thereby moderating the upward pressure. Abundant liquidity triggers an equivalent mechanism in the opposite direction.

Both these alternative procedures have their advantages and drawbacks. The main problem with continuous intervention is that it discourages activity in the money markets, while the weakness of minimum reserve requirements is that their stabilising property vanishes during the last few days of the reserve maintenance period.

The Eurosystem has opted for the second procedure. Hence, in the last few days of each maintenance period there is usually an increase in overnight interest rate volatility in the interbank market. Nevertheless, this greater variability would only be of concern if it impaired the signalling of monetary policy stance and, in particular, if it were transmitted to longer terms. In any event, there are instruments available to stabilise very short-term rates on specific occasions.

Against this background, the present article focuses on the variability of the euro area overnight interbank interest rate. The article is organised as follows. After this introduction, we briefly describe the operational framework of the Eurosystem monetary policy; the third section reviews the volatility of this rate; the fourth analyses to what extent it is transmitted to longer maturities; and the fifth sets out the main conclusions.

Operational framework of Eurosystem monetary policy

One of the factors determining the behaviour of overnight interbank interest rates is the operational framework of monetary policy. In the Eurosystem this basically consists of three instruments: reserve requirements, open market operations and standing facilities. Reserve requirements oblige institutions to hold a minimum average volume of funds with their national central bank (NCB) during each maintenance period of approximately one month. As noted in the introduction, this mechanism helps to stabilise the yield of very short-term interbank deposits.

Open market operations are transactions between NCBs and counterparty institutions in which the NCBs inject funds into or drain them from the system. There are four types, the most important being the so-called main refinancing operations (MROs). These transactions, which

are executed weekly, consist of tenders in which bidding takes place for loans with a maturity of seven days (fourteen days till March 2004) used by the participating institutions to meet the bulk of their liquidity needs. Since June 2000 MROs have been conducted through variable-rate (previously fixed-rate) tenders with a preset minimum bid rate. This minimum bid rate plays a central role in signalling the stance of monetary policy.

The other open market operations are longer-term refinancing operations, structural operations and fine-tuning operations[1]. The latter are executed on an ad hoc basis to manage the liquidity situation in the market and, in particular, smooth the effects on interest rates caused by unexpected liquidity fluctuations in the market.

Finally, standing facilities are a mechanism to enable liquidity to be injected or drained at very short term at the initiative of the institutions. There are two types: the marginal lending facility and the deposit facility. Banks can use the former to obtain overnight funds from the NCBs against eligible assets at a preset cost. The latter enable counterparties to make overnight deposits with their NCBs, the remuneration of which is also preset. The interest rates on these transactions provide a ceiling (in the marginal lending facility) and a floor (in the case of the deposit facility) for the overnight interest rate in the interbank market, thereby helping to stabilise it. Since April 1999 the price of the marginal lending facility and the deposit facility has stood 100 basis points (bp) above and below, respectively, the minimum rate on MROs.

Until November 2001, the ECB Governing Council could change the key policy rates in either of its two monthly meetings. This meant that very short-term money market conditions were heavily influenced by expectations of movements in these rates. To reduce the importance of these factors in the behaviour of overnight interest rates, it was decided that from that date the Governing Council would only assess the stance of monetary policy once a month. This reduced the length of time in each reserve maintenance period during which these prices could change.

Despite this change, very short-term monetary conditions continued to be influenced, albeit to a lesser extent, by expectations about interest rate movements. For this reason, a reform of the operational framework of Eurosystem monetary policy came into force in March 2004 to eliminate this source of variability of very short-term yields. The following changes were made. Firstly, reserve maintenance periods were rescheduled to begin on the settlement date of the first MRO after the ECB Governing Council's monthly meeting at which the monetary policy stance is assessed. Previously, these periods always started on the 24th of each month and ended on the 23rd of the following month. Also, the term of MROs was reduced from two weeks to one week. The first change means that at the beginning of each maintenance period the institutions know the policy rates that will prevail during that maintenance period, while the second prevents the demand for funds in MROs from being influenced by expectations about the ECB Governing Council's decision. Thus, for example, if the term of MROs had been held unchanged at fourteen days, the volume of bids in the last tender would tend to increase in scenarios in which the prices of monetary policy instruments were expected to increase, because the funds obtained could, during the first week of the following reserve maintenance period, earn a yield exceeding their cost. Hence the two measures ensure that neither the management of reserves by credit institutions, nor, consequently, overnight interest rate movements will be affected by expectations of changes in interest rates.

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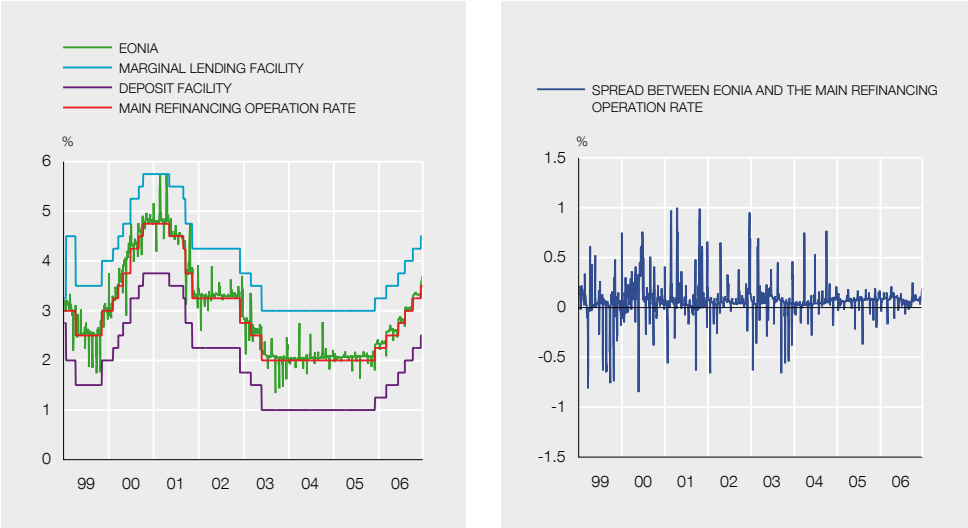
1. For more details of these operations and of the operational framework of the Eurosystem, see ECB (2006a).

EONIA AND EUROSYSTEM POLICY RATES CHART 1



SOURCE: European Central Bank.

Overnight interest rate volatility in the interbank market

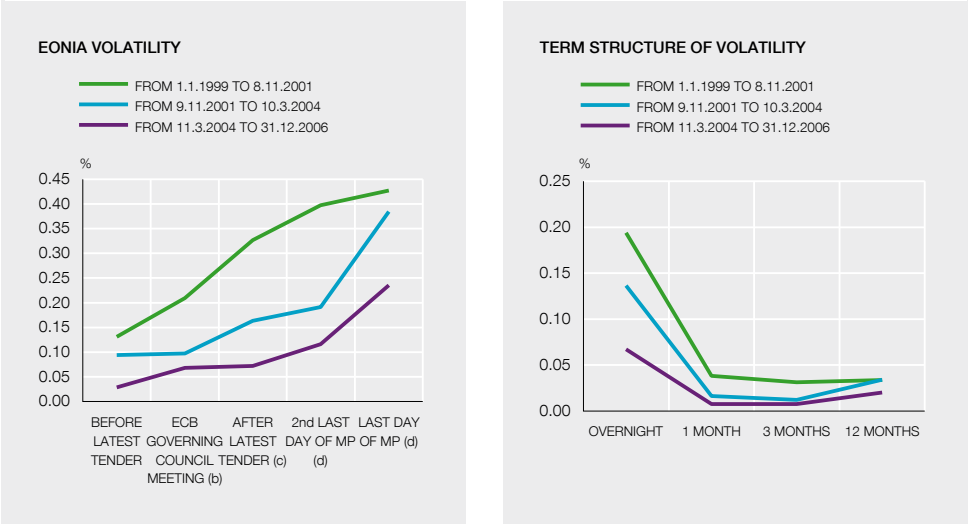
Chart 1 shows overnight interest rates in the euro area interbank market as measured by the EONIA (Euro OverNight Index Average), which is an index calculated daily by the ECB on the basis of overnight lending transactions by a selected group of institutions in the interbank market. This indicator has fluctuated around the minimum bid rate of MROs (the fixed rate till May 2000). Naturally, this rate has moved within the range determined by the prices of the marginal lending and deposit facilities. The right-hand panel of this chart, which plots the spread over the MRO minimum bid rate, shows more clearly how the EONIA has varied. In particular, it discloses a lower volatility during the last two years of the sample.

The left-hand panel of Chart 2 illustrates how the volatility of the EONIA, proxied by the standard deviation of the spread between this rate and the MRO minimum bid rate, is influenced by the operational framework of monetary policy. Thus EONIA volatility is greatest in the period from the last tender until the end of the maintenance period and, in particular, in the last two sessions. Specifically, the variability of the price of overnight deposits on these days is three times higher than in the other sessions. This is because, following the last MRO, the stabilising properties of the minimum reserve requirement disappear. In particular, if an unexpected shock before that tender causes system liquidity to contract, the institutions can offset that scarcity by temporarily reducing their deposit with the central bank below the required level, because they know the Eurosystem will re-establish the situation in the following MRO. After that operation, however, this can no longer be done, and the EONIA rate will move in response to unexpected variations in liquidity.

It can also be seen that the volatility of the EONIA tends to increase on the dates when the ECB Governing Council assesses the monetary policy stance, which reflects the effect of announcements made in the introductory statement and in the ECB President's press conference.

The left-hand panel of Chart 2 also enables the impact of the changes to the monetary policy operational framework to be assessed. In particular, it shows that the volatility of the EONIA decreased during the whole of the maintenance period, both after the decision to reduce the frequency with which the ECB Governing Council assesses the policy stance (this measure

VOLATILITY OF EURO AREA INTERBANK INTEREST RATES (a) CHART 2



SOURCES: European Cental Bank and European Banking Federation.

a. EONIA volatility is calculated as the standard deviation of the spread between this yield and the MRO minimum bid rate.
The volatility of longer-term rates is calculated as the standard deviation of the daily changes in these yields.
b. Only those in which the monetary policy stance is assessed.
c. Excluding the last two days of the reserve maintenance period.
d. MP: Reserve maintenance period.

came into force in November 2001) and after the reform in March 2004 aimed also at limiting the extent to which very short-term money market conditions are affected by policy rate expectations. Although it cannot be ruled out that other factors may also have played a part in reducing the variability of the EONIA, these reforms have foreseeably contributed to it. Thus, as seen in the right-hand panel of Chart 2, the volatility of longer-term interest rates also decreased during these sub-periods, but to a lesser extent[2]. In any event, the decrease at the end of the maintenance period in the latest sub-sample is also due to greater use of fine-tuning operations by the Eurosystem[3].

Another interesting feature illustrated by the right-hand panel of Chart 2 is the U-shaped term structure of the volatility of interbank yields, which is also seen in other countries[4]. This term structure exhibits high values at the short-term end of the curve (overnight), which tend to decrease as the time horizon increases and are lowest between one and three months, after which they subsequently rise.

Comparison with other countries shows that the volatility of overnight interest rates in the euro area is clearly lower than in the United Kingdom, and higher than, although very close to, that of the United States, particularly in recent times (see Chart 3). In addition, it can be seen that in the US market the variability of deposit yields has been decreasing, although less so than in the euro area. In the United Kingdom, the notable decrease seen in the latest sub-sample is probably related to the changes in the operational framework of monetary policy that came into force in March 2005 and in May 2006[5].

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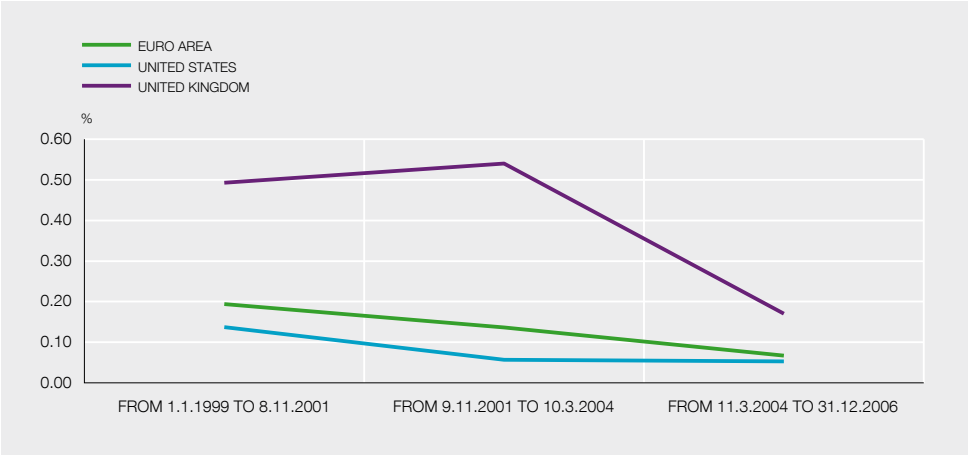
2. The volatility of interest rates at longer than overnight terms has been approximated by the standard deviation of the daily movements. **3.** For more details of these operations, see, for example, ECB (2006b). **4.** See, for example, Ayuso, Haldane and Restoy (1997). **5.** Following the entry into force of the latest of these reforms, the estimated volatility in the United Kingdom is close to, although higher than, that in the euro area.

OVERNIGHT INTEREST RATE VOLATILITY. INTERNATIONAL COMPARISON (a) CHART 3



SOURCES: ECB, Bank of England, Federal Reserve Bank of New York and Reuters.

a. Volatility is calculated as the standard deviation of the spread between the overnight interest rate and the central bank reference rate.

Transmission of volatility along the yield curve

As noted in the introduction, one of the reasons for designing a monetary policy operational framework aimed at keeping very short-term interest rate volatility at a low level is to guard against the possibility of volatility spreading to the longer-term yields relevant to private-sector spending decisions. A study of EONIA volatility in the period from January 1999 to November 2003 by Alonso and Blanco (2005) found evidence that in the last few days of the reserve maintenance period there was no transmission along the curve, but that, in contrast, it did occur in the other sessions. In particular, the price of 1-month and 3-month deposits was affected, although not that of 1-year deposits.

The update of the estimates by Alonso and Blanco (2005) for the sub-period prior to the reform of the monetary policy operational framework (January 1999 to March 2004) confirms the results of this study[6]. In particular, as Table 1 shows, the coefficient measuring the proportion of EONIA volatility transmitted to longer terms in the last two days of the maintenance period is not statistically significant. In contrast, the tests used do not allow the hypothesis that this parameter takes on a positive value during the other sessions to be rejected in the case of 1-month and 3-month yields. Specifically, the estimated figure, which is less than one, indicates that the transmission is incomplete. Nor is there evidence of transmission from the EONIA for the 1-year term.

When the same exercise is carried out using data for the period from the March 2004 reform of the monetary policy operational framework to the end of the sample (end-2006), it is found that the parameters associated with the transmission of volatility from the EONIA to longer maturities are in no case statistically significant. This suggests that in the most recent period the behaviour of the overnight money market interest rate does not seem to affect the variability of longer-term yields.

Taken as a whole, this evidence seems to suggest that the transmission of volatility from the EONIA to longer maturities that was taking place before the March 2004 reform of the monetary policy operational framework might have been because the overnight interest rate contained information on policy rate expectations. Thus the contagion was located precisely in that part of the maintenance period where the EONIA's behaviour could be expected to be

6. The methodology used is described in Alonso and Blanco (2005).

TRANSMISSION OF EONIA VOLATILITY (a) TABLE 1

Term	1.1.1999 to 10.3.2004		11.3.2004 to 31.12.2006	
	End of maintenance period (b)	Other days	End of maintenance period (b)	Other days
One month	ns	0.1	ns	ns
Two months	ns	0.1	ns	ns
Three months	ns	ns	ns	ns

a. Proportion of EONIA volatility transmitted to longer terms. "ns" denotes a coefficient that is not statistically significant.
b. Last two days of the reserve maintenance period.

relatively more influenced by changes in those expectations. This is also supported by the fact that these effects disappeared once the reforms had been introduced and the EONIA ceased to be influenced by interest rate expectations and only reflected factors related to system liquidity. In any event, the results of the latest sub-sample should be interpreted with caution, since the time period is relatively short.

Conclusions

As in other economic areas, the Eurosystem's operational framework for monetary policy is designed, inter alia, to limit the volatility of very short-term interest rates so as not to obstruct the signalling of monetary policy stance, hinder liquidity management by institutions or generate negative macroeconomic effects associated with the possible transmission of interest rate volatility to the longer maturities relevant to agents' spending decisions.

The evidence presented in this article shows that the volatility of the EONIA has been relatively low, close to but somewhat above that observed for the overnight interbank interest rate in the United States and below that in the United Kingdom. Moreover, after the two reforms of the Eurosystem's operational framework for monetary policy in November 2001 and March 2004, the variability of this indicator decreased. This is consistent with the goal pursued in these reforms, i.e. that very short-term monetary conditions, and thus the behaviour of the EONIA within each reserve maintenance period, should not be influenced by changes in policy rate expectations.

Furthermore, the volatility of the EONIA shows a marked pattern in each reserve maintenance period. In particular, the highest values occur in the last two days of each maintenance period. However, according to the estimates made, the variability is not transmitted to longer maturities. By contrast, until the reform of the operational framework for monetary policy that came into force in March 2004, there was evidence of transmission to 1-month and 3-month interest rates, which does not seem to have continued after the reform. Again, this latter finding may be explained by the changes made in that reform, although this evidence must be interpreted with some caution because the period of time elapsed since then is still short.

15.2.2007.

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