THE EUROSYSTEM'S OPEN MARKET OPERATIONS DURING THE RECENT PERIOD OF FINANCIAL MARKET VOLATILITY

The recent period of financial market volatility, which spilled over into the euro area money market in August 2007, marked an important test for the Eurosystem's operational framework for monetary policy implementation. This article provides a chronological overview of the Eurosystem's open market operations in the period from August 2007 to March 2008. It then describes the impact of measures taken as regards the functioning of the money market, taking into account the ECB's fundamental goal of ensuring that the very short-term interbank money market rates are close to the policy rate decided by the ECB's Governing Council. The article concludes that the Eurosystem's open market operations were broadly successful in maintaining the average level of very short-term interbank money market rates close to the policy rate in this period of greater than normal volatility, in particular at the beginning of the financial market turmoil and in the period approaching the year-end. Overall, the Eurosystem's operational framework has proven fairly resilient to the financial market turmoil and no structural changes were needed to cope with the greater volatility.

1 INTRODUCTION

The period of financial market volatility that started in August 2007 constitutes an important test for the Eurosystem's operational framework for monetary policy implementation. This framework comprises three categories of instruments: open market operations, minimum reserve requirements and standing facilities.[1] While open market operations comprise several different operations, the Eurosystem has so far conducted two types: refinancing operations, through which liquidity (i.e. banks' current account holdings with the Eurosystem) is temporarily lent to counterparties against eligible collateral,[2] and the collection of fixed-term deposits for fine-tuning purposes, which are used to temporarily absorb liquidity from counterparties. Counterparties need a certain amount of liquidity to fulfil their reserve requirements and to satisfy liquidity needs arising from autonomous liquidity factors, which comprise items on the Eurosystem's balance sheet not related to monetary policy instruments. The largest autonomous factor is banknotes in circulation.

The Eurosystem offers two standing facilities which can be accessed at the discretion of individual banks, namely a deposit facility and a marginal lending facility. At their own initiative, banks can place liquidity in the deposit facility on an overnight basis at a rate – decided by the Governing Council – which, since April 1999, has been one percentage point below the policy rate (the minimum bid rate in main refinancing operations), while they can borrow overnight liquidity against eligible collateral via the marginal lending facility at a rate which is one percentage point above the policy rate.

At the same time, banks must hold an amount of liquidity corresponding to their reserve requirements (calculated as a ratio of their short-term liabilities). This requirement needs to be complied with on average over each reserve maintenance period. These periods vary in length but are approximately one month long.

1 See also the ECB Monthly Bulletin articles: "The Eurosystem's experience with forecasting autonomous factors and excess reserves" (January 2008); "The Eurosystem's experience with fine-tuning operations at the end of the reserve maintenance period" (November 2006); "Initial experience with the changes to the Eurosystem's operational framework for monetary policy implementation" (February 2005); and "Changes to the Eurosystem's operational framework for monetary policy implementation" (August 2003); as well as Box 1 entitled "Publication of the benchmark allotment in the main refinancing operations" (April 2004). More generally, see (ECB) "General documentation on the Eurosystem monetary policy instruments and procedures", amended on 20 September 2007.

2 The Eurosystem accepts as eligible collateral a broad range of assets, including government bonds, corporate bonds, covered bonds, uncovered bank bonds, asset-backed securities and credit claims. The different types of collateral are subject to different haircuts. Overall, the Eurosystem's collateral framework has allowed the liquidity funding risk of counterparties during the financial turmoil to be mitigated by facilitating their access to central bank credit.

With these instruments, the Eurosystem implements the monetary policy decisions of the Governing Council of the ECB. That is, it manages the liquidity situation in the euro area money market with the aim of steering very short-term interbank rates as close as possible to the policy rate decided by the Governing Council. In order to continue meeting this objective during the recent period of financial market volatility, which brought about a change in the pattern of banks' demand for liquidity, the Eurosystem has adjusted the timing and maturity of its open market operations, but has made no changes to the other categories of instruments of its operational framework.

This article reviews how the Eurosystem made use of open market operations in the recent period of financial market volatility. Section 2 describes how the Eurosystem uses open market operations, against the background of standing facilities and reserve requirements, to implement monetary policy, i.e. to meet the objective of steering very short-term interbank money market rates close to the policy rate decided by the Governing Council. Section 3 examines the spillover of the turmoil into the euro area money market and the implications for banks' demand for liquidity, and Section 4 describes and assesses the Eurosystem's response to these events via the conduct of open market operations. Section 5 concludes.

2 HOW THE EUROSYSTEM IMPLEMENTS MONETARY POLICY

The Eurosystem makes a clear distinction between, on the one hand, decisions by the Governing Council of the ECB on the monetary policy stance and, on the other hand, the implementation of these decisions through monetary policy instruments (see Box 1).[3] In the context of its monetary policy strategy and in order to fulfil its mandate, the Governing Council regularly conducts an assessment of risks to price stability on the basis of its economic and monetary analyses. Using the information derived from these analyses, it sets the levels of key ECB interest rates that will serve to maintain price stability over the medium term. The ECB's Executive Board implements these decisions. This clear separation between the decision on the monetary policy stance and its implementation, together with the transparency-oriented communication strategy of the ECB, reduces the risk that economic agents may mistakenly perceive volatility in short-term interbank money market rates, triggered by temporary and unpredictable fluctuations in liquidity demand and supply, to be monetary policy signals of the Eurosystem. This separation has been particularly important during the recent period of financial market volatility, when short-term money market rates were occasionally very volatile.

3 This separation was reinforced in 2004, when changes to the operational framework were implemented. Since then, there has been no direct interaction between changes in key ECB interest rates and movements in very short-term interest rates during a reserve maintenance period, because any change in official rates only becomes effective at the start of the next maintenance period. However, the Governing Council is free to change the ECB's key interest rates at any time.

Box 1

SEPARATION BETWEEN MONETARY POLICY DECISIONS AND LIQUIDITY OPERATIONS

The ECB has maintained a clear distinction between, on the one hand, interest rate decisions taken to maintain price stability (i.e. the determination of the monetary policy stance) and, on the other hand, liquidity decisions taken in the course of implementing this stance.

In "normal" times, maintaining this distinction helps to ensure that the intentions of monetary policy-makers are not misinterpreted by market participants and the public. It serves to isolate signals of the monetary policy stance from the impact on very short-term interest rates of the (sometimes inevitable) noise introduced by liquidity movements. In particular, errors in forecasting autonomous factors (such as the demand for banknotes) are inevitable, with the result that allotment decisions in the regular Eurosystem refinancing operations do not precisely fulfil counterparties' liquidity needs. The operational framework for the implementation of monetary policy introduced by the Eurosystem in 1999 has proved very successful in maintaining this distinction. It has been able to clearly signal the monetary policy stance, thereby avoiding uncertainty and misinterpretation that could have created volatility in the money market, and may then have been potentially transmitted to the broader economy.

At times of market stress, maintaining the distinction between decisions on the monetary policy stance and liquidity operations may be even more important, especially if the tensions strongly affect the money market (as has been the case with the recent financial market turmoil). In such circumstances, liquidity management may need to be more active in order to contribute to the functioning of the money market and steer very short-term money market rates close to the minimum bid rate of the Eurosystem's main refinancing operations. If there were no clear separation between monetary policy decisions and liquidity management decisions, the potential for the market to misunderstand monetary policy intentions would be greatly exacerbated, to the detriment of the effective signalling and transmission of the monetary policy stance.

While monetary policy decisions and liquidity operations should be kept separate in order to ensure clarity in the signalling of the monetary policy stance and its effective transmission, decisions made in these two spheres naturally reinforce each other.

On the one hand, the orderly functioning of the money market is of the utmost importance for the transmission of the key policy rates to the economy in general and the price level in particular. Recent experience demonstrates that disturbances in the money market may well interfere with policy transmission. Central banks should therefore contribute to the smooth functioning of financial markets in general, and money markets in particular. As described in the main text, open market operations can contribute in this regard. However, it is also important to recognise that there are limits to the ability of central banks to ensure that markets act in a particular manner. Ultimately, the smooth functioning of the money market relies mainly on the behaviour of and trust among market participants.

On the other hand, conditions in the money market influence wider financing conditions and thus affect household and corporate spending decisions and, ultimately, the evolution of the price level. As such, money market conditions need to be taken into account when reaching monetary policy decisions on the appropriate level of interest rates, as part of the comprehensive assessment made by the Governing Council in its regular economic and monetary analyses.

The behaviour of the very short-term interest rates in "normal" times is well understood. Under normal circumstances the two standing facility rates constitute a corridor and thereby limit the volatility of the overnight rate. Furthermore, the ability to average reserve holdings over a maintenance period means that the holding of liquidity in the current account with the central bank on one day is a (quasi-) perfect substitute for holding liquidity on another day during the maintenance period. This facilitates stabilisation of very short-term interest rates because day-to-day fluctuations of liquidity conditions can be smoothed out over the period. On the last day of a maintenance period, when averaging is no longer possible, liquidity conditions will determine the overnight rate. To the extent that "balanced liquidity conditions" are achieved (i.e. an equal probability of a shortage or a surplus of liquidity, which would need to be offset via standing facilities at the end of the maintenance period and thus the probabilities of recourse to the marginal lending facility and the deposit facility are equal), the overnight rate will be maintained close to the minimum bid rate on that day. This acts as an anchor to the overnight rate on preceding days, thereby delivering very short-term interest rates close to the policy rate throughout the maintenance period.

To date, in its one-week main refinancing operations (MROs) the ECB has normally allotted an amount of liquidity to the banking system which is very close to the benchmark amount.[4] This is defined as the allotment amount that allows counterparties to smoothly fulfil their reserve requirements by maintaining, in aggregate terms, the same level of current account holdings with the central bank on each day of the reserve maintenance period. The benchmark amount takes into account all influences on liquidity conditions which are known at the time of allotment, i.e. the liquidity already supplied via other open market operations and the ECB's forecasts of autonomous factors and of excess reserves – the latter denoting banks' demand for reserve holdings that are larger than the minimum reserve requirements. Before the start of the financial market turmoil, allotting close to the benchmark amount did normally result in balanced liquidity conditions in the very short-term money market with an overnight rate close to the minimum bid rate.

Furthermore, as the ECB normally aims to establish balanced liquidity conditions, since October 2004 it has normally conducted a fine-tuning operation on the last day of the maintenance period. This approach supports ex ante expectations in the market that the overnight rate will be at the midpoint of the corridor formed by the standing facility rates (i.e. the minimum bid rate) on the last day of the period, which, as mentioned above, anchors the EONIA[5] close to the policy rate earlier in the period.

Longer-term refinancing operations (LTROs) provide liquidity normally for a three-month period in order to cater for counterparties' need to obtain refinancing from the Eurosystem at a maturity longer than one week. In these operations the Eurosystem does not, as a rule, intend to send signals to the market, therefore, it normally acts as a rate taker. Accordingly, LTROs are usually executed in the form of variable rate tenders with pre-announced allotment amounts. From time to time, the ECB indicates the operation volume to be allotted in forthcoming tenders. The Eurosystem may also execute LTROs through fixed rate tenders or without pre-announcing the allotment amount.

Finally, with respect to the size of the Eurosystem's refinancing operations, the outstanding amount averaged around €450 billion in 2007, corresponding to the liquidity needs arising almost entirely from reserve requirements and the net liquidity-absorbing effect of autonomous factors. Owing to structural features, these two components are both much larger than in other currency areas, implying that the Eurosystem's open market operations are far larger than those of the other main central banks.

4 See Box 1 entitled "Publication of the benchmark allotment in the main refinancing operations", in the April 2004 issue of the Monthly Bulletin.

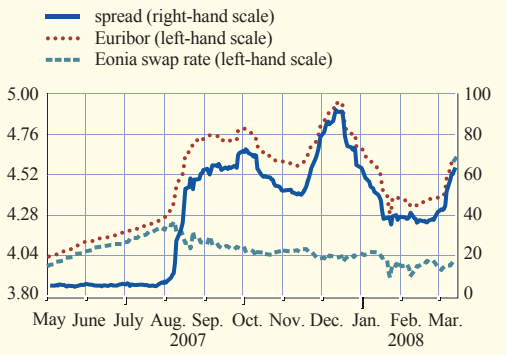
5 The widely used reference rate for overnight euro deposits is the "euro overnight index average" – EONIA – computed as a weighted average of all overnight unsecured lending transactions in the interbank market initiated within the euro area by a panel of 43 contributing banks.

3 FINANCIAL MARKET VOLATILITY AND BANKS' DEMAND FOR LIQUIDITY

The financial market turmoil, which started in the US sub-prime mortgage market, spilled over into the euro area money market on 9 August 2007. Due to the adverse developments in the United States, banks faced the risk of having to provide funding to structured investment vehicles and conduits that had invested in mortgage-backed securities or to reabsorb them onto their balance sheets. Consequently, they became increasingly concerned about their liquidity positions and balance sheets. Furthermore, as the number of banks reporting exposures to the US sub-prime mortgage market continued to grow, banks became increasingly unwilling to provide funds to counterparties in the interbank market due to concerns about their creditworthiness. As many of the initial estimates of banks' exposures and write-down needs subsequently had to be revised upwards, a climate of general distrust and uncertainty prevailed. This caused a spiralling of banks' perceptions of credit risk (i.e. the risk of losses associated with default) and liquidity funding risk (i.e. the risk of being unable to raise the liquidity needed to service payments, or only being able to do so at a cost that is disproportionate to banks' credit standings). In the early days of the turmoil, this led to hoarding of liquidity and progressively weaker interbank money market activity, which was only partly corrected by subsequent central bank intervention. In certain periods, interbank lending on an unsecured basis was largely discontinued, in particular lending at longer maturities. A possible indicator of difficulties in the term money market is the spread between the three-month deposit and swap rates (see Chart 1 and Box 2).

Chart 1 Spread between the three-month Euribor and the EONIA swap rate

(percentages per annum; basis points)



Sources: ECB and Bloomberg.

Box 2

SPREAD BETWEEN DEPOSIT AND SWAP RATES AS AN INDICATOR OF MONEY MARKET TENSIONS

With respect to the interbank money market, the following observations for the determinants of the deposit rate (represented in this box by the three-month Euribor) and the EONIA swap rate of the same maturity must be made in order to interpret the spread between the two.

First, the deposit rate is the price for irrevocably obtaining credit and liquidity over a given period of time, without the provision of collateral. Hence, this rate contains a counterparty credit risk premium, a liquidity risk premium and a term premium related to the uncertainty about the future path of short-term interest rates. Second, the EONIA swap rate is the fixed rate that banks are willing to pay in exchange for receiving the average EONIA as calculated over the maturity of the contract. Therefore, the swap rate reflects the same risk premia that are priced into the expected overnight deposit rates (for which the EONIA is a reference rate), which likewise comprise both a liquidity and a credit element. However, the average

risk of lending via short-term overnight deposits is negligible compared with lending via long-term fixed deposits, because the former can be adapted to new circumstances each day. Therefore, when there is an increase in the perceived level of credit and liquidity risk among banks, the EONIA swap rate reacts much less than the deposit rate. The spread between the two rates can therefore be used as an indicator for the overall liquidity and credit risk premia in the money market.[1]

Nevertheless, it is difficult to say whether an increase in the spread reflects an increase in liquidity risk or credit risk, which are closely related and difficult to disentangle. However, the fact that the two risks tend to increase with one another, and given the anecdotal evidence that some banks seem to have entirely lost their access to liquidity in the unsecured money market at maturities beyond a few weeks, suggests that the spread was to some extent driven by liquidity risk developments.

1 A further difference exists in that Euribor rates are fixed at 11 a.m., while EONIA swap rates are collected at 6.30 p.m. The spread between the two rates, therefore, also reflects changes in the yield curve between these points in time during the day.

The elevated liquidity risk perceived by banks during the financial market turmoil had two main implications for the Eurosystem's liquidity management. First, banks increasingly relied on liquidity from the Eurosystem as they had either lost access to liquidity from the interbank market or could only access it at elevated prices. As a consequence, a significant increase was observed in the MRO and LTRO tender rates compared with the EONIA swap rates for the same maturities. Second, the pattern of banks' demand for liquidity seemed to change as banks preferred to fulfil their reserve requirements relatively early in the reserve maintenance period. By holding reserves early in the period, banks reduced their need to raise liquidity later in the maintenance period. As a consequence, the principle of the (quasi-) perfect substitutability of liquidity that normally holds true for any two days of a maintenance period in a system with averaging reserve requirements, was attenuated, and the overnight rate became more volatile.

4 OPEN MARKET OPERATIONS DURING THE FINANCIAL MARKET TURMOIL

In the circumstances described above, the ECB devoted great attention to the overall functioning of both the short and longer-term money markets. From the very first day that the financial market turmoil reached the euro area money market, the ECB conducted several additional refinancing operations, first with very short (overnight) maturities and then with longer (three-month) maturities as well. In this respect it should be borne in mind that a central bank cannot directly control the development of a spread, such as the difference between the three-month Euribor and the EONIA swap rate, as it is affected by factors outside the central bank's scope of influence, in particular the credit risk component. More generally, the ECB has always stressed that central banks cannot be expected to solve more fundamental problems specific to individual banks and credit markets. However, the liquidity risk premium reflects, at least in part, the breakdown of the money market, in particular at longer maturities, where a central bank has some leeway to enhance solvent banks' access to liquidity. The contribution of the Eurosystem during the period of financial market volatility has therefore been to continue to steer aggregate liquidity conditions in a way which supports banks' liquidity management process over time. A central bank's key contribution to countering increased liquidity risk at longer

maturities is to support the re-establishment of the smooth functioning of the very short-term money market and to communicate and act on its commitment to this goal over time.

4.1 OVERVIEW OF THE MEASURES TAKEN

In the environment of increased liquidity risk and in response to changes in the pattern of some banks' demand for liquidity, the ECB supported banks' access to liquidity and the general functioning of the money market by adjusting (i) the distribution of the liquidity supply within the reserve maintenance period, and (ii) the way in which liquidity was allotted to the banking system.

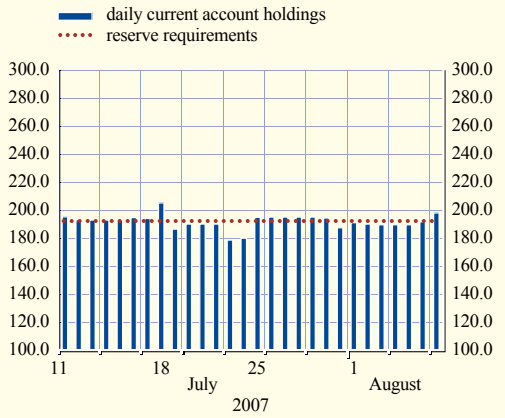
In response to the changes in the pattern of banks' demand for liquidity during the reserve maintenance period, the ECB adjusted the distribution of the liquidity by increasing the supply at the beginning of the period and reducing it later in the period so that the average supply of liquidity remained unchanged. Indeed, before the turmoil, reserve holdings remained broadly at the level of the required reserves (Chart 2 shows holdings in the last maintenance period before the start of the financial market turmoil), whereas during the turmoil they were largely above the level of the required reserves early in the maintenance period and well below this level later in the period (see Chart 3 for holdings in the first maintenance period of the financial market turmoil).

From the technical definition of the benchmark allotment it follows that such a liquidity supply path, which is termed "frontloading", is achieved by allotting liquidity significantly above the benchmark early in the maintenance period and then gradually reducing the amounts allotted above the benchmark in later MROs.

The way in which liquidity was allotted to the banking system comprised the following actions: (i) given the absence of a precise estimation of the changes in the pattern of banks' demand, in particular at the beginning of the financial market turmoil, the ECB made more frequent use of fine-tuning operations than in "normal" times, both in order to inject more liquidity in addition to the above-benchmark allotment provided in the MROs, and to absorb excess liquidity, as needed in order to steer the EONIA close to the minimum bid rate; (ii) the average maturity of open market operations was lengthened, mainly by offering supplementary

Chart 2 Fulfilment of reserve requirements in "normal" times

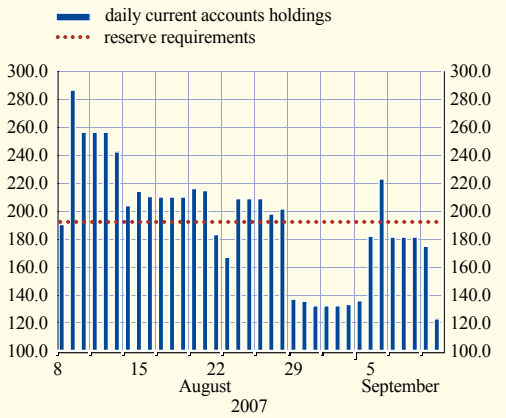
(EUR billions; maintenance period of 11 July-7 August 2007)



Source: ECB.

Chart 3 Fulfilment of reserve requirements during the financial market turmoil

(EUR billions; maintenance period of 8 August-11 September 2007)



Source: ECB.

LTROs. This allowed counterparties to reduce their need for liquidity in the future, i.e. their "liquidity gaps", which are conventional liquidity risk measures; (iii) a special tender procedure with full allotment was applied on two occasions when it was deemed more efficient to leave it to the market to determine the exact allotment amount.

None of these measures mark a structural change to the Eurosystem's operational framework for monetary policy implementation. Moreover, throughout the period of financial market turmoil, the ECB communicated its liquidity policy intentions and explained its actions via press releases and statements on newswire services[6] as well as via its main communication channels (e.g. press conferences, speeches, the ECB Monthly Bulletin, etc.). In the same vein, the Eurosystem's ongoing contacts with market participants, which enable it to receive information on specific events and feedback on market sentiment, proved especially helpful during this time.

4.2 CHRONOLOGICAL REVIEW OF THE MEASURES TAKEN

THE DIFFICULT START: AUGUST AND SEPTEMBER 2007

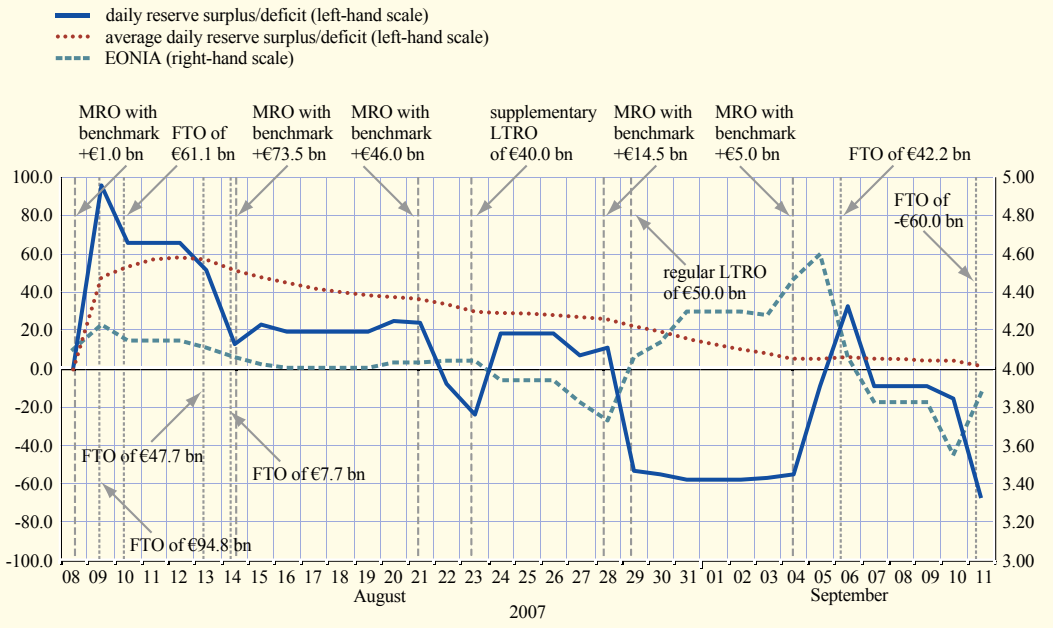
When it became clear on the morning of 9 August that there was an imminent risk of gridlock in the euro area money market and the overnight rate increased to 4.60%, the ECB released a communication stating its readiness to contribute to orderly conditions in the euro area money market. A few hours later, it conducted a fine-tuning operation in which it injected liquidity with an overnight maturity into the market via a fixed rate tender with full allotment of all bids. In the days that followed, upward pressure on the overnight rate continued because counterparties were reluctant to lend liquidity and feared unexpected liquidity needs. Consequently, the ECB carried out three more fine-tuning operations, each with an overnight maturity, for progressively smaller amounts. However, unlike the first, they were conducted through a variable rate tender procedure with a minimum bid rate. Together with the ensuing MRO with an allotment of €73.5 billion above the benchmark amount, these fine-tuning operations succeeded in stabilising very short-term interest rates for some time. In subsequent MROs, the ECB gradually reduced the allotments from historically high levels above the benchmark so that banks' reserve surpluses were reabsorbed by the end of the maintenance period. A drawback of this approach to supplying liquidity was that a large daily reserve deficit – the difference between current account holdings and required reserves – of nearly €60 billion occurred for around one week, which reduced the buffer normally provided by the minimum reserve system and led to a sharp increase in the EONIA, notably on the last trading day in August (i.e. the end-of-month reporting day when banks usually "window dress" their balance sheets). After the last MRO of the maintenance period the overnight rate is normally more responsive to differences between the actual allotment and the benchmark amount. The allotment of €5 billion above the benchmark was very ample on a historical scale. However, the overnight rate increased strongly after the allotment so that the ECB conducted another liquidity-providing fine-tuning operation on the following day.

As activity in the longer-term money market remained limited, in particular for unsecured lending, on 22 August the ECB carried out a supplementary LTRO via a variable rate tender. This operation aimed to further enhance banks' access to longer-term funding and to foster market activity through the associated redistribution of the aggregate allotment among banks. Both factors were intended to improve the functioning of the very short-term money market and thereby the ability to steer the EONIA. This supplementary LTRO did not affect the principle that the total liquidity provided should be left unchanged, as subsequent MROs were accordingly reduced. Thus, in effect the ECB altered the maturity composition of its

6 For details, see http://www.ecb.europa.eu/mopo/implement/omo/html/communication.en.html.

Chart 4 ECB measures, reserve holdings and the EONIA during the maintenance period of 8 August-11 September 2007

(EUR billions; percentages per annum)



Source: ECB.
Notes: The daily reserve surplus/deficit is the difference between the current account holdings of banks and the minimum reserve requirements for each day; the average daily reserve surplus/deficit is the average of the daily reserve surpluses/deficits that have occurred since the beginning of the maintenance period. FTO stands for "fine-tuning operation".

outstanding refinancing operations, giving greater weight to three-month operations.

Overall, this period of high tensions was characterised by exceptionally active use of open market operations, which were effective in steering the average level of the EONIA (4.05%), although they could not avoid a comparatively high level of volatility. Chart 4 summarises the ECB's open market operations and the evolution of reserve holdings and of the EONIA during the first reserve maintenance period of the financial market turmoil (8 August-11 September 2007).

In the following maintenance period (12 September-9 October 2007), the ECB applied a broadly similar approach, allotting significant excess liquidity at the beginning of the maintenance period which was then gradually reabsorbed over the following weeks by reducing the allotment above the benchmark. Once again, the average level of the EONIA (3.93%) was close to the policy rate although the EONIA continued to be rather volatile, partly because it took time to quantify the change in the pattern of banks' demand.

Notwithstanding the additional liquidity provided in August with a three-month maturity, liquidity in the longer-term segments of the money market continued to be limited, and the ECB conducted another supplementary LTRO. In this operation, no allotment amount was preset and it was carried out as a variable rate tender. This allowed the ECB to take into account additional information regarding counterparties' demand as contained in the bid schedule, i.e. the rates and quantities of banks' bids. The bid schedule revealed that, overall, the banking system was still willing to pay a large premium for refinancing from the Eurosystem with a three-month maturity, with the weighted average rate (4.52%) being much higher than in the LTRO conducted before the start of the turmoil (4.20%).

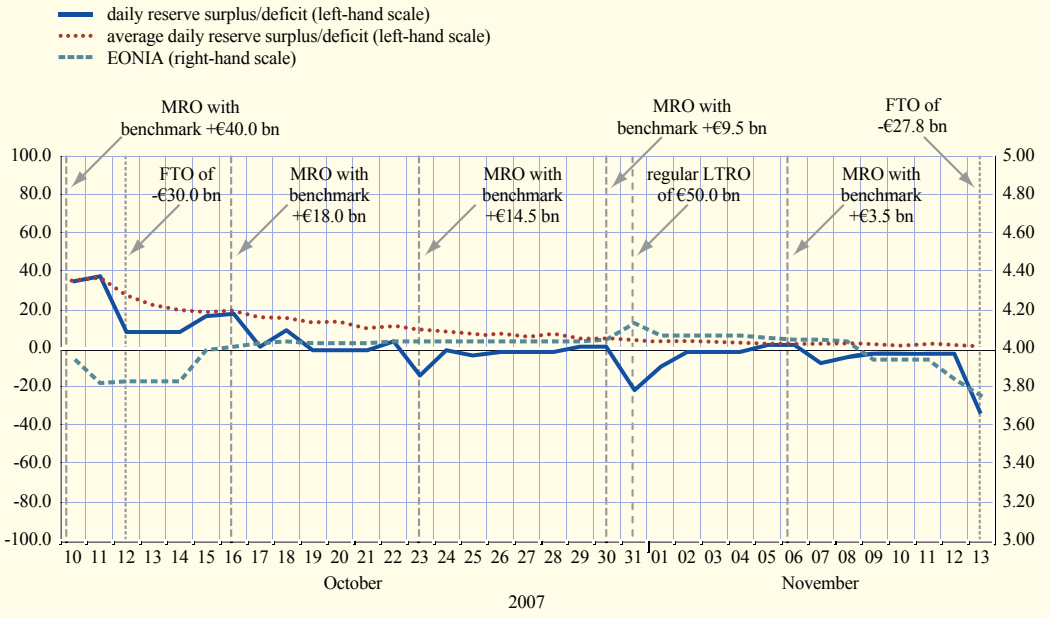
SIGNS OF IMPROVEMENT: OCTOBER AND NOVEMBER 2007

The subsequent maintenance period (10 October-13 November 2007, see Chart 5) marked a return to quasi-normality regarding the overnight rate volatility and liquidity policy, as demand for liquidity was more stable owing to some improvements in the general financial market conditions and probably also to the reinforced liquidity supply policy of the ECB that was announced on 8 October, before the start of the maintenance period. In the first MRO of the period, the ECB allotted an amount substantially above the benchmark amount. When this turned out to be too ample and interest rates fell significantly, some of the excess liquidity was absorbed in a fine-tuning operation and very short-term interest rates stabilised at a level close to 4.00% thereafter. In subsequent MROs, in which the allotment amount above the benchmark was progressively reduced, the ECB chose to provide a level of liquidity that was slightly on what the ECB perceived to be the ample side, in order to avoid a peak in very short-term market rates. The issued communication and this liquidity policy succeeded remarkably in stabilising very short-term rates close to the minimum bid rate.

In the following maintenance period (14 November-11 December 2007) renewed upward pressure on very short-term interest rates emerged ahead of the end of November and the year-end, when banks were particularly anxious to secure their liquidity holdings. In the light of this, the ECB increased the amount allotted above the benchmark, and thereby brought the overnight rate back to levels close to the minimum bid rate in the days that followed. The final allotment of the maintenance period was followed by a relatively sharp decline in the overnight rate, and the ECB partially absorbed surplus liquidity in a fine-tuning operation while still maintaining a surplus which was then absorbed through a fine-tuning operation

Chart 5 ECB measures, reserve holdings and the EONIA during the maintenance period of 10 October-13 November 2007

(EUR billions; percentages per annum)



Source: ECB.
Notes: The daily reserve surplus/deficit is the difference between the current account holdings of banks and the minimum reserve requirements for each day; the average daily reserve surplus/deficit is the average of the daily reserve surpluses/deficits that have occurred since the beginning of the maintenance period. FTO stands for "fine-tuning operation".

on the last day of the maintenance period. This stabilised very short-term interest rates at levels closer to the minimum bid rate, albeit still somewhat below it.

Finally, in order to further consolidate the progress achieved regarding the normalisation of the euro area money market, the ECB decided to renew the two outstanding supplementary LTROs, which matured on 23 November and 12 December respectively, in both cases through variable rate tenders with a preset amount of €60 billion.

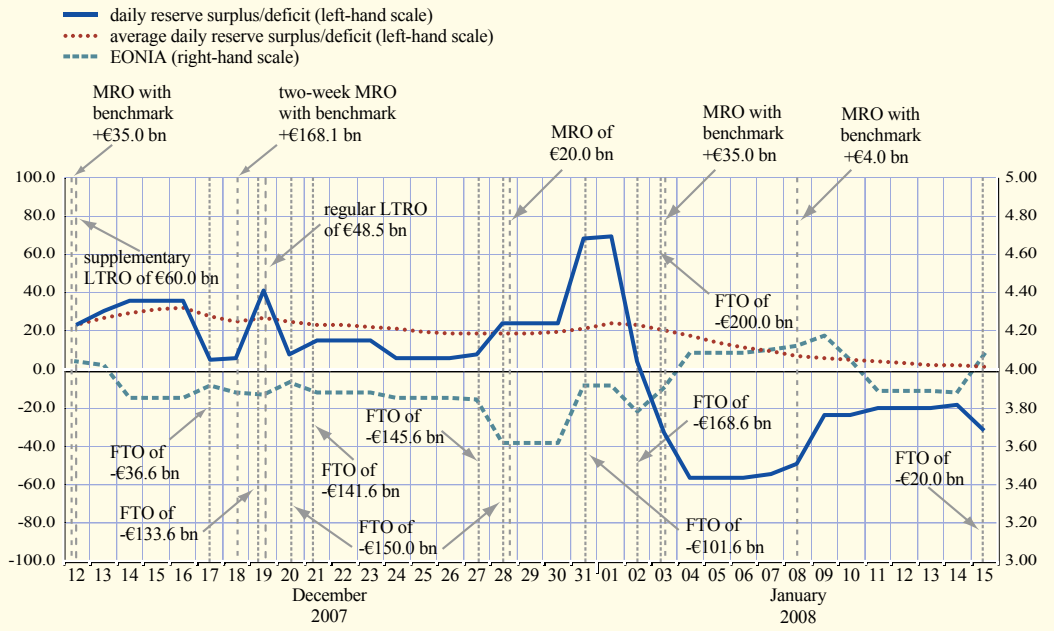
THE YEAR-END TENSIONS: DECEMBER 2007

In view of the approaching year-end, tensions re-emerged and a more active approach was once again required in the maintenance period of 12 December 2007-15 January 2008 (see Chart 6). To reassure market participants regarding its commitment to the smooth functioning of the money market, the ECB announced on 30 November that it would, exceptionally, lengthen the maturity of the penultimate MRO of the year to two weeks, thereby covering Christmas and the year-end.

Notwithstanding this announcement and despite the ample allotment in the first MRO of the maintenance period, and in contrast to the pattern in previous years, the premium that banks had to pay in advance for liquidity on the last day of the year did not decline as the end of the year approached. For instance, the two-week Euribor was quoted on 17 December – the first day on which it covered the end of the year – at a level of 4.95%, i.e. close to the rate of the marginal lending facility. This therefore bore witness to the very tense money market conditions. As a further measure, the ECB consequently announced that in the exceptional two-week MRO it would satisfy all bids at or above the weighted average rate of the previous

Chart 6 ECB measures, reserve holdings and the EONIA during the maintenance period of 12 December 2007-15 January 2008

(EUR billions; percentages per annum)



Source: ECB.
Notes: The daily reserve surplus/deficit is the difference between the current account holdings of banks and the minimum reserve requirements for each day; the average daily reserve surplus/deficit is the average of the daily reserve surpluses/deficits that have occurred since the beginning of the maintenance period. FTO stands for "fine-tuning operation"

MRO (4.21%). As a result, the ECB allotted €348.6 billion, which was €168.1 billion above the benchmark amount. Large amounts of this additional liquidity were subsequently absorbed via several fine-tuning operations, mostly with an overnight maturity. The EONIA remained somewhat below the minimum bid rate, reflecting banks' comfortable liquidity positions.

Shortly thereafter, a slight underbidding occurred in the regular LTRO. The volume of submitted bids was €1.5 billion lower than the pre-announced allotment amount of €50 billion. Again, this reflected the very comfortable liquidity situation following the allotment in the two-week MRO. Finally, despite a "negative" benchmark amount[7] in the last one-week MRO of the year, an amount of €20 billion was allotted in order to satisfy residual demand for liquidity ahead of the end of the year.

On average, the EONIA was 3.93% in this maintenance period. On the last trading day of the year it was, for the first time since 1999, somewhat below the policy rate.

Furthermore, in the context of international central bank cooperation, the ECB announced on 12 December that it would participate in joint central bank actions to address elevated pressures in US dollar short-term funding markets. Specifically, the Eurosystem would offer US dollar funding to Eurosystem counterparties against collateral eligible for Eurosystem credit operations. In two Eurosystem operations, funding of USD 10 billion was provided with a maturity of approximately one month. The two operations were conducted at a fixed rate equal to the marginal rate of the simultaneous tenders by the Federal Reserve System. While it obviously did not directly affect euro liquidity, this US dollar Term Auction Facility reduced banks' liquidity gaps in US dollars, and thereby probably also reduced the related demand for euro liquidity. The operations were renewed in January and March 2008. While international cooperation between central banks has been quite common in the field of foreign exchange markets, this occasion marked the first multilateral central bank cooperation in the money market field, which is central to the implementation of a central bank's monetary policy.

IN SPITE OF IMPROVEMENTS, SOME TENSIONS PERSISTED: JANUARY TO MARCH 2008

In the first maintenance period after the year-end (16 January-12 February 2008, see Chart 7), the money market situation looked broadly similar to the situation in the 10 October-13 November 2007 maintenance period. The latter period therefore served as a point of reference for determining how much above the benchmark amount would be allotted in the MROs. The EONIA was remarkably stable throughout the maintenance period at a level very close to the minimum bid rate, with the only exception being a relatively large peak at the end of January. No fine-tuning operations were necessary, apart from the regular one at the end of the maintenance period.

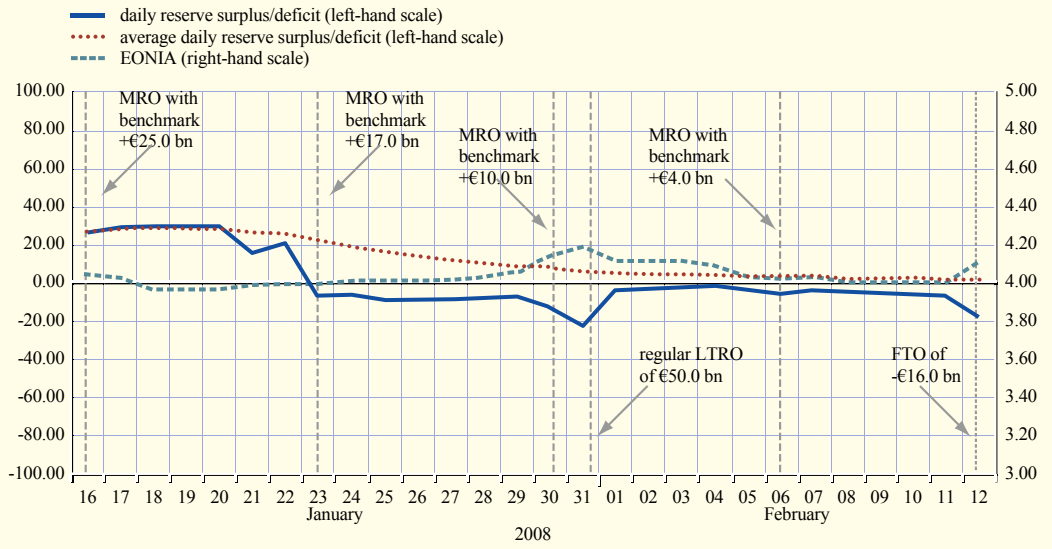
However, some tensions continued to prevail, as was illustrated for example by the spread between the three-month Euribor and EONIA swap rates. This spread decreased only to slightly below 40 basis points, i.e. a level far higher than the level prevailing before the turmoil, which was below 10 basis points. Consequently, the ECB announced on 7 February that it would renew the two outstanding supplementary LTROs again, on 21 February and 13 March respectively.

In the following maintenance period (13 February-11 March 2008), the EONIA continued to be stable throughout the period at a level very close to the minimum bid rate. On average, the EONIA was 4.03% in this period. As in the previous maintenance period, no fine-tuning operations were necessary, apart from the one on the last day of the maintenance period.

7 The ECB explained on 27 December that the calculation of the negative benchmark amount followed the usual procedure and resulted from the fact that the two-week MRO had established very ample liquidity conditions for the entire two-week period, one week of which overlapped with the regular MRO.

Chart 7 ECB measures, reserve holdings and the EONIA during the maintenance period of 16 January-12 February 2008

(EUR billions; percentages per annum)



Source: ECB.
Notes: The daily reserve surplus/deficit is the difference between the current account holdings of banks and the minimum reserve requirements for each day; the average daily reserve surplus/deficit is the average of the daily reserve surpluses/deficits that have occurred since the beginning of the maintenance period. FTO stands for "fine-tuning operation"

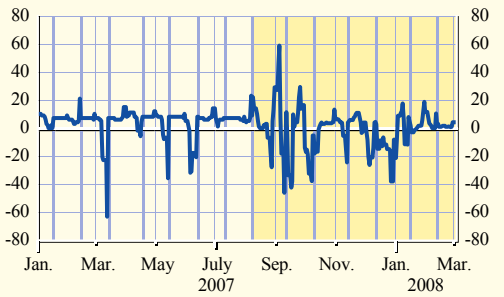
4.3 IMPACT OF THE MEASURES TAKEN

The chronological overview demonstrates that the various measures – notably the "frontloading" of liquidity within a maintenance period and the increase in the frequency of fine-tuning operations – were broadly successful in steering the average level of the EONIA close to the minimum bid rate, although the volatility of the EONIA was higher than in "normal" times, notably at the beginning of the turmoil and again before the year-end (see Chart 8).

The effectiveness of reserve averaging as a tool to steer the overnight rate in the course of a maintenance period weakened during the turmoil. In this regard, it is interesting to note that the significant increase in volatility of the overnight rate was only observed before the last day of the maintenance period, while, in fact, on that day volatility decreased (see the Table). As in "normal" times, on the last day of the period the overnight rate is solely determined by the probability for net recourse to the marginal lending facility or the deposit facility and the rates thereof, and it is not influenced by the possibility of substituting reserve holdings on different days. The reason for the additional relative stability of the overnight rate on the last day of the period during the financial turmoil may be that a necessary condition for stability in the overnight rate on that day is the conduct of fine-tuning operations to absorb aggregate

Chart 8 Spread between the EONIA and the minimum bid rate

(basis points)



Source: ECB.
Notes: The period of turmoil in the euro area money market is highlighted in yellow. The end of each maintenance period is indicated by the vertical lines.

Statistics on the EONIA spread in the course of maintenance periods before and during the turmoil

(basis points)

EONIA spread		before the last week	last week, excl. last day	last day
before the turmoil (Mar. 2004 to July 2007)	standard deviation	3.1	7.4	23.8
	average	7.3	5.3	5.1
during the turmoil (Aug. 2007 to March 2008)	standard deviation	12.3	20.3	15.9
	average	0.7	-4.0	-0.2

Source: ECB.

liquidity imbalances which can no longer be offset via reserve averaging. The conduct of such operations was almost certain during the turmoil, given the liquidity policy chosen by the ECB.

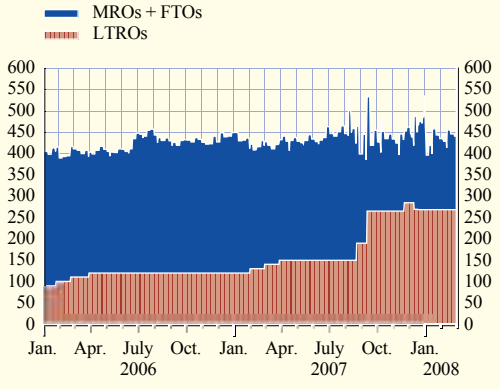
It is rather more difficult to assess how far the measures affected conditions in the longer-term segment of the money market. Nevertheless, the lengthening of the maturity structure of the Eurosystem's outstanding refinancing operations, which was achieved by reducing the size of one-week MROs and expanding LTROs (see Chart 9), may have satisfied the relatively strong demand within the banking system for reducing liquidity gaps.

This strong demand is also evident from the fact that the spread between the LTRO weighted average rate and the three-month EONIA swap rate increased to 50 basis points at the end of August 2007 and to 85 basis points in early December, while the spread between the MRO weighted average rate and the one-week EONIA swap rate increased to 10 basis points and to 35 basis points respectively (see Chart 10).

Overall, with respect to the Eurosystem's measures to enhance banks' access to liquidity and, more generally, to improve the functioning of the money market at longer than overnight maturities, the most successful actions appear to have been the conduct of several supplementary LTROs and the variation of full allotment in the two-week MRO before the year-end. Furthermore, the US dollar Term Auction Facility operations reduced banks' liquidity

Chart 9 Total outstanding open market operations

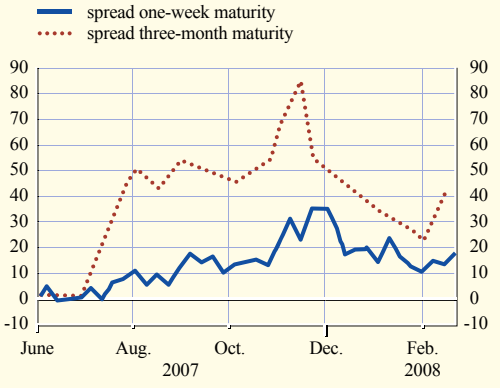
(EUR billions)



Source: ECB.

Chart 10 Spreads between the MRO weighted average rate and the one-week EONIA swap rate and between the LTRO weighted average rate and the three-month EONIA swap rate

(basis points)



Source: ECB.

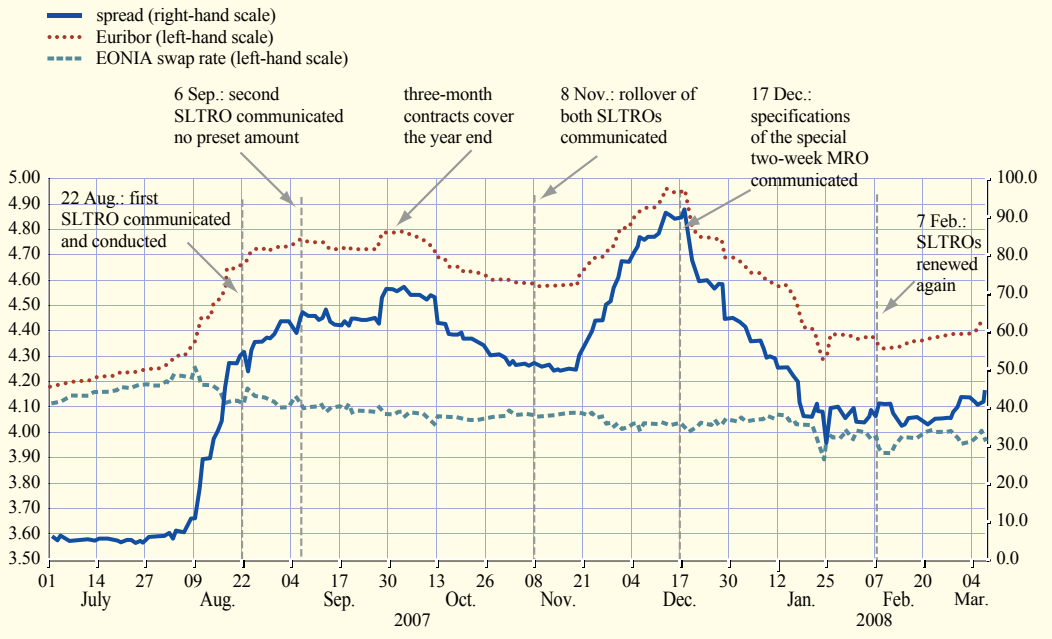
gaps in US dollars and thereby probably also reduced the related demand for euro liquidity, thus providing confidence to the market (see Chart 11).

Moreover, the general liquidity allotment policy aimed at steering the overnight rate is likely to have had a significant indirect positive effect on general money market conditions, because the success achieved in stabilising the overnight rate also spilled over to somewhat longer-term maturities – at least in the period to mid-January 2008 – for instance by enhancing the possibilities for arbitrage between different maturities.

Finally, it is important to underline that Charts 2, 3 and 9 confirm that the average liquidity supply in open market operations was not higher during the financial market turmoil compared with the situation before, as the higher MRO allotment at the start of each maintenance period was compensated by lower MRO allotments later on and the increase in the size of the three-month LTROs was compensated by a reduction in the size of the refinancing provided via the one-week MROs. Hence, the supply of liquidity was unchanged when narrowly defined as current account holdings with the central bank, although the measures did have a mitigating effect on banks' overall liquidity risk. Accordingly, the ECB did not create conditions to ensure that interest rates stayed systematically below the policy rate during the turmoil and it did not provide liquidity to force banks to use the deposit facility, even though the use of the deposit facility did increase slightly from a daily average of €0.2 billion in 2006 to €0.7 billion during the period of financial market turmoil (while the average use of the marginal lending facility increased only slightly, from €0.1 billion per day in 2006 to €0.2 billion per day during the turmoil). Overall, the various measures taken within the context of monetary policy implementation via the Eurosystem's

Chart 11 Spread between the three-month Euribor and the EONIA swap rate

(percentages per annum; basis points)



Source: ECB.
Note: SLTRO stands for "supplementary LTRO".

operational framework also contributed to the maintenance of financial stability.

5 CONCLUSION

This article provides an overview of the rationale for the Eurosystem's conduct of open market operations during the financial market volatility that spilled over into the euro area money market in August 2007. The Eurosystem's operational framework, which aims to steer very short-term money market rates close to the MRO minimum bid rate that is determined by the Governing Council, proved able to provide the degree of flexibility needed to achieve this objective even in times of financial market tensions. Indeed, while, in "normal" times, it is sufficient to calibrate regular open market operations to meet very stable liquidity demand on the part of the banking system in order to stabilise money market rates, the experience during the financial market turmoil demonstrated that it was also possible, and effective, to accommodate volatile liquidity demand under stressful conditions. Overall, no structural adjustments to the Eurosystem's operational framework were needed in order to cope with the ongoing financial market turmoil.