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EUROPEAN CENTRAL BANK

EUROSYSTEM

OCCASIONAL PAPER SERIES

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THE USE OF THE EUROSYSTEM'S MONETARY POLICY INSTRUMENTS AND OPERATIONAL FRAMEWORK SINCE 2009¹

by Fabian Eser,² Marta Carmona Amaro,³
Stefano Iacobelli⁴ and Marc Rubens⁵

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ABSTRACT

This paper provides a comprehensive overview of the use of the Eurosystem's monetary policy instruments and the operational framework from the first quarter of 2009 until the second quarter 2012. The paper discusses in detail, from a liquidity management perspective, the standard and non-standard monetary policy measures taken over this period. The paper reviews the evolution of the Eurosystem balance sheet, participation in tender operations, the outright purchase programmes, patterns of reserve fulfilment, recourse to standing facilities as well as the steering of money market interest rates.

JEL code: D02, E43, E58, E65

Keywords: Monetary policy implementation; Central bank operational framework; Central bank liquidity management; Non-standard monetary policy measures.

NON-TECHNICAL SUMMARY

The purpose of the operational framework and its monetary policy instruments is to implement the monetary policy decisions of the Governing Council of the European Central Bank (ECB). The European Central Bank together with the national central banks of the euro area countries forms the Eurosystem. While the main objective of the Eurosystem's monetary policy implementation is to control short-term interest rates, other important objectives include the orderly functioning of money markets through provision of liquidity and the equal treatment of financial institutions.

The present paper gives a comprehensive and detailed overview of the use of the Eurosystem's monetary policy instruments, which have been adapted to respond to the significant challenges posed by the financial crisis and the subsequent sovereign debt crisis. The focus in this paper is on issues related to liquidity management and interbank markets; it does, however, not cover the entire transmission mechanism of monetary policy. The paper concentrates on the period from the first quarter of 2009 to the second quarter of 2012, but frequently comparisons are made to pre-crisis times.

In simplified terms, several phases can be distinguished: a first pre-crisis phase, stretching until the end of July 2007, in which the banking system appeared sound and money markets functioned seamlessly; second, a phase of tensions in which bank balance sheets came under pressure due to uncertain valuations of sub-prime mortgages which led to tensions in the money market as counterparties grew concerned about increasing liquidity and credit risk; a third phase starting with the collapse of Lehman Brothers in September 2008, resulting in significant stress in the banking system and freezing the money market along name-specific lines; and, finally, a further phase began with the outbreak of the sovereign debt crisis in May 2010 which put banking systems in some euro area countries under enormous stress due to their exposure to sovereign debt.

The response of the Eurosystem in the first and second phase consisted of liquidity injections to alleviate money market tensions. Furthermore, the emerging preference of counterparties to frontload their reserve requirement was accommodated and the share of longer-term refinancing increased. The response to the fallout from Lehman Brothers involved a swift cut in the main refinancing rate from 4.25% in October 2008 to 1% in May 2009. In addition, a number of non-standard measures were introduced: first, the fixed rate full allotment procedure; second, the provision of liquidity with longer maturity in supplementary 3-month, 6-month and 12-month longer-term operations; third, a temporary broadening of the collateral framework; fourth, the introduction of a Covered Bond Purchase Programme; and, fifth, special foreign currency operations in cooperation with a number of major central banks. In late 2009, a phasing-out of these measures began, as the collateral framework was somewhat tightened and the supplementary 3-month, 6-month and 12-month operations were not renewed. It was even possible to hold a 3-month tender on a variable rate basis. The emergence of the sovereign debt crisis led, however, to a reassessment of the phasing-out. The malfunctioning of certain sovereign bond markets, in particular in Greece, Portugal and Ireland, which suffered from illiquidity was deemed to threaten the transmission of monetary policy. In response to this, the Securities Markets Programme was introduced. Within this programme certain euro area debt instruments are bought in order to mitigate the impairment of the monetary policy transmission mechanism.

The first half of 2011 was relatively stable and interventions faded out. Upside risks to inflation led to an increase of the main refinancing rate by 25 basis points in April 2011 and again in July 2011. However, in July 2011 the sovereign debt crisis negatively affected Italy and Spain. The reactivation of the Securities Markets Programme was announced on 7 August 2011. Nonetheless, the money market became increasingly segmented along

national lines, with the negative feedback loop between distressed sovereign debtors and banking stress increasingly affecting the real economy. This raised the spectre of a severe credit crunch. Following a 6-month longer-term refinancing operation in August 2011, it was decided in October 2011 to hold two operations of approximately 12-month duration. Before the conduct of the second, however, on 8 December 2011 two longer-term refinancing operations (LTROs) with 36-month maturity were announced, to be allotted on 21 December 2011 and 29 February 2012. Furthermore, an additional temporary widening of the collateral framework was announced, as well as a second covered bond purchase programme. Following these measures, the money market, the banking system and the real economy have shown signs of stabilisation.

Against that background, this paper discusses in detail the evolution of the balance sheet of the Eurosystem. The balance sheet logic of liquidity management is explained, as is the fact that the amount of recourse by counterparties to the deposit facility is not in itself evidence of liquidity hoarding.

In particular the fixed rate full allotment policy has led to significant expansion of the balance sheet. At the same time, however, the maturity of operations also leads to a timely and natural reduction in the size of the balance sheet.

The eligibility and participation of counterparties in refinancing operations and the standing facilities is discussed in detail. The first 12-month LTROs and the two 36-month LTROs have attracted demand from a third to one half of all eligible counterparties, emphasising the breadth of the operations. Furthermore, the analysis shows how the allotment of longer-term liquidity tends to crowd out demand in shorter-term operations.

Demand in foreign currency operations exhibited a peak surrounding the collapse of Lehman Brothers. While during the intensification of the sovereign debt crisis in the fourth quarter

of 2011 demand for US dollar funding of euro area counterparties again increased, this fell far short of the demand in the period surrounding the collapse of Lehman Brothers.

As regards the outright purchase programmes established for monetary policy purposes, the focus in this paper is on the liquidity impact. While the liquidity from the Covered Bond Purchase Programmes has not been sterilised, fine-tuning operations have generally successfully offset the liquidity impact of the Securities Markets Programme.

The fixed rate full allotment procedure allows counterparties to freely determine their path of reserve fulfilment over the course of a maintenance period. The paper provides a simple statistic capturing the deviation from smooth reserve fulfilment and thus establishing the degree of frontloading. It demonstrates that the degree of frontloading can be explained primarily by the amount of excess liquidity in the banking system. However, the recent increase in excess liquidity due to the two 36-month LTROs does not appear to have led to an even larger degree of frontloading.

As regards the patterns of recourse to the standing facilities, it is clear that recourse to the deposit facility over the course of a maintenance period reflects the amount of excess liquidity in the banking system. Regarding within-period patterns the rising recourse to the deposit facility reflects the frontloading of reserve requirements. Recourse to the deposit facility is dominated by frequent users of the facility rather than moderate or occasional users, contrary to the recourse to the marginal lending facility. Deposit facility recourse by counterparties with Eurosystem refinancing accounted for more than 50% of total recourse when the first 12-month operation matured. From the second half of 2010 this share fell to between 30% and 20%. With the allotment of the two 36-month LTROs this share has risen again above 40%.

Recourse to the marginal lending facility has been moderate, except for shorter periods and

isolated spikes due to specific events. Per quarter the number of counterparties having recourse at least once to the marginal lending facility is significantly higher than the average number of counterparties having recourse, suggesting that the marginal lending facility is used, as intended, to bridge short-term liquidity shocks of a relatively small size.

With regard to the steering of money market interest rates, the crisis has given liquidity management an additional objective, that is, to provide intermediation in the face of impaired interbank markets. Due to the fixed rate full allotment procedure, liquidity provision has primarily been demand-determined. Liquidity demand can thus itself serve as an indicator of money market conditions; although it should be noted that once a large LTRO has been allotted, liquidity provision is locked-in for a considerable period. Volatility of money market rates such as EONIA within a maintenance period follows a hump-shaped relation to the amount of excess liquidity. EONIA volatility is low both when excess liquidity is high and pushes EONIA to the deposit facility rate and when liquidity conditions are balanced. Between these positions volatility is high.

Overall, there have been four defining features of the Eurosystem's use of monetary policy instruments since 2009. These are the fixed rate full allotment procedure; longer-term operations of 12-month and 36-month maturity; outright purchases for monetary policy purposes and foreign currency operations. While the provision of large amounts of liquidity for longer-term periods has been a very flexible, simple and efficient tool to ensure relatively orderly money markets, the demand-driven nature of liquidity provision in the fixed rate full allotment procedure and the resulting, often considerable, excess liquidity have had significant implications for the implementation of monetary policy.

I INTRODUCTION

The Eurosystem's monetary policy instruments and operational framework are used to implement the monetary policy decisions of the Governing Council of the European Central Bank (ECB).¹ The main objective of the operational framework is the steering of short-term money market rates. Other important objectives of the operational framework are, first, to support the framework for signalling the monetary policy stance; second, to provide liquidity and ensure the orderly functioning of money markets, thereby contributing to financial stability; third, to be compatible with the principles of a free market economy and efficient resource allocation; and, fourth, to ensure the equal treatment of financial institutions and harmonisation of rules and procedures.²

The operational framework has played a crucial role in the Eurosystem's monetary policy during the course of the financial crisis. This paper provides a comprehensive overview of the use of monetary policy instruments. The period covered is from the start of the first quarter 2009 to the end of the second quarter 2012. The perspective taken here is primarily that of monetary policy implementation and liquidity management, rather than the related dimensions of collateral and risk management.

Prior to the financial crisis, liquidity management could exclusively focus on the steering of money market rates. Since then, the impairment of euro area money markets, covered bond markets and sovereign debt markets has posed significant challenges for the implementation of monetary policy. These challenges and the rationale behind the Eurosystem's response are discussed in detail in, for instance, González-Páramo (2011c) and European Central Bank (2012a: 63-85).³ The present paper complements and goes beyond contributions such as these, discussing the use of the Eurosystem's monetary policy instruments and the performance of the operational framework in greater depth.

The paper has the following structure. To provide some context, Section 2 discusses the state of the euro area banking system and money markets. Section 3 provides a brief overview of the Eurosystem monetary policy response. Section 4 considers the evolution of the Eurosystem balance sheet. Section 5 discusses counterparties' bidding behaviour in Eurosystem open market operations. Section 6 gives a concise overview of foreign currency operations. Section 7 briefly discusses the outright purchase programmes with a monetary policy purpose. Section 8 considers patterns of reserve fulfilment. Section 9 discusses recourse to the standing facilities. Section 10 discusses the steering of money market rates, before Section 11 briefly concludes.

1 The most important rules and procedures relating to monetary policy implementation can be found in European Central Bank (2012b).

2 For a discussion of the objectives of the operational framework see European Central Bank (2011c, 2012a).

3 For additional references see section 3.

2 EURO AREA BANKING SYSTEM AND MONEY MARKET

This section reviews the state of the euro area banking system and money market. To some extent the developments in the banking system and money market can be seen as exogenous to the use of monetary policy instruments. However, measures taken by the Eurosystem have also had a significant impact on the money market and banking system themselves.

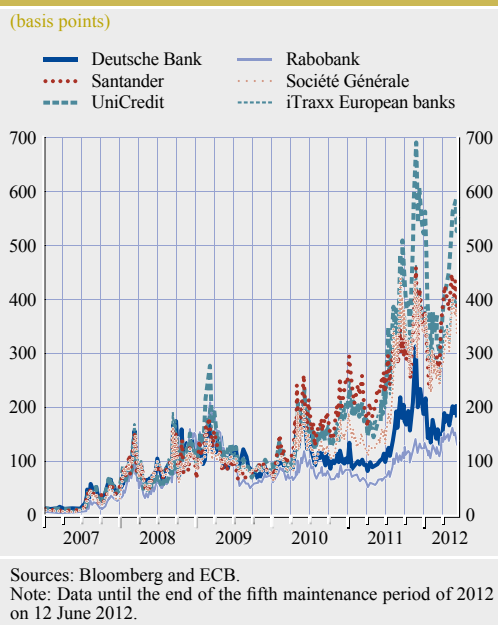
2.1 EURO AREA BANKING SYSTEM

In the summer of 2007, the euro area financial system appeared resilient in the light of the favourable economic and financial conditions of the previous years. The balance sheets of financial firms were generally in good shape and some bursts of market volatility were weathered without any problem.⁴ Starting in August 2007, the banking system revealed itself to be more vulnerable than anticipated, especially with regard to the increasing deterioration in the credit quality of US sub-prime mortgages. Banks' balance sheets came under increasingly serious pressure due to asset quality deterioration and funding conditions that reflected increasing uncertainty about the worsening economic outlook.

Following the collapse of Lehman Brothers in September 2008, the sub-prime crisis turned into a full-blown global financial crisis, affecting macroeconomic conditions increasingly negatively. The erosion of the market value of assets necessitating significant write-downs weakened the balance sheets of banks. Funding costs remained high, as did the price for insuring against bank failure (see Chart 1).

During the second half of 2009, remedial actions taken by central banks and governments restored confidence in the global banking system. A positive feedback loop of improving prospects in the real economy increased the stability of the banking system. Nonetheless, continued write-downs resulted in a sustained drag on banks' profitability. In the first half of 2010,

Chart 1 Five-year credit default swaps for selected banks and iTraxx European banks index

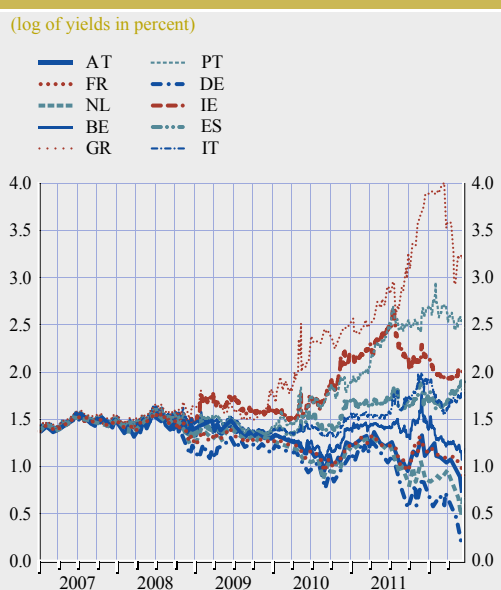


many large euro area banking groups returned to profitability and strengthened financial performance. Dependence on government support and enhanced credit support measures tended to wane.

In early 2010 rising concerns about sovereign credit risk in the euro area initiated negative feedback loops between the vulnerabilities facing public finances and the banking system. By May 2010 market liquidity was significantly reduced. Concern grew about mark-to-market losses on sovereign bond holdings and the crowding-out of bank funding. The cost of insuring against euro area bank credit losses shot up to exceed levels seen around the time of the Lehman Brothers collapse. The developments in national bond markets also exerted different levels of stress in different countries. This can be seen in Charts 1 and 2. The latter shows the logarithm of yield levels rather than yield levels themselves. This allows the significantly divergent yield developments to be more easily

⁴ For more detail on the state of the euro area banking system, see the ECB Financial Stability Reports, e.g. European Central Bank (2011a).

Chart 2 The dynamics of 10-year government bond yields in selected euro area countries



Sources: Bloomberg and ECB.
 Notes: Data until the end of the fifth maintenance period of 2012 on 12 June 2012. AT: Austria; BE: Belgium; DE: Germany; ES: Spain; FR: France; GR: Greece; IE: Ireland; IT: Italy; NL: Netherlands; PT: Portugal.

visible within one graph. As a result of those developments, the euro area banking system became increasingly segmented along national lines.⁵ The growing tensions in Greece, and also in Ireland and Portugal, which had to seek EU/IMF financial assistance, contrasted with an apparent improvement in the resilience of the banking sector in the rest of the euro area. In the middle of 2011, concerns about public finances affected also Spain and Italy. Contagion risks in relation to larger euro area sovereign debtors gained momentum due to the interplay of vulnerabilities concerning public finances and the financial sector itself. The significant uncertainty and sharply slowing economic activity in the distressed countries increased the negative feedback loop between banks and sovereign debtors. Euro area bank funding pressures increased markedly in specific market segments, in particular in unsecured term funding and US dollar funding. These developments reversed at the end of 2011, following the allotment of the first of two 36-month longer-term refinancing operations

(LTROs). Since then, stress in the banking system has fallen significantly, also aided by the allotment of the second 36-month LTRO. Nonetheless, stress remains at an elevated level compared to pre-crisis times.

2.2 MONEY MARKET CONDITIONS

In the pre-crisis phase, the interbank market worked smoothly, with the Eurosystem calibrating liquidity conditions to steer money market rates close to the minimum bid rate in main refinancing operations (MRO). Central bank liquidity flowed freely throughout a fully integrated interbank market.⁶ In August 2007, tensions in the interbank market became visible. Overnight rates started trading at unusually high spreads to the MRO rate as some banks perceived a need to hedge against large negative liquidity shocks. Banks developed a preference for fulfilling their reserve requirements earlier in the maintenance period which the Eurosystem accommodated by allotting more than the benchmark amount early in the maintenance period.

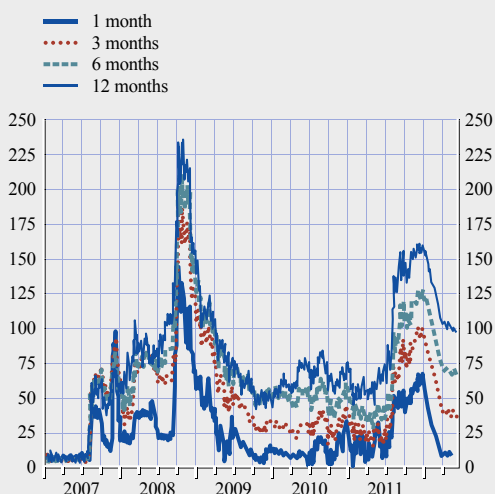
Following the collapse of Lehman Brothers, interbank trading came to a virtual standstill due to interrelated and worsening liquidity and credit risks. As a result, some banks struggled to obtain funds in the interbank market. In addition, term spreads such as EURIBOR minus the Overnight Interest Rate Swap (OIS) initially shot up sharply, and although starting 2009 at high levels followed a downward trend throughout the year (see Chart 3).

From 2010 until the summer of 2011, term spreads remained below the levels seen at the time of the sub-prime crisis. Increasing tensions in sovereign bond markets led to increased volatility and not to a marked rise in term spreads as such. The intensification of the sovereign debt crisis which shifted the focus to Spain and Italy led EURIBOR-OIS term spreads to rise

5 This is discussed in more detail in European Central Bank (2012a).
 6 For a comprehensive review of money market conditions see European Central Bank (2009e, 2010e, 2011b).

Chart 3 EURIBOR-OIS spreads for different maturities

(basis points)



Source: Bloomberg.
Note: Data until the end of the fifth maintenance period of 2012 on 12 June 2012.

significantly from July 2011, although never reaching heights seen around the time of the collapse of Lehman Brothers. Furthermore, it is notable that the fluctuating credit spreads seen in the credit default swap market (see Chart 1 and Chart 3) were only partially translated into higher money market spreads. After the allotment of the first 36-month tender, term spreads started to fall significantly from their post-Lehman high. Despite the reversal of term spreads, the longer maturities remain at an elevated level.

Following the Lehman Brothers collapse money market segmentation was mainly observed in relation to individual banks, with name-specific credit risk concerns being the key driver for the worsening of some banks' funding conditions (both in terms of pricing and overall market access). By contrast, in the more recent phase of the crisis, which has been dominated by the fiscal situation in certain euro area countries, segmentation has run primarily along national borders. Another important development in interbank markets is the continued shift of turnover from the unsecured money market to the secured repo segment. This shift is discussed in detail in Box 2 in European Central Bank (2012a).

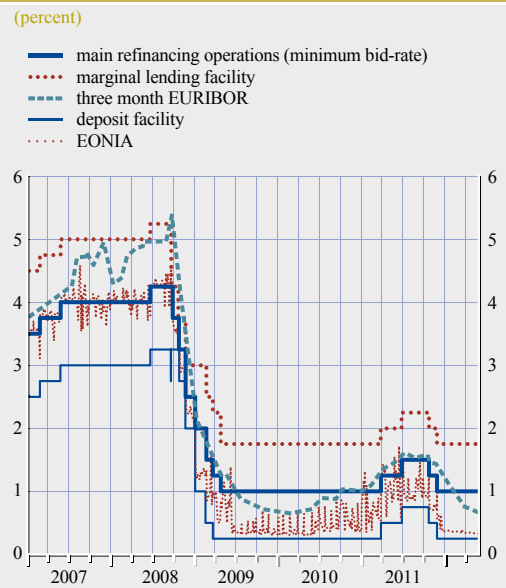
3 EUROSISTEM MONETARY POLICY RESPONSE

When money market tensions came to the fore in August 2007, the Eurosystem was the first major central bank to respond with injections of liquidity to ease the tensions.⁷ Subsequently, the Eurosystem satisfied counterparties' preference to fulfil their reserve requirements early in the maintenance period, increasing the size of longer-term operations relative to the main refinancing operations.⁸ Beyond the liquidity provision in euro, the Eurosystem also began providing US dollars in coordination with the Federal Reserve in December 2007.

The fallout from the collapse of Lehman Brothers led to a strong response by the Eurosystem with the standard interest rate tool. The minimum bid rate in refinancing operations was lowered swiftly from 4.25% in October 2008 to 1% in May 2009 (see Chart 4). Beyond this a number of non-standard measures were taken which together became known as "enhanced credit support".⁹ First, with effect from mid-October 2008, the Eurosystem applied the fixed rate full allotment procedure where counterparties have all their bids fulfilled against sound collateral. Second, supplementary longer-term refinancing operations of longer maturities, such as 6 months and 12 months, were introduced.¹⁰ Third, in collaboration with other major central banks, foreign currency liquidity, in particular US dollars, was provided. Fourth, although the Eurosystem already had a relatively broad collateral framework in terms of the collateral and counterparties accepted, the collateral list was temporarily further widened. For example, the rating threshold for securities other than asset-backed securities was lowered from A- to BBB- and collateral denominated in foreign currencies such as the US dollar, Japanese yen and pound sterling became eligible.¹¹ Fifth, the Eurosystem embarked for the first time on outright purchases for monetary policy purposes in the form of the Covered Bond Purchase Programme.

In the wake of those measures and remedial actions taken by other central banks and governments, conditions improved to the point

Chart 4 ECB policy rates and key money market rates



Source: ECB.
Note: Data until the end of the fifth maintenance period of 2012 on 12 June 2012.

that the Eurosystem embarked on the phasing-out of non-standard measures.¹² From December 2009 to April 2010 this process began by not renewing the supplementary refinancing operations of 3-month, 6-month and 12-month maturity. In relation to collateral, eligibility requirements for asset-backed securities were tightened and the expiry date for the other temporary collateral measures, such as the enlargement of the list of collateral assets and the reduction in the rating threshold, was initially set for the end of 2010. In addition, the supply of US dollar liquidity-providing operations was

7 For a comprehensive chronology of Eurosystem measures see European Central Bank (2011e) as well as European Central Bank (2008a, 2008b, 2009a, 2009b, 2010a, 2010c, 2011d, 2011f, 2012c).

8 This phase was considered by Papademos (2007) and Stark (2007).

9 These measures were described by Trichet (2009b) and González-Páramo (2010).

10 The impact of the first 12-month operation was discussed in European Central Bank (2009d).

11 The collateral policies are discussed in European Central Bank (2012a, 2012d).

12 The exit was discussed at the time in Trichet (2009a) and more recently in González-Páramo (2011b).

discontinued and variable rate tender procedures were reintroduced for regular 3-month refinancing operations.

However, the sovereign debt crisis which came to a head in Greece in spring 2010 and soon spread, also through contagion, to Portugal and Ireland led to a re-assessment of this phasing-out process.¹³ As certain sovereign bond markets became dysfunctional and as sovereign bonds play a central role in the transmission mechanism of monetary policy, the ECB launched on 10 May 2010 the Securities Markets Programme (SMP) under which it conducts outright purchases of euro area debt securities in the secondary market.¹⁴ The liquidity impact of this programme has been sterilised through the conduct of weekly liquidity-absorbing operations. In the first half of 2011 conditions seemed relatively stable and hardly any interventions took place. At the same time upside risks in inflation were identified and the Eurosystem increased its main refinancing rate to 1.25% in April 2011 and to 1.5% in July 2011.

The negative bond market developments in Italy and Spain in late July 2011 led to the reaffirmation of the active implementation of the SMP on 7 August when the Italian and Spanish sovereign bond markets also began to be severely affected.¹⁵

The increasing segmentation of interbank markets triggered by the stress in certain sovereign bond markets and the resulting negative feedback loop into the real economy led once more to a lengthening of the maturity of open market operations. On 9 August 2011 a 6-month LTRO was allotted. In addition, on 6 October 2011 the ECB announced two LTROs with maturities of 12 and 13 months as well as the launch of a second Covered Bond Purchase Programme (CBPP2).

Nonetheless, the economic outlook took a sharp turn for the worse, with a credit crunch looming and increasing downward risks for inflation.¹⁶ Thus, the main refinancing rate was lowered again

in two steps in November and December 2011. More than that, on 8 December 2011 the Governing Council announced another package of measures aimed at supporting bank lending to households and companies, given the importance of banks for financing the euro area, and, at the same time, intended to support activity in the euro area money market.¹⁷ First, the allotment of two LTROs with 36-month maturity was announced for 21 December 2011 and 24 February 2012. These measures were aimed at providing refinancing support to euro area banks.¹⁸ Second, a temporary broadening of the set of eligible collateral facilitated access to central bank liquidity. The additional asset types included were targeted to improve, in particular, the refinancing conditions for smaller banks financing small and medium-sized enterprises, of particular importance to the euro area. First, the rating threshold applicable to certain asset-backed securities was reduced. In addition, national central banks were allowed on a temporary basis to accept as collateral performing credit claims, such as bank loans, satisfying specific criteria. Third, to stimulate money market activity and reduce EONIA volatility the end-of-maintenance-period fine-tuning operations were discontinued. Furthermore, reserve requirements were temporarily reduced from 2% to 1% to reduce banks' need for collateral. In addition to this, foreign currency operations with 84-day maturity were re-introduced and the pricing of foreign currency operations made more attractive.

Chart 5 shows the developments of excess liquidity resulting from the measures described. Until August 2007 excess liquidity was steered to be zero and EONIA close to the MRO rate. From August 2007, the tensions in money markets, the liquidity injections and the

13 Contagion is discussed in detail in Constâncio (2011) and González-Páramo (2011c).

14 See, for instance, Trichet (2010) and European Central Bank (2010d).

15 See, for instance, European Central Bank (2011i, 2011j).

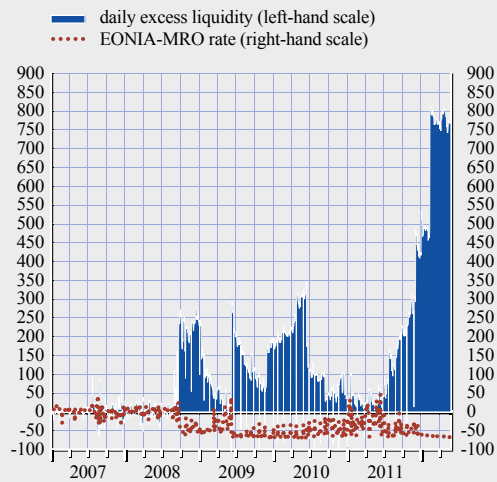
16 See, for instance, Draghi (2011, 2012), Cœuré (2012) and Praet (2012).

17 See, for instance, European Central Bank (2011g).

18 European Central Bank (2012e) provides some early insights into the impact of the two operations.

Chart 5 Excess liquidity and the EONIA spread to the ECB main refinancing rate

(EUR billion; basis points)



Source: ECB.

Note: Data until the end of the fifth maintenance period of 2012 on 12 June 2012.

allotment of liquidity above benchmark implied deviations from balanced liquidity and a slightly higher volatility of EONIA. Moreover, with the introduction of the fixed rate full allotment procedure, substantial excess liquidity developed. However, noticeably, in May 2009 and the first half of 2011, excess liquidity fell to almost balanced liquidity conditions. In contrast, the recent allotment of the two 36-month operations has taken excess liquidity to new record levels.

4 EUROSISTEM BALANCE SHEET

This section discusses how the Eurosystem's use of monetary policy instruments is reflected

in the individual items of the Eurosystem's balance sheet. To clarify the basic concepts, Box 1 explains the balance sheet logic of liquidity management.

Box 1

THE BALANCE SHEET LOGIC OF EUROSISTEM LIQUIDITY MANAGEMENT

Eurosystem liquidity management is based on the Eurosystem balance sheet.¹ Analysis of the central bank balance sheet reveals how much central bank liquidity, sometimes also known as “reserves”, is in circulation. To illustrate the basic concepts, Table A shows the Eurosystem balance sheet at the end of the fourth quarter of 2011 in simplified form. Table 1 shows the Eurosystem balance sheet at quarter-end since Q1 2009.²

In normal times, the ECB provides liquidity in its MROs so as to allow counterparties to smoothly fulfil their liquidity needs. Liquidity needs stem from reserve requirements and “autonomous factors”, such as the quantity of banknotes in circulation. Under these circumstances liquidity management aims to steer interest rates by equalising the probability of banks being long on or short of central bank liquidity at the end of a maintenance period over the course of which banks have to fulfil their reserve requirement on average. If banks in aggregate are short, they require recourse to the marginal lending facility. If they are long, they must have recourse to the deposit facility. If the probability of recourse to either facility is equal, then, under certain assumptions concerning market functioning and aggregate risk aversion, the price of central bank liquidity in the interbank

1 See, for instance, Bindseil (2004), or Mercier and Papadia (2011).

2 The Eurosystem publishes a detailed balance sheet on a weekly basis on its website, see www.ecb.int/press/pr/wfs.

Table A Simplified Eurosystem balance sheet at the end of Q4 2011

(amounts in EUR billion)

Assets		Liabilities		Assets net of liabilities	
Foreign currency operations					
USD ops.	62	Federal Reserve	62	Net foreign currency operations	0
DKK swaps	0	SNB	0		
Autonomous liquidity factors					
Autonomous factor assets	1,011	Autonomous Factor Liabilities	1,290	Net autonomous liquidity factors	-279
Net foreign assets	633	Banknotes	884		
Domestic assets	378	Government deposits	80		
		Other (net)	326		
Monetary policy instruments					
Liquidity provision	1,111	Liquidity absorption	832	Net liquidity provision	279
CBPPs	62	Current accounts	156		
SMP	213	Absorbing FTOs	212		
MRO	131	DF	464		
LTROs	704				
FTOs	0				
MLF	1				
Total	2,184	Total	2,184	Total	0

Notes: USD ops.: US dollar operations; SEK swaps: Swedish kroner swaps; Gov. deposits: government deposits; CBPPs: Covered Bond Purchase Programmes; SMP: Securities Markets Programme; MROs: main refinancing operations; LTROs: longer-term refinancing operations; FTOs: fine-tuning operations; MLF: marginal lending facility; DF: Deposit facility.

market will equal the mid-point of the standing facilities corridor, i.e. the minimum bid rate in main refinancing operations. With this equilibrium achieved on the last day of the maintenance period, intertemporal arbitrage ensures, under certain conditions, that the interbank rate is also equal to the minimum bid rate in main refinancing operations on the days prior to the last day of each maintenance period. This was, by and large, the situation prevailing before the crisis. The allotment amount in main refinancing operations that balances liquidity conditions while allowing counterparties to fulfil their reserve requirement smoothly is known as the benchmark allotment amount.³

Liquidity needs arise from autonomous liquidity factors and reserve requirements. Autonomous liquidity factors are items of the central bank balance sheet which are unrelated to the implementation of monetary policy, at least in the short term. The main categories of liquidity providing autonomous factors are net foreign assets and domestic assets. Acquisition by the central bank of such assets implies the transfer of central bank liquidity to the banking sector. By contrast, the major liquidity absorbing autonomous factors are banknotes and government deposits. Other autonomous factors are netted on the liability side in Table A. Liquidity needs result not only from autonomous liquidity factors but also from reserve requirements. Counterparties fulfil their reserve requirements by maintaining, on average, current accounts above a sufficient level. As long as liquidity-providing net autonomous factors do not exceed reserve requirements the banking system is in liquidity deficit. In this case the central bank has to provide liquidity through open market operations to balance liquidity conditions.

There are three types of monetary policy instruments providing liquidity. The first are open market operations, taking the form of repurchase operations. In normal pre-crisis times, longer-term refinancing operated with a pre-set amount, while the main refinancing operations were calibrated to steer liquidity conditions. In addition, fine-tuning operations can be used at any point to provide additional liquidity for a specified term. Second, outright purchases of assets for monetary policy purposes inject liquidity. Third, smaller amounts of liquidity can also be obtained overnight through the marginal lending facility.

Liquidity can be re-absorbed in three ways. First, counterparties can keep central bank liquidity on their current accounts. Balances needed to fulfil counterparties' reserve requirement are remunerated at the minimum bid rate in main refinancing operations. In contrast, excess reserves kept on the current account are not remunerated. Second, counterparties can shift their liquidity holdings to the deposit facility where it is remunerated at the deposit facility rate. Third, counterparties can tender their liquidity in liquidity-absorbing fine-tuning operations.

Importantly, other things being equal, any increase in the net provision of liquidity through net open market operations and outright purchases necessarily has to show up on the liability side of the balance sheet in the form of higher current accounts, deposit facility recourse or fixed-term deposits. Thus, a higher recourse to the deposit facility does not necessarily reflect a hoarding of liquidity by banks. This can be seen from two different perspectives. First, looking at the central bank balance sheet, in accordance with established accounting principles, autonomous liquidity factors and monetary policy instruments netted over assets and liabilities have to sum to zero. Thus, if autonomous factors are constant and more liquidity is provided through open market operations or outright purchases, then either current accounts, liquidity-absorbing fine-tuning operations or recourse to deposit facilities have to increase. Second, considering the position of individual banks, if any bank A keeps hold of its liquidity, it has the choice of

³ For details on the benchmark see http://www.ecb.int/mopo/implementation/omo/pdf/How_to_calculate_the_benchmark.pdf.

placing it on its current account, the deposit facility or to bid in liquidity-absorbing operations. If, however, bank A passes its liquidity to bank B in the interbank market, then bank B will have the choice bank A previously had, i.e. it can keep the liquidity on its current account, on the deposit facility or participate in liquidity-absorbing operations. Regardless of whether or not bank A and bank B trade, the Eurosystem balance sheet is identical. Thus, in itself, recourse to the deposit facility gives no indication of how much trading is taking place between banks.

The liquidity effect of foreign currency operations depends on their nature. For instance, where in US dollar operations the Eurosystem provides, via a swap arrangement with the Federal Reserve, US dollars against Eurosystem-eligible collateral, this leaves the amount of euro central bank liquidity unchanged. In contrast, US dollar swap operations in which the Eurosystem provides, via a swap arrangement with the Federal Reserve, US dollars against euro constitute a liquidity-absorbing operation as euro liquidity is withdrawn from the banking system.

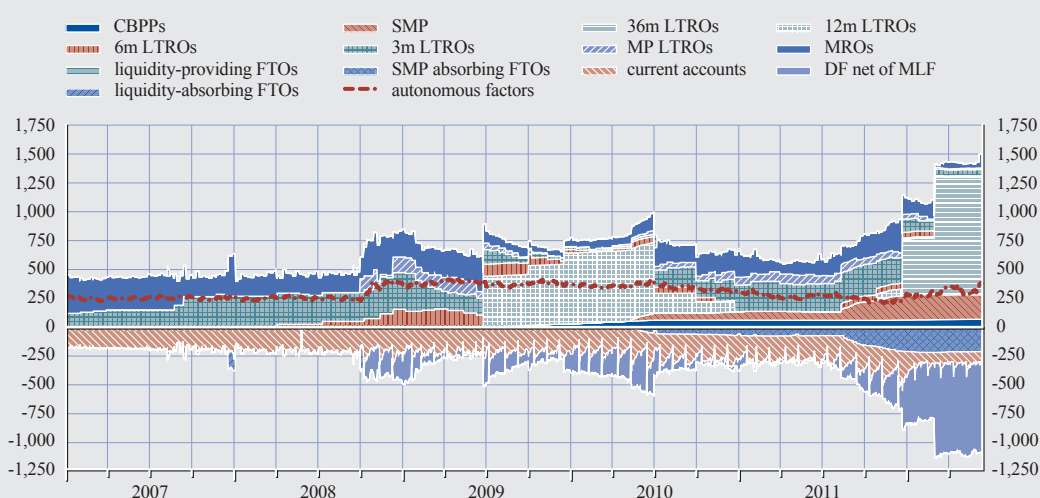
The Eurosystem balance sheet is not perfectly lean i.e. containing only items related to the implementation of monetary policy. This was already the case before the crisis (see Bindseil 2004).¹⁹ The evolution of the balance sheet since the financial crisis reflects, in particular, the fixed rate full allotment policy (see Table 1 and Chart 6). Under the fixed rate full allotment procedure liquidity provision becomes largely demand-determined. As a result, the size of the

Eurosystem balance sheet becomes endogenous, driven to a significant extent by the liquidity demand of counterparties. For instance, while gross liquidity provision from open market operations amounted to less than €500 billion in June 2007 and August 2008, by the end of the first quarter of 2009 it stood at €669 billion,

¹⁹ The evolution of the Eurosystem balance sheet was also considered in European Central Bank (2009c, 2011h).

Chart 6 Eurosystem liquidity provision and absorption

(EUR billion)



Source: ECB.

Notes: Data until the end of the fifth maintenance period on 12 June 2012. The Outright Portfolio series represents the book value of settled purchases of the two Covered Bond Purchase Programmes (CBPP, CBPP2) as well as the Securities Markets Programme (SMP). LTRO: longer-term refinancing operation; MP: FTO: fine-tuning operation; DF: deposit facility; MLF: marginal lending facility.

Table I Simplified Eurosystem balance sheet Q1 2009 to Q2 2012

(in EUR billion)

	2009				2010				2011				2012	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Assets														
Foreign currency operations														
USD ops.	125	41	26	3	0	1	0	0	0	0	0	62	24	22
DKK swaps	2	2	0	0	0	0	0	0	0	0	0	0	0	0
SEK swaps	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Autonomous liquidity factors														
Net foreign assets	405	392	395	426	458	542	511	548	528	540	610	633	636	655
Domestic assets	329	338	341	336	337	332	342	358	368	385	372	378	379	351
Monetary policy instruments														
CBPPs	0	0	16	29	44	61	61	61	61	60	59	62	66	70
SMP	0	0	0	0	0	59	63	74	77	74	163	213	214	211
MROs	238	106	67	79	78	163	166	196	100	141	199	131	63	180
LTROs	431	729	667	669	662	406	317	298	323	313	379	704	1,091	1,080
FTOs	0	0	0	0	0	111	29	0	0	0	0	0	0	0
MLF	1	0	0	1	0	0	2	0	1	1	3	1	1	1
Total	1,531	1,611	1,513	1,544	1,579	1,675	1,491	1,535	1,458	1,514	1,785	2,184	2,474	2,570
Liabilities														
Foreign currency operations														
Federal Reserve	125	41	26	3	0	1	0	0	1	0	0	62	24	22
SNB	40	24	8	9	0	0	0	0	0	0	0	0	0	0
Autonomous liquidity factors														
Banknotes	753	769	771	807	802	816	815	835	826	849	860	884	881	894
Gov. deposits	147	153	145	126	118	116	98	82	65	72	54	80	146	146
Other (net)	198	139	193	204	237	318	277	286	257	278	300	326	338	408
Monetary policy instruments														
Current accounts	190	168	218	233	179	160	190	177	206	216	154	156	86	117
Absorbing FTOs	0	0	0	0	0	32	62	74	77	74	161	212	214	117
DF	79	316	151	162	243	232	49	81	26	25	256	464	785	773
Total	1,531	1,611	1,513	1,544	1,579	1,675	1,491	1,535	1,458	1,514	1,785	2,184	2,474	2,570

Source: ECB.

Note: The data are quarter-end values. USD ops.: US dollar operations; SEK swaps: Swedish kroner swaps; Gov. deposits: government deposits; CBPPs: Covered Bond Purchase Programmes; SMP: Securities Markets Programme; MROs: main refinancing operations; LTROs: longer-term refinancing operations; FTOs: fine-tuning operations; MLF: marginal lending facility; DF: deposit facility. USD ops represent the dollar operations which create a liability to the Federal Reserve. DKK and SEK swaps refers to the swap operations conducted in cooperation with Danmarks Nationalbank and Sveriges Riksbank. Claims of the Swiss National Bank (SNB) arise in connection with the swap arrangement between the ECB and SNB for the provision of CHF/EUR swaps.

before reaching €740 billion while the first 12-month LTRO of €442 billion was outstanding.

However, with the maturity of the three first 12-month LTROs, by the end of Q3 2010 gross liquidity provision through open market operations fell again to €512 billion. This demonstrates that, with improved conditions, the Eurosystem balance sheet can contract as quickly as it expands. With the intensification of the sovereign debt crisis in Spain and Italy in the final quarter of 2011 and the allotment of the two 36-month operations, both gross liquidity

provision and the size of the Eurosystem balance sheet have, of course, reached new highs.

The Eurosystem balance sheet also reflects the size of the outright purchases for monetary policy operations which constitute a new tool of monetary policy implementation for the Eurosystem. Unlike the liquidity injected through the purchases within the Covered Bond Purchase Programmes (CBPP), the liquidity resulting from the Securities Markets Programme (SMP) is sterilised on a weekly basis, as can be seen on the liability side of the balance sheet.

5 OPEN MARKET OPERATIONS

This section describes the main developments with regard to Eurosystem open market operations up to the end of the second quarter of 2012. First, it summarises the decisions taken. Then, it discusses the main developments with regard to the different operations.

5.1 DECISIONS

On 8 October 2008 the Governing Council decided to allot MROs according to the fixed rate full allotment tender procedure, with effect from the operation settling on 15 October 2008. This procedure was subsequently also applied in maintenance period operations and 6-month LTROs. In addition, the Governing Council decided on 7 May 2009 to introduce fixed rate full allotment tenders with a maturity of 12 months. Three such operations were allotted on 24 June, 30 September and 16 December 2009. In the LTROs, the minimum bid rate set was the minimum bid rate in the MRO prevailing at the time.²⁰

While on 3 December 2009 the Governing Council decided to continue the fixed rate full allotment policy at least until the end of Q1 2010, it decided, at the same time, to allot the final 6-month operation on 31 March 2010. Furthermore, the Governing Council established that for the final 12-month operation the interest rate would be indexed at the average of the MRO rates during the life of the operation. This principle has been applied to all fixed rate full allotment LTROs since then.

On 4 March 2010 a decision was taken to return to variable rate tenders in 3-month LTROs starting from the operation to be allotted on 28 April 2010. In this particular variable rate operation, as total bids fell short of the communicated intended volume, the total bid amount was allotted. In the light of the tensions in sovereign debt markets, it was decided on 10 May 2010 that, following this one variable rate 3-month LTRO, the fixed

rate full allotment would be re-introduced in all regular 3-month operations. It has since been confirmed that fixed rate full allotment will continue to apply in all operations at least until the end of the sixth maintenance period of 2012. On 6 June 2012 the Governing Council decided to continue conducting its main refinancing operations as fixed rate full allotment tenders at least until the end of the twelfth maintenance period of 2012 on 15 January 2013. Accordingly, the procedure will also continue to apply in the maintenance period operations which will continue to be conducted as long as needed. Furthermore, the 3-month LTROs allotted on 25 July, 29 August, 31 October, 28 November and 19 December 2012 will be conducted as fixed rate full allotment tenders.

Furthermore, as part of a wider set of measures to support bank lending, the ECB announced on 8 December 2011 two LTROs of 36-months maturity, with an option of repayment after one year. The first 36-month operation was allotted on 21 December 2011 and replaced the 12-month operation of 26 October 2011, while the second 36-month operation was allotted on 29 February 2012.

In addition, liquidity-providing bridge operations have been conducted both upon the maturity of non-standard 6-month and 12-month LTROs in order to facilitate the transition into MROs and to allow for the rolling of funds from MROs into LTROs.

As for absorbing fine-tuning operations (FTOs), regular one-week FTOs to absorb the liquidity effect of the SMP were initiated along with the SMP itself on 10 May 2010. At the same time, from November 2008, absorbing operations with overnight maturity were conducted on the last day of the maintenance period.

²⁰ A detailed list of decisions is available in the annexes “Chronology of monetary policy measures of the Eurosystem” and “Overview of the ECB’s communication related to the provision of liquidity” to the ECB Annual Reports, e.g. European Central Bank (2010a, 2011d, 2012c).

The discontinuation for the time being of these operations was announced on 8 December 2011, with effect from the twelfth maintenance period of 2011.

5.2 ELIGIBILITY AND PARTICIPATION

Table 2 summarises in detail the eligibility and participation of counterparties in the different types of Eurosystem open market operations. The data presented are averages over the quarter. In contrast, the figures in italics contained in brackets indicate the number of individual counterparties making use of the respective monetary policy instrument at least once in a given quarter.

Since Q1 2009 the number of credit institutions in the euro area has fallen steadily by a total of around 5%, to approximately 6,150. Following the introduction of fixed rate full allotment tender procedures, the expansion of the collateral list and the increased eligibility of counterparties in FTOs, participation numbers in open market operations have increased substantially since October 2008. Participation in shorter operations tends generally to be crowded out by participation in longer operations. In particular, three operations attracted large demand. The first 12-month operation allotted on 24 June 2009 saw €442 billion allotted to 1,121 bidders, while the two 36-month operations allotted €489 billion to 523 bidders and €530 billion to 800 bidders, respectively.

Table 2 Counterparty eligibility, participation in operations and recourse to standing facilities

	Q1 2009	Q2 2009	Q3 2009	Q4 2009	Q1 2010	Q2 2010	Q3 2010	Q4 2010	Q1 2011	Q2 2011	Q3 2011	Q4 2011	Q1 2012	Q2 2012
Credit institutions	6,560	6,535	6,487	6,459	6,447	6,425	6,383	6,349	6,318	6,291	6,256	6,225	6,181	6,156
Eligible for														
OMO	2,130	2,174	2,257	2,289	2,295	2,293	2,294	2,277	2,295	2,304	2,291	2,293	2,357	2,375
MLF	2,289	2,321	2,376	2,397	2,427	2,425	2,404	2,398	2,518	2,634	2,622	2,607	2,619	2,627
DF	2,797	2,805	2,784	2,772	2,814	2,823	2,802	2,791	2,909	3,022	3,000	2,980	2,962	2,964
Participation in														
MRO	544 <i>(923)</i>	570 <i>(956)</i>	342 <i>(618)</i>	165 <i>(415)</i>	81 <i>(207)</i>	88 <i>(225)</i>	126 <i>(249)</i>	164 <i>(393)</i>	204 <i>(498)</i>	226 <i>(515)</i>	170 <i>(398)</i>	168 <i>(344)</i>	118 <i>(274)</i>	87 <i>(170)</i>
MP LTRO	110 <i>(179)</i>	126 <i>(221)</i>	74 <i>(128)</i>	13 <i>(28)</i>	11 <i>(21)</i>	18 <i>(33)</i>	32 <i>(48)</i>	45 <i>(70)</i>	46 <i>(70)</i>	53 <i>(78)</i>	44 <i>(73)</i>	43 <i>(63)</i>	27 <i>(49)</i>	20 <i>(31)</i>
3m LTRO	72 <i>(244)</i>	67 <i>(261)</i>	33 <i>(125)</i>	16 <i>(78)</i>	23 <i>(38)</i>	23 <i>(55)</i>	118 <i>(273)</i>	197 <i>(418)</i>	216 <i>(424)</i>	208 <i>(392)</i>	169 <i>(303)</i>	90 <i>(189)</i>	44 <i>(97)</i>	41 <i>(85)</i>
6m LTRO	46 <i>(107)</i>	94 <i>(201)</i>	44 <i>(97)</i>	21 <i>(54)</i>	-	59 <i>(97)</i>	-	-	-	-	114 <i>(114)</i>	-	-	-
12m LTRO	-	1,121 <i>(1,121)</i>	-	407 <i>(686)</i>	-	-	-	-	-	-	-	181 <i>(181)</i>	-	-
36m LTRO	-	-	-	-	-	-	-	-	-	-	-	523 <i>(523)</i>	800 <i>(800)</i>	-
FTO: bridge	-	-	-	-	-	-	64 <i>(112)</i>	28 <i>(49)</i>	-	-	-	73 <i>(73)</i>	71 <i>(71)</i>	-
FTO: end of MP	114 <i>(173)</i>	114 <i>(164)</i>	160 <i>(214)</i>	157 <i>(209)</i>	189 <i>(231)</i>	184 <i>(238)</i>	166 <i>(211)</i>	143 <i>(189)</i>	148 <i>(203)</i>	120 <i>(186)</i>	123 <i>(178)</i>	152 <i>(196)</i>	-	-
FTO: weekly SMP	-	-	-	-	-	89 <i>(278)</i>	77 <i>(166)</i>	57 <i>(123)</i>	65 <i>(129)</i>	65 <i>(120)</i>	83 <i>(156)</i>	98 <i>(182)</i>	102 <i>(192)</i>	69 <i>(118)</i>
Recourse to														
DF	78 <i>(240)</i>	28 <i>(206)</i>	147 <i>(446)</i>	199 <i>(486)</i>	246 <i>(497)</i>	235 <i>(481)</i>	166 <i>(451)</i>	124 <i>(421)</i>	128 <i>(429)</i>	109 <i>(398)</i>	176 <i>(472)</i>	240 <i>(531)</i>	382 <i>(604)</i>	414 <i>(644)</i>
MLF	2 <i>(14)</i>	2 <i>(21)</i>	6 <i>(71)</i>	6 <i>(107)</i>	4 <i>(86)</i>	5 <i>(99)</i>	4 <i>(119)</i>	6 <i>(113)</i>	5 <i>(103)</i>	5 <i>(119)</i>	4 <i>(112)</i>	10 <i>(130)</i>	7 <i>(115)</i>	7 <i>(113)</i>

Source: ECB.

Notes: The data are quarterly averages with the following exception. Data in brackets and italics denote the number of counterparties which participated in the respective type of operation at least once in a given quarter. OMO: open market operations; MLF: marginal lending facility; DF: deposit facility; MRO: main refinancing operations; MP: maintenance period operation; LTRO: longer-term refinancing operation; FTO: fine-tuning operation; SMP: Securities Markets Programme.

The average quarterly number of counterparties accessing standing facilities has tended, on the side of the deposit facility, to move in tandem with the amount of excess liquidity. In relation to the marginal lending facility, the average number of counterparties having recourse has remained fairly low and stable, although the average recourse may be a reflection of market tensions. In this connection, it is interesting to note that the number of counterparties with recourse to the marginal lending facility at least once is significantly larger than the average number of counterparties with marginal lending facility recourse. This suggests that, generally speaking, marginal lending facility recourse primarily reflects demand for smaller amounts by a larger number of counterparties buffering small liquidity shocks.

5.3 BIDDING IN OPEN MARKET OPERATIONS

The following discussion focuses more on the number of bidders than bid amounts. The two often are closely related and the latter has already been touched upon in Section 4.

MAIN REFINANCING OPERATIONS

Chart 7a shows bid amounts and bidders for MROs. In pre-crisis times, i.e. until August 2007, the number of bidders in MROs was relatively constant at around 350. In that period the changing bid amounts reflect changes in the benchmark, i.e. the allotment amount needed to balance liquidity conditions.

Following the introduction of fixed rate full allotment, the number of bidders in MROs first increased significantly and subsequently exhibited significant volatility. The number of bidders reached a record of 851 bidders in the MRO allotted on 18 November 2008. At the beginning of January 2009 demand in MROs fell to around 500 bidders before increasing again to about 700 bidders in the middle of June 2009. With the allotment of the first 12-month operation, the number of bidders in MROs fell significantly, falling below 100 in the first half of 2010. With the maturity of the 12-month tenders the number of bidders started

rising again without occasional spikes. The allotment of the two large 36-month operations has again lowered the number of bidders in MROs.

MAINTENANCE PERIOD LTROs

In November 2008 the Eurosystem introduced maintenance period operations, i.e. open market operations of maintenance period length (see Chart 7b).²¹ Maintenance period operations were introduced to address counterparties' preference for frontloading the fulfilment of reserve requirements within the maintenance period. Demand in these operations exceeded €100 billion from December 2008 to May 2009 with around 120 bidders. With the allotment of the first 12-month operation bid amounts fell to less than €3 billion and fewer than 10 bidders in December 2009. With the maturity of the 12-month LTROs in June 2010, demand in maintenance period operations increased steadily to a relative maximum of €80 billion allotted to around 60 counterparties in May 2011. Since then demand has fallen steadily again to less than €15 billion, allotted to fewer than 20 bidders since February 2012.

3-MONTH LTROs

Three-month operations were conducted once a month prior to the crisis. However, from August 2007 to January 2010 one additional 3-month LTRO was conducted every month. Since then, the frequency has returned to the regular mode of one operation per month.

Prior to the crisis, from January to August 2007, the number of bidders in LTROs was stable at around 150. From August 2007 spikes in the bid amounts are visible. A record bid amount in 3-month LTROs of more than €150 billion was placed in the operation allotted on 24 September 2008, following the Lehman Brothers collapse.

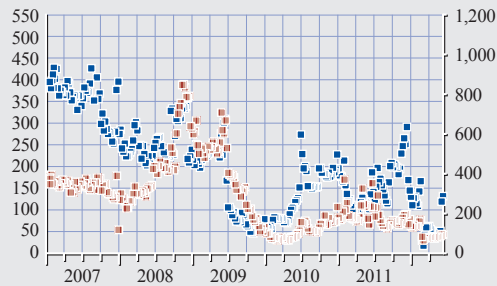
²¹ The first regular maintenance period operation was allotted on 6 November 2008 under the fixed rate full allotment procedure. It replaced a previous operation, which had been conducted on 29 September as a special term refinancing operation with a 38-day maturity. This operation was unique in that it was still conducted as a variable rate tender but spanned two maintenance periods. Subsequent maintenance period operations were allotted in fixed rate full allotment tenders and spanned only one maintenance period.

Chart 7 Demand in Eurosystem open market operations

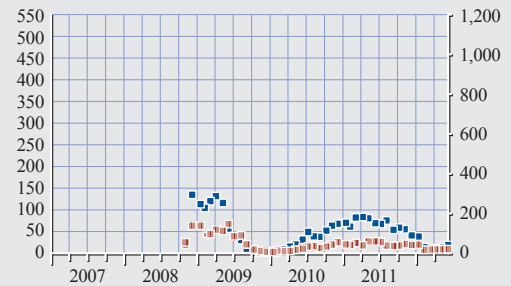
(EUR billion: number of bidders)

■ bid amount (left-hand scale)
■ bidders (right-hand scale)

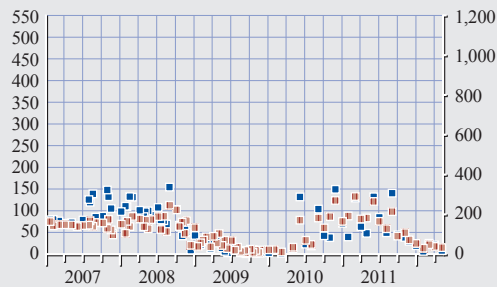
a) Main refinancing operations



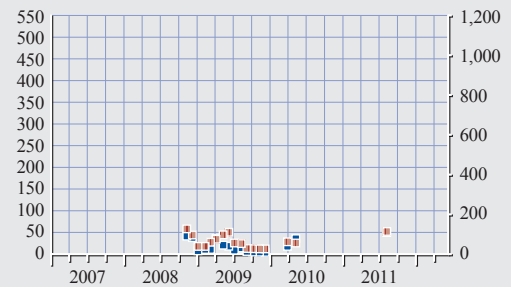
b) Maintenance period LTROs



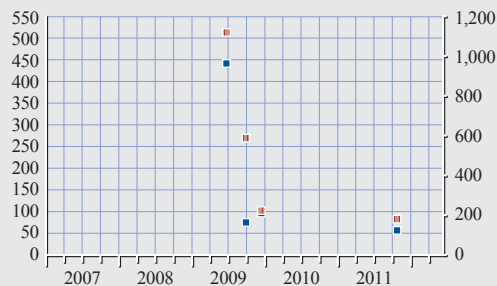
c) 3-month LTROs



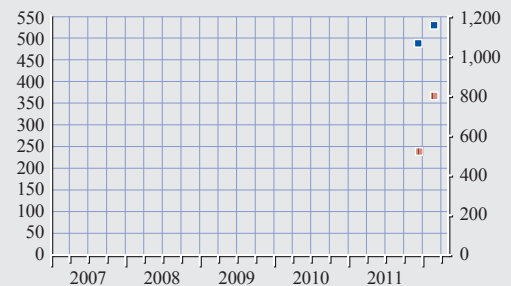
d) 6-month LTROs



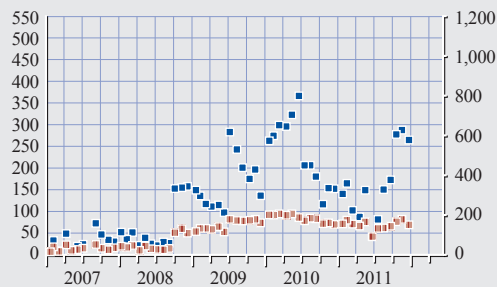
e) 12-month LTROs



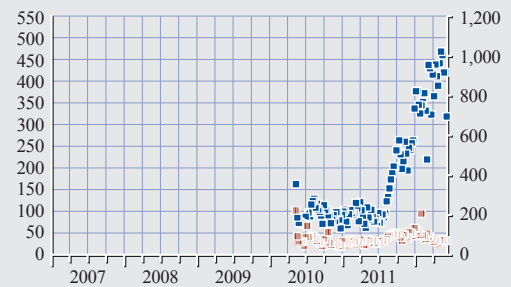
f) 36-month LTROs



g) Liquidity absorbing end-of-period FTOs, overnight



h) Weekly SMP liquidity-absorbing operations, one week maturity



Source: ECB.

Note: Data from the beginning of the first maintenance period of 2007 on 17 January 2007 to the end of the fifth maintenance period of 2012 on 12 June 2012.

However, the introduction of fixed rate full allotment resulted in a reduction in bid amounts and bidders in LTROs, for instance, with fewer than 50 bidders bidding for less than €10 billion in the first 3-month operation in January 2009. Of course, this decrease must be seen in the context of two rather than just one 3-month LTRO being allotted per month. The allotment of the first 12-month LTRO further reduced demand in 3-month LTROs. Following the phasing-out of the supplementary 12-month and 6-month operations demand in the 3-month LTROs recovered significantly. Subsequently, the three outstanding 3-month operations were of different size. This is related to the maturities of the 12-month operations, when significant parts of the maturing amounts were rolled into the next 3-month operation. As these 12-month operations were maturing according to a quarterly rhythm (end of the second, third and fourth quarter of 2010) they were all rolled into the 3-month operation at the quarter end. In addition, the large 36-month LTROs crowded out 3-month operations.

6-MONTH LTROs

These were conducted with fixed rate full allotment on a monthly basis from November 2008 until December 2009. Three additional operations were conducted in March and May 2010 as well as August 2011 in response to tensions emanating from sovereign debt markets. The first such operation attracted 127 bidders, the highest number of bidders yet in a 6-month operation, allotting €42 billion (Chart 7d). In the subsequent operations bidders and amounts more than halved. The lowest levels were seen during the life of the first 12-month LTRO, with less than €1 billion allotted to 21 counterparties in November 2009. The largest allotment of €50 billion to 114 bidders was seen in the last such operation in August 2011.

12-MONTH AND 36-MONTH LTROs

The Eurosystem initially conducted three 12-month LTROs with fixed rate full allotment. The fixed rate in the first two operations was equal to the MRO rate prevailing at the time

of the respective operation. By contrast, the rate in the last 12-month tender was set to be the average MRO rate over the LTRO's lifetime. Chart 7e shows that the first one attracted a record of 1,121 bidders which bid for €442 billion. Demand in the two additional 12-month LTROs fell but was still substantial with €97 billion allotted to 224 counterparties in December 2009.

Two additional LTROs of approximately 12- and 13-month maturity were announced for October and December 2011. The first of the two proved to be the smallest 12-month tender so far, with demand from 121 counterparties for €57 billion.

Before the conduct of the 13-month operation it was decided to conduct LTROs of 36-month maturity, with the option of early repayment after 12 months. Counterparties participating in the October 2011 12-month operation were allowed to switch into the first 36-month operation, while the 13-month operation announced for December 2011 was scrapped. The 36-month operations did not attract quite as many bidders as the first 12-month operation, with 523 and 800 bidders respectively (Chart 7f). However, with allotment amounts of €489 and €530 billion respectively they set new records. Following these operations, a crowding-out of operations with shorter maturities was again observable.

FINE-TUNING OPERATIONS: END OF PERIOD

The Eurosystem conducted fine-tuning operations on the final day of the maintenance period in order to counter liquidity imbalances on that day. Until the introduction of the fixed rate full allotment procedure, these fine-tuning operations usually had an intended amount. The Governing Council decided to temporarily broaden, as of 6 October 2008, the list of eligible counterparties for fine-tuning operations. The list was broadened from a restricted list of institutions fulfilling specific quantitative and qualitative criteria to cover all institutions eligible to participate in Eurosystem open market operations based on standard tenders and fulfilling additional operational or other selection criteria.

From November 2008 liquidity-absorbing fine-tuning operations continued to be conducted on the final day of the maintenance period in order to reduce liquidity imbalances on that day. These tenders were conducted as variable rate tenders with up to two bids per counterparty and a maximum bid rate equal to the minimum bid rate in main refinancing operations. While these operations did not fully restore balanced liquidity conditions, they substantially reduced the liquidity imbalance on the final day of the maintenance period. As part of a package of measures aimed at improving money market activity, these operations have been discontinued for the time being with effect from the twelfth maintenance period of 2011.

Chart 7g shows that participation in fine-tuning operations increased following the decision to broaden the list of eligible counterparties and to introduce fixed rate full allotment which allowed larger liquidity imbalances. From November 2008 participation in these operations was generally high with at least 100 counterparties bidding in all operations except one. At the same time, participation was volatile with nearly 200 banks bidding in the period January to May 2010. The offered amounts were also significant, reflecting the amount of excess liquidity prevailing.

FINE-TUNING OPERATIONS: SMP-STERILISING OPERATIONS

When the ECB announced the start of the SMP on 10 May 2010, it also announced that, in order to sterilise the liquidity impact of the government bond purchases, specific operations would be conducted to re-absorb the liquidity injected through the SMP. In the first operation a record 227 counterparties bid (Chart 7h). Subsequently, the number of bidders was fairly stable with around 60 to 70 bidders, except for two spikes when more than 100 counterparties bid. From August 2011 the number of bidders and bid amounts increased. This development coincides with the reaffirmation of the active implementation of the SMP and an increase in excess liquidity.

6 FOREIGN CURRENCY OPERATIONS

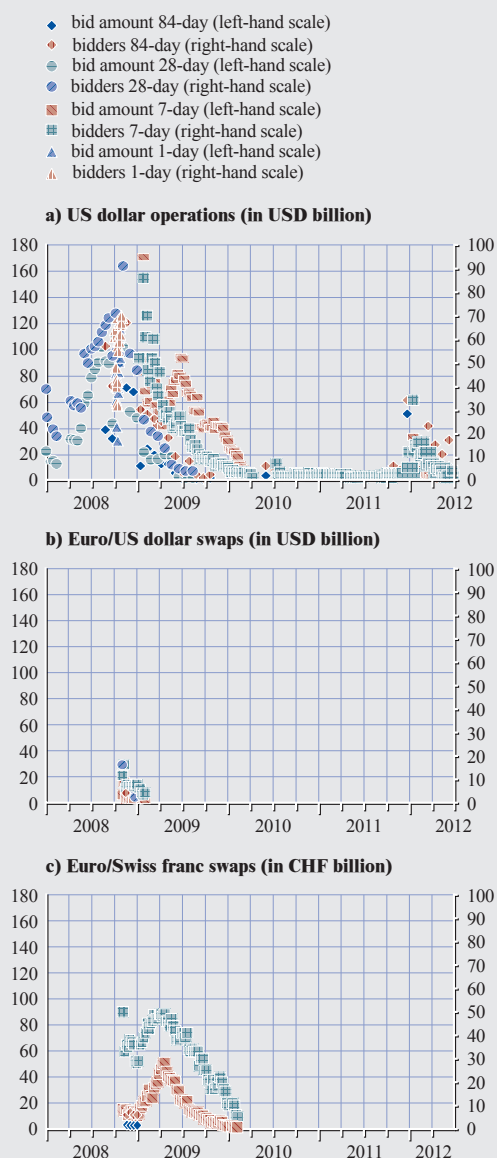
In the course of the crisis, the Eurosystem engaged in foreign currency operations in cooperation with a number of major central banks. Of particular importance has been the provision of US dollars which the Eurosystem began in December 2007 on the basis of swap arrangements with the Federal Reserve.

Chart 8a shows demand in terms of bid amounts and number of bidders in US dollar operations in which US dollars have been provided against Eurosystem eligible collateral. These operations are liquidity-neutral in terms of euro. In the case of foreign currency swaps such as euro/US dollar swaps and euro/Swiss franc swaps (see Charts 8b and 8c) the foreign currency was provided against euro. Thus, from the perspective of Eurosystem liquidity management, these swap operations constitute liquidity-absorbing operations. Additional swap arrangements also existed with Danmarks Nationalbank and Sveriges Riksbank which were provided with euro for their counterparties. These arrangements were thus liquidity-providing. Moreover, on a limited scale, pounds sterling were provided to euro area counterparties through a swap arrangement with the Bank of England.

Chart 8a shows that demand for US dollars provided by the Eurosystem existed from the first operation in December 2007. After peaking around the time of the collapse of Lehman Brothers, demand fell back markedly in the course of 2009 until from February 2010 US dollar operations were discontinued. With the intensification of the sovereign debt crisis, one-week operations were re-introduced. However, until the end of November 2011, these did not attract significant demand. Increasing difficulties by counterparties to obtain US dollar funding led also to the re-introduction of 84-day US dollar operations. On 30 November 2011 the pricing of dollars was made more attractive. Subsequently, for both shorter and longer maturities demand in US dollar operations increased although remaining far below the

levels seen around the time of the collapse of Lehman Brothers. Following the allotment of the two 36-month LTROs, also the demand in foreign currency operations fell again.

Chart 8 Demand in foreign currency operations



Source: ECB.

Note: Data until the end of the fifth maintenance period of 2012 on 12 June 2012. The right-hand scale of all three charts represents the number of bidders. In all three charts the area to the left of 15 October 2008 represents the variable rate tenders, while the area to the right represents the fixed-rate full allotment.

As for the allotment procedure, the first foreign currency operation to use the fixed rate full allotment procedure was allotted on 16 October 2008, i.e. at the time the fixed rate full allotment procedure was introduced in all Eurosystem open market operations. Prior to that, overnight operations, especially those held immediately after the collapse of Lehman Brothers, were conducted as variable rate tenders with pre-set amounts, while the 28-day and 84-day operations were held as fixed rate tenders with pre-set amounts.

Compared to the demand experienced in US dollar tender operations, demand for euro/US dollar swaps was moderate, with demand falling over the course of their conduct. Demand for Swiss francs in euro/Swiss franc swap operations increased from their initiation in October 2008 to peak in April 2009. Subsequently, demand fell steadily before these swap operations were discontinued in January 2010.

7 OUTRIGHT OPERATIONS FOR MONETARY POLICY PURPOSES

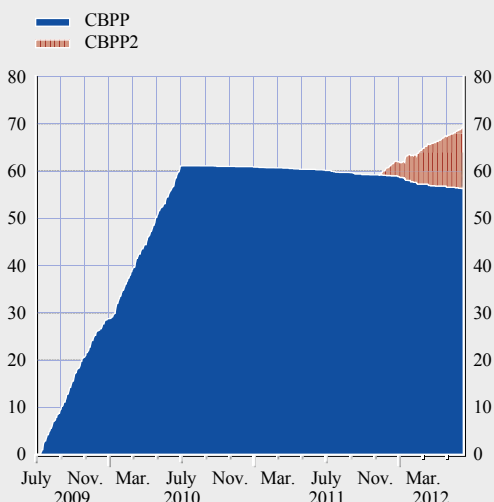
The Eurosystem has undertaken outright purchases of securities as an instrument of monetary policy. First, in 2009, the Covered Bond Purchase Programme (CBPP) was introduced to support the longer-term funding of banks and reduce the pressure on the money market. Second, in 2010, the Securities Markets Programme (SMP) was introduced to support the monetary policy transmission mechanism.²²

7.1 COVERED BOND PURCHASE PROGRAMMES

On 7 May 2009 the Governing Council decided to purchase euro-denominated covered bonds as part of the Covered Bond Purchase Programme (CBPP). The technical modalities were decided on 2 June 2009 establishing that purchases of €60 billion would be made, distributed across the euro area in both primary and secondary markets. Purchases began in July 2009 and were fully implemented by June 2010.

Chart 9 Liquidity effect of Covered Bond purchase programmes

(EUR billion)



Source: ECB.

Note: Data until the end of the fifth maintenance period of 2012 on 12 June 2012.

The four objectives of the CBPP were to contribute to (a) promoting the ongoing decline in money market term rates; (b) easing funding conditions for credit institutions and enterprises; (c) encouraging credit institutions to maintain and expand their lending to clients; and (d) improving market liquidity in important segments of the private debt securities market.²³

Under the CBPP, the Eurosystem made outright purchases of covered bonds to the nominal value of €60 billion over the 12-month period from 6 July 2009 to the end of June 2010, when the programme was completed.

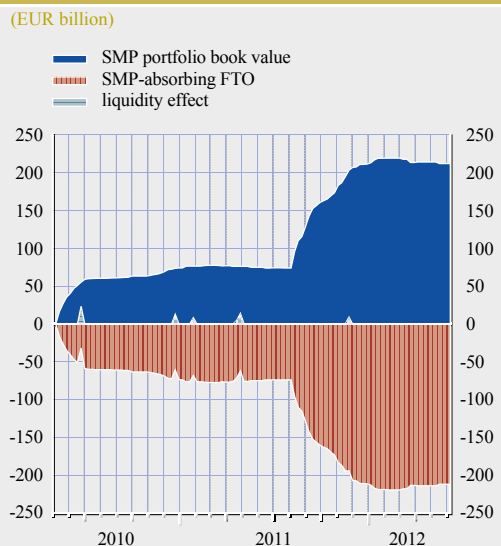
With the intensification of the sovereign debt crisis in the summer of 2011, however, covered bond markets again came under significant pressure. The Governing Council therefore decided at the beginning of October 2011 to announce a second CBPP (CBPP2) under which it is intended to purchase €40 billion of covered bonds between the start of November 2011 and the end of October 2012. CBPP2 shares with the first CBPP the objectives of easing funding conditions and encouraging institutions to maintain or expand lending to their clients, thereby contributing to the Eurosystem's role in supporting the functioning of financial markets.

Purchases within CBPP2 began 14 November 2011. As of the end of the fifth maintenance period of 2012 on 12 June 2012, €13.1 billion of bonds have been bought within CBPP2, while €56.3 billion of bonds are outstanding under the first CBPP. The liquidity injected through the CBPPs is shown in Chart 9.

22 See, for instance, González-Páramo (2011c) and European Central Bank (2012a: 63-85) for a more detailed discussion of how dysfunctions of covered bond and sovereign bond markets impaired the monetary policy transmission mechanism and how the CBPPs and the SMP addressed these.

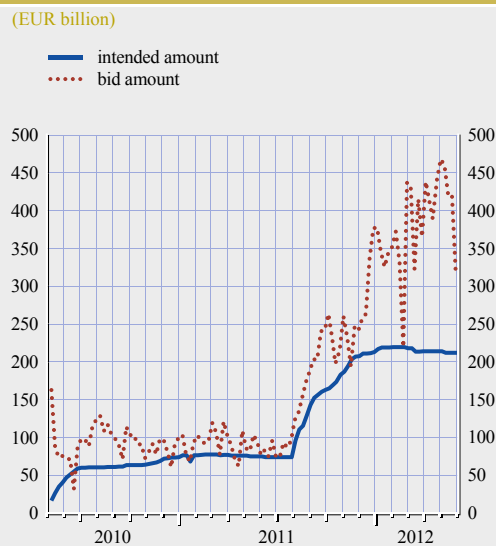
23 For a detailed discussion of the modalities and impact of the first CBPP see European Central Bank (2010b) and Beirne et al. (2011).

Chart 10 SMP settled book value on Friday and associated SMP-absorbing operation on Tuesday



Source: ECB.
Note: Data until the end of fifth maintenance period of 2012 on 12 June 2012.

Chart 11 SMP-absorbing FTOs: intended and bid amounts



Source: ECB.
Note: Data until the end of fifth maintenance period of 2012 on 12 June 2012.

7.2 SECURITIES MARKETS PROGRAMME

On 10 May 2010 the Governing Council decided to conduct interventions in euro area public and private debt securities markets by means of the Securities Markets Programme (SMP). The objective of this temporary programme is to address the malfunctioning of securities markets, ensuring depth and liquidity in the affected market segments, and to restore an appropriate monetary policy transmission mechanism.²⁴

In order to sterilise the liquidity impact of these interventions, the Governing Council decided that specific operations would be conducted to re-absorb the liquidity injected through the SMP on a weekly basis. The absorbing operations are usually conducted on a Tuesday as a collection of fixed term deposits with one-week maturity in a variable rate tender with the rate applied in main refinancing operations as the maximum bid rate. The amount to be absorbed is equal to the book value of the SMP portfolio at the end of the week preceding the SMP-absorbing fine-tuning operation.

Except for only six instances of minor underbidding, the liquidity provided through the SMP, which is defined as the settled book value of the securities acquired and not yet matured, has been successfully absorbed. As a result, the liquidity effect has been minimal (see the green area in Chart 10). Furthermore, the net liquidity effect has been only temporary.

Chart 11 plots the intended absorbing amount against the amounts bid by counterparties. In the very first operation bids significantly exceeded the intended amount. Subsequently, bid amounts remained relatively close to intended amounts until the end of July 2011. Following the reactivation of the SMP in August 2011 bid amounts relative to intended amounts again started to increase. In recent months, in particular since the allotment of the two 36-month LTROs, bid amounts have significantly exceeded intended amounts, reflecting the large amount of excess liquidity.

²⁴ The role of the Securities Markets Programme within the operational framework is considered in more detail in González-Páramo (2011c) and ECB (2012a: 63-85).

8 MINIMUM RESERVES AND THEIR FULFILMENT

Following the introduction of the euro, the reserve requirement was established at 2% of deposits. However, with effect from the first maintenance period of 2012, the ECB reduced the reserve requirement to 1%. Under prevailing conditions with large amounts of excess liquidity in the system, reserve requirements appear less important with a view to stabilising money market rates. In addition, other things being equal, lower reserve requirements could stimulate money market activity.

Counterparties have to fulfil their reserve requirement over the course of the maintenance period only on average and not on a daily basis. This allows counterparties to buffer short-term liquidity shocks.

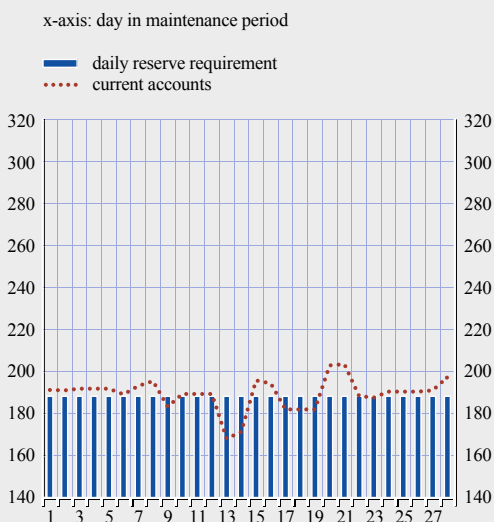
Prior to the crisis, when allotments in main refinancing operations were made according to the benchmark allotment, counterparties chose to fulfil their reserve requirement smoothly, i.e. holding more or less their average

daily reserve requirement every day on their current account (see the example of the fourth maintenance period of 2007 in Chart 12). Following tensions in money markets in August 2007, counterparties developed a preference to frontload their reserve fulfilment within the maintenance period. The Eurosystem accommodated this preference by allotting amounts greater than the benchmark in MROs. Nonetheless, it continued to ensure balanced liquidity conditions over the course of the maintenance period. Following the introduction of the fixed rate full allotment procedure, liquidity conditions were no longer necessarily balanced over the course of the maintenance period with counterparties free to choose their reserve fulfilment path. As can be seen in Chart 13 for the example of the eleventh maintenance period of 2007, this led to a very pronounced frontloading of reserve fulfilment.

Although reserve fulfilment occurs over the course of a maintenance period it is possible to capture the deviation from smooth reserve fulfilment through frontloading in terms of a single statistic per maintenance period.

Chart 12 Reserve fulfilment in the fourth maintenance period of 2007 (variable-rate tenders with benchmark allotment)

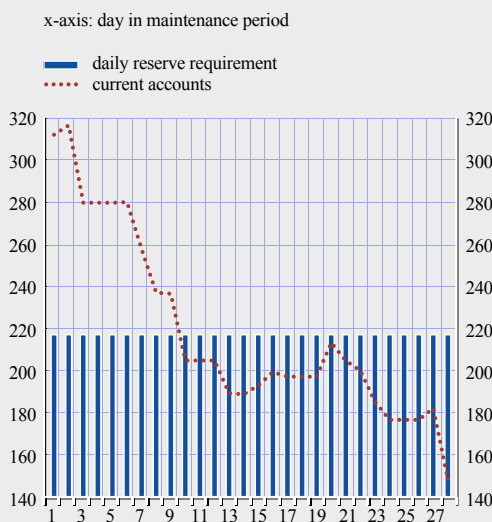
(EUR billion)



Source: ECB.

Chart 13 Reserve fulfilment in the eleventh maintenance period of 2008 (fixed-rate full allotment)

(EUR billion)



Source: ECB.

Table 3 Deviation from smooth reserve fulfilment

(in percent)

MP1 2009	MP2 2009	MP3 2009	MP4 2009	MP5 2009	MP6 2009	MP7 2009	MP8 2009	MP9 2009	MP10 2009	MP11 2009	MP12 2009
17	11	9	8	2	3	17	11	11	13	11	11
MP1 2010	MP2 2010	MP3 2010	MP4 2010	MP5 2010	MP6 2010	MP7 2010	MP8 2010	MP9 2010	MP10 2010	MP11 2010	MP12 2010
17	17	19	19	28	29	16	14	16	6	11	17
MP1 2011	MP2 2011	MP3 2011	MP4 2011	MP5 2011	MP6 2011	MP7 2011	MP8 2011	MP9 2011	MP10 2011	MP11 2011	MP12 2011
0	9	8	4	9	13	13	22	14	27	25	27
MP1 2012	MP2 2012	MP3 2012	MP4 2012	MP5 2012							
35	25	28	27	27							

Source: ECB.

Notes: The deviation from smooth reserve fulfilment in percent is calculated as $100 * (\text{maintenance period average of the daily reserve fulfilment ratio} - 1)$, where the daily reserve fulfilment ratio on a given day is the sum of all current accounts up to and including that day divided by the sum of the daily reserve requirement up to and including that day.

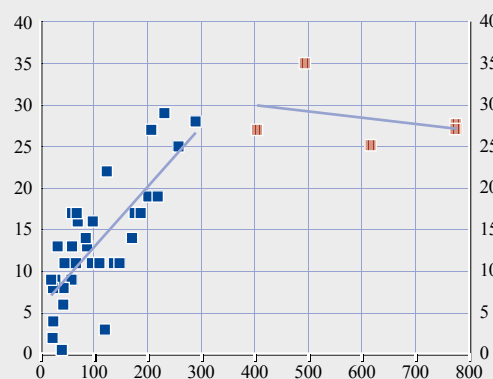
The percentage deviation from smooth reserve fulfilment is shown in Table 3. A value of zero represents smooth reserve fulfilment over the maintenance period. A negative value would indicate backloading of reserve fulfilment, whereas positive values indicate frontloading.

Chart 14 plots the percentage deviation from smooth fulfilment, i.e. the degree of frontloading, against maintenance period averages of excess liquidity. The degree of frontloading generally increases with the amount of excess liquidity. This relationship appears fairly monotone up to a level of excess liquidity of approximately €300 billion. However, the higher excess liquidity resulting from the two 36-month LTROs does not appear to have led to a further proportionate increase in the degree of frontloading. This is illustrated by the two linear fitted lines for the two samples below and above €300 billion of excess liquidity.

Chart 14 The relationship between excess liquidity and deviations from smooth reserve fulfilment

x-axis: excess liquidity, EUR billion
y-axis: deviation from smooth reserve fulfilment, percent

■ MP1 2009 - MP11 2011
■ MP12 2011 - MP5 2012



Source: ECB.

Notes: Data from the first maintenance period 2009 until the fifth maintenance period of 2012. MP: maintenance period.

9 RECOURSE TO STANDING FACILITIES

Whereas open market operations are conducted at the initiative of the central bank, standing facilities can be accessed at the initiative of eligible counterparties.

9.1 DEPOSIT FACILITY

The observed patterns of deposit facility recourse can be explained by reference to the balance sheet logic of liquidity management.²⁵ All liquidity provided by the central bank returns to it, as counterparties either keep it on their current accounts, on the deposit facility or return it in liquidity-absorbing operations. We can thus define daily excess liquidity as the sum of the deposit facility (DF) and excess reserves, i.e. the amount by which on a given day counterparties' current accounts (CA) exceed their daily reserve requirement (RR):

$$EL_t = DF_t + CA_t - RR_t. \quad (1)$$

Excess reserves are not remunerated, while the deposit facility is remunerated at the deposit facility rate. Thus, the daily average of excess reserves, i.e. CA-RR, tends to be low. As a result, as is also suggested by (1), the maintenance period average of deposit facility recourse reflects, above all, the maintenance period average of excess liquidity (compare Chart 15 with Chart 5 and see Table 4).

Recourse to the deposit facility exhibits a strong rising trend within each maintenance period. Chart 16 illustrates this intra-maintenance period pattern for a typical maintenance period. The rising trend of deposit facility recourse within the maintenance period is due to counterparties' preference to frontload reserve requirements, as was discussed in the previous section. Current accounts tend to exceed the daily reserve requirement early in the maintenance period and to fall below this in the later part

²⁵ See also Box 1.

Chart 15 Deposit facility recourse since 2007

(EUR billion)

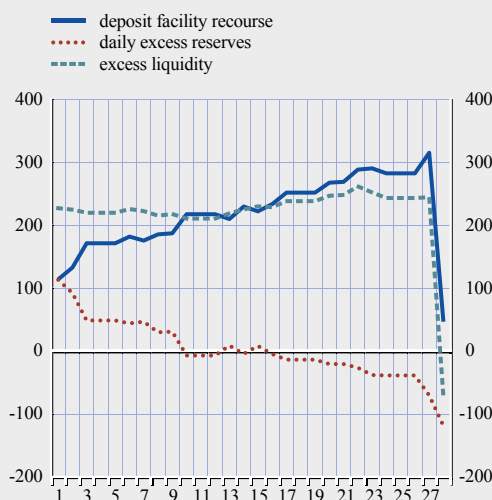


Source: ECB.
Note: Data until the end of the fifth maintenance period of 2012 on 12 June 2012.

Chart 16 Intra-maintenance pattern of deposit facility recourse: the example of the fourth maintenance period of 2011

(EUR billion)

x-axis: day in maintenance period



Source: ECB.

Table 4 Recourse to the deposit facility

(in EUR billion)

	MP1 2009	MP2 2009	MP3 2009	MP4 2009	MP5 2009	MP6 2009	MP7 2009	MP8 2009	MP9 2009	MP10 2009	MP11 2009	MP12 2009
Mean	175	95	58	43	22	120	185	137	110	86	66	147
Standard Deviation	27	22	12	24	10	128	36	26	32	26	26	70
	MP1 2010	MP2 2010	MP3 2010	MP4 2010	MP5 2010	MP6 2010	MP7 2010	MP8 2010	MP9 2010	MP10 2010	MP11 2010	MP12 2010
Mean	175	186	201	218	289	230	97	84	69	42	45	66
Standard Deviation	51	52	46	61	75	49	44	26	21	24	25	30
	MP1 2011	MP2 2011	MP3 2011	MP4 2011	MP5 2011	MP6 2011	MP7 2011	MP8 2011	MP9 2011	MP10 2011	MP11 2011	MP12 2011
Mean	39	27	23	23	18	30	57	122	169	205	373	399
Standard Deviation	28	10	9	17	7	25	46	39	57	59	72	104
	MP1 2012	MP2 2012	MP3 2012	MP4 2012	MP5 2012							
Mean	489	621	771	768	771							
Standard Deviation	27	178	22	36	23							

Source: ECB.

of the maintenance period. If excess liquidity is constant over the course of the maintenance period, recourse to the deposit facility will thus increase over the course of the maintenance period, as can be seen from equation (1).

Furthermore, the maintenance period pattern of deposit facility recourse has been affected by the

overnight end-of-maintenance-period absorbing operations conducted from November 2008 until December 2011. As these provide an alternative for counterparties to place their central bank liquidity usually better remunerated than the deposit facility, recourse to the deposit facility has fallen on the final day of the maintenance period (see Chart 16).

Box 2

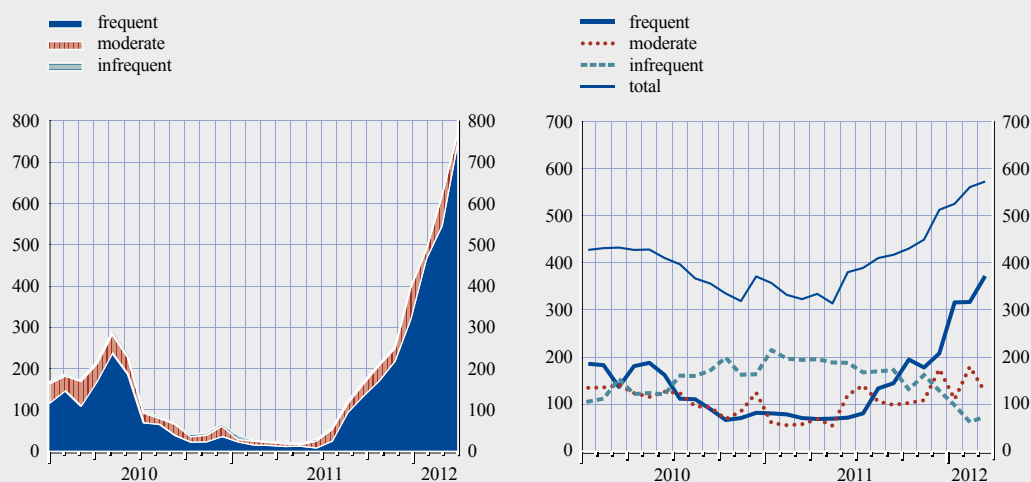
DEPOSIT FACILITY RECOURSE: FREQUENCY AND OVERLAP WITH REFINANCING OPERATIONS

This box analyses the use of the deposit facility from Q1 2010 to Q1 2012. Particular attention is paid to the frequency of deposit facility recourse and its overlap with refinancing operations.

In 2010 the recourse to the deposit facility was significant in each maintenance period, as a consequence of the large liquidity surplus and the persistent tensions in the money market (Chart A). Recourse to the deposit facility reached a relative peak in May 2010, at the height of the Greek sovereign debt crisis, when some banks that had lost access to the market increased their reliance on Eurosystem refinancing operations and generated a liquidity surplus in the system. Recourse to the deposit facility significantly decreased after the maturity of the first 12-month LTRO, at the end of June 2010, as counterparties only partially rolled over the large amount that they borrowed for precautionary reasons at the beginning of the financial crisis. A temporary increase in the volume of the deposit facility was observed towards the end of 2010 reflecting a new increase in Eurosystem refinancing. In 2011 recourse to the facility gradually

Chart A Deposit facility recourse by frequency: amounts (left-hand scale) and number of counterparties (right-hand scale)

(EUR billion; number of counterparties)



Source: ECB.

fell to €18 billion in the fifth maintenance period of 2011, only to start rising again as the sovereign debt crisis intensified; it almost tripled by July, and was almost ten times higher by September. In the third maintenance period of 2012, following the second 36-month LTRO, recourse increased to €771 billion.

Frequency of deposit facility recourse

For the purpose of the analysis, counterparties are classified into three groups according to the frequency of their recourse to the deposit facility. Banks that deposited funds at least 75% of the days in a maintenance period are classified as “frequent users”, other depositors (between 25% to 75% of the days) are classified as “moderate users” while those that deposited funds less than 25% of the days are classified as “infrequent users”.

The number of counterparties that deposited funds at least once in each maintenance period followed the same pattern as was observed in relation to deposit facility volume, although at a slower pace (see Chart A). After the maturity of the first 12-month LTRO the total number of depositors gradually decreased from 432 at the beginning of 2010 to 314 in the fifth maintenance period of 2011; frequent users also dropped (both in absolute and in relative terms) as many of them discontinued their recourse to the facility or reduced the volume or frequency of their participation (in that case, usually depositing funds only at the end of the maintenance period). This trend was reversed in the second half of 2011 and the total number of depositors reached a new height in the third maintenance period of 2012 at 572; at that time frequent users represented 65% of the total. Recourse to the deposit facility is highly concentrated. Half of the funds in each maintenance period were deposited by only 10 counterparties for most of the time.

Relationship between deposit facility and refinancing operations

In the first half of 2010, before the maturity of the first 12-month LTRO, most funds (about 60%) were deposited by the same banks that had borrowed from the Eurosystem, mainly through

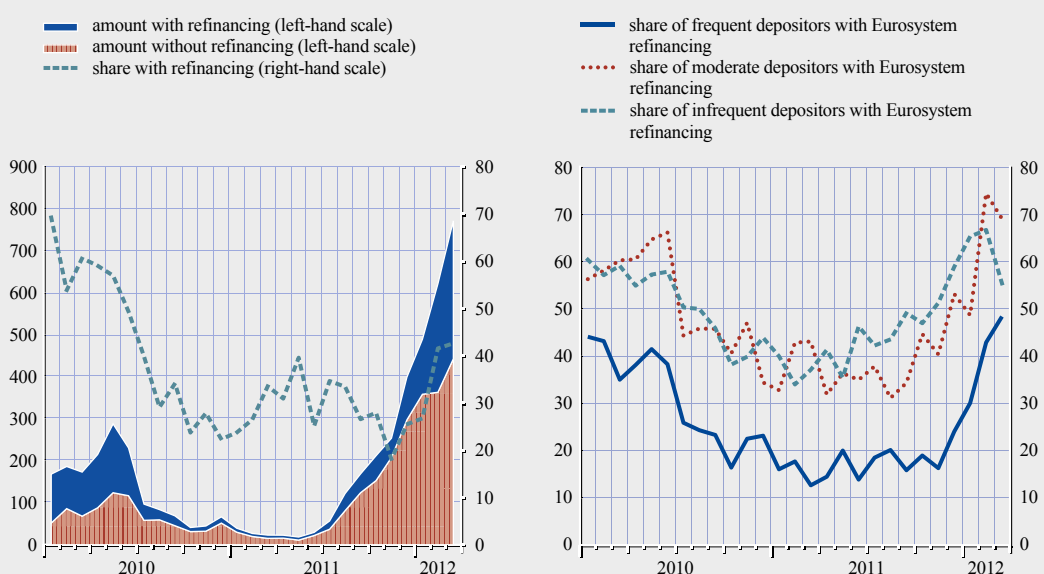
longer term operations (see Chart B on the left). This evidence confirms that at least some of the funds were borrowed for precautionary reasons. In detail, during the first five maintenance periods of 2010, on average €119 billion was deposited by banks with an outstanding LTRO borrowing (representing 18% of the total LTRO outstanding). This amount is likely to be higher if banking groups rather than counterparties were considered.

After the maturity of the first 12-month LTRO, the above relationship between the deposit facility and Eurosystem borrowing changed. For the following year (until July 2011) less than 30% of funds were deposited by counterparties with an outstanding refinancing. This percentage fell to less than 20% in the eleventh maintenance period of 2012. This appears to suggest that especially during the most difficult times of the debt crisis the precautionary component of the demand for central bank liquidity weakened and, at the same time, such demand was increasingly driven by the need to substitute market financing with central bank financing.

At this time, among deposit facility counterparties, those with an outstanding Eurosystem borrowing were mainly infrequent or moderate users of the facility. Again, the two 36-month LTROs somewhat changed this picture; in February and March 2012 counterparties that borrowed funds from the Eurosystem increased their share of the deposit facility from 25% to more than 40% of the total. Chart B on the right considers frequent, moderate and infrequent depositors and shows the share of each of these groups which has Eurosystem refinancing. While we see an increase in the share with refinancing for all three groups at the end of 2011, the increase is particularly strong for the frequent depositors.

Chart B Deposit facility recourse by Eurosystem refinancing

(EUR billion; percent)



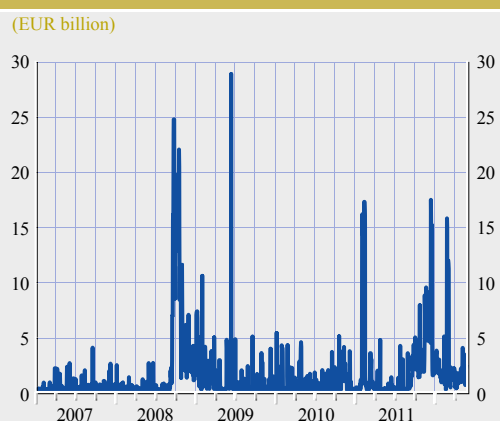
Source: ECB.

9.2 MARGINAL LENDING FACILITY

During pre-crisis times, when liquidity conditions were steered to be neutral, marginal lending facility recourse was infrequent and small. As interbank markets ensured smooth trading in central bank liquidity, recourse to the marginal lending facility was required only in the case of liquidity shocks or if the banking system as a whole happened to be slightly short of liquidity at the end of the maintenance period. As can be seen from Chart 17, marginal lending facility recourse at that time was sporadic and insubstantial, reflecting minor liquidity shocks or liquidity imbalances in the banking system as a whole.

Following the collapse of Lehman Brothers, marginal lending facility recourse started to increase and came close to €25 billion by the end of September 2008. However, by November 2008, recourse to the marginal lending facility had fallen below €5 billion with the occasional spike, before reaching virtually zero by the middle of 2009.

Chart 17 Marginal lending facility recourse since January 2007



Source: ECB.
Note: Data until the end of the fifth maintenance period of 2012 on 12 June 2012.

As can be seen from Table 5, maintenance period averages of marginal lending facility recourse have been moderate. Only in one maintenance period did marginal lending facility recourse exceed €10 billion, and only in four maintenance periods did it exceed €5 billion.

Table 5 Recourse to the marginal lending facility

(in EUR billion)												
	MP1 2009	MP2 2009	MP3 2009	MP4 2009	MP5 2009	MP6 2009	MP7 2009	MP8 2009	MP9 2009	MP10 2009	MP11 2009	MP12 2009
Mean	2.0	1.6	1.1	0.7	0.7	1.3	0.3	0.2	0.3	0.3	0.7	0.4
Standard Deviation	1.6	2.1	1.0	1.0	1.2	5.4	0.8	0.5	0.8	0.7	0.8	1.0
	MP1 2010	MP2 2010	MP3 2010	MP4 2010	MP5 2010	MP6 2010	MP7 2010	MP8 2010	MP9 2010	MP10 2010	MP11 2010	MP12 2010
Mean	0.1	0.9	0.4	0.9	0.3	0.3	0.1	0.6	0.7	0.8	1.9	0.5
Standard Deviation	0.5	1.6	0.8	1.3	0.7	0.4	0.2	0.6	0.8	3.0	1.1	0.8
	MP1 2011	MP2 2011	MP3 2011	MP4 2011	MP5 2011	MP6 2011	MP7 2011	MP8 2011	MP9 2011	MP10 2011	MP11 2011	MP12 2011
Mean	0.0	7.6	0.8	0.4	0.0	0.2	0.1	0.3	1.5	2.8	4.4	6.0
Standard Deviation	0.1	7.5	1.1	0.9	0.0	0.3	0.2	0.8	1.1	1.5	2.8	4.7
	MP1 2012	MP2 2012	MP3 2012	MP4 2012	MP5 2012							
Mean	2.3	2.2	3.0	1.1	1.6							
Standard Deviation	0.8	3.8	4.1	0.6	0.9							

Source: ECB.

10 STEERING OF MONEY MARKET RATES

In general, the steering of short-term interest rates is the main objective of the operational framework. The Eurosystem does not, however, specify a particular operational target. Nonetheless, considerable attention has been paid to EONIA, the unsecured overnight interest rate charged by banks in the EONIA panel.

However, in response to the crisis, in addition to the steering of money market rates, liquidity management has aimed also to support the functioning of the money market through the provision of liquidity to ensure its functioning in spite of high levels of risk aversion and a preference to insure against liquidity shocks.

10.1 CORRIDOR WIDTH BETWEEN THE STANDING FACILITIES

Until the onset of the financial crisis, and with brief exceptions in the very first months following the introduction of the euro in 1999, the corridor between standing facilities was ± 100 basis points either side of the rate applied in main refinancing operations. On the introduction of the fixed rate full allotment procedure in October 2008, the corridor was narrowed to ± 50 basis points, before it was widened again to the original width in January 2009. On 7 May 2009 the Governing Council decided to decrease the rate applied in main refinancing operations by 25 basis points to 1% while decreasing the corridor width of standing facilities in relation to the rate applied in main refinancing operations from ± 100 basis points to ± 75 basis points so that the deposit facility rate remained at 0.25%. The corridor width of ± 75 basis points has been maintained even when the rate applied in main refinancing operations was increased to 1.25% in April 2011 and 1.5% in July 2011 and subsequently decreased again to 1.25% in November 2011 and to 1% in December 2011.

10.2 LEVEL AND VOLATILITY OF EONIA

The development of the ECB's official interest rates, as well as of two important money market rates, namely EONIA and three-month EURIBOR, is shown in Chart 4. That chart underlines the fact that the introduction of the full allotment procedure and in particular the allotment of the first 12-month LTRO at the end of June 2009 caused the emergence of a significant liquidity surplus in the euro area banking system, resulting in overnight rates and 3-month rates drifting below the ECB's MRO rate for an extended period of time. Only in October 2010, when excess liquidity had significantly declined, did the three-month EURIBOR rise back above the MRO rate. In the course of 2011 this has also occasionally been the case for EONIA. However, the rise in excess liquidity in the second half of 2011 again put downward pressure on money market rates. In particular, following the allotment of the first 36-month operation, EONIA was pushed back to about 10 basis points above the deposit facility rate, with three-month EURIBOR also embarking on a downward trend.

As can be seen from Table 6, from the seventh maintenance period of 2009 to the sixth maintenance period of 2010, excess liquidity was of such large proportions that EONIA was mainly steered by the deposit facility rate and more or less flat at about 10 basis points above that rate. As an exception, on the final day of the maintenance period when the end-of-period fine-tuning operation decreased excess liquidity, EONIA increased, usually by around 40 basis points. Following the maturity of the 12-month LTROs, levels of excess liquidity fell again below €100 billion and EONIA was set again somewhat higher, exhibiting a strong intra-maintenance period pattern, starting off relatively high and falling towards the deposit facility rate during the course of the maintenance period. In the latter half of 2011, the increase in excess liquidity again

Table 6 EONIA spread to the MRO rate: level and standard deviation

(in basis points)

	MP1 2009	MP2 2009	MP3 2009	MP4 2009	MP5 2009	MP6 2009	MP7 2009	MP8 2009	MP9 2009	MP10 2009	MP11 2009	MP12 2009
Mean	-58	-54	-43	-38	-20	-37	-65	-65	-64	-64	-64	-65
Standard Deviation	5	3	11	15	19	27	2	4	5	7	6	5
	MP1 2010	MP2 2010	MP3 2010	MP4 2010	MP5 2010	MP6 2010	MP7 2010	MP8 2010	MP9 2010	MP10 2010	MP11 2010	MP12 2010
Mean	-68	-67	-66	-65	-67	-60	-53	-58	-52	-30	-43	-52
Standard Deviation	7	6	6	6	6	9	9	6	13	17	15	14
	MP1 2011	MP2 2011	MP3 2011	MP4 2011	MP5 2011	MP6 2011	MP7 2011	MP8 2011	MP9 2011	MP10 2011	MP11 2011	MP12 2011
Mean	-18	-35	-34	-10	-16	-28	-41	-61	-43	-57	-56	-54
Standard Deviation	30	20	9	28	20	30	25	6	15	6	5	10
	MP1 2011	MP2 2011	MP3 2011	MP4 2011	MP5 2011							
Mean	-63	-64	-64	-66	-67							
Standard Deviation	1	1	1	0	1							

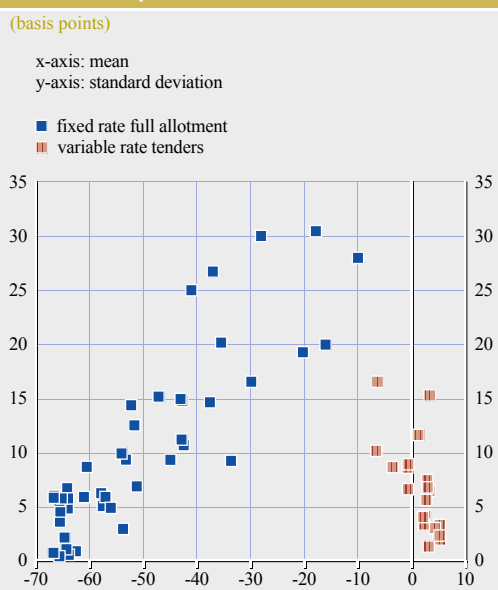
Source: ECB.

pushed EONIA towards the deposit facility rate, reducing also the intra-maintenance period volatility of EONIA to low levels. Even then, end-of-period fine-tuning operations created some artificial EONIA volatility on the final day of the maintenance period. For instance, it may be observed that both from the first to the third maintenance period of 2010 and the first to the third maintenance period of 2012 EONIA traded close to the deposit facility rate. However, in 2012 EONIA volatility was significantly lower, as end-of-period FTOs have been temporarily suspended.

Generally, a hump-shaped relationship between the level of EONIA and its intra-maintenance-period standard deviation can be observed. This is shown in Chart 18 which plots the maintenance period average EONIA spread against its standard deviation. EONIA volatility can be seen to be low both when EONIA is very close to the deposit facility, i.e. when there is considerable excess liquidity and when the EONIA spread is close to zero, i.e. when also liquidity conditions are more or less in balance. However, all observations in which the EONIA spread is close to zero stem from the pre-crisis variable rate tender period. Under the fixed rate

full allotment procedure, a narrower EONIA spread has gone almost universally hand-in-hand with greater EONIA volatility within the maintenance period.

Chart 18 The relationship between the EONIA spread and EONIA volatility in terms of the intra-maintenance period mean and standard deviation



Source: ECB.

Note: Data from the first maintenance period of 2007 to the fifth maintenance period of 2012.

THE RELATIONSHIP BETWEEN EONIA AND EXCESS LIQUIDITY¹

Definitions of excess liquidity

Excess central bank liquidity can be defined in different ways. The most common measure of excess liquidity is what we here call daily excess liquidity (EL). Daily excess liquidity is defined as the difference between, on the one hand, the net liquidity provision through open market operations (OMOs) and the marginal lending facility (MLF) and, on the other hand, liquidity needs. Liquidity needs are the sum of autonomous factors (AF) and the daily reserve requirement (RR). RR is the constant daily reserve requirement if counterparties fulfil their requirement perfectly smoothly. Daily excess liquidity is then:

$$EL_t \equiv OMO_t + MLF_t - AF_t - RR. \quad (2)$$

As all central bank liquidity flows back to the central bank, daily excess liquidity can equivalently be written as the sum of the recourse to the deposit facility (DF) and the daily reserve surplus, i.e. the difference between current accounts (CA) and RR:

$$EL_t \equiv DF_t + CA_t - RR. \quad (3)$$

With variable rate tenders and benchmark allotment daily excess liquidity is close to zero by construction. In other words, counterparties fulfil their reserve requirement smoothly, i.e. on most days their current accounts will be fairly close to RR. This was the general pattern prior to the crisis and is illustrated by the fourth maintenance period of 2007 in Chart 12.

With the start of money market tensions in August 2007 counterparties developed a preference not to fulfil their reserve requirement smoothly but instead to frontload reserve requirements. This preference was met, starting on 14 August 2007, with allotment greater than the benchmark earlier in the maintenance period. Starting on 15 October 2008 full allotment at fixed rates was introduced, rendering liquidity provision completely demand determined. This allowed for a much stronger frontloading and greater amounts of liquidity, as can be seen in Chart 13.

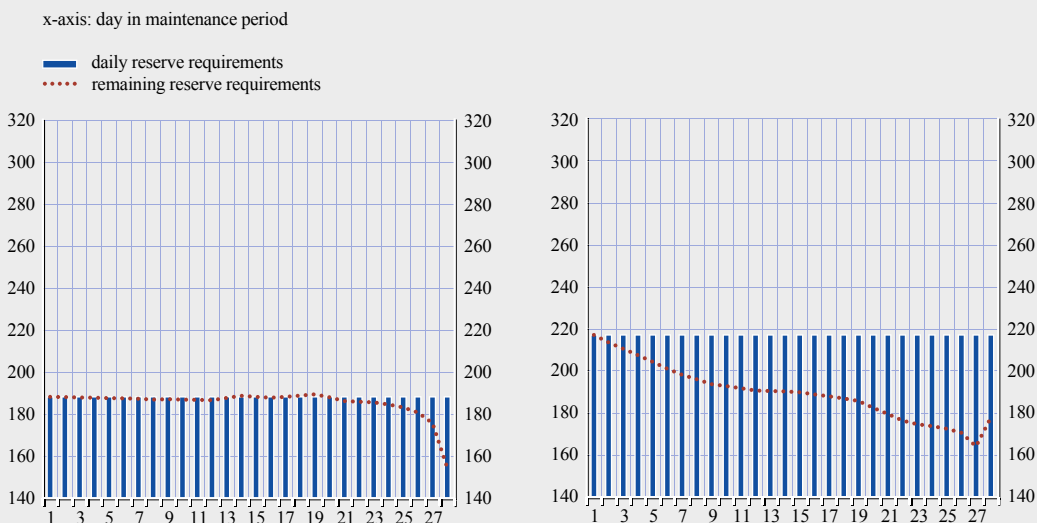
When liquidity conditions are not close to balanced, then daily excess liquidity becomes a less accurate measure of liquidity conditions as the definition of daily excess liquidity assumes the counterparties fulfil their reserves smoothly, i.e. maintain CA close to RR on a daily basis. However, when counterparties hold a reserve surplus, i.e. $CA > RR$, then the daily reserve requirement remaining to be fulfilled in the rest of the maintenance period falls below RR. The daily average remaining reserve requirement equals the total reserve requirement in the maintenance period minus the sum of all current accounts until the previous day, divided by the number of days remaining within the maintenance period:

$$RRR_t \equiv \frac{T \times RR - \sum_{i=1}^{t-1} CA_i}{T - t + 1}. \quad (4)$$

¹ The material of this box stems from Eser and Manganelli (2012) where it is discussed in more detail.

Chart A Daily reserve requirements and remaining reserve requirements for the fourth maintenance period of 2007 (left-hand scale) and the eleventh maintenance period of 2008 (right-hand scale)

(EUR billion)



Source: ECB.

Chart A shows remaining reserve requirements for two maintenance periods representing the two environments of balanced liquidity conditions on the left and higher excess liquidity on the right. In an environment of balanced liquidity conditions the remaining reserve requirements correspond very closely to the constant RR (see the left-hand scale). Only on the final days of the period do remaining reserve requirements fall below the daily reserve requirement. This could be one explanation for the finding in the pre-crisis literature, e.g. Hirsch et al. (2007), that there is generally no within-period liquidity effect on EONIA, except on the final days of the maintenance period following the latest MRO allotment.²

In contrast, the right-hand scale shows how in an environment of excess liquidity counterparties' frontloading of reserves fulfilment reduces the daily remaining reserve requirements below RR. We can define a measure of accumulated excess liquidity (AEL) which takes into account how frontloading reduces remaining reserve requirement:

$$AEL_t \equiv OMO_t + MLF_t - AF_t - RRR_t, \quad (5)$$

We can decompose accumulated excess liquidity into daily excess liquidity and frontloading excess liquidity (FEL):

$$AEL_t \equiv EL_t + FEL_t, \quad (6)$$

where we define frontloading excess liquidity as the accumulated excess reserves per remaining day:

$$FEL_t \equiv \frac{\sum_{i=1}^{t-1} (CA_i - RR)}{T - t + 1} \quad (7)$$

² See also Bindseil and Seitz (2001), Würtz (2003) and Moschitz (2004).

Thus, frontloading excess liquidity is the difference between the constant daily reserve requirement RR and the remaining reserve requirement:

$$FEL_t \equiv RR - RRR_t. \quad (8)$$

The definition of accumulated excess liquidity nests that of daily excess liquidity in the sense that, if counterparties fulfil their reserve requirements perfectly smoothly, the daily reserve requirement is equal to RR , frontloading excess liquidity is zero and accumulated excess liquidity is equal to daily excess liquidity.

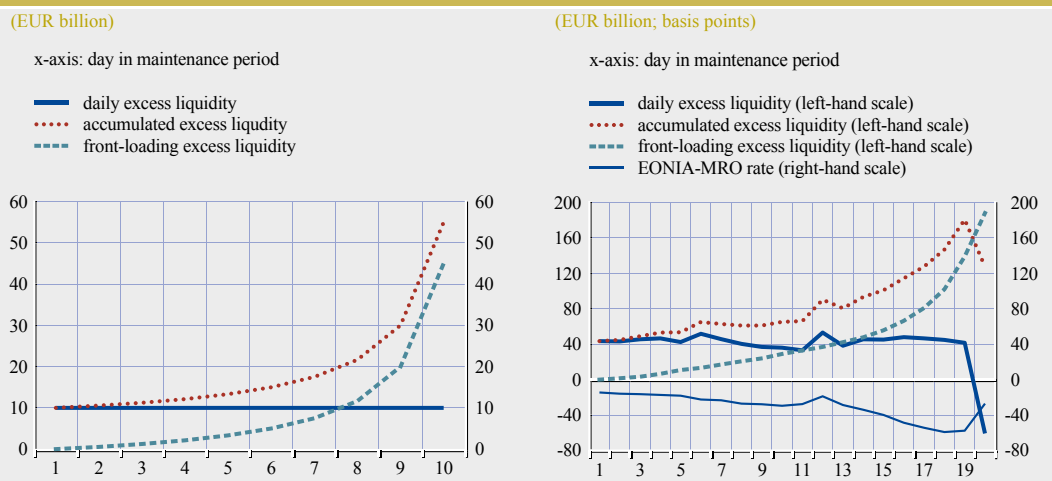
Intra maintenance period liquidity effects

The different liquidity measures are illustrated in Chart B (left-hand scale). For illustrative purposes it is assumed there that daily excess liquidity is constant. If some of the daily excess liquidity remains on current accounts rather than on the deposit facility, frontloading excess liquidity grows over time and so does accumulated excess liquidity. Chart B (right-hand scale) plots the different liquidity measures and the EONIA as observed over a series of maintenance periods in which strong within-maintenance period patterns could be observed. Similar to the stylised example on the left-hand scale, daily excess liquidity was in fact relatively stable over the maintenance period, except for a blip on the final day due to end-of-period fine-tuning operations. However, frontloading excess liquidity and accumulated excess liquidity both trend upwards. The movement of the EONIA spread exhibits meanwhile a clear within-period pattern as well as a negative relationship to accumulated excess liquidity.

Time series

Chart C plots time series for the EONIA spread, daily excess liquidity, frontloading excess liquidity and accumulated excess liquidity.

Chart B (Accumulated) excess liquidity: stylised (left-hand scale), averages from the tenth maintenance period of 2010 to the third maintenance period of 2011 (right-hand scale)



Source: ECB.

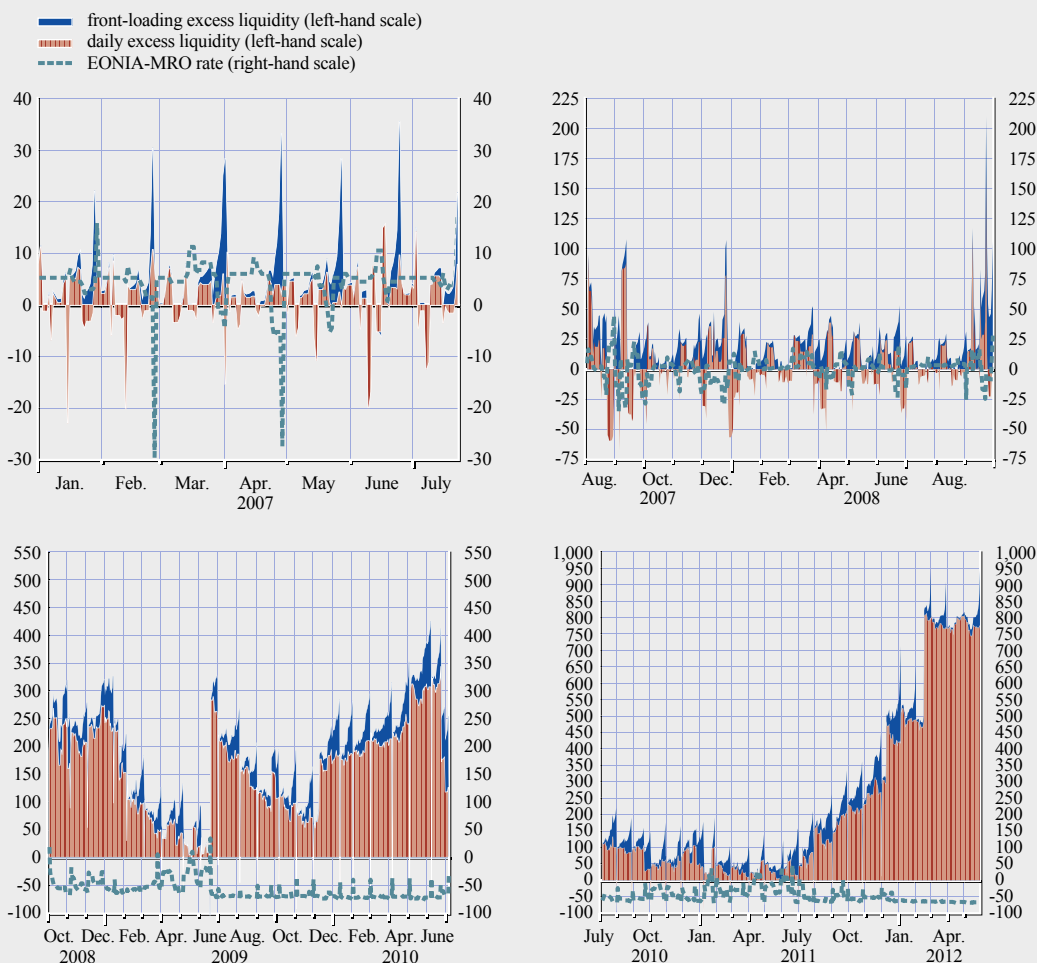
Note: On the right-hand scale, the actual values are standardised to a maintenance period with 20 business days and then averaged across the maintenance periods.

The top left panel captures the pre-crisis period. EONIA was usually around five basis points above the MRO rate, with an occasional downward spike at the end of the period, which in fact coincides with spikes of FEL. This observation is consistent with the pre-crisis results in Würtz (2003) and Bindseil and Seitz (2001) who find a within-period liquidity effect only in the final week of the maintenance period when benchmark allotment cannot correct liquidity imbalances.

The top right panel shows the period of money market tensions before the adoption of fixed rate full allotment. The satisfaction of frontloading preferences lead to greater volatility of liquidity and EONIA but both continue to be steered. The lower two panels show the period of fixed rate full allotment when liquidity provision became demand driven, resulting in much more volatile liquidity conditions and, at times, significant excess liquidity. We also see that where there are large volumes of excess liquidity, EONIA exhibits low volatility as EONIA remains close to the deposit facility rate.

Chart C Time series of excess liquidity and the EONIA spread

(EUR billion; basis points)

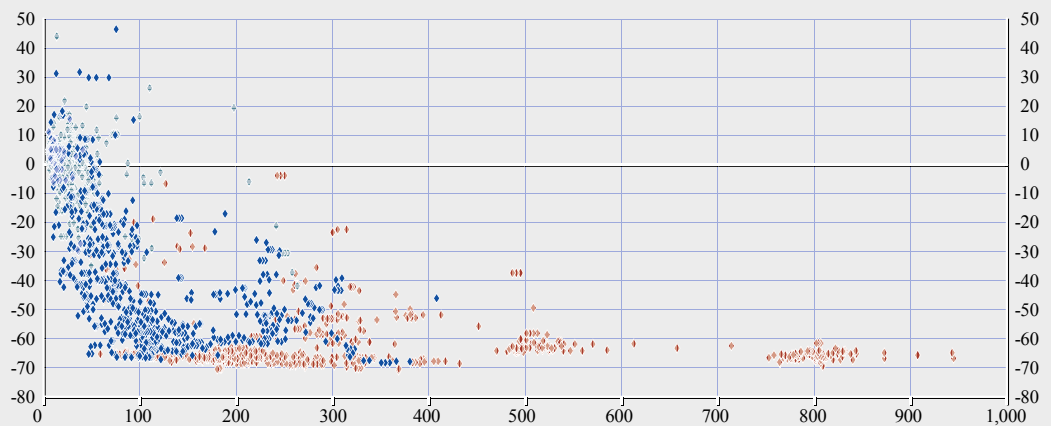


Source: ECB.
Note: The EONIA spread is EONIA-MRO rate.

Chart D The relationship between EONIA spread and accumulated excess liquidity

x-axis: accumulated excess liquidity, € billion
y-axis: EONIA spread, basis points

- ◆ fixed rate full allotment: liquidity needs not fulfilled by LTROs (since 15 October 2008)
- ◆ fixed rate full allotment: liquidity needs fulfilled by LTROs (since 15 October 2008)
- ◆ variable rate tenders (7 August 2007 to 14 October 2008)
- ◆ variable rate tenders (1 January 2007 to 6 August 2007)



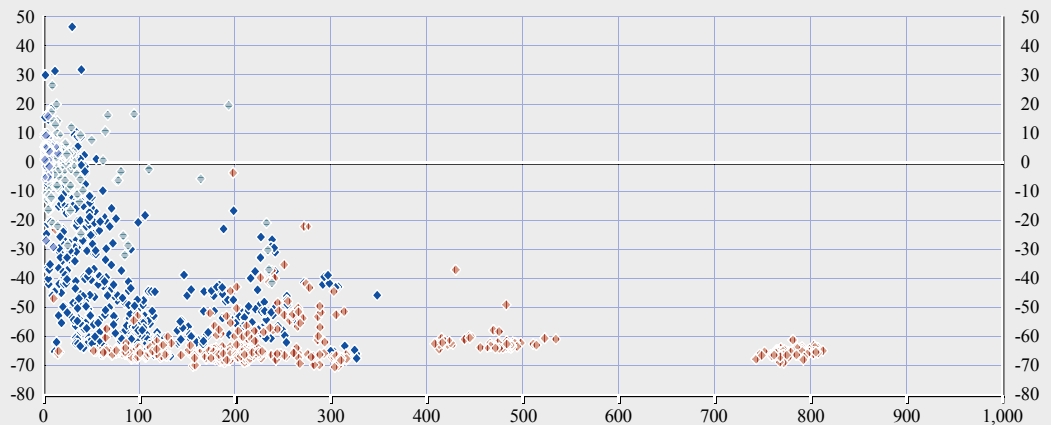
Source: ECB.

Note: The EONIA spread is normalised to a corridor width of ± 75 basis points.

Chart E The relationship between EONIA spread and daily excess liquidity

x-axis: daily excess liquidity, € billion
y-axis: EONIA spread, basis points

- ◆ fixed rate full allotment: liquidity needs not fulfilled by LTROs (since 15 October 2008)
- ◆ fixed rate full allotment: liquidity needs fulfilled by LTROs (since 15 October 2008)
- ◆ variable rate tenders (7 August 2007 to 14 October 2008)
- ◆ variable rate tenders (1 January 2007 to 6 August 2007)



Source: ECB.

Note: The EONIA spread is normalised to a corridor width of ± 75 basis points.

Cross-section

The patterns discussed can also be seen in a cross-sectional plot between the EONIA spread and accumulated excess liquidity (Chart D). The green observations correspond to the top left panel in Chart C, while the red observations correspond to the top right panel.

In relation to the fixed rate full allotment period, we can, in addition, distinguish two regimes. In the first, captured by the blue observations, liquidity needs within a maintenance period are not fulfilled by LTROs extending beyond the end of the maintenance period. For AEL between zero and about €10 billion we observe a noisy but clear linear relationship between EONIA and AEL. Above €125 billion EONIA is largely flat. If liquidity needs in the maintenance period are completely satisfied by LTROs maturing after the end of the maintenance period, captured by the orange observations, then EONIA appears more or less completely flat and low.

Chart E is similar to Chart D except that instead of accumulated excess liquidity, daily excess liquidity is used. Especially when daily excess liquidity is between zero and €100 billion we see that the relationship between EONIA and daily excess liquidity is much noisier than that between EONIA and accumulated excess liquidity.

10.3 EONIA VOLUME

Not only has the behaviour of EONIA changed, in addition, underlying trading volumes declined due to developments in liquidity conditions, increasing money market frictions and the related increasing preference for secured trading as opposed to unsecured trading.

Table 7 shows that this trend for lower activity in the unsecured market appears to have also reached the market for overnight maturity, with the EONIA volumes that had recovered since the maturity of the first 12-month LTRO recently having again somewhat declined, remaining at relatively low levels to the end of the sample.

Table 7 EONIA volume

(in EUR billion)												
	MP1 2009	MP2 2009	MP3 2009	MP4 2009	MP5 2009	MP6 2009	MP7 2009	MP8 2009	MP9 2009	MP10 2009	MP11 2009	MP12 2009
Mean	39.0	44.8	47.5	38.0	33.9	33.4	30.2	34.2	35.9	38.7	38.1	27.2
Standard Deviation	3.2	7.0	6.4	15.3	8.7	9.9	4.6	3.0	6.1	5.0	6.3	11.2
	MP1 2010	MP2 2010	MP3 2010	MP4 2010	MP5 2010	MP6 2010	MP7 2010	MP8 2010	MP9 2010	MP10 2010	MP11 2010	MP12 2010
Mean	27.1	27.0	25.1	26.1	24.7	35.4	46.9	44.3	46.7	46.2	41.1	40.4
Standard Deviation	3.4	2.9	8.8	3.9	5.9	10.6	8.4	5.1	6.8	11.2	5.7	9.4
	MP1 2011	MP2 2011	MP3 2011	MP4 2011	MP5 2011	MP6 2011	MP7 2011	MP8 2011	MP9 2011	MP10 2011	MP11 2011	MP12 2011
Mean	40.9	41.1	39.4	35.2	29.4	26.0	27.1	26.9	32.6	33.3	31.4	29.2
Standard Deviation	14.1	5.1	5.1	13.8	5.2	3.8	4.5	3.9	6.2	6.8	4.7	7.7
	MP1 2012	MP2 2012	MP3 2012	MP4 2012	MP5 2012							
Mean	30.1	30.6	28.1	28.0	21.5							
Standard Deviation	2.9	6.0	2.3	3.8	5.2							

Source: ECB.

Box 4

INTERBANK LENDING: THE EFFECT OF EXCESS LIQUIDITY AND CORRIDOR WIDTH

The relationship between interbank trading and excess liquidity

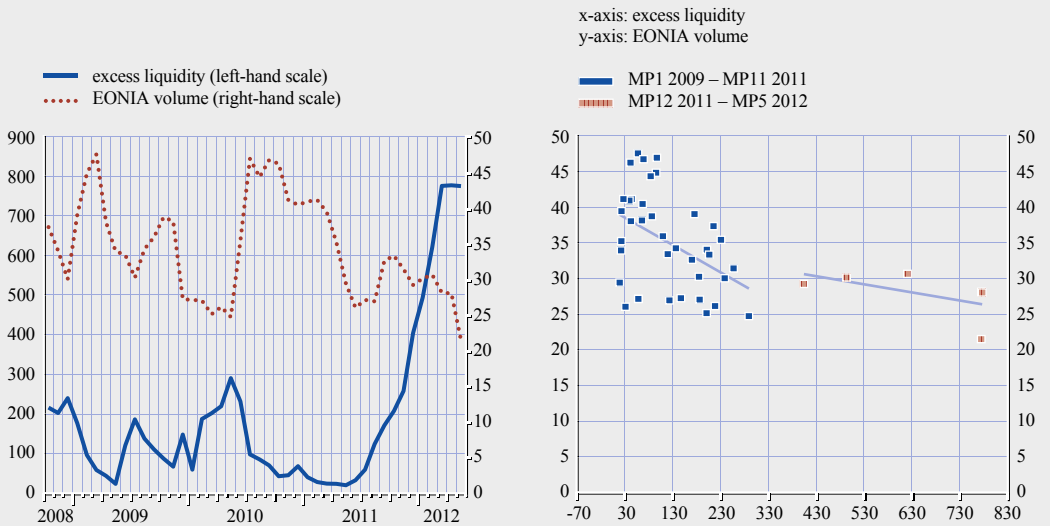
This box investigates the relationship between interbank market activity and excess liquidity. In the regime of variable rate tenders with benchmark allotment, liquidity conditions are largely neutral. In that case excess liquidity is virtually zero and has no impact on the volume of interbank trading.

In contrast, since the beginning of fixed rate full allotment in the tenth maintenance period of 2008, a significant negative relationship between EONIA volumes and excess liquidity can be observed (see Chart A). This reflects a replacement of interbank intermediation by central bank intermediation. While the negative relationship between excess liquidity and EONIA volumes seems to hold relatively well especially up to the middle of 2010, in the course of 2010 into 2011 excess liquidity was relatively low while, at the same time, EONIA lending also fell. Similarly, in the second half of 2011 excess liquidity increased without EONIA volumes falling markedly. However, following the allotment of the two 36-month operations EONIA volumes fell again to some extent.

Chart B shows the relation between secured overnight lending, as represented by the Eurex Repo's Euro GC Pooling Overnight (GCPION) volume, and excess liquidity. Here, too, we see a negative relationship which is, however, not as strong as that for unsecured lending. This relatively weaker relationship between excess liquidity and GCPION volumes may be explained – at least in part – by the general increase in secured versus unsecured lending discussed, which is discussed in European Central Bank (2012a). This, in turn, may also explain why in Chart A through 2010 into 2011 unsecured lending has been falling despite relatively low levels of excess liquidity.

Chart A Excess liquidity and unsecured overnight EONIA lending

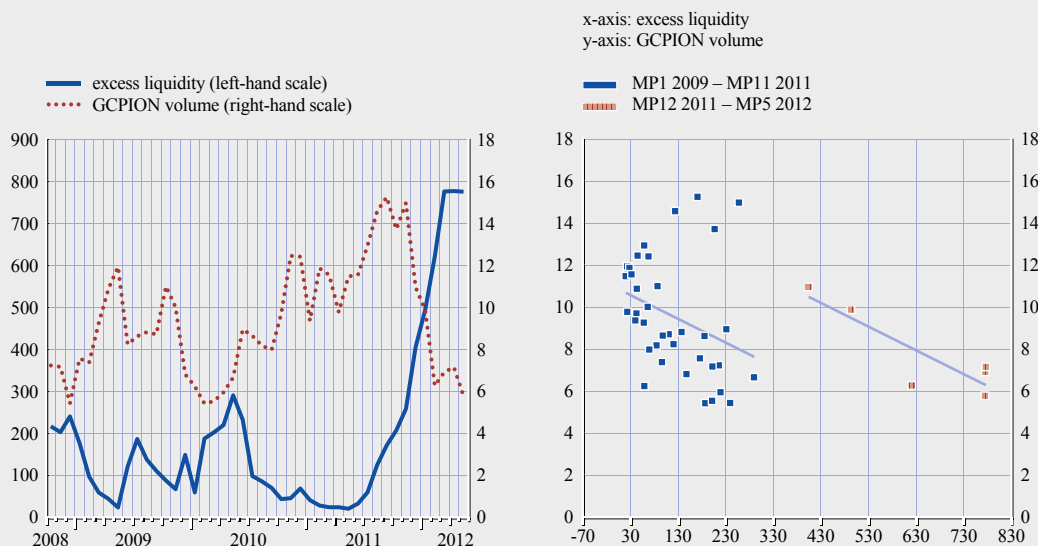
(EUR billion)



Source: ECB.

Chart B Excess liquidity and secured overnight GCPION lending

(EUR billion)



Sources: Bloomberg and ECB.

Interbank activity, corridor width and excess liquidity

Interbank market activity is also sensitive to the width of the corridor set by the standing facilities. The width of the corridor determines the opportunity cost of interbank trading. While the usual width of the corridor has been ± 100 basis points, it was reduced to ± 50 basis points during the eleventh and twelfth maintenance periods of 2009, following the introduction of fixed rate full allotment. In that period, EONIA volumes were relatively low. This may, however, also have been due to higher excess liquidity or a reluctance to lend due to perceived credit risk as well as the underlying shift towards secured lending. From the first maintenance period of 2010 the corridor width of ± 100 basis points was re-established, before it was reduced to ± 75 basis points with effect from the fifth maintenance period of 2010 when the main refinancing rate was reduced to 1%.

The following simple linear regression quantifies the importance of the different effects. Maintenance period averages from the first maintenance period of 2007 to the eleventh maintenance period 2011 are used. EONIA volume is regressed, first, on a constant; second, in relation to excess liquidity, interacted with a dummy for the fixed rate full allotment periods so that the model assumes that there is a relationship between excess liquidity and EONIA volume only when there actually is excess liquidity; third, in relation to the width of the corridor, measured in terms of the difference between the main refinancing rate and the deposit facility rate; fourth, in relation to GCPION volume in order to control for variations in secured interbank lending; and, fifth, in relation to credit risk in terms of the three-month EURIBOR-OIS spread:

$$EONIAvol = \beta_1 + \beta_2 d^{FRFA} EL + \beta_3 Corridor + \beta_4 GCvol + \beta_5 3mEuriborOis \quad (10)$$

Determinants of EONIA volume, regression results

	β_1	β_2	β_3	β_4	β_5
Coefficient	27.91	-0.06	0.22	-0.51	0.07
(t-statistic)	(2.97)	(-4.46)	(2.41)	(-1.56)	(2.20)
	R-squared				0.63

As shown in the table, all regression coefficients are statistically significant, with the exception of the GCPION volume. The lack of statistical significance of the GCPION volume may be due to the fact that secured overnight lending is also affected by credit risk which is also captured in the regression through the three-month EURIBOR-OIS spread. In particular, corridor width, excess liquidity under fixed rate full allotment and credit risk are statistically significant. Increases in excess liquidity are associated with lower EONIA volumes, as are increases in secured overnight lending. Importantly, even controlling for excess liquidity and credit risk, the width of the standing facilities corridor appears to have a significant effect on unsecured overnight lending.

¹ The optimal width of the corridor is discussed, for instance, in Bindseil and Jablecki (2011).

II CONCLUSION

This paper has given a comprehensive overview of the use of the Eurosystem's monetary policy instruments since the introduction of the fixed rate full allotment procedure in all operations since October 2008. It documents the changes in the Eurosystem balance sheet which are driven in particular by the size of open market operations under fixed rate full allotment. On the liability side, increased provision of central bank liquidity shows up necessarily in the form of increased recourse to the deposit facility. Recourse to the deposit facility thus does not indicate in itself how much interbank trading is taking place and what banks do with the central bank liquidity they have obtained. As the maturity of the first 12-month longer-term operation (LTRO) has shown, reduced demand in fixed rate full allotment operations allows the Eurosystem balance sheet to automatically contract when warranted by market conditions.

The data on participation in operations underlines the breadth and versatility of the operational framework. While the number of credit institutions has fallen by around 5% since the start of 2009, over the same period the number of credit institutions eligible to participate in open market operations has risen by 1%. Thus, the share of credit institutions eligible for open market operations has risen by nearly 15% over the period. Actual participation has also been significant, with demand in longer-term operations generally crowding out demand in shorter-term operations. Of all the supplementary LTROs introduced in response to the crisis, 6-month LTROs have tended to attract the least demand.

In relation to minimum reserves and their fulfilment, fixed rate full allotment has allowed for particularly pronounced frontloading. There appears to be a strong relation between the volume of excess liquidity and the degree of frontloading of reserve requirements. Similarly, recourse to the deposit facility over the maintenance period as a whole is a reflection

primarily of excess liquidity, while within the maintenance period recourse to the deposit facility tends to rise due to the frontloading of reserve requirements.

All in all, the Eurosystem's monetary policy instruments have proven effective and versatile. Not least the allotment of two 36-month LTROs, allotted in December 2011 and February 2012 using the fixed rate full allotment tender procedure, appears to have been instrumental in significantly reducing liquidity risk emanating from the euro area banking system, thereby breaking the upward trend in term spreads and rising credit default swap premia in relation to euro area banks.

To some extent money market conditions and use of the fixed rate full allotment procedure pose a trade-off between the objective of steering money market rates and other important objectives such as the promotion of orderly money markets. While under benchmark allotment with variable rate tenders liquidity conditions and money market conditions could be effectively steered to the MRO rate, under the fixed rate full allotment policy interbank overnight rates can exhibit greater volatility. However, if liquidity provision exceeds a certain level, volatility once again decreases, but overnight interbank market rates remain close to the deposit facility and not the MRO rate. Nonetheless, once conditions warrant the phasing-out of the fixed rate full allotment procedure, the reduction in excess liquidity will lead interbank market rates back to the MRO rate. For intermediate levels of excess liquidity the concept of accumulated excess liquidity proves useful to explain interbank market rates.

In relation to the programmes of outright purchases for monetary policy purposes, the focus in this paper has been on their liquidity impact. While the liquidity from the Covered Bond Purchase Programmes has not been sterilised, the fine-tuning operations have generally successfully offset the liquidity impact of the Securities Markets Programme.

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