

# Monetary Policy Implementation during the Crisis in 2007 to 2008

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Since the outbreak of turbulence in the financial markets in August 2007, the implementation of monetary policy – typically a peripheral aspect for observers of monetary policy – has attracted increased attention. The heightened attention was accompanied by uncertainty about how to interpret the liquidity measures taken and what to make of the new instruments introduced. This contribution provides the facts needed to properly understand central bank measures by focusing on the euro area and the U.S.A. Essentially, observers need to be aware that today, the main avenue of monetary policy implementation is interest rates rather than monetary aggregates such as the monetary base. Moreover, adjusting the liquidity implementation framework is not necessarily tantamount to changing the monetary policy stance. Finally, the specific institutional frameworks of individual central banks have a bearing on how they implement monetary policy. The contribution concludes with a description of possible techniques for implementing monetary policy under very low interest rates.<sup>1</sup>

JEL classification: E43, E58

Keywords: monetary policy implementation, financial crisis, operating procedures, money market, quantitative easing

Since August 2007, the operational framework for the implementation of monetary policy, usually a peripheral aspect of monetary policy, has moved into the limelight, as central banks have among others provided large-scale liquidity injections, introduced new longer-term refinancing operations (LTROs), extended the list of assets eligible as collateral for monetary policy operations, bought mortgage-based securities and commercial paper, moved to a fixed rate tender procedure with full allotment for the main refinancing operations, and launched new lending programs. While the monetary policy stance – which is epitomized by the policy rate – has always been closely monitored, observers used to take little note of the instruments with which central banks keep market interest rates closely aligned with official interest

rates, at least as long as the times were tranquil. The actual implementation of monetary policy was considered a technical issue; accordingly, it was often not well understood.<sup>2</sup>

Consequently, there was frequent uncertainty about how to interpret central banks' measures when the financial crisis erupted. For instance, do operations providing liquidity on a large scale signify policy easing? Also, how do the monetary policy measures of the European Central Bank (ECB) compare with those of the Federal Reserve System (Fed)? Finally, what does “quantitative easing” mean?

This contribution uses an explanatory overview of the general features of monetary policy implementation to provide a better understanding of the measures taken during the one-and-a-half years to February 2009. The pre-

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<sup>2</sup> This applies even to academic research on monetary policy, which is frequently based on a stylized presentation in which the monetary base is accorded a key role in the implementation of monetary policy that it does not actually have in practice. Among other things, such a perspective results in the misconception that reserve requirements serve to control money supply, or that the central bank steers interest rates by adjusting the monetary base (Borio, 1997, pp. 9–10). Using examples in the literature on liquidity effects, the bank lending channel and sterilized foreign exchange intervention, Disyatat (2008) demonstrates the problems inherent in models based on monetary aggregates.

Refereed by:  
Ulrich Bindseil, ECB

sentation concentrates on the U.S.A. and the euro area as cases in point, but the policy of other central banks is easily understood by analogy.

Section 1 sketches out the main elements of monetary policy implementation and delineates some of the major differences between the approaches of the ECB and the Fed prior to the onset of the turmoil in the summer of 2007 as the basis for the interpretation of their measures after August 2007. These are then discussed in section 2. Section 3 deals with the worsening of the turmoil after the collapse of Lehman Brothers, the U.S. investment bank, in mid-September 2008. In retrospect, central banks were all faced with similar challenges to policy implementation, and, subject to differences in their operational frameworks, they reacted similarly to these challenges. The types of instruments and their use tended to converge.

Meanwhile, the interest rate cuts in the wake of the marked deterioration of the economic outlook since fall 2008 have raised new policy implementation issues, especially that of how to ease monetary policy further when interest rates are already very low. Currently, it is not clear to what extent individual central banks will take nonstandard measures, i.e. measures other than adjusting interest rates, and what measures these might be. Consequently, section 4 closes with some general considerations about monetary policy and policy implementation in a low-interest rate environment.

## 1 The Operational Framework for Implementing Monetary Policy

Before embarking on the discussion of monetary policy implementation, it is

appropriate to briefly clarify the difference between monetary policy strategy itself and its implementation.

### 1.1 Strategic and Operational Targets

As a rule, the tasks of central banks are laid down in their respective statutes. For example, the primary objective of the European System of Central Banks (ESCB) is “to maintain price stability”; moreover “without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Community” (Article 105(1) of the Treaty). The Bank of England Act 1998 also mandates price stability as the objective of the Bank of England (BoE), and, subject to that, calls on the BoE to support growth and employment. The mandate of the Fed is defined more broadly: In addition to the requirement of maintaining stable prices, it calls for monetary policy commensurate with long-run potential growth, maximum employment and moderate long-term interest rates.<sup>3</sup>

Whether a central bank targets low inflation or full employment, it cannot control these strategic targets directly; it can only attempt to reach these targets through the implementation of monetary policy measures. Policy implementation is done through an operational target that must comply with two criteria: First, the operational target must be such that the central bank is well equipped to control it, and second, the operational target must have a predictable causal relationship with strategic targets, allowing the central bank to control the strategic target by controlling the operational target.

There is a broad consensus among central banks that the best primary target is a very short-term interest rate

<sup>3</sup> For a more detailed presentation of the differences, see e.g. Crespo Cuaresma and Gnan (2008).

(Borio, 1997).<sup>4</sup> In most cases, this is the overnight rate – the interest rate at which banks lend immediately available funds, namely their deposits or balances with the central bank, to another bank. While such a very short-term rate does not play an immediate role for spending and investment decisions, the short-term interest rate and expectations about its future course determine the level of longer term rates, i.e. the yield curve. Long-term rates in turn are reflected in decisions taken in the real economy and thus in the end have an impact on central banks' strategic targets. The process by which changes in short-term interest rates are passed on to the economy in general is called the “monetary policy transmission mechanism.” Precise steering of short-term interest rates coupled with a stable transmission mechanism allows central banks to reach their strategic targets (ECB, 2004).

## 1.2 Supply and Demand for Central Bank Balances, Minimum Reserves, and Short-Term Interest Rates<sup>5</sup>

The market for central bank balances (bank deposits at the central bank), which determines short-term interest rates, has some special features. On the one hand, the central bank is the monopoly *supplier* of such balances and can create these at will. On the other hand, the central bank has a strong in-

fluence on the *demand* for central bank balances. This demand results from the reserve requirements, which the central bank determines, and the prominent role that central banks play in the payment system. Being able to control both supply and demand equips central banks to steer overnight rates very accurately.

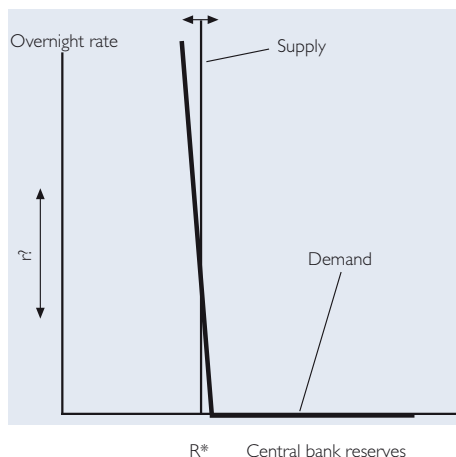
For banks, holding balances with the central bank is a necessity. These balances are as good as cash, and may be essential for achieving payment finality, as in some jurisdictions payments can only be settled with finality in central bank money. Central bank money also plays a pivotal role in electronic payment systems that transmit payments between banks. From a commercial bank's view, its balances with the central bank are comparable to cash in a consumer's pocketbook: The bank will try to have balances at a level that is high enough for it to execute all transactions, even ones that come as a surprise, just like a consumer tries to have enough cash on hand to buy things on a whim, if necessary. Like cash, reserves held at the central bank do not bear interest, or at least not an attractive amount of interest, however, so that banks, like consumers, will try to keep these holdings as small as possible. This means that demand for balances for transactions purposes will react very little to changes in price (in the overnight rate) and is therefore very inter-

<sup>4</sup> An alternative target, previously used by the Fed among others, is the size of bank balances with central banks. While these aggregates can be easily controlled by central banks as well, this method is subject to constraints, which eventually prompted the Fed to return to steering the federal funds rate, the rate that banks charge each other for overnight loans. See Bindseil (2004) on the Fed and Bundesbank, and Tucker (2004) on the Bank of England.

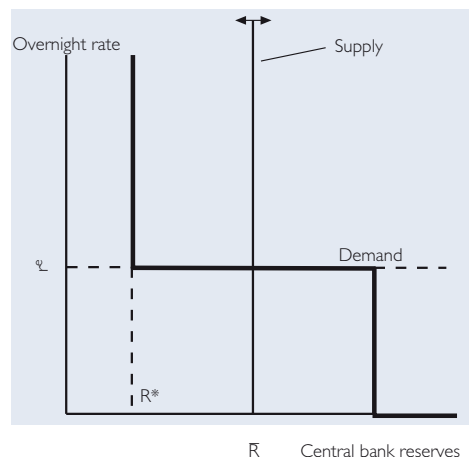
<sup>5</sup> Most central banks have made available detailed descriptions of their operational frameworks. ECB (2004) gives an introductory overview of the ECB's framework; the related technical documentation is available in ECB (2008). Readers interested in policy implementation in the U.S.A. will find easily accessible information in Fed (2005). Whereas Bank of England (2008) is not targeted at a general readership, it does provide a useful introduction to the techniques used to control overnight rates that extends beyond the specific situation of the BoE. The fundamental similarities between central banks are more easily discernible in comparative works, however, like those regularly published by the Bank for International Settlements (BIS). Subsection 1.2 is heavily based on Borio (1997, 2001). The monograph by Bindseil (2004) includes a detailed, rather advanced-level discussion and in addition provides a description of the evolution of policy instruments over time.

**Demand for Central Bank Balances**

**Market for Reserve Balances without Reserve Requirements**



**Market for Reserve Balances with Reserve Requirements**



est-inelastic, as evidenced by the vertical curve of the demand function in Chart 1 (left panel): Demand for the transaction balance, or reserves,  $R$  is independent of, or hardly dependent on, interest rate  $r$ . Without intervention by the central bank, even tiny fluctuations in demand for balances would lead to very strong interest rate fluctuations, given fixed supply (with the central bank as the monopoly supplier). If the demand of all banks exceeds the supply of central bank money, the interest rate rises very sharply, as banks are hardly willing to forgo the reserves that they urgently need even if interest rates are high. Conversely, if demand is only slightly lower than central bank supply, many banks will try to shed excess balances, but will not find any takers: the price (interest rate) declines toward zero.

The best way to understand the supply of central bank balances is to study the central bank’s balance sheet. For easier reading, the items in the balance sheet can be rearranged under four categories:

1. Autonomous factors cover all balance sheet items other than those linked with monetary policy operations and central bank balances. Typically, these factors are not under the direct control of the central bank, or, at least, they are not managed within the operational framework of implementing monetary policy. The autonomous factors include banknotes in circulation, general government deposits and the long-term investments of the central bank, and they are found both on the liability side (e.g. banknotes in circulation) and on the asset side (e.g. gold holdings). In monetary policy implementation practice, the autonomous factors are considered a given.
2. Open market operations are part of a central bank’s operational framework. They are conducted on initiative of the central bank with the objective of managing the volume of central bank balances. In open market transactions, the central bank can, e.g., sell or buy assets outright or conclude repurchase agreements

(repos). Under such repos, the central bank buys (sells) securities and simultaneously obtains the right and obligation to resell (repurchase) them at a future date. Whenever open market transactions are conducted, central bank balances are either created or destroyed.

3. Standing facilities are also monetary policy operations, but they are conducted on initiative of banks, unlike in the case of open market operations. The central bank determines the conditions applicable to the standing facilities, whereas the degree of utilization is determined by the eligible counterparties. By way of example, in the euro area there is a liquidity-absorbing deposit facility under which banks can make overnight deposits, and there is a marginal lending facility under which banks can obtain additional liquidity overnight against collateral.
4. Current account holdings with the central bank.

From the central bank's perspective, current account holdings with the central bank represent the balance of the three above-mentioned components. Assuming that the autonomous factors are exogenous, the objective of mone-

tary policy implementation is to wield open market operations and the standing facilities such that the supply of deposits and banks' demand for deposits is in equilibrium at the desired interest rate (chart 1).

As mentioned, the demand for central bank money for transaction purposes is rather interest-inelastic. As a result, the central bank is faced with fairly large interest rate fluctuations. Various technical solutions to this problem are available: Many central banks, including e.g. the ECB and the Fed, operate a minimum reserve system based on averaging provisions.<sup>6</sup> The idea is to give banks a second motivation for holding central bank balances above and beyond the transaction motive: this type of holding reacts more elastically to the interest rate and thus prevents overly large interest rate fluctuations. The reserve requirement in the euro area is such that banks have to hold minimum reserves in excess of the amounts they need for transaction purposes (chart 1, right panel: reserves for transaction purposes  $R^* < \text{average reserve requirement } \bar{R}$ ) – but they do not need to do so every single day: compliance with reserve requirements is determined on the basis of the average

Chart 2

### Stylized Central Bank Balance Sheet

Assets	Liabilities
Gold, foreign exchange	Capital and reserves
Investments	General government balances
Securities purchased under open market transactions	Banknotes in circulation
Liquidity-providing repurchase agreements	Liquidity-absorbing repurchase transactions
Lending facility	Deposit facility
<b>Total assets =</b>	<b>Total liabilities</b>
Central bank balances	
Autonomous factors	
Monetary policy operations	

<sup>6</sup> Canada and Australia, e.g., have systems that do not use minimum reserves (Borio, 1997).

daily balances on the counterparties' accounts over the course of the maintenance period. As long as banks expect the interest rate to be unchanged over this period, it is not important when they hold the required reserves – today, tomorrow or in a week – as long as they hold at least the amount needed for transactions  $R^*$  every day. Averaging substantially increases demand elasticity: If the interest rate is only marginally higher than the expected future rate  $r^e$ , many banks will be willing to lend out their reserves in the expectation that they will be able to comply with the reserve requirement later in the period at lower interest. The reverse applies when the interest rate falls short of the expected future rate  $r^e$ . In fact, demand is perfectly elastic for the interest rate expected for the remainder of the period (chart 1, right panel). Hence, averaging periods act as a buffer. Thus, for central banks, supply management focuses on the last day of the minimum reserve maintenance period when banks have to boost holdings to reach the average or, alternatively, invest balances held in excess of the average. On this day, the market is once again in the same position as in chart 1 (left panel). Under these conditions, the ECB conducts fine-tuning operations that either provide or withdraw liquidity as needed. In the U.S.A., the reserve requirements are substantially lower than in the euro area, and the averaging period is shorter. The principle, though, is the same in both systems.<sup>7</sup>

### 1.3 Provision of Central Bank Money in the Euro Area and in the U.S.A. up to the Summer of 2007

The bulk of central bank money used to be supplied through open market operations in the euro area and in the U.S.A. The Fed resorted primarily to direct purchases and sales of securities and used repos mainly for fine-tuning, e.g. to offset seasonal fluctuations in currency in circulation. The ECB used repos both for structural liquidity-providing operations and to meet peak demand.<sup>8</sup> Essentially, the maturities and frequencies of open market operations are set depending on how often a central bank wants to hold auctions and on how extensively it uses open market operations to manage liquidity. The Fed's approach was to manage central bank balances through daily operations. Thanks to high reserve requirements and the averaging period, the ECB got by on weekly operations plus the above-mentioned fine-tuning operations at the end of the maintenance period; in addition, three-month repos covered part of the structural liquidity need.

Central banks tend to use standing facilities to absorb shocks, e.g. end-of-day and end-of-period shocks when banks have a shortfall of liquidity or excess liquidity. As banks have unlimited access to standing facilities at all times, these instruments prevent market interest rates from fluctuating excessively. In the euro area, the overnight rate cannot rise above the rate on the lending facility (usually the official rate

<sup>7</sup> The BoE applies an interesting variant of the minimum reserve regime: Based on banks' predictions of how volatile their demand for reserves will be, banks themselves determine the amount of minimum reserves prior to the beginning of the maintenance period. The BoE provides interest on reserve holdings if they are close to the reserve target. No interest is paid on excess reserves, and if reserve holdings are below target, the respective bank must pay interest (details in Clews, 2005; for a more basis discussion, see Tucker, 2004).

<sup>8</sup> There are arguments supporting both variants: Direct purchases prevent regular auctions of large volumes of funds. On the other hand, repos should have less of an influence on relative prices; moreover, no decision is required on securities to be purchased.



+100 basis points); at the same time, the interest on the deposit facility (official rate – 100 basis points) prevents the overnight rate from falling too far. In line with their role among the different liquidity-providing operations, standing facilities generally have a maturity of no more than one day. In the U.S.A. reserves were not remunerated until the financial crisis intensified in 2008; the purpose of switching to remuneration was to create a lower limit for the overnight rate along the lines of the ECB deposit facility.

Chart 3 shows the main balance sheet components of the Eurosystem and of the Fed. Given the Fed's heavy reliance on outright purchases of U.S. Treasury securities, such securities predominate on the asset side of its balance sheet. In contrast, the volume of repo operations was insignificant, and the credit facility (discount window) was hardly accessed. Banknotes accounted for the lion's share of liabilities, whereas banks' holdings on current accounts with the Fed were fairly small.

Unlike the Fed, the ECB resorted heavily to repos for its monetary policy operations, whereas volumes under the credit and deposit facilities were insignificant. Banknotes (liabilities) and foreign exchange (assets) predominated among the autonomous factors. Corresponding to the Eurosystem's higher reserve requirements, banks' balances on current accounts with the Eurosystem accounted for a larger share of the balance sheet than in the case of the Fed.

Up to the summer of 2007, both the Eurosystem and the Fed controlled only the overall amount of liquidity available to the banking sector whereas the interbank market was responsible for the intermediation of funds from banks participating in the central bank's monetary policy operations to other banks as well as from banks with excess liquidity to those with a need for liquidity.

Different ranges of counterparties were eligible to participate in monetary policy operations with the ECB and

Chart 3

### Consolidated Balance Sheet of the Fed and the Eurosystem (at the end of 2006)

Fed		Eurosystem	
USD billion		EUR billion	
<b>Assets</b>		<b>Assets</b>	<b>Liabilities</b>
Gold, foreign currency	33.7	Gold, foreign currency	319.0
Float	3.5	Other assets	380.5
Other assets	11.8	Long-term repurchase agreements	120.0
U.S. Treasury securities	783.6	Short-term repurchase agreements	330.5
Repurchase agreements	40.8	Lending facility	0.0
Discount window	0.0		
	<b>873.4</b>		<b>1,150.0</b>
<b>Liabilities</b>			
Capital, other liabilities	67.0		Other liabilities
Government balances	4.7		282.0
Banknotes	783.0		Capital
			66.2
Bank balances	18.7		Banknotes
			628.2
			Deposit facility
			0.1
			Bank balances
			173.5
			<b>1,150.0</b>

Central bank balances
Autonomous factors
Monetary policy operations

Sources: Annual reports of the Fed and the ECB.

with the Fed. In the euro area, in principle all institutions subject to reserve requirements were eligible to participate in open market operations and had access to the standing facilities. While all banks subject to reserve requirements were able to refinance themselves at the discount window in the U.S.A., the Fed conducted the regular open market operations only with 20 investment banks, the primary dealers, most of which in turn had no access to the discount window.

A similar distinction between open market operations and standing facilities was made with regard to the eligible securities. As a rule, central banks require counterparties to collateralize all credit transactions with them using e.g. government securities (Chailloux et al., 2008b; ECB, 2007). In defining which securities are eligible as collateral for regular repurchase agreements, the Fed was very restrictive and admitted only securities issued or guaranteed by the government or another public sector entity. By contrast, the list of securities admitted to the discount window was very long. Along the lines of its treatment of counterparties, the ECB did not apply different eligibility criteria to regular operations and to standing facilities. The eligibility criteria for collateral were broad for both types of operations.

## 2 Changes since the Summer of 2007

To sum up, before the summer of 2007, monetary policy instruments and operational frameworks in the industrialized countries of the West displayed important common features, but there were also some key differences: The

large majority of central banks, including the ECB and the Fed, used a very short-term rate in implementing their monetary policy. In both institutions, the implementation and the transmission of monetary policy impulses relied significantly on well-functioning money and capital markets. There were differences, however, in the composition of the balance sheet, the range of counterparties eligible for monetary policy operations, the eligible securities and the design of the individual monetary policy instruments. As long as the financial markets operated smoothly, these differences were largely irrelevant, though.

All this changed very rapidly when the tensions that had started in the U.S. mortgage lending markets in the spring of 2007 spread to the money markets at the beginning of August 2007. Concerns about the risks attached to subprime mortgage loans led to price losses of subprime-backed securities that quickly cascaded through to other risk-fraught segments of the securities market. Uncertainty about the extent and distribution of losses prompted investors to withdraw to safe-haven investment. When it became known at the end of July 2007 that IKB Deutsche Industriebank AG had sustained huge losses, the crisis spread to Europe as well. Concern about sudden liquidity needs caused banks' demand for funds to rise sharply, and the overnight rate surged to levels far above the official rate. The volume of funds traded declined, and there were signs of rationing. On August 9, 2007, the ECB took the first measures to enhance liquidity; the Fed and other central banks soon followed.<sup>9</sup>

<sup>9</sup> Borio (2008) provides a synoptic account of the years preceding the crisis. For a chronology of the summer months of 2007, see BIS (2007) and the OeNB's *Financial Stability Reports 14 and 15*.



## 2.1 Tensions in Various Financial Market Segments Have Weakened Monetary Policy Transmission Channels

The key role of liquidity in banking results from the particular role banks play in modern economies.<sup>10</sup> The structural discrepancy between short-term borrowing and long-term lending puts banks at the risk of bank runs.<sup>11</sup> While current and savings account deposits by nonbanks are frequently secured by deposit insurance, the risk of a run is also given in the unsecured segment of the money market, which has become increasingly important in recent years (Borio, 2007). Expectations play a major role, also in the banks' management of their own liquidity: If banks, for instance, anticipate difficulties in accessing short-term funding in the interbank market, they will hoard excess funds themselves and will extend less credit to other banks. Like a run, liquidity hoarding turns into a self-fulfilling prophecy and causes liquidity to dry up, even if concerns about other banks' solvency and creditworthiness are unfounded. Central banks consider a liquidity shortage in interbank markets a problem not just because they are specifically responsible for banking and financial stability, but also because a shortage represents a challenge to the stability of the short-term market rate and thus monetary policy implementation.<sup>12</sup>

In the summer of 2007, the first immediate challenge for central banks was to control the overnight rate. Controlling the short-term rate in an oper-

ational framework like the ECB's is based on stable expectations about the development of short-term rates over the reserve maintenance period and on the smooth distribution of liquidity among banks via the interbank market. When the crisis broke out, unstable demand for reserves caused short-term rates to fluctuate, which in turn reduced banks' willingness to lend money. Consequently, the overnight rate – the starting point of the monetary policy transmission mechanism – could no longer be kept in line with the official rate as envisaged (chart 4).

The turbulences had an impact not just on the overnight rate. Banks' worries about their future funding stress boosted their demand for longer-term funding in the interbank markets substantially, which caused the spread of three-month interest rates over expected overnight rates to shoot up (chart 5). This was compounded by concerns about counterparties' creditworthiness.<sup>13</sup> The turmoil in long-term money and foreign exchange markets did not directly hamper the management of the overnight rate, but did affect the transmission from the policy rate through money market rates to the rates relevant for the real economy (IMF, 2008). Therefore, central banks took measures to calm these markets as well.

Additionally, the issue arose of how to adjust monetary policy in reaction to the effects of the financial turmoil on the real economy. This question, however, lies outside the scope of this contribution.

<sup>10</sup> For an overview of the following issues, see e.g. Freixas and Rochet (1997).

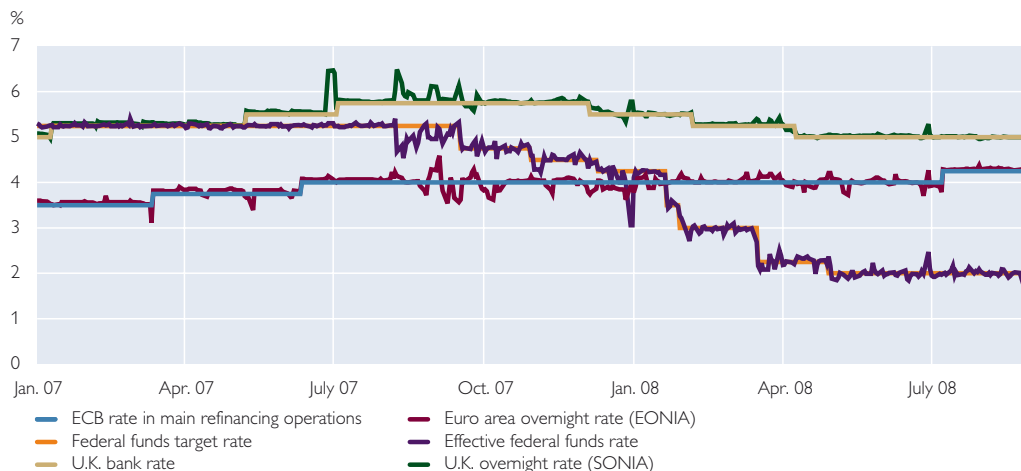
<sup>11</sup> Due to asymmetric information, loans extended by banks are hard to sell or only at a significant discount. Even if a bank could have covered all liabilities originally, illiquidity may turn into insolvency under such circumstances.

<sup>12</sup> Historically, monetary policy as practiced today is a recent central banking task. Liquidity management and the lender-of-last-resort role may thus be viewed as the original functions of central banks. See e.g. Goodhart (1988).

<sup>13</sup> Distinguishing between credit and liquidity risk is difficult empirically; see Michaud and Upper (2008).

Chart 4

**Overnight Rates and Policy Rates until September 2008**



Sources: Thomson Reuters, NCBs.

Chart 5

**Spread between Three-Month Collateralized and Uncollateralized Interbank Loans<sup>1</sup>**



Source: Thomson Reuters.

<sup>1</sup> In the markets for collateralized loans, borrowers provide collateral for funds, usually liquid securities, that the lender may sell upon maturity if the borrower fails to repay the loan.

**2.2 Measures to Facilitate Banks' Liquidity Management<sup>14</sup>**

In principle, monetary policy instruments are designed to ensure a stable supply of liquidity. In the summer of

2007, central banks expanded the set of monetary policy instruments and adjusted it to facilitate banks' liquidity management even further.<sup>15</sup> Four of the dimensions of the policy framework

<sup>14</sup> The ECB's Monthly Bulletin contains a chronology of the most recent monetary policy measures. A dedicated website of the Fed provides insights into the Fed's new instruments and programs (<http://www.federalreserve.gov/monetarypolicy/bst.htm>).

<sup>15</sup> These measures are aimed at all banks eligible to participate in central banks operations. This study does not cover liquidity aid for individual banks (Emergency Liquidity Assistance – ELA – in the euro area).

discussed above are especially relevant to liquidity management (Bindseil, 2009):

1. Availability of securities eligible as collateral for monetary policy operations. The supply of liquidity is more stable if (1) many different types of securities are eligible, (2) a far larger volume of securities is available than is actually used for central bank operations, and (3) these securities are distributed evenly in the banking system.
2. Credit facility: The credit facility is used on individual banks' initiative; it thus provides practically guaranteed access to central bank liquidity.
3. Broad access to central bank operations: In the case of liquidity constraints triggered by distrust among banks, direct access to the central bank provides an alternative distribution mechanism.
4. Reserve averaging allows strong fluctuations in individual bank's daily balances in the short-term, thus helping to absorb liquidity shocks.

In all monetary areas, the central banks' measures followed a similar objective, namely to facilitate liquidity management. However, this objective was implemented in different ways that were contingent on the operational framework in place before the turmoil.

A simple measure employed to give banks more certainty that they would be allocated sufficient liquidity was to conduct more operations with larger volumes. To alleviate the uncertainties at the end of 2007, the ECB provided unlimited liquidity at the turn of the year for two weeks but then conducted

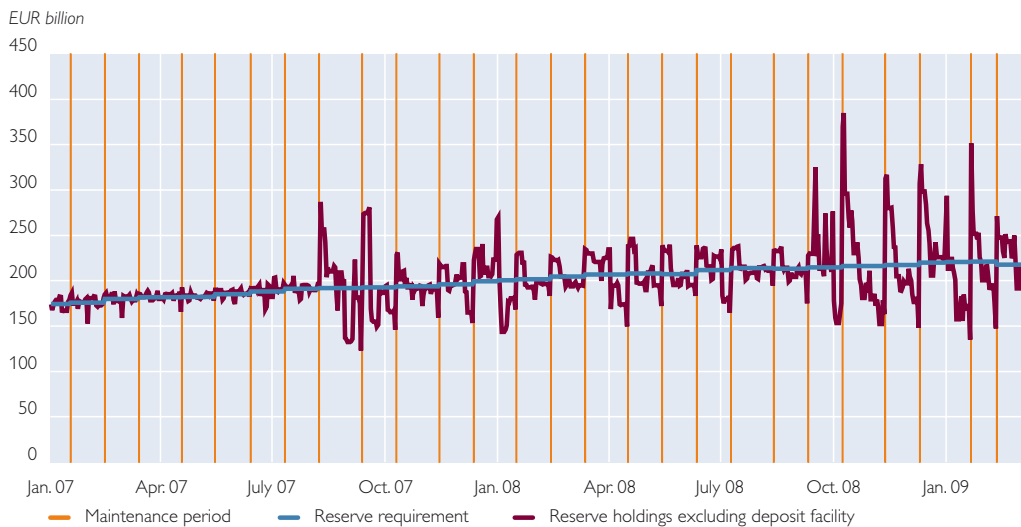
offsetting transactions to reabsorb the liquidity right away. The rationale was to provide every bank individually with sufficient liquidity while preventing excess liquidity that could have exerted pressure on the overnight rate.

In systems with high minimum reserve requirements subject to averaging provisions such as those of the ECB and the Swiss National Bank (SNB), banks could by construction let their daily balances fluctuate sharply. However, as banks were uncertain whether they would have continued access to sufficient liquidity, they had a strong interest in fulfilling their reserve requirements early in the period, which – given that the total supply of central bank liquidity is fixed – not all banks would have been able to do at the same time. Therefore, the ECB and the SNB increased liquidity allocation at the beginning of the period and reduced it by the same measure at the end of the period, a practice referred to as front-loading (chart 6).<sup>16</sup>

At the same time, the central banks had to ensure that liquidity was distributed properly among banks – i.e. that the intermediation of funds within the banking system, which normally occurs through the interbank market, did indeed work properly. A first option that circumvented the dysfunctional interbank market was to widen the range of banks admitted directly to central bank operations. The Fed in particular chose this tack. Traditionally, only a handful of banks were admitted to open market operations with the Fed; the establishment of the Term Auction Facility (TAF) created a similar instrument for a very large group of banks. In exchange, the primary dealers – previ-

<sup>16</sup> The BoE, with its system in which banks choose their reserve targets and pay penalty interest for overshooting or undershooting their own target, reached a similar result by permitting significantly larger deviations around the reserve target.

### Minimum Reserve Requirements and Fulfillment



Source: ECB.

ously eligible to participate only in open market operations – were given access to a credit facility, the Primary Dealers Credit Facility (PDCF).

A second option to facilitate access to central bank liquidity for banks was to expand the list of securities eligible for monetary policy operations. Furthermore, new facilities of the BoE – the Special Liquidity Scheme (SLS) – and the Fed – the Term Securities Lending Facility (TSLF) – allowed banks to swap previously ineligible securities, e.g. corporate bonds, against government securities (Fleming et al., 2009). The government securities acquired under these programs were then available either for private transactions, e.g. as collateral for interbank lending, or for operations with the central bank.

Conversely, the ECB widened neither the range of eligible counterparties nor did it fundamentally change the list of eligible securities,<sup>17</sup> given its pre-crisis open system of counterparties

and comprehensive list of eligible securities. Thereby banks' new needs could be met within the existing framework.

By construction, credit facilities represent further reassurance for banks that they would, ultimately, receive liquidity directly from the central banks. As a rule, the premium that banks pay on the credit facility compared to the main refinancing operation is, however, designed to restrict the use of the credit facility to exceptional situations. To make the credit facility more attractive for banks, the Fed therefore gradually reduced this premium in response to the financial crisis. Yet both in the U.S.A. and in the U.K., recourse to the credit facility was taken as a signal that a bank was in distress. This stigma alienated banks that merely had a temporary liquidity management problem, such as a large end-of-day payment, and prevented them from using the facility. With this experience in mind, the BoE reformed

<sup>17</sup> The ECB expanded the list of securities at the end of October 2008, but tightened the criteria for specific categories of asset-backed securities and uncovered bank bonds in January 2009.

the credit facility from the ground up (Bank of England, 2008). The euro area did not suffer from this stigma; the credit facility fulfilled the function assigned to it.

### **2.3 Measures to Support the Term Money Markets and Foreign Exchange Markets**

As indicated previously, the banks' liquidity concerns produced tensions also in the longer-term money markets. While monetary policy implementation does not target these markets directly, they do play an important role in monetary policy transmission.

Indirectly, the term markets received support from the stabilization of overnight markets already. If banks are certain that they will receive overnight liquidity any time at acceptable terms, their willingness to lend excess liquidity for longer periods grows. However, overall, the crisis caused demand for long-term liquidity to rise in 2007 by relation to the supply available. Consequently, central banks provided relatively higher volumes of funds in long-term operations. The ECB acted first among central banks and started as early as August 2007 to reduce the volumes in the weekly refinancing operations and at the same time to increase the funds provided in three-month LTROs. Moreover, it offered an LTRO with a maturity of six months. Other central banks had to create longer-term refinancing operations from scratch, e.g. the SNB. The BoE also boosted the share of longer-term operations among its liquidity-providing operations.<sup>18</sup>

The constraints in the interbank market were not limited to a single monetary area, but also affected foreign exchange markets (Baba et al., 2008). European banks found it especially difficult to obtain U.S. dollar funding. In December 2007, reciprocal swap agreements (swap lines) between the Fed and the ECB, BoE and SNB, respectively, were concluded to provide European banks with U.S. dollar funding through their central bank. When the turmoil became stronger in September 2008, the tenders were expanded considerably.

### **2.4 Assessment of the Impact of Liquidity Management Measures on Central Banks' Balance Sheets**

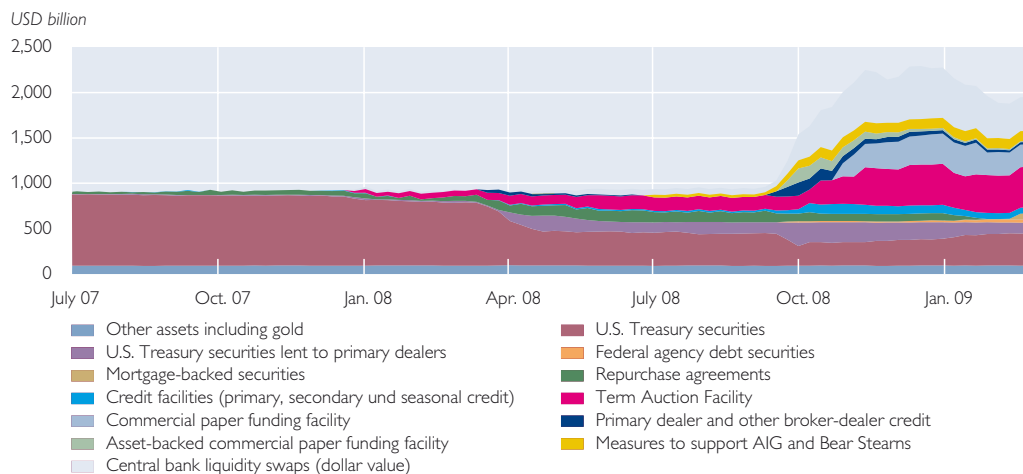
At first glance, the expansion of funding under the existing facilities and the introduction of additional tenders and facilities appeared to create additional liquidity. Formulations such as "central banks flood the market with liquidity" suggested that central banks had expanded the volume of their operations sharply. In actual fact, the size of the large central banks' balance sheets remained unchanged – what did change was the composition of the balance sheets.

For example, as chart 7 shows, the Fed sold U.S. Treasury securities to the same extent as repo operations were extended and new facilities, such as the TAF, were introduced. The chart clearly indicates the operations conducted before the change of the year 2007 to 2008 and the bailout of the

<sup>18</sup> In the case of the Fed, these arrangements were complemented by special programs for specific markets, such as the Term Securities Lending Facility for collateralized money markets, the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility and the Commercial Paper Funding Facility for the commercial paper market, and the Term Asset-Backed Securities Loan Facility for particular segments of the market for collateralized loans. For details on the individual programs and further literature, see in particular <http://www.federalreserve.gov/monetarypolicy/bst.htm>

Chart 7

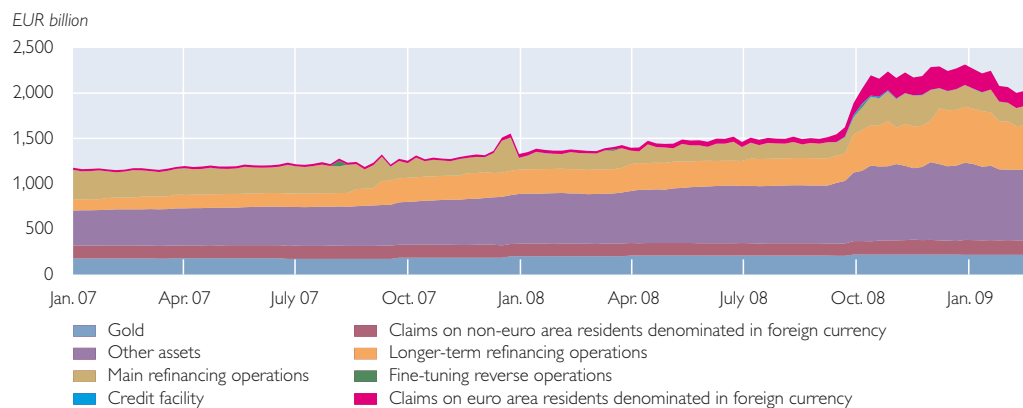
**Consolidated Balance Sheet of the Fed – Assets**



Source: Fed.

Chart 8

**Consolidated Balance Sheet of the Eurosystem – Assets**



Source: ECB.

U.S. investment bank Bear Stearns in spring 2008. Moreover, the Fed lent a growing share of government securities against less liquid eligible collateral to improve primary dealer’s balance sheets. On balance, this adjustment did not have an effect on banks’ reserve holdings with the Fed, nor did it have an effect on the Fed’s total assets.

The expansion of longer-term repos of the BoE, the SNB and the ECB was offset by a reduction of the same size in

short-term repos. Chart 8 shows this shift for the balance sheet of the Eurosystem. The outbreak of the turmoil in summer 2007 did not affect the long-term growth trend of the balance sheet that is driven above all by rising demand for currency in circulation. The balance sheet also shows the temporary operations conducted around the turn of the year. Central banks that expanded the list of eligible securities or that accepted more risky securities



from banks were subject to higher risk; the total size of their balance sheets rose only minimally until fall 2008.<sup>19</sup>

### 3 Measures Taken after the Bankruptcy of Lehman Brothers

When Lehman Brothers, one of the major U.S. investment banks, filed for bankruptcy protection in September 2008, the financial crisis took a dramatic turn for the worse. As an issuer of short-term instruments bought by money market funds, of credit default swaps and as a broker, Lehman Brothers held a key position in important segments of the financial market. The threat that a systemically pivotal bank might not be able to fulfill its obligations weighed heavily on the interbank market. The total volume of trading in the interbank market declined, and banks became very concerned about refinancing. Massive outflows from money market funds unleashed a torrent of sales that extended to all but the safest types of investment. The turmoil spread to other banks, triggering a series of increasingly broader government support packages. From mid-October 2008, the financial markets were buffeted by growing concern about the course of the real economy. Central banks responded with liquidity measures and interest rate cuts (BIS, 2008).

#### 3.1 New Measures

Up until then, the central banks' liquidity measures had supported the interbank market but had depended on a more or less proper functioning of that

market. Under the prevailing conditions, however, this strategy no longer worked. When Lehman Brothers filed for bankruptcy, banks lost all remaining confidence in other market participants, as the jump in risk premiums on uncollateralized loans depicted in chart 5 shows. Many banks with excess liquidity on their hands were no longer willing to lend to other banks with temporary liquidity needs, not even overnight, and the interbank market all but broke down. The option of choice for central banks was to take over the intermediation function.

This strategy was most clearly observable at the ECB. At weekly tenders, the Eurosystem's main refinancing operations, banks previously had to bid for a fixed amount of liquidity determined by the ECB. Although this volume was raised when the ECB front-loaded liquidity allocation to the beginning of the maintenance period, banks remained uncertain whether liquidity would be allotted to them and whether enough liquidity would be available in the interbank market. This uncertainty led to a rise in average bids in the course of September 2008. On October 8, 2008, the weekly main refinancing procedure was held with full allotment at a fixed interest rate, the interest rate on the main refinancing operation. This removed any vestiges of uncertainty about liquidity management for banks. Chart 8 shows the rise in the allotment amount in the main and longer-term refinancing operations.

The Fed provided banks and primary dealers with liquidity under the credit facility, the discount window

<sup>19</sup> The BoE with its reserve targets set by banks represents an outlier. In the U.S.A. and in the euro area, minimum reserves are calculated on the basis of banks' balance sheets. As excess reserves attract no interest or only low interest, banks had little incentive to hold excess reserves, so that the liability side of the central banks' balance sheets remained unchanged. As banks in the U.K. can determine their reserve targets themselves, and as these reserves attract interest, the uncertainty after the summer of 2007 prompted banks to increase their reserve targets, expanding the BoE's balance sheet.

and new programs such as the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility and in conjunction with the government rescue package for the insurance company AIG. Chart 7 also clearly indicates the increase in allotment under the TAF and purchases of commercial paper. In February 2009, the Fed began to acquire mortgage-based securities.

Internationally coordinated measures were taken to supplement the individual central banks' measures. Apart from the joint interest rate move on October 8, 2008, which was aimed at strengthening confidence in the monetary policymakers' ability to act, these measures included efforts to prevent international liquidity bottlenecks. Intercentral bank swap lines were extended, and on October 13, 2008, the Fed, the ECB, the BoE and the SNB announced that they would conduct tenders of U.S. dollar funding at fixed interest rates for full allotment, just like the tenders of the ECB.<sup>20</sup> The financial statements of the Fed and the Eurosystem (charts 7 and 8) reflect the balances from the swap operations and U.S. dollar auctions.

### 3.2 Pressure on Overnight Rates and Liquidity Absorption

Purchases of securities without reductions of other portfolio items and the substantially higher allotments in repo operations resulted in a considerable increase in the size of the major central banks' balance sheets. In the euro area and in Switzerland, balance sheets expanded by some 30%; the Fed's and the BoE's balance sheet volume doubled. These increases occurred in just a few short weeks, and, while they are certainly evidence of the central banks' decisive action, they are not in themselves a measure of individual currency areas' problems or of central banks' activities. The rates of balance sheet growth are contingent not just on the needs of the banking sector, but also on the size of balance sheets before the crisis and on the degree to which government bailout packages were handled through central bank balance sheets.

In any event, a rise on the asset side is inevitably linked to a rise on the liability side. A look at the stylized central bank balance sheet in chart 9 shows that, given constant autonomous factors unchanged by the worsening of the

Chart 9

#### Impact of an Increase in the Asset Side of a Central Bank's Balance Sheet

Assets		Liabilities		Assets		Liabilities	
Gold, foreign currency		Capital and reserves		Gold, foreign currency		Capital and reserves	
Investments		Government balances		Investments		Government balances	
		Banknotes in circulation				Banknotes in circulation	
Liquidity-providing operations				Liquidity-providing operations			
		Bank balances				Bank balances	
<b>Total assets =</b>		<b>Total liabilities</b>		<b>Total assets =</b>		<b>Total liabilities</b>	

Central bank balances
Autonomous factors
Monetary policy operations

<sup>20</sup> At the regional level, similar arrangements were agreed for the euro and the Swiss franc. See box 3 in BIS (2008).

crisis, the additional liquidity had to increase bank deposits at the central bank. As explained in section 1, though, demand for central bank balances is interest-inelastic; the excess supply of central bank balances relative to the amount needed to fulfill reserve requirements exercises strong downward pressure on the overnight rate. In extreme cases, the overnight rate drops to zero.<sup>21</sup> To keep market rates at the level of key interest rates, excess liquidity had to be absorbed.

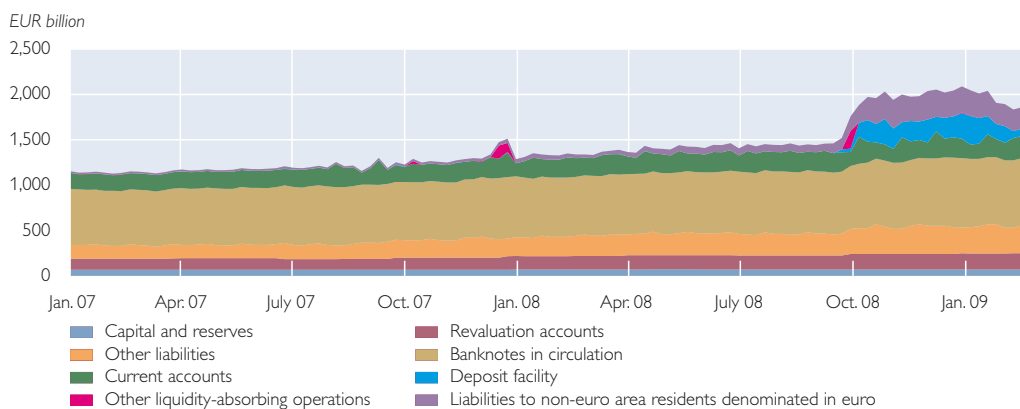
Faced with the same task, the ECB, the Fed and the BoE chose different approaches befitting their respective operational frameworks. In the case of the Eurosystem, the expansion of the balance sheet was limited; moreover, the Eurosystem's operational framework facilitated the automatic absorption of excess liquidity through the deposit facility. As the deposit facility gives banks the option of investing any given amount at fixed interest at the end of the day, the market rate cannot fall below the interest rate on the deposit facility. In recent years, the interest

rate on the deposit facility has always been 1 percentage point below the key interest rate. At the utmost, excess liquidity would have caused the market rate to sink to a level 1 percentage point below the key interest rate. To hold the market rate closer to the key interest rate, the ECB reduced the corridor between the rate on the marginal lending facility and the rate on the deposit facility to  $\pm\frac{1}{2}$  percentage point around the rate on the main refinancing operation on October 8, 2008. As chart 10 evidences, apart from a marginal rise in currency in circulation, the liquidity not required to fulfill reserve requirements subsequently went into deposit holdings. To sum up, the ECB strengthened its intermediation role to offset the interbank market from seizing up: It accepted deposits of banks with excess liquidity on one side and provided banks in need of liquidity with funds against collateral on the other side.

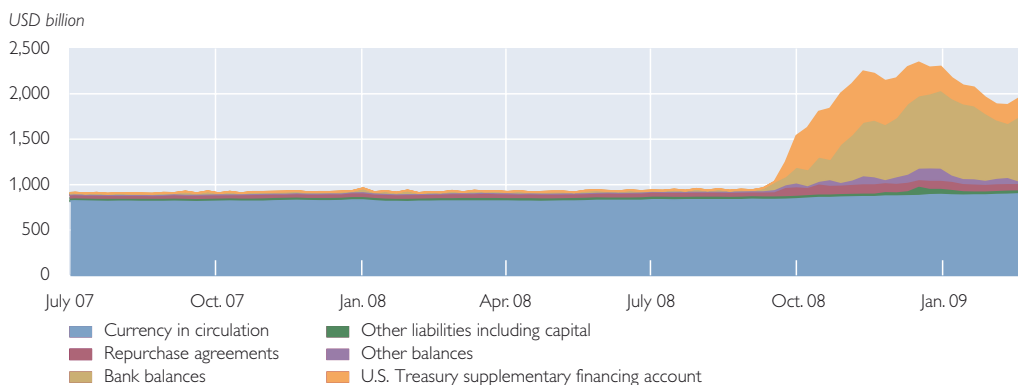
Before the crisis, the Fed did not have an instrument that corresponded to the ECB's deposit facility. Banks' deposits with the Fed were not conceived

Chart 10

### Consolidated Balance Sheet of the Eurosystem – Liabilities



<sup>21</sup> Depending on the distribution of reserves among banks and the assessment of risk for each bank, rationing can lead to a positive interest rate in equilibrium.

**Consolidated Balance Sheet of the Fed – Liabilities**

Source: Fed.

to bear interest.<sup>22</sup> Therefore, an automatic lower limit on the short-term interest rate did not exist. Consequently, the Fed took two measures. To absorb liquidity, the U.S. Treasury issued Treasury bills of more than USD 500 billion and deposited the proceeds with the Fed (see the Treasury Supplementary Financing Account in chart 11). At the same time, the remuneration of reserves, scheduled for introduction in 2011, was brought forward, creating a mechanism similar to that of the ECB's deposit facility.<sup>23</sup> Consequently, the federal funds rate did not fall to zero even though banks had high excess funds, as shown in chart 11.

Central banks can also issue interest-bearing securities to absorb liquidity, an option chosen by the BoE,

Sveriges Riksbank and the SNB, among others.<sup>24</sup>

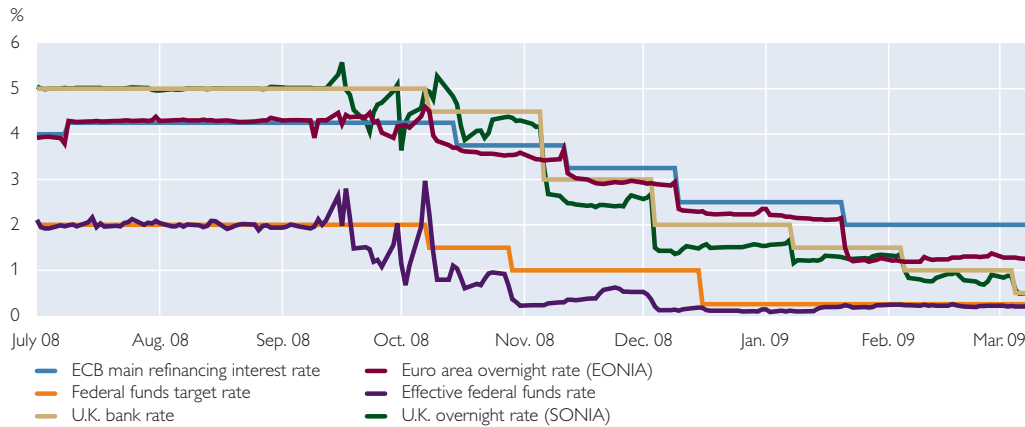
To sum it up, the central banks adjusted their policies in similar ways, though their approaches were informed by the differences in the respective operational frameworks. The interbank markets seized up almost completely in nearly all monetary areas. In response, central banks increased their balance sheets on the asset side. Central banks had to absorb the excess liquidity thus created so as not to lose control of the market interest rate. To this end, central banks wielded a mix of instruments comprising open market operations and interest-bearing facilities. Whereas the various measures stopped short-term rates from sinking below a certain level, they were not completely successful.

<sup>22</sup> This was possible because the reserve requirements are very low by comparison to those in the euro area and the implicit tax resulting from the fact that these deposits did not bear interest was therefore negligible.

<sup>23</sup> At the outset, the Fed set the interest rate at below the federal funds target rate, by analogy to the ECB's interest rate corridor. To be able to control the federal funds rate better, the interest rate was increased gradually to the level of the federal funds target rate, meaning the lower part of the corridor was squeezed to zero. Despite this measure, the effective federal funds rate slipped below the federal funds target rate at times because some market participants cannot hold an interest-bearing account with the Fed. Under normal conditions, banks would close this gap by arbitraging, that is, by borrowing cheap on the federal fund market and depositing the funds with the Fed and receiving higher interest. Such operations, however, require a functioning money market.

<sup>24</sup> The U.K. is, once again, a special case on account of the reserve targets bank set themselves. When the crisis became more acute in October 2008, banks boosted their reserves and thus reduced excess liquidity, though only to a minimal degree.

Chart 12

**Overnight Rates and Policy Rates since July 2008<sup>1</sup>**

Source: Thomson Reuters, NCBs.

<sup>1</sup> Since the interest rate cut in December 2008, the Fed has targeted a federal funds rate of between 0% and 0.25%. For the sake of simplicity, this corridor is represented by a uniform line at the 0.25% level.

But the gap between market and official rates was not very large and simply foreshadowed the stepwise cut in key rates a bit (chart 12).

### 3.3 Did These Measures Represent Quantitative Easing?

Was the expansion of central banks' balance sheets tantamount to monetary policy easing? As stated above, the volume of central banks' balance sheets does not in itself indicate whether monetary policy is restrictive or expansionary. Central bank's interest rates, not the size of their balance sheets, reflect the monetary policy stance. A specific key interest rate is compatible with many different balance sheet compositions – a balance sheet may be large or small, and may contain fewer or more risky investments.

Hence, observers need to distinguish between changes in central banks' policy and changes in the composition and size of their balance sheets since summer 2007. This distinction is the basis for the separation principle that the ECB has repeatedly cited in its public statements. According to this principle, monetary policy decisions and

decisions about key interest rates are independent of the implementation of these decisions, which impact e.g. on the size and composition of the balance sheet (ECB, 2008c). In practice, this means that the ECB can support liquidity and the functioning of key financial markets by adjusting its operational framework for implementing monetary policy – without changing the monetary policy stance. In actual fact, the monetary policy course of the major central banks developed differently in the first year of the crisis, in each case reflecting the economic circumstances and the mandate of the respective central bank. The Fed, for instance, cut rates already in September 2007; the BoE followed in December 2007, but kept rates above those of the euro area until November 2008. The fairly positive development of the economy until the summer of 2008 and concern about a persistent rise in inflation prompted the ECB to raise key interest rates marginally in July 2008. The SNB and Sveriges Riksbank also increased official rates in the year between summer 2007 and summer 2008. Even though the stance of monetary policy in the

various monetary areas differed, the central banks pursued very similar targets in supporting money, foreign exchange and other markets: Monetary policy and liquidity policy are two horses of a different color.<sup>25</sup>

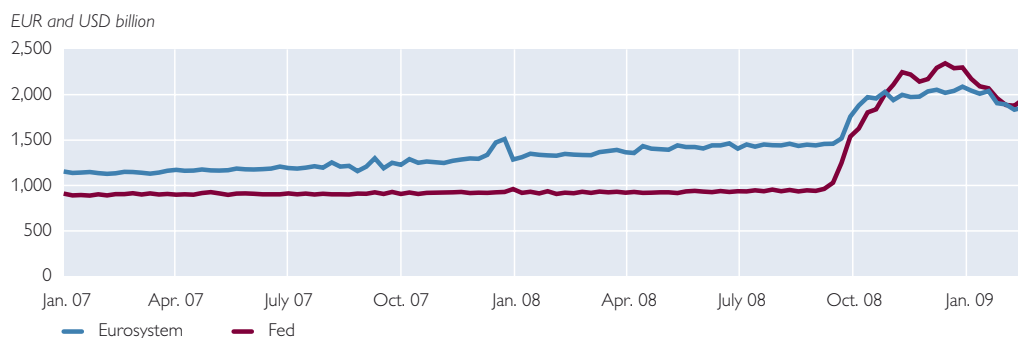
The central banks' measures of October 2008 are best viewed from the financial stability perspective. As expected in a moment of crisis, the central banks fulfilled their traditional role of ensuring the supply of liquidity to the banking and financial system.<sup>26</sup>

The Lehman Brothers bankruptcy increased the demand for liquid investments; the expansion of the central bank's balance sheet and the respective asset-side adjustments gave the private sector a chance to exchange less liquid assets for perfectly liquid ones, i.e. central bank liquidity (central bank balances). Unlike in the first year of the

crisis, during this stage, liquidity measures and adjustments of the monetary policy stance developed in parallel. All major central banks slashed key interest rates in response to forecasts of declining inflation rates and the sharp slowdown in real economic activity. Monetary and liquidity policy were not independent of one another, as the worsening of the financial crisis spurred new liquidity measures and was also the cause of the economic slowdown and hence of the expansionary monetary policy. Nevertheless, the two policies did not have to move in parallel throughout this phase either. The enlargement of central bank balance sheets occurred largely during September and October 2008, whereas the interest rate cuts were taken in November 2008 and afterwards. And even though monetary policy was gradually

Chart 13

### Total Assets of the Eurosystem and of the Fed



Source: ECB, Fed.

<sup>25</sup> Of course, monetary policy and liquidity policy are not independent of one another. Stable conditions in financial markets are necessary for a reliable and predictable transmission of monetary policy measures to the real economy. High and volatile risk premiums like those that have been observed in unsecured longer-term money markets change transmission. All liquidity measures were geared toward reestablishing the normal performance of the financial markets that are relevant for the monetary policy transmission mechanism. In this sense, liquidity policy serves the implementation of monetary policy. Crespo Cuaresma and Gnan (2008), however, list some problems that might crop up in times of crisis, when monetary policy instruments and the provision of liquidity to banks are changed very massively. Under such conditions, it becomes difficult to achieve a macroeconomically suitable monetary policy orientation, and it becomes hard to properly communicate the monetary policy stance. While there are of course manifold links between the monetary policy stance and its implementation, it is useful and appropriate to consider decisions about the monetary policy stance and liquidity policy measures taken to implement them as separate.

<sup>26</sup> For more on the provision of liquidity during times of crisis and potential interaction of central banks' crisis intervention role and the implementation of monetary policy, see Crespo Cuaresma and Gnan (2008).



eased, the size of central bank balance sheets, admittedly a very rough measure of liquidity policy, remained stable and in fact in January 2009 (Fed) and February 2009 (Eurosystem) shrank to levels well below those observed in October and November 2008 (chart 13).

#### 4 Key Policy Rates Close to Zero and Nonstandard Measures – An Outlook

The decisive interest rate measures of the past few months have lowered official rates to a level that potentially creates new challenges for the operation of monetary policy as a result of the zero lower bound on nominal interest rates. As cash offers a risk-free nominal interest rate of zero, nobody is willing to invest money at negative interest rates (which would be equivalent to having to pay a fee for a deposit). If the central bank cuts the key interest rate to zero, it loses its traditional instrument to stimulate the economy, namely a (further) reduction of the short-term nominal interest rate (Svensson, 2003).

Under such conditions, the central bank's operational framework, which is geared toward managing the short-term interest rate – the issue discussed so far in this contribution – is rendered insufficient. However, the short-term interest rate is not the only lever with which central banks can influence the real economy. They may also resort to what the public debate refers to as nonstandard measures. All major central banks – the Fed, the BoE, the Bank of Japan (BoJ) and die ECB – have either taken nonstandard measures since the beginning of the crisis, or have at least not discounted their use. Little experience had as yet been made with such measures when this contribution was written at the end of February 2009, so presenting and evaluating them must wait until a later date. To facilitate the

understanding and interpretation of current developments, this study provides an overview of fundamental considerations and possible measures by way of conclusion (Clouse et al., 2003; Yates, 2002).

Reaching the zero lower bound does not mean that monetary policy cannot be loosened further. Central banks' leverage results from the fact that the interest rates relevant for economic decisions are not short-term nominal interest rates, but rather long-term real interest rates, i.e. retail interest rates adjusted for expected inflation. The short-term nominal interest rate is an important, albeit not the only determinant of real interest rates. As investment values are assessed over a longer period, expectations about future short-term nominal rates play an important role. Principally, central banks can influence all these components.

Two historical developments have produced a fairly recent, comprehensive literature on the issue of monetary policymaking at the zero lower bound. When inflation receded in the 1990s and 2000s, nominal interest rates also decreased. At the same time, the monetary policy discussion was oriented more on the inflation rate, and many central banks were obligated to reach a specific inflation target. When inflation targets were set, policymakers had to weigh the disadvantages of inflation against wage and price rigidities, which make adjustment to shocks increasingly harder at very low inflation rates. The zero lower bound represents one such rigidity. This literature makes mainly theoretical arguments and operates with simulations (e.g. ECB, 2003). Roughly at the same time, Japan, which slipped into deflation in 1998, became a textbook example of monetary policy at the zero lower bound (Baba et al., 2005; Ito, 2006). In historical terms,

Japan is a big exception, as periods with nominal interest rates of close to zero are very rare (Borio and Filardo, 2004).

Both the theoretical literature on the optimum inflation rate and advice derived from Japan's experience apply to the current situation only to a limited extent. The core scenario in both cases is deflation, which keeps the real interest rate too high. But deflation does not appear to represent the main problem of monetary policy now. The decline in inflation worldwide is the result of the drop in energy prices; inflation is expected to be consistently above zero in the next few years.

Accordingly, the Fed, which is generally considered to have taken the most unconventional of measures, underlines the differences between its case and that of Japan, both in diagnosing the issues and in policymaking. Especially at the beginning, the BoJ chose to influence the longer-term risk-free interest rate, first by committing to continued low short-term interest rates (zero interest rate policy – ZIRP) and later by systematically expanding commercial banks' central bank balances (quantitative easing). The Fed is now focusing less on the longer-term risk-free interest rate and more on risk premiums in specific market segments (commercial paper, money market funds, student loans, mortgage loans, etc.). Ben Bernanke, the chairman of Board of Governors of the Federal Re-

serve System, summarizes the different approaches under the term credit easing (qualitative easing) versus quantitative easing.<sup>27</sup> With its announcement of March 18, 2009, that it will purchase longer-term Treasury securities, the Fed has expanded its strategy and is now trying to influence both the risk-free interest rate and risk premiums. The BoE announced a similar policy move on March 5, 2009.

As credit easing is targeted at spreads, central banks can use this approach also for key interest rates above the zero mark if they believe that the objectives of monetary policy, such as price stability or full employment, can be attained better with methods other than interest rate cuts. In fact, the Fed, as well as other central banks, e.g. the BoE and the ECB, started to take measures to influence specific risk premiums long before they began to lower interest rates to the current level. As described above, in the case of the euro area, the ECB took such measures primarily to influence longer-term money markets by widening the longer-term tender operations and full allotment on the weekly main refinancing procedure since October 2008. Moreover, the enlargement of the list of eligible securities at the end of October 2008 indirectly supported financial market segments suffering from illiquidity, in addition to giving banks a bigger liquidity buffer.<sup>28</sup>

<sup>27</sup> See Chairman Bernanke's speech at the National Press Club Luncheon, Washington D.C., on February 18, 2009 (<http://www.federalreserve.gov/newsevents/speech/bernanke20090218a.htm>).

<sup>28</sup> ECB President Trichet noted, for instance, in the press conference held February 5, 2009, when asked about the options for quantitative easing in the euro area: "[...] let me remind all of us that when we started to cope with the tensions on the markets in general – and it is already some time ago, in August 2007 – we were the central bank in the world that was the most open to eligibility of collateral in the form of private paper. And you know that other major central banks had to considerably change their own frameworks in order to be able to do more or less the same. [Our openness to such paper is] something which would have been described in other environments and other economies as close to non-standard easing. Or close to, I would say, credit easing perhaps, as you know is the term used on the other side of the Atlantic. And I would again mention the fact that we have to day the combination of, first, our unlimited supply of liquidity; second, very broad eligibility of collateral; and third, the fact that our balance sheet has considerably augmented in size."

Which instruments central banks choose in the future, and how similar or different their approaches will be, will depend on many factors. But most certainly, all measures are preceded by economic analysis in the different monetary areas. Even if the analysis results are similar, the measures may differ, depending on individual central banks'

options as given by their operational and legal frameworks. Coordination and the division of responsibilities with other economic policymakers will be just as important, in particular with fiscal policymakers and financial supervisors, who are also subject to frameworks specific to their monetary areas.

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*Eurosystem*: For data on daily liquidity conditions (open market operations, marginal lending facilities) in the euro area (<http://www.ecb.de/stats/monetary/res/html/index.en.html>).

The consolidated weekly financial statement of the Eurosystem is retrievable from the ECB's Statistical Data Warehouse under <http://sdw.ecb.europa.eu/browse.do?node=2018802>

*Fed*: Weekly historical averages tables:

<http://www.federalreserve.gov/releases/h41/hist/>

The *Bank of England* also has an interactive database.

Under <http://www.bankofengland.co.uk/mfsd/iadb/BankStats.asp?Travel=NIx>, the consolidated balance sheet of the BoE is to be found under "B Monetary financial institutions' balance sheets, income and expenditure/Central bank's balance sheet (Bank of England 'Bank return')/Consolidated statement"

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