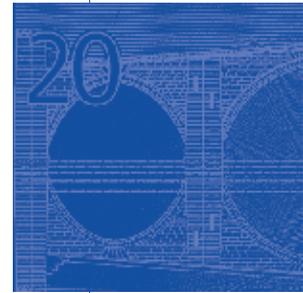


## ARTICLES

# EXPERIENCE WITH FOREIGN CURRENCY LIQUIDITY-PROVIDING CENTRAL BANK SWAPS



*Since the onset of the financial crisis in 2007, bilateral central bank swap lines allowing the provision of foreign currency to local counterparties have become an important tool of central bank international cooperation to prevent systemic risk and limit contagion across major currencies. The design and calibration of the operations used by the ECB to provide foreign currency liquidity to domestic banks helped to achieve the key objectives of the swap lines and calmed markets and funding concerns during the crisis while taking into account moral hazard considerations. The assessment of the experience gained with the swap lines, which is discussed in the article, led major central banks in October 2013 to replace the temporary bilateral swap lines with a network of standing bilateral swap lines. The improvement in US dollar funding conditions and limited demand in the US dollar liquidity-providing operations by euro area banks in 2013 and 2014 allowed the ECB to discontinue part of the operations which make use of the swap lines to provide foreign currency liquidity to euro area banks. The ECB will, on a regular basis, assess the need for the remaining US dollar liquidity-providing operations, taking into account the fact that the standing swap lines provide a framework for the reintroduction of US dollar liquidity-providing operations if warranted by market conditions.*

### I INTRODUCTION

This article describes the ECB's experience with temporary swap lines between major central banks over recent years, including during the financial crisis, and the changing modalities of their usage over time. Section 2 of the article provides a chronological overview of the swap lines deployed by the ECB and other central banks. Section 3 elaborates on the objectives and the design of foreign currency liquidity provision by the ECB during the financial crisis. Section 4 reviews the empirical evidence of the effectiveness of the foreign currency liquidity-providing swaps. Section 5 summarises the main lessons learnt from the establishment of temporary swap lines, leading to the most recent measures taken by the ECB in coordination with other central banks with regard to foreign currency liquidity provision.

### 2 BILATERAL CENTRAL BANK SWAP LINES: AN OVERVIEW

Swaps lines between central banks enable the receiving central bank – hereafter also referred to as the home central bank – to obtain foreign currency liquidity from the issuing central bank. Such agreements have been part of central banks' set of monetary policy instruments for decades. Their primary use was originally to temporarily affect the domestic liquidity situation when other instruments would not serve the purpose or to temporarily and indirectly influence foreign exchange rates. In addition, foreign exchange swaps have been used to allow central banks to acquire foreign exchange to fund interventions. Until the 1990s, the Federal Reserve System maintained an extensive network of foreign exchange swap lines with various central banks and the BIS. The swaps lines with central banks of euro area countries were discontinued with the introduction of the single currency in 1999.<sup>1</sup>

Unlike previous foreign exchange swap agreements, the swap agreements established by the ECB in 2001 and in the period since 2007 were oriented towards providing foreign currency liquidity to domestic counterparties.<sup>2</sup>

<sup>1</sup> For more details, see *Instruments of Monetary Management: Issues and Country Experiences*, IMF, 1997, p. 148ff.

<sup>2</sup> For more details on these agreements, see the press releases issued by the ECB on 13 September 2001 and 12 December 2007.

When in the aftermath of the terrorist attacks on 11 September 2001 euro area banks were experiencing difficulties in receiving US dollars from their US counterparties, the Federal Reserve and the ECB quickly concluded a foreign exchange swap agreement. The US dollars were then distributed to Eurosystem national central banks, which in turn provided the dollars to domestic counterparties.

In the early stages of the sub-prime crisis, the ECB concluded an agreement with the Federal Reserve to allow the provision of US dollars to Eurosystem counterparties, as US dollar funding markets were already beginning to show signs of strain in 2007. In December 2007 the ECB began conducting US dollar liquidity-providing operations for limited amounts. Following the bankruptcy of Lehman Brothers in September 2008, the size of the US dollar operations conducted by the ECB increased substantially as US dollar funding markets began to freeze up. In October 2008 the ECB also concluded a swap agreement with the Swiss National Bank to provide Swiss franc funding to Eurosystem counterparties as Swiss money market rates increased.

In 2011 the Bank of England, the Bank of Canada, the Bank of Japan, the Federal Reserve, the Swiss National Bank and the ECB established a network of bilateral swap lines to allow each central bank to provide foreign currency to domestic counterparties, should the need arise. To date, in the case of the ECB, the use of the swap lines has been limited to the provision of US dollar and Swiss franc liquidity to Eurosystem banks, and there has not been any provision of euro under these swap lines. In October 2013 the temporary swap lines were turned into a network of standing swap agreements, in recognition of the fact that their existence had helped to ease strains in financial markets.

In addition to the above-mentioned agreements, the ECB has also concluded a number of agreements since the start of the financial crisis to provide euro to other central banks, such as Danmarks Nationalbank, Latvijas Banka, the Magyar Nemzeti Bank, Narodowy Bank Polski and Sveriges Riksbank. Most recently, the ECB established a bilateral swap agreement with the People's Bank of China for the provision of euro and Chinese renminbi.

Table 1 provides a chronology of the swap agreements as announced by the ECB including the maximum amount of the swap line and the currency of denomination.

**Chronology of liquidity-providing arrangements and operations as announced by the ECB**

Date	Description	Maximum amount (in billions)
13 September 2001	ECB establishes swap agreement with Federal Reserve	USD 50
13 October 2001	Swap agreement with Federal Reserve expires	
12 December 2007	ECB establishes swap agreement with Federal Reserve	USD 20
17 December 2007	ECB begins conducting 28-day US dollar repo operations with fixed rate	
20 December 2007	ECB establishes swap agreement with Sveriges Riksbank	EUR 10
11 March 2008	Federal Reserve enlarges swap line with ECB	USD 30
2 May 2008	Federal Reserve enlarges swap line with ECB	USD 55
11 August 2008	ECB begins conducting 84-day US dollar repo operations with fixed rate	
18 September 2008	Federal Reserve enlarges swap line with ECB	USD 110
18 September 2008	ECB begins conducting overnight US dollar repo operations with variable rate	
26 September 2008	Federal Reserve enlarges swap line with ECB	USD 120
29 September 2008	Federal Reserve enlarges swap line with ECB	USD 240

**Chronology of liquidity-providing arrangements and operations as announced by the ECB  
(cont'd)**

Date	Description	Maximum amount (in billions)
13 October 2008	Federal Reserve enlarges swap line with ECB	Unlimited
15 October 2008	ECB establishes swap agreement with Swiss National Bank	CHF 25 per tender
15 October 2008	ECB discontinues overnight US dollar repo operations	
15 October 2008	ECB begins conducting 7-day US dollar repo operations with fixed rate	
16 October 2008	ECB establishes agreement to provide euro to Magyar Nemzeti Bank	EUR 5
20 October 2008	ECB begins conducting 7-day and 84-day Swiss franc foreign exchange swap operations with fixed rate	
21 October 2008	ECB begins conducting 7-day and 28-day US dollar foreign exchange swap operations with fixed rate	
26 October 2008	ECB establishes swap agreement with Danmarks Nationalbank	EUR 12
11 November 2008	ECB establishes agreement to provide euro to Latvijas Banka	EUR 1
21 November 2008	ECB establishes agreement to provide euro to Narodowy Bank Polski	EUR 10
28 January 2009	ECB discontinues 7-day and 84-day Swiss franc foreign exchange swap operations	
28 July 2009	ECB discontinues 28-day US dollar repo operations	
6 October 2009	ECB discontinues 84-day US dollar repo operations	
1 February 2010	Swap agreement with Federal Reserve expires	
9 May 2010	ECB re-establishes swap line with Federal Reserve	Unlimited
11 May 2010	ECB begins conducting 7-day US dollar repo operations with fixed rate	
18 May 2010	ECB conducts an 84-day US dollar repo operation with fixed rate	
17 December 2010	ECB establishes swap agreement with Bank of England, subsequently renewed three times until 30 September 2014	GBP 10
12 October 2011	ECB begins conducting 84-day US dollar repo operations with fixed rate	
30 November 2011	Pricing of swap reduced from USD OIS+100 basis points to USD OIS+50 basis points, bilateral network of swaps established with Bank of Canada, Bank of England, Bank of Japan, Federal Reserve and Swiss National Bank	Unlimited
10 October 2013	ECB establishes bilateral swap agreement with People's Bank of China	EUR 45 CNY 350
31 October 2013	Temporary swap agreements with Bank of Canada, Bank of England, Bank of Japan, Federal Reserve and Swiss National Bank converted to standing bilateral swap lines	Unlimited
23 April 2014	ECB discontinues 84-day US dollar repo operations	

**3 SPECIFIC OBJECTIVES OF ECB SWAP LINES OVER TIME AND CORRESPONDING DESIGN OF THE FACILITIES**

Liquidity-providing swap lines between central banks enable the receiving central bank to obtain foreign currency and redistribute it locally to its counterparties unconstrained by the levels of its foreign reserves. They provide central banks with a tool to address adverse market events in foreign currency funding markets and to mitigate negative spillover effects of such tensions on financial stability and the real economy within and across jurisdictions. From a Eurosystem perspective, they are therefore a monetary policy tool that enhances the smooth functioning of the transmission mechanism for both the issuing and the home central banks, by protecting the respective markets from external tensions, and thereby ultimately contributing to the fulfilment of the mandate of the central banks involved. This general goal of swap lines and foreign currency liquidity-providing operations to domestic counterparties can be operationalised on the basis of various modalities according to specific market circumstances.

In general, the foreign currency funds are provided to the home central bank against domestic funds or other assets pledged by the home central bank in favour of the issuing central bank. Funds received by the home central bank are then used to provide foreign currency liquidity to its domestic counterparties. For the ECB, the provision of these funds represents a monetary policy instrument in which risks are shared at the Eurosystem level and the decision-making process for monetary policy operations applies. This ensures optimal coordination at the Eurosystem level in the deployment of this monetary policy tool. The foreign currency liquidity is provided to the counterparties against standard eligible collateral that is denominated in euro and hence subject to the Eurosystem general valuation haircuts calibrated to cater for the market, credit and liquidity risk of the pledged collateral. The currency mismatch between the foreign currency liquidity supplied and the euro-denominated collateral also entails foreign exchange risk to the Eurosystem, which is mitigated with an additional valuation margin. The margin is calibrated to reflect the possible loss of market value during a given period owing to adverse movements in the foreign exchange rate with a given level of statistical significance. The specific objectives of the swap lines influence the design of the facility established between central banks as well as the modalities with which funds are provided to the market. Section 3.1 assesses the specific objectives pursued by the ECB with the foreign currency swaps deployed at various points in time, considering also the corresponding design of the facility. Section 3.2 briefly describes the occasions on which the ECB has entered into euro-providing swaps with foreign central banks and their rationale.

### **3.1 FOREIGN CURRENCY SWAPS AND FOREIGN CURRENCY LIQUIDITY PROVISION IN PERIODS MARKED BY MARKET TENSIONS**

#### **3.1.1 US DOLLAR LIQUIDITY PROVISION FOLLOWING THE TERRORIST ATTACKS OF 11 SEPTEMBER 2001**

In the context of the financial market disruption that followed the terrorist attacks of 11 September 2001, the ECB and the Federal Reserve established a temporary one-month swap arrangement on 13 September.<sup>3</sup>

The swap agreement allowed the ECB to make short-term financing available to euro area banks when they were facing significant difficulties in raising short-term US dollar financing (owing to the reluctance of counterparties in the United States to lend US dollars during European trading hours before they were certain about their own liquidity needs) and experiencing operational difficulties in accessing the Federal Reserve's discount window. Given the high level of uncertainty over the extent of daily funding needs after the sudden shock, the liquidity-providing operations for euro area counterparties had an overnight maturity and were priced at a level reflecting prevailing US short-term financing conditions. The swap facility was used on three occasions up to 17 September for a total maximum outstanding amount of USD 19.5 billion. The swap lines and US dollar-providing operations were quickly discontinued once market conditions had normalised and an orderly functioning of the US market had been restored.

#### **3.1.2 US DOLLAR LIQUIDITY PROVISION PRIOR TO THE BANKRUPTCY OF LEHMAN BROTHERS**

Under the impression that short-term funding was generally available at attractive conditions, some financial institutions had over time become less careful in managing the liquidity risks they had accumulated. Short-term interbank funding was often used to fund longer-dated investment in less liquid assets, leaving the borrowing institutions vulnerable to rollover risk. Moreover, funding commitments, i.e. contingent liabilities, had been made, in favour of, for example, investment vehicles or public authorities. Given the international role of the US dollar and the depth of its

<sup>3</sup> For more details, see the ECB's press release of 13 September 2001.

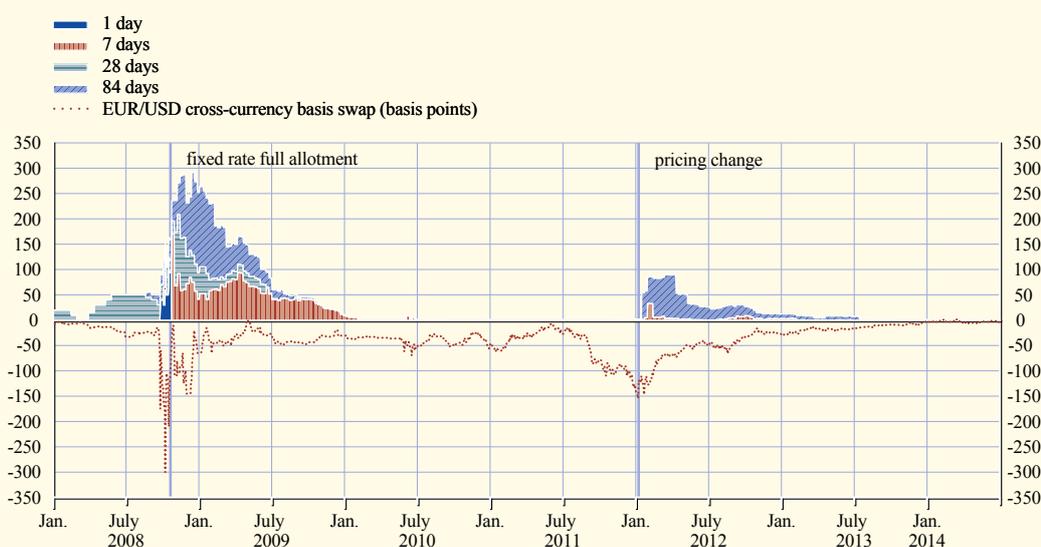
financial markets, many of those commitments and investments by European banks were made in that currency, even when the funding needs of the borrowers were in a third currency, as US dollars were eventually expected to be swapped for another currency.

Strains in funding markets first emerged in the middle of 2007 in the wake of growing unease about the exposure of financial institutions to US sub-prime mortgages. These concerns grew in the second half of the year as more information came to light on the scale of both direct on-balance-sheet exposure and indirect exposure via special purpose vehicles. As a result of the uncertainty about the creditworthiness of counterparties, interbank and other credit lines were significantly and abruptly scaled back, leading to the emergence of a systemic risk.

For these reasons, on 12 December 2007 the Bank of Canada, the Bank of England, the ECB, the Federal Reserve and the Swiss National Bank announced coordinated measures designed to address elevated pressures in short-term funding markets. As part of these measures, the ECB established a temporary swap line with the Federal Reserve and initially conducted two US dollar liquidity-providing operations, in connection with the US dollar Term Auction Facility (TAF), against ECB-eligible collateral. In the first half of 2008 further operations were conducted in which the ECB offered a fixed amount of US dollars at the marginal rate resulting from the TAF conducted in a coordinated manner in the United States over a maturity of initially one month, which was later complemented by operations with a tenor of about three months. In this first phase, the US dollar provision helped European banks to address their structural US dollar funding needs resulting from their US dollar-denominated assets and from the US dollar funding needs of their euro area customers. According to BIS estimates<sup>4</sup>, this funding gap had reached at least USD 1.0 trillion by mid-2007 and, until the onset of the crisis, had been met by tapping the interbank market, by borrowing from central banks and by conducting foreign exchange swaps to convert primarily

**Chart I Outstanding amounts in the Eurosystem's US dollar-providing operations versus three-month EUR/USD cross-currency basis swap**

(USD billions)



Source: ECB.

4 Fender, I. and McGuire, P., "European banks' US dollar funding pressures", *BIS Quarterly Review*, June 2010.

domestic currency funding into dollars. The US dollar liquidity provision was therefore structured to contain the funding costs faced by euro area banks when fulfilling their structural funding needs, while minimising interference with market functioning. An auction with a fixed quantity of liquidity appeared to be the most appropriate tool to achieve these objectives while ensuring consistency with the domestic operations of the Federal Reserve. The operations were of a longer maturity as term funding was the most impaired market segment and euro area banks' funding needs were of a structural nature. The longer maturities also provided sufficient reassurance to banks about the availability of funds over a medium-term horizon at a time in which the commitment to offer further foreign currency liquidity-providing operations covered a more limited period.

The pricing was designed to contain funding costs while ensuring coordination with the domestic operations of the Federal Reserve, i.e. euro area counterparties obtained funds at the marginal rate resulting from similar liquidity-providing operations conducted by the Federal Reserve for its domestic counterparties. Over time, different pricing arrangements were used depending on the circumstances. In general, the issuing central bank contributes to defining the pricing terms at which liquidity is provided by the home central bank to its counterparties, in order to avoid interference with the issuing central bank's monetary policy implementation. In this context, the terms of the foreign currency liquidity operations are in general set by the home central banks so that foreign currency liquidity is not offered at cheaper terms than those offered by the issuing central bank to its domestic counterparties, although the home central bank remains ultimately responsible for its relationship with its domestic counterparties and the issuing central bank only has a relationship with the home central bank.

The US dollars obtained by the ECB via the swap with the Federal Reserve were made available via repo operations against eligible collateral to a large number of Eurosystem counterparties at a time of systemic stress. From the perspective of the home central bank, collateralised operations also minimised the impact on the provision of liquidity in euro.

The operations were successful in containing the spread between the US dollar London interbank offered rate (LIBOR) and the US dollar overnight indexed swap (OIS) rate while providing banks with time to restructure their balance sheets in an orderly fashion, limiting the need for fire sales of assets which would have had a negative impact on the economy. Properly calibrating the tendered amount proved increasingly difficult. As US dollar funds were offered at a fixed rate, in cases where bids were submitted in excess of the tendered amount, banks' bids were only partially fulfilled. This process provided clarity regarding the price at which US dollar funding could be obtained by central banks abroad. From the perspective of the borrowers, however, it did not allow them to increase their chances of covering a larger share of their needs by submitting bids at higher rates. The allotment of a fixed amount at a fixed rate could also have attracted bids that were motivated not by genuine funding needs but by the fact that the pricing of the operations was attractive in the prevailing market situation.

### **3.1.3 THE COORDINATED CENTRAL BANK REACTION FOLLOWING THE BANKRUPTCY OF LEHMAN BROTHERS**

After the bankruptcy of Lehman Brothers in 2008, banks were confronted with very large liquidity needs, which were difficult to estimate, in a context of unprecedented and heightened risk aversion and systemic risk. These market circumstances required adaptations in the design of US dollar-providing operations.

The nature of the shock and the extremely high uncertainty regarding short-term liquidity developments at the height of the crisis warranted the temporary offering of overnight operations

in which the Eurosystem acted as a price-taker via variable rate tender procedures (“American auctions”). Funds were allocated in accordance with the intensity of needs as reflected in the bidding terms. When the most intense phase of the crisis had been overcome, the level of uncertainty had decreased but structural US dollar needs remained. The overnight operations were replaced by short-term (7-day) and longer-term (84-day) operations conducted on the basis of a pre-announced calendar, which proved sufficient to cover banks’ funding needs and stabilise markets. The commitment to offer regular and frequent short-term operations also reduced somewhat the need to offer longer-term operations and helped to limit the hoarding of US dollar liquidity that might have occurred if there had been greater uncertainty about funding availability over the medium term.

Swap limits were initially increased and eventually removed, allowing in principle an unlimited provision of US dollars. The shift to a fixed rate full allotment procedure for the US dollar tenders was consistent with the procedures in place for euro tender operations offered by the Eurosystem.

In October 2008, when the fixed rate full allotment tender procedures were introduced, the pricing of the longer-term operations was changed from the rate charged in the Federal Reserve’s TAF to a fixed rate of 100 basis points above the corresponding OIS rate, thus implying a premium over the expected monetary policy stance of the Federal Reserve as reflected in the almost risk-free OIS rates. The change in the modalities of pricing did not just make the provision of US dollars abroad independent of the results of the TAF, i.e. an instrument that was only temporarily offered by the Federal Reserve; introducing pricing at backstop levels was a counterbalance to the Eurosystem henceforth offering US dollar provision that was limited ex ante only by the collateral that counterparties could post. In addition to limiting moral hazard, this meant that in a normal environment banks would not have an incentive to make use of the operations. In the crisis situation in which the pricing was introduced, such levels were, however, below the levels at which European banks could fund themselves.

The implied costs of the US dollar provision also depended on the cost of the collateral that banks had to post. When providing foreign currency against the regular eligible collateral, the Eurosystem needed to protect itself from the risk of adverse exchange rate movements. The longer the maturity of the operation, the greater this protection needed to be. During the period following the bankruptcy of Lehman Brothers, the Eurosystem decided to revalue the position every week. This allowed the haircut applied to the assets used as collateral to be lowered from 20% to 12%. This change substantially reduced the amount of collateral to be posted by counterparties while maintaining a high level of protection for the Eurosystem via the weekly updates of the foreign exchange rate.

During this period the Eurosystem temporarily complemented the US dollar provision to euro area counterparties via the US dollar repo-type operations with foreign exchange swaps in which counterparties deposited the domestic currency in exchange for the foreign currency liquidity. The conduct of swap operations rather than repo-type operations proved to have two drawbacks. First, swaps are more prone to interfere with monetary policy implementation, as Eurosystem counterparties have to deposit euro cash with the central bank. Everything else being equal, this has a draining impact on euro liquidity and can in principle make the forecasting of liquidity needs and the allocation of liquidity in euro tenders more difficult. A second drawback is that such operations may attract bidding also from counterparties that are searching for opportunities to invest in the domestic currency, i.e. the euro. The calibration of the pricing is hence complex. Swap operations, however, have the advantage of widening the distribution of foreign currency to banks that do not hold sufficient eligible securities as collateral. Demand in the foreign exchange swap operations proved to be relatively limited as banks at the aggregate level were in general not constrained by

the availability of collateral and preferred the modalities of the US dollar repo operations. In this context, preference was given to continuing with the repo-style operations, and the provision of US dollars via foreign exchange swaps was quickly terminated.

The coordinated resolve demonstrated by the provision of unlimited funds and the reassurance that the provision would be adequate to meet demand as long as sufficient collateral could be posted were decisive in calming market jitters, gradually containing systemic risk and minimising spillover effects on euro area domestic market conditions. Lower demand for short-term US dollar funding from international borrowers also eased tensions in US dollar domestic markets.

These actions were also helpful in preventing an abrupt liquidation of US dollar assets and facilitating a more orderly balance sheet restructuring while the balance sheet mismatch was being addressed.

The funding tensions of euro area banks were not limited to euro and US dollar liquidity during this period. Several euro area banks held a significant amount of Swiss franc-denominated assets as a result of the decision by households and companies in some euro area and in non-euro area jurisdictions to borrow from local subsidiaries of euro area banks in Swiss francs. These private sector actors took advantage of very low interest rates in many cases without a proper understanding of the foreign exchange risks to which they were exposed. Several European banks lacked access to a Swiss franc-denominated deposit base or the domestic operations of the Swiss National Bank at that time, even though the Swiss National Bank accepts non-domestic banks as counterparties. The interbank market via which a significant proportion of these assets had been funded was significantly impaired, owing to a heightened perception of counterparty risk and a reduction in bilateral credit lines. Asset disposal was also difficult while borrowers found themselves in difficult financing conditions as a consequence of a currency devaluation that increased the value of their liability in the domestic currency.

In this context the ECB and the Swiss National Bank jointly announced measures to improve liquidity in short-term Swiss franc money markets and eventually introduced seven-day and three-month foreign exchange swap operations to provide Swiss franc liquidity. The objectives of the Swiss franc liquidity-providing operations from a Eurosystem perspective were largely similar to those of the US dollar-providing operations. They were essential to contain systemic risk, prevent a fire sale of assets and facilitate a more orderly restructuring of balance sheets while market activity recovered.

In the calibration of the operational parameters several factors played a role. In contrast to most US dollar operations, the Swiss franc operations were conducted as foreign exchange swaps. This increased operational complexity by comparison with repo operations helped to achieve better consistency with the Swiss National Bank's operational framework. This also had an impact on the pricing of the Swiss franc operations, as the Swiss National Bank had lowered interest rates rapidly. In line with the mechanism described above, this made the Swiss franc operations relatively attractive and led to overbidding in many operations. The general pricing terms were therefore changed on two occasions, which successfully limited bids not motivated by apparent funding needs.

In the choice of tenors, an initial seven-day maturity was complemented by a three-month maturity to help reduce tensions in the term segment of the Swiss franc money markets, which was the most

impaired. The maturities offered were consistent with the ECB's own operational framework and with the maturities offered by the ECB for euro and US dollar operations.<sup>5</sup>

As market tensions gradually abated, both the US dollar and the Swiss franc operations could gradually be scaled back. In January 2009 Swiss franc operations were halted.

By mid-2009 US dollars were being borrowed from the ECB by a smaller number of large banks with significant US dollar-denominated assets on their balance sheets and a few banks with more impaired market access and lower credit ratings. Given the improvements in the functioning of the financial markets, US dollar operations were eventually discontinued in January 2010.

### 3.1.4 THE SOVEREIGN DEBT CRISIS AND THE CURRENT STATUS

A third phase of the financial crisis started in May 2010 when the euro area sovereign debt crisis escalated. To limit the risk of renewed strains in euro area banks' US dollar short-term funding, the central banks that had previously coordinated their US dollar liquidity provision<sup>6</sup> re-established their swap lines with the Federal Reserve. The US dollar operations for euro area banks continued to be priced as a backstop facility, i.e. more expensively than market levels, at OIS+100 basis points. Despite very limited use of the facility until summer 2011, when the sovereign debt crisis escalated further and spilled over into several countries, the reintroduction of the dollar-providing operations was reported to be useful for euro area banks: the regular offering of operations at a fixed rate and without an ex ante limit reassured US dollar lenders that their borrowers could avail themselves of alternative funding sources, hence reducing liquidity risk premia. The usefulness of an instrument priced at backstop levels thus cannot be measured only in terms of actual demand.

As the sovereign debt crisis intensified in summer 2011, and despite the increase in the EUR/USD cross-currency basis swap, recourse to the US dollar tender operations remained limited, thereby calming market tensions only to a limited extent. This was in all likelihood due to a stigma attached to banks being reliant on central bank funding, in particular when such funding was expensive. In increasingly tiered markets in which funding costs differed markedly across countries and banks, counterparties tried to limit their use of the borrowing operations as they were subject to intense scrutiny by regulators, investors and rating agencies on their funding sources and were concerned that reliance on central bank funding at rates significantly above market rates could be interpreted as a sign of weakness.

In November 2011 the price was therefore changed to OIS+50 basis points, and this reduction helped to "de-stigmatise" the US dollar operations and briefly increased recourse to the facility.

At the same time, the Bank of Canada, the Bank of England, the Bank of Japan, the ECB, the Federal Reserve and the Swiss National Bank announced coordinated action to enhance their capacity to provide liquidity support to the global financial system with the purpose of easing strains in financial markets. As part of these measures and as a contingency measure, these central banks established temporary bilateral liquidity swap arrangements, which allowed liquidity to be provided in each jurisdiction in any of their currencies should market conditions so warrant. The network was established among systemically important central banks whose financial and economic systems

<sup>5</sup> As a result of this experience, the European Systemic Risk Board issued on 21 September 2011 a recommendation with regard to the risks inherent to loans in foreign currencies. The recommendation urges banks to be particularly vigilant to ensure that the information provided to borrowers enables those borrowers to adequately appreciate the risks stemming from loans incorporating a foreign exchange risk, and in this way to make an informed choice about the acceptance of a credit.

<sup>6</sup> The Bank of Canada, the Bank of England, the ECB, the Bank of Japan and the Swiss National Bank.

are strongly interwoven after an initial fruitful experience of bilateral cooperation. It provided a powerful message of central bank cooperation and firm resolve to tackle global liquidity problems and prevent strain in one jurisdiction from spilling over into others.

While the establishment of the network of swap lines and the conduct of regular US dollar-providing operations addressed short-term market needs and minimised systemic risk arising from the strains in the financial markets, the European Systemic Risk Board (ESRB) issued a recommendation on 22 December 2011 on US dollar-denominated funding of credit institutions, recognising a need for a more structured approach to prevent a repetition of the tensions in US dollar funding markets. The ESRB recommendation aimed to address the root cause of the US dollar funding tensions and contained two main points of action for the national supervisory authorities: (i) to monitor US dollar funding and the liquidity risk taken by credit institutions, encouraging them to take action to manage risks arising from maturity mismatches in US dollars appropriately, and (ii) to ensure that credit institutions develop contingency funding plans to enable them to handle a shock in US dollar funding.

Banks' actions to address the ESRB's recommendations, the progress in the euro area in terms of fiscal consolidation, economic recovery and structural reforms, and the continuous provision of unlimited US dollar funding all contributed to the normalisation of the US dollar funding markets for euro area banks. Demand for the regular US dollar tenders dropped throughout 2012 and remained very limited in 2013.

While very little use was made of the swap line during this period, it was reconfirmed that the usefulness of the facility is not evidenced solely by the demand at the regular operations. The existence of an adequately sized and appropriately priced swap arrangement between central banks which in principle allows for the provision of foreign currency liquidity to domestic counterparties provides reassurance as to the availability of funding alternatives, thereby reducing liquidity risk. On the basis of the experience gained, which is discussed in more depth in Sections 4 and 5, the central banks that had established the network of temporary bilateral swap lines decided to convert these temporary swap lines into standing arrangements, which are arrangements that will remain in place until further notice.

In view of the considerable improvement in US dollar funding conditions and the low demand for US dollar liquidity-providing operations, on 24 January 2014 the ECB in coordination with the other central banks participating to the swap network decided to gradually reduce its offering of US dollar liquidity-providing operations and announced that the 84-day operations would be discontinued as of April 2014. It was decided that the seven-day US dollar-providing operations would continue to be offered until further notice, but that the need for the regular provision of the operations would be re-assessed in due course taking into consideration the low demand and normalising US dollar funding conditions for euro area banks. The assessment will also take into account that the standing swap lines provide a framework for the reintroduction of US dollar liquidity-providing operations if warranted by market conditions.

In addition to the above measures taken during the sovereign debt crisis, the ECB also signed a temporary swap agreement with the Bank of England in December 2010. The agreement allowed pounds sterling to be made available to the Central Bank of Ireland as a precautionary measure, for the purpose of meeting any temporary liquidity needs of the banking system in pounds. The temporary swap between the ECB and the Bank of England helped to ensure an orderly restructuring of the Irish banking system at a time when Irish banks were experiencing impaired access to the wholesale market and prevented a fire sale of assets and a too abrupt deleveraging process.

### 3.2 THE EURO-PROVIDING FACILITIES

In addition to the arrangements enabling the ECB to receive foreign currency, the ECB has established several euro-providing arrangements with non-euro area central banks. In assessing the business case for establishing euro-providing arrangements with non-euro area central banks, the ECB has in general taken into account a broad set of factors, including (i) the existence of exceptional circumstances characterised by significant actual or potential euro liquidity needs as a result of serious market dysfunctions together with an assessment of the causes of the dysfunctions; (ii) the systemic relevance for the euro area of the country requesting a swap line, in particular the direct and indirect exposures of euro area banks to that country and the potential impact of market tensions on financial markets or the banking sector in the euro area; (iii) the presence of sound economic fundamentals; (iv) the financial risk for the Eurosystem; and (v) the consistency with any parallel support provided by the IMF.

On the basis of these criteria, and with a view to containing global contagion and reducing systemic risk and spillover effects on euro area markets, the ECB in the period following the bankruptcy of Lehman Brothers established euro-providing agreements with the Magyar Nemzeti Bank, Danmarks Nationalbank, Latvijas Banka, Narodowy Bank Polski and Sveriges Riksbank. More recently, the ECB has established a bilateral currency swap agreement with the People's Bank of China, reflecting the growing systemic importance of China and the rapidly growing bilateral trade and investment between the euro area and China, to serve as a backstop liquidity facility and to reassure euro area banks of the continuous provision of Chinese renminbi.<sup>7</sup>

The euro-providing agreements established by the ECB over time were set up, depending on various considerations, either as swaps in which euro liquidity is provided to the foreign central bank against receipt of foreign currency collateral on an ECB account with the foreign central bank or as repo operations in which euro liquidity is provided against receipt of euro-denominated securities as collateral on an ECB custody account. Any subsequent euro provision is handled by the foreign central bank, which decides on the allocation within the pre-agreed limit of the swap/repo line and bears the counterparty risk. Although the specific operational parameters of these agreements differed, overall they were structured so as to minimise any impact on the ECB's provision of euro liquidity and the ECB's own monetary policy framework.

In most cases, these operations enabled the foreign central banks to provide euro liquidity to their domestic counterparties at a time when they were experiencing significant difficulties in funding their euro-denominated assets in the market. Overall these agreements played a very useful role in limiting tensions in the euro area markets in the aftermath of the bankruptcy of Lehman Brothers, contributed to the coordinated central bank response to the global financial crisis and boosted the response capability of the central banks beyond the levels of their foreign reserve assets.

## 4 ASSESSMENT OF THE EFFECTIVENESS OF THE ECB'S SWAP LINES

The foreign currency-providing operations of the Eurosystem had a significant effect on euro area money markets and were thus a useful instrument within the monetary policy framework of the Eurosystem. Three factors facilitated the efficacy of these swap lines: first, the credible commitment to provide sufficient foreign currency liquidity; second, a pricing policy that hindered opportunistic

<sup>7</sup> For more details, see the ECB's press release of 10 October 2013.

bidding or stigma, as appropriate; and third, the alleviation of actual short-term funding needs in foreign currencies. This section assesses the Eurosystem's US dollar-providing operations and also considers the experience gained with the foreign exchange swaps in Swiss francs.<sup>8</sup>

The next subsection explains the indicators against which the swap lines are assessed and the environment prior to the introduction of the swap lines. The following subsections summarise the key features which ensured the efficacy of the swap lines.

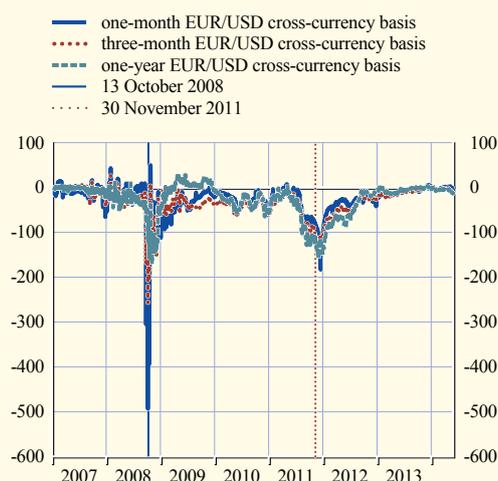
#### 4.1 INDICATORS OF EFFECTIVENESS AND BACKGROUND

Against the background of large US dollar funding needs at increased costs for euro area banks before the introduction of the swap lines, the effectiveness of the US dollar-providing operations is evaluated against their impact on US dollar funding costs for euro area banks. The Eurosystem's US dollar-providing operations were introduced in an environment in which euro area banks held significant amounts of US dollar assets, while their funding possibilities had deteriorated. This was also reflected in the cost of US dollar funding, which can be measured by the spread between the US dollar LIBOR and the US dollar OIS rate of the same maturity as well as by the basis of the EUR/USD cross-currency swap.<sup>9</sup> First, the LIBOR-OIS spread approximates the risk premium which banks have to pay in order to borrow US dollars at a fixed rate.<sup>10</sup> Second, the basis of the EUR/USD cross-currency swap is the difference between the US dollar funding costs implied by swapping euro into dollars and the direct funding costs of a loan in US dollars. The basis thus reflects the premium at which euro area banks can borrow US dollars.

Prior to the financial crisis, the swap basis for the EUR/USD and other major currency pairs hovered close to zero, meaning that the cost of funding in US dollars obtained by swapping euro was almost identical for most market participants, regardless of their location or size, and almost identical to the cost of borrowing US dollars unsecured. After the onset of the crisis, however, it became more expensive to obtain US dollars through the foreign exchange swap market, and the premium that banks had to pay rose above normal levels, increasing to a high of more than 270 basis points for three-month funding in September 2008 (Chart 2). The disruptions were broad-based across funding maturities and were also evident in other foreign exchange swap currency pairs, such as the USD/JPY. In addition to banks, the tensions also affected other financial institutions such as pension funds.

Chart 2 EUR/USD cross-currency basis swap

(in basis points)



Sources: Bloomberg and ECB.

8 Empirical evidence on other central banks and other currencies can be found, for example, in Aizenman J. and Pasricha, G.K., "Selective Swap Arrangements and the Global Financial Crisis: Analysis and Interpretation", *International Review of Economics & Finance*, 19 (3), 2010, pp. 353-365.

9 Goldberg, L.S., Kennedy, C. and Miu, J., "Central Bank Dollar Swap Lines and Overseas Dollar Funding Costs", *Federal Reserve Bank of New York Economic Policy Review*, May 2011, pp. 3-20.

10 For more details, see the article entitled "Euro area risk-free interest rates: measurement issues, recent developments and relevance to monetary policy", *Monthly Bulletin*, ECB, July 2014.

The disruptions in the interbank lending market were also reflected in the LIBOR-OIS spread, with lending conditions deteriorating in particular at longer maturities. Chart 3 shows the elevated levels of three-month LIBOR-OIS spreads, reflecting the risk premia that had emerged. From the very low, if not abnormally low, levels shortly before the crisis, spreads increased from July 2007 to October 2008 by nearly 3.5 percentage points.

#### 4.2 THE SIZE OF THE FOREIGN CURRENCY LIQUIDITY PROVISION

The change to unlimited US dollar liquidity provision under a fixed rate full allotment procedure on 13 October 2008 allowed significant use to be made of the US dollar-providing operations at the different maturities and helped to ease the elevated pressure on money markets (see Chart 1). When the US dollar operations were first conducted by the Eurosystem, the allotment was restricted to USD 20 billion. However, at that stage, the announcement of the swap lines on 12 December 2007 was not particularly effective in containing market tensions, and the LIBOR-OIS spread continued to widen. Further changes, such as the announcement of higher limits for the maximum allotment amounts and the extension of the Federal Reserve's bilateral swap agreements to other central banks, did not manage to contain the increase in the LIBOR-OIS spread until the middle of October 2008. The Federal Reserve had also introduced some measures of its own, and the actual allotment amounts in the US dollar auctions of the Federal Reserve, the ECB and the Swiss National Bank increased continuously, but US dollar LIBOR-OIS spreads remained elevated in 2008 and surged to record highs following the bankruptcy of Lehman Brothers. Counterparties judged the allotment amount to be too limited in relation to banks' overall US dollar funding needs to have a major impact on US dollar money markets.

Following the switch to the fixed rate full allotment procedure on 13 October 2008, the LIBOR-OIS spread fell significantly from its peak of 364 basis points on 10 October 2008, declining by about 200 basis points within a month. In mid-2009 it moved back to levels close to normal conditions. The foreign exchange swap market showed similar signs of improvement, stabilising at levels below the unprecedented high levels recorded following the bankruptcy of Lehman Brothers. While the prices on the foreign exchange swap market revealed that banks were ready to pay more to secure US dollars for several months, the market was functioning and remained liquid, according to market participants. By late spring 2009 bid-ask spreads for EUR/USD foreign exchange forward swaps had converged towards levels seen before the crisis, although anecdotal reports show that the overall volume of activity in the foreign exchange swap market remained well below pre-crisis levels.<sup>11</sup>

11 According to Coffey, N., Hrungr, W.B. and Sarkar, A., "Capital Constraints, Counterparty Risk, and Deviations from Covered Interest Rate Parity", *Federal Reserve Bank of New York Staff Reports*, No 393, 2009, the swap line announcements and actual operations were effective in reducing the swap basis.

Chart 3 USD LIBOR-OIS spread

(in percentage points)



Sources: Bloomberg and ECB.

### 4.3 THE PRICING OF THE FOREIGN CURRENCY LIQUIDITY PROVISION

The effectiveness of the swap provision was supported by a pricing policy which was (i) conditional on the market environment, and (ii) set at a level which ensured first that the swap was an effective backstop and subsequently that stigma was avoided. Towards the end of 2011 the tensions in the cross-currency basis rose again in the context of the sovereign debt crisis in the euro area. In this environment, the previous pricing of the swaps at OIS+100 basis points no longer seemed appropriate, since at this premium counterparties did not seem to be using the swap even as a backstop owing to the potential stigma attached. Market participants were reported to be concerned about making use of the facility in this environment, thereby sending a negative signal to the markets. Recourse to the swap lines was therefore very limited (see also Chart 1). Notably, after sporadic recourse to the facilities, it was reported that market participants were trying to identify the bidders in order to establish which counterparties were facing potential challenges in terms of US dollar refinancing.

Market participants were generally sensitive to the pricing against market conditions, as the spread between the swap rate set for the operations and the market rate was a significant determinant of participation in the tenders (see Box 1). Counterparties also demonstrated high price sensitivity with regard to swaps providing other foreign currencies. For example, the Swiss franc-providing operations became very attractive and bid amounts rose sharply in the first half of 2009 on account of the attractive pricing of the EUR/CHF swaps. The Eurosystem was de facto absorbing euro at a rate that was favourable by comparison with the one-week EURIBOR and in particular with the rate on the ECB's deposit facility. The bidding behaviour following changes in the pricing of the swap also suggests that some banks used the EUR/CHF swaps to deposit euro rather than to obtain Swiss francs.

#### Box 1

#### BIDDING BEHAVIOUR IN US DOLLAR-PROVIDING OPERATIONS BY THE EUROSYSYEM

In order to understand who participated in the US dollar-providing operations of the Eurosystem and thus ultimately benefited directly from the funding, this box analyses the bidding behaviour of counterparties. Estimating a panel model of bidding behaviour, it is found that recourse to the operations was mainly a reaction to adverse money market conditions.

In detail, a (random effects) panel model is estimated for the bidding behaviour since the establishment of the swap lines. Five explanatory factors are used. First, the cost of money market funding is approximated as the spread between the bid rate in the US dollar operations and the USD LIBOR rate. Second, the VIX index controls for global risk aversion. Third, excess liquidity conditions are captured to discriminate between structurally different episodes of monetary policy in the euro area of neutral liquidity and competitive auctions versus excess liquidity and fixed rate full allotment. Fourth, as a measure of the market pricing of the uncertainty of future rates, the model includes the one-month one-year swaption implied volatility. Fifth, a calendar and maintenance period effect controls for important dates in terms of funding, such as end-of-month effects. This is when banks typically hoard their cash for balance sheet window-dressing and market funding becomes relatively expensive.

Regression results of bidding behaviour in US dollar-providing operations

	Bid rate- LIBOR spread	VIX index	Excess liquidity	Swaption implied volatility	End-of- month effect	End-of- maintenance period effect	Constant	Total observations	Number of counterparties
Coefficient	30.24**	8.867***	-0.000828***	3.912*	-141.5	-104.2	574.5**	4,883	260
Standard error	(0.0248)	(0.00290)	(1.36e-05)	(0.0809)	(0.369)	(0.188)	(6.07e-05)		

The model estimation suggests that four factors in particular are economically and statistically significant. First, the spread between the bid rate and the USD LIBOR rate is significantly positive. If the individual funding conditions of a counterparty deteriorate by an increase in the spread between the bid rate and the LIBOR of 1 percentage point, this counterparty is estimated to increase its recourse by about USD 30 million. Second, an increase in the VIX index of 1 percentage point increases the bid amount by about USD 9 million. This indicates greater recourse to the ECB's US dollar operations if global risk aversion increases. Third, €1 billion of excess liquidity lowers the bidding in the operations by about USD 0.8 million, since a relatively accommodative domestic monetary policy stance reduces the need to participate in other central bank operations. Fourth, the higher the market price of volatility, the more counterparties appreciate readily available US dollar funding. Accordingly, an increase of 1 in the swaption implied volatility correlates with a higher take-up in the US dollar operations of USD 3.9 million.

Given the importance of pricing as a determinant of recourse to the swap lines, the ECB announced on 30 November 2011 that it was cutting the cost of US dollar-providing operations to OIS+50 basis points. This lowered the cost of using the facility and effectively reduced the stigma attached to the operations, and recourse to the operations rose accordingly. This change marked another significant break in the cross-currency basis swap and the LIBOR-OIS spread, although the immediate effect was not as pronounced as that following the introduction of the fixed rate full allotment procedure (see Chart 2). While the average EUR/USD cross-currency basis swap five days before the policy change was -149 basis points, the average basis swap five days afterwards was -126 basis points, implying a US dollar easing of 23 basis points.

#### 4.4 REDUCING ACTUAL US DOLLAR FUNDING NEEDS IN THE SHORT TERM

In addition to the commitment to provide unlimited US dollar liquidity and an appropriate pricing policy, the actual provision of US dollar liquidity by the Eurosystem to its counterparties helped to reduce tensions in the cross-currency money market. In general, the provision of foreign currency within the monetary policy framework can be effective via two mechanisms. First, the announcement and commitment to provide foreign currency liquidity can be effective, since the facility can be an effective backstop in the event of market funding tensions. It is a prerequisite that this announcement is credible and sufficient in terms of the amount. Second, the provision of foreign currency can also be effective and alter market rates if the actual amount allotted in the policy operations is sufficient to change the market equilibrium. Section 4.2 described how the two announcements regarding the establishment of the US dollar swap lines and the changes in pricing were effective as announcements. Box 2 shows that the actual recourse to the ECB's US dollar-providing operations also has an effect on market rates. It is found that the provision of USD 1 billion had an immediate impact of about 10 basis points on the three-month EUR/USD cross-currency basis swap. Thus, the operations also had a direct effect on cross-currency money

market conditions as they alleviated short-term funding pressures. However, at the same time the ESRB also put in place work streams to reduce market pressures by addressing liquidity needs, which coincided with the actual provision of US dollar liquidity (see Section 3).

## Box 2

### SHORT AND LONG-TERM EFFECTS OF US DOLLAR LIQUIDITY PROVISION BY THE ECB

This box analyses the short-term and long-term effects of recourse to the ECB's US dollar operations, showing that the US dollar operations were effective in their aim to contain stress in cross-currency money markets. The analysis uses an error correction model of the EUR/USD cross-currency basis swap on the outstanding amount of the US dollar operations controlling for a measure of global risk aversion, the VIX index.<sup>1</sup> Error correction models are particularly suitable for analysing what are known as cointegrated time series and the short and long-term effects of shocks. The EUR/USD cross-currency basis swap, the outstanding amount of the US dollar operations and the VIX feature this cointegration, meaning that the data are in a long-run equilibrium. Short-run deviations from this equilibrium relationship owing to shocks will be corrected over time (error correction). Our model specification captures these two components:

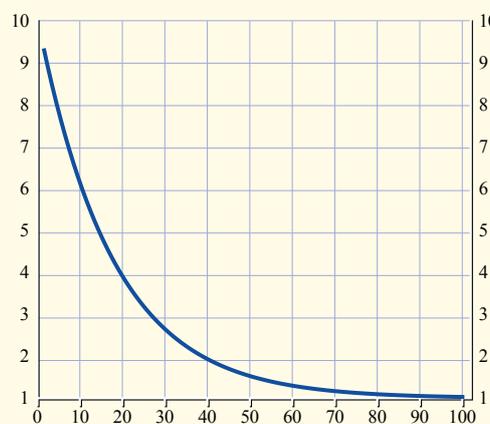
$$\Delta X_t = \alpha_0 + \alpha_1 \cdot \Delta M_t + \alpha_2 \cdot \Delta V_t - \rho \cdot (X_{t-1} + \beta_1 \cdot M_{t-1} + \beta_2 \cdot V_{t-1})$$

where  $X_t$  defines the time series of the cross-currency basis swap,  $M_t$  the outstanding amount of the US dollar operations and  $V_t$  the data of VIX.  $\rho$  specifies the long-term multiplier. Hence, provision of, for instance, USD 1 billion via the US dollar swap line had an immediate impact of about 10 basis points on the three-month EUR/USD cross-currency basis swap, and after 46 days (the average maturity of the swap operations) a final impact of 154.8 basis points is obtained. An interpretation of this longer-term effect needs to take into account that the outstanding amount in the tender will drop again after the maturity of each tender. Accordingly, at its maturity every tender has an offsetting effect in the opposite direction to its settlement. It is the short-term effect which plays the pivotal role in relation to the basis swap, while the long-run effect, in this model, is neutral.

The immediate effect of the settlement of the operation is obviously the largest, and the effect declines over time. Since the approach pools all operations with differing maturity

#### Impulse-response function for an increase of USD 1 billion in the ECB's US dollar operations

(changes in cross-currency basis swap)



Source: ECB.

<sup>1</sup> The use of a measure of risk aversion can be supported by the findings of Baba, N. and Packer, F., "Interpreting deviations from covered interest parity during the financial market turmoil of 2007-08", *Journal of Banking & Finance*, 33 (11), 2009, pp. 1953-1962.

and the maximum of 84 days, it is not surprising that the final impact is reached after about 80 days. However, the marginal impact at that point is negligible. Summarising the results, it is fair to say that, in addition to the effect that the announcement of US dollar swap lines had, the actual recourse to the US dollar operations helped to reduce short-term stress in cross-currency money markets. This effect is most pronounced at the beginning of the respective tender and diminishes over the maturity.

## 5 LESSONS LEARNT AND CONCLUSIONS

The bilateral swap lines and related foreign currency liquidity facilities were the result of a coordinated effort among central banks to address and prevent stress in the foreign currency short-term funding markets. Through their action, the central banks aimed to maintain the overall stability of the financial system, preventing a disorderly deleveraging and limiting the disruptive effects of funding tensions on real economic activity.

Whereas the overarching goal of the swap lines remained broadly unchanged throughout the crisis, the objectives and the operational parameters of foreign currency liquidity provision have evolved over time depending on the prevailing market situation and the issues at stake during the various stages of the crisis, as described in Section 3. An assessment of the appropriateness of the calibration of operational parameters should therefore not be made in isolation, as the choice of facility design is state and time-dependent and is determined by a range of factors such as the severity of market tensions and the causes of disruption in the market, the objectives of the issuing and home central banks, the amounts of liquidity available (i.e. whether the swap lines are unlimited or restricted) and whether the measures are designed to help address acute funding gaps or rather envisaged as a pre-emptive tool to instil market confidence. The following subsections discuss the lessons learnt regarding the main parameters of the temporary swap lines and how these were considered in the design of the new network of standing swap lines.

### 5.1 PRICING OF FOREIGN CURRENCY LIQUIDITY PROVISION

The optimal pricing model needs to strike the right balance between two considerations. On the one hand, the price should be set sufficiently above the cost of funds for most banks under normal market conditions to avoid moral hazard and provide adequate incentives for banks to restructure their balance sheets and to resume recourse to market-based funding when conditions normalise. As the provision of foreign currency liquidity under normal market conditions is not considered to be a core task of a central bank, appropriate pricing helps to ensure that the main responsibility for managing funding and liquidity risks related to foreign currency assets and liabilities remains with credit institutions. On the other hand, the price should not be set so high that it generates undue stigma among market participants in accessing the facilities. Such stigma may reduce or entirely preclude banks' borrowing via such a facility. This, in turn, undermines the effectiveness of the facility in acting as a backstop for lending even during extreme tail events. In a context of tiered market access, high penalty rates above prevailing market rates are more likely to lead to stigma.

The pricing of foreign currency operations and their calibration should be largely dependent on market conditions. At times of elevated market tensions, the pricing could be high without deterring participation. As market conditions improve, the price could be lowered without engendering a

high use of the facilities. The pricing is also dependent on the specific objectives of the issuing central bank, which has a vested interest in ensuring that swap lines are consistent with its monetary policy framework.

## **5.2 SIZE OF FOREIGN CURRENCY LIQUIDITY PROVISION**

The effectiveness of the US dollar-providing facilities since 2007 has been closely linked to the amount of liquidity provided. From the Eurosystem's perspective, the amount of foreign currency liquidity offered was determined by the availability of swap lines with the respective issuing central banks. Limited amounts allotted competitively can be effective in containing money market rate spreads in periods of moderate stress. However, under very adverse circumstances, it might become increasingly difficult to estimate banks' foreign currency needs and to size the liquidity provision accordingly. For instance, the deployment of unlimited swap facilities in October 2008 was instrumental in achieving a sustainable reduction in the levels of market stress and containing systemic risk.

## **5.3 FREQUENCY AND MATURITY**

The maturity of foreign currency liquidity provision also needs to be adjusted flexibly depending on the source of market disruptions and the needs of the banking sector. Operations with a very short maturity offer flexibility, which is particularly important when the market is facing a sudden shock (such as the default of Lehman Brothers) and banks are trying to meet their immediate liquidity needs. On the other hand, longer maturities provide more funding certainty and are required when market funding is lastingly reduced owing to heightened credit or liquidity concerns on the part of investors.

Furthermore, the need for longer-term operations as a source of funding certainty can also be addressed by a commitment to continue to provide operations with a pre-defined schedule, as this removes the need for precautionary buffers.

## **5.4 THE MAIN CONSIDERATIONS FOR THE FRAMEWORK OF STANDING SWAP ARRANGEMENTS**

The experience with the temporary swap lines and the various designs of operational parameters was reflected in the design and modalities of the new framework of standing swap agreements which was announced on 31 October 2013. Most elements of the standing agreements are similar to those of the temporary swap lines, retaining the key features that proved to be most effective in addressing market tensions, i.e. the importance of a coordinated approach among the participating central banks and the ability to provide foreign currency to address global funding stresses. This provides the central banks with a framework to take measures when warranted by market conditions.

However, the new network remains intentionally unspecific on a number of aspects. While it provides assurance about the availability of the liquidity backstop, the circumstances under which the network of standing swap lines could be activated and the operational modalities of foreign currency liquidity provision have not been specified *ex ante*. This helps to ensure that market participants prudently manage liquidity and funding risks in foreign currencies, thus reducing further the risk of moral hazard. It should also allow the participating central banks to calibrate the relevant parameters (pricing, amount and maturity) in a flexible way depending on market conditions.