

Longer-term changes in the unsecured interbank money market

The turnover in the unsecured interbank money market has been dropping since the financial crisis, but in particular since 2015. Important factors driving this development are changes in the use of monetary policy instruments and innovations in banking regulation. In terms of monetary policy, the high levels of excess liquidity as a result of asset purchases for monetary policy purposes, in particular, are currently a key factor. Another relevant issue is that the spread between the Eurosystem's main refinancing rate and the deposit facility rate is significantly reduced compared to the first ten years of the monetary union.

The decrease in turnover in the overnight money market is particularly striking. At last count, EONIA panel banks granted other institutions just roughly one-twentieth of the average lending volume of 2008. This segment of the interbank money market is therefore virtually inexistent. As more banks hold excess central bank reserves than before, fewer banks seek liquidity on interbank money markets, causing a direct drop in turnover.

Lower turnover and a decrease in the spread versus key interest rates reduce the interest income that can be achieved per lending relationship. This leads to a reduction of the supply on the interbank money market. In many cases, lower interest income no longer covers the fixed counterparty-specific (monitoring) costs. Consequently, only few institutions are able to lend profitably in the interbank money market, and not all those seeking to obtain central bank reserves on the market will be able to fund themselves at terms commensurate with their respective counterparty risk. In the absence of intermediation through money markets, institutions' marginal liquidity and refinancing costs will be determined by the key interest rates set by the Eurosystem, which are independent of counterparty risk. At times, these rates can therefore be more favourable than market conditions. Banking sector risks are therefore no longer fully reflected in refinancing costs, which may impair the efficiency of the allocation of financial and ultimately also of real resources.

In the interests of an efficient allocation of resources in the euro area, the objective must therefore be to strive for a more rather than less market-based management of banks' liquidity. Going forward, if the Eurosystem reduces excess liquidity in the long term, possibly combined with a re-enlargement of the interest rate spread between the main refinancing rate and the deposit facility rate, banks would have greater incentives to trade liquidity in the market again.

At the same time, it must be taken into account that various changes in the regulatory treatment of money market transactions between banks have created conditions which could make it more difficult to revitalise the interbank money market. However, the positive turnover developments during various periods with declining levels of excess liquidity since 2009 suggest that the possibility of a revival of interbank money markets and a simultaneous reduction of the intermediation role of the Eurosystem should not be ruled out in the long term.

■ Introduction

Banks' liquidity management: balancing liquidity fluctuations via the interbank money market

Banks trade central bank reserves in the interbank money market. Commercial banks' conduct of business, for instance processing payments, causes constant fluctuations in the balances of their accounts with the central bank. The interbank money market allows banks to balance these short-term liquidity fluctuations by trading with one another. If an individual bank temporarily has a shortage of central bank reserves, it can borrow central bank reserves from other banks in order to meet minimum reserve requirements and make payments on behalf of customers. If the redistribution of liquidity among banks is readily possible via money markets, banks need not maintain any systematic liquidity buffers in the form of central bank reserves over and above their reserve requirements.

Use of monetary policy instruments has significant influence on liquidity management

Central banks exert a significant influence on banks' liquidity management through their use of monetary policy instruments: for instance, central banks may, on demand, provide their monetary policy counterparties with any additional liquidity they require individually by means of standing facilities or through regular credit operations.¹ In addition, central banks can provide the banking system with excess liquidity in the form of central bank reserves through asset purchases, even in the absence of individual or aggregate demand from banks for additional central bank liquidity.

Changes in the environment for the euro area interbank money market

The Eurosystem has taken both paths, in particular with the full allotment in monetary policy refinancing operations that was introduced at the end of 2008 and has been extended repeatedly and with the creation of very large volumes of excess liquidity² as a result of the expanded asset purchase programme (APP). With these and additional measures, the Eurosystem has fundamentally changed the basic conditions for banks' liquidity management within the euro area. On top of that, there have also been changes to the regulatory environ-

ment, especially in terms of capital requirements and liquidity regulations.

The present article will outline the resulting longer-lasting changes in the unsecured interbank money market based on various publicly available indicators. These include interest rates and/or interest rate spreads as well as market turnover and relevant stock variables, in particular banks' liquidity position vis-à-vis the Eurosystem.

■ Unsecured interbank money market: changes in liquidity and interest rate conditions

Basics

Through their short-term liquidity management, banks traditionally ensure their capacity to pay by borrowing the required funds in the interbank money market. Banks' capacity to pay is key not just for the institutions themselves but also from their clients' point of view. Bank clients trust that they can access their due account balances at all times and can carry out payments. Ultimately, banks that conduct maturity transformation can only meet this crucial interest of their clients permanently if they themselves are able to procure the central bank reserves required for deposit withdrawals in the interbank money market in due time. Market access of this nature requires a minimum degree of confidence on the part of an institution's potential creditors in the interbank money market.³

Banks that engage in maturity transformation require effective market access in order to maintain capacity to pay

¹ From commercial banks' perspective, the interest rate differential between the central bank's credit and deposit rates is an important factor in determining the attractiveness of central bank credit operations compared to loans in the interbank money market.

² Excess liquidity generally means banks' aggregate reserve balances with the central bank in excess of the institutions' potential aggregate reserve requirements. For the Eurosystem, it makes sense to define excess liquidity as, for instance, "current accounts (including minimum reserve balances) plus deposit facility minus reserve requirement (as an average for the respective maintenance period)".

³ See, for example, Choudry (2003), p. 533.

Unsecured interbank money market – definition and institutional aspects

In unsecured transactions in the interbank money market, the bank granting credit does not take in any collateral to cover itself against the eventuality of the recipient bank being unable to fully repay the loan. Transactions in the unsecured interbank money market are often conducted via telephone in the form of bilateral over-the-counter (OTC) credit agreements and are based on ongoing business relations between institutions.¹ In practice, one of the key prerequisites for a credit transaction to be concluded between banks is probably for the credit-granting institution's risk management unit to determine the set of potential counterparties in addition to setting limits for each institution deemed to be creditworthy. The main parameters underlying individual transactions in the unsecured interbank money market are loan amount, maturity and interest rate.² Transactions of this kind are often carried out as overnight transactions, which means that the credit amount becomes due on the very next business day.

Prominent measures of interest rate conditions in the unsecured interbank money market are the transaction-based EONIA for overnight lending and the EURIBORs for lending in various maturities; both are published by the European Money Markets Institute (EMMI).³ These measures are important sources of summary information for Eurosystem monetary policy makers in their assessment of the effectiveness and efficiency of the direct monetary transmission mechanism in the interest rate channel, i.e. regarding the transmission of policy rates to banks' marginal liquidity and funding costs. However, they also serve as reference rates for derivative instruments, which financial market players use to manage interest rate risk, amongst other things. In financial mar-

kets, the prices of such derivative instruments – e.g. interest rate swaps – often serve as the basis for the valuation of capital market instruments and may also be used to gauge policy rate expectations.⁴

1 If banks purchase unsecured bank bonds with a short (residual) maturity, this may also be interpreted as an unsecured interbank money market transaction. That segment of the market is, however, disregarded for the purposes of this article.

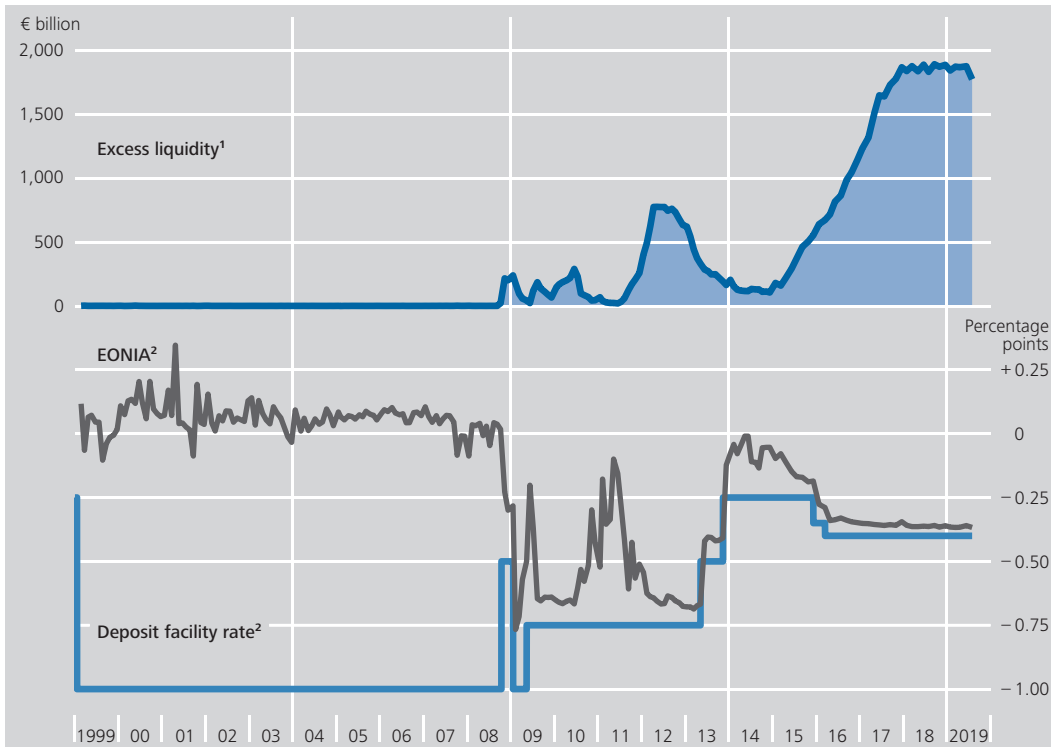
2 In principle, further parameters, e.g. the payment systems used for settlement, may be determined on an individual basis.

3 Please note the ongoing reform initiatives, for instance, the potential replacement of the EONIA with the ECB's euro short-term rate (€STR) or the transition to a hybrid methodology for the EURIBORs. See also European Central Bank (2018).

4 See also Deutsche Bundesbank (2017a).

Interest rate spreads and excess liquidity

As an average for each maintenance period



1 Current accounts minus minimum reserve requirement plus deposit facility. 2 Interest rate spread versus main refinancing rate.
 Deutsche Bundesbank

Liquidity management: maintaining capacity to pay, avoiding excessive central bank reserves

However, under normal circumstances, it is not profitable for banks to hold excess central bank reserves. Banks therefore regularly seek to hold their assets⁴ not as central bank reserves but in the form of more lucrative investments. Traditionally, both aspects together – maintaining a bank’s capacity to pay while at the same time avoiding unnecessary, unprofitable buffers in the form of central bank reserves – have constituted a main objective of banks’ liquidity management.

Profitability of interbank money trading depends on environment

Banks can also play an active role in the interbank money market by accepting other banks’ deposits in addition to the activities resulting from business with non-banks and by issuing money market loans to other institutions. Whether such transactions are profitable from banks’ perspective and are therefore conducted in meaningful degree depends, crucially, on various underlying conditions, in particular the design of monetary policy instruments and on banking regulation.

Balanced liquidity conditions before the financial crisis

Since the introduction of the euro in 1999, there was, for a long time, virtually no change to the basic conditions in the euro area interbank money market that were determined by monetary policy (see the chart above). The banking system had to participate in the Eurosystem’s weekly refinancing operations in order to be able to fulfil aggregate reserve requirements.⁵ The Eurosystem maintained balanced liquidity conditions via limited allotments in refinancing operations: the banking system’s aggregate liquidity position vis-à-vis the Eurosystem, on average during the maintenance period, amounted to little more than the re-

Balanced liquidity conditions: interbank loans and main refinancing operations approximate substitutes

⁴ Beyond potential minimum reserve requirements.

⁵ The banking system was operating under what is known as a “structural liquidity deficit” vis-à-vis the Eurosystem.

serve requirement.⁶ Institutions balanced any remaining volatility in their central bank balances as a result of their business operations by participating in the interbank money market.⁷ Banks' marginal willingness to pay for an interbank loan was broadly equivalent to the interest rate of the Eurosystem's main refinancing operations.⁸

Incentives for lending in the interbank money market determined by interest rate spread between the main refinancing rate and the deposit facility rate

Banks needed an economic incentive to lend out central bank reserves in excess of their minimum reserve requirements in money market transactions with other banks. The Eurosystem created this incentive by maintaining a constant 100 bps spread between the minimum bid rate for the main refinancing operations and the interest rate on the deposit facility (deposit facility rate). Compared to the marginal willingness to pay of banks with remaining liquidity needs, banks would have foregone a considerable amount of interest by using the deposit facility as opposed to lending in the interbank market.⁹ It was therefore a straightforward decision to offer any central bank reserves not needed to meet reserve requirements to other institutions with liquidity needs via the interbank money market rather than making use of the Eurosystem's deposit facility. Given the aggregate shortage of central bank reserves, the equilibrium of short-term interbank money market rates was slightly above the minimum bid rate in the Eurosystem's main refinancing operations.¹⁰

Measures to stabilise the short-term interest rates from 2007 onwards

From the summer of 2007 onwards, interbank markets around the world experienced tensions. A loss of confidence in one another increased banks' sensitivity to potential counterparty risks. This was also evident in rising interest rates (and/or increasing risk premia¹¹) in the interbank money market. From the perspective of an individual bank providing liquidity, higher interest rates seemed justified: first, a broad loss of confidence had the potential to make it more expensive for the individual bank to obtain liquidity for itself. Second, interest rates on interbank money market loans had to reflect the changes in the assessment of counterparty-

specific credit risks. During this period, the Eurosystem initially deployed various discretionary measures to stabilise interest rate conditions in the interbank money market in the euro area without, however, altering the monetary policy framework for the interbank money market as a whole.¹² This changed when the initial liquidity crisis evolved into a full-blown financial crisis in the autumn of 2008, resulting in ever greater turmoil also in the euro area. In October 2008, the Eurosystem decided that refinancing operations would be carried out through a fixed-rate tender procedure with full allotment at the interest rate on the main refinancing operations.¹³ At the same time, the interest rate corridor created by the Eurosystem's key interest rates was narrowed. In particular, the Governing Council of the ECB reduced the differential between the main refinancing rate and the deposit facility rate to 50 bps for a limited period until January 2009.

⁶ In other words, excess liquidity was negligibly small. From 1999 until June 2007, it averaged less than €1.1 billion.

⁷ Against sufficient collateral, the Eurosystem provides banks with additional liquidity at all times through the marginal lending facility. However, it charges a significantly higher interest rate than the main refinancing rate, meaning that the Eurosystem's monetary policy counterparties do not make systematic use of this instrument.

⁸ It should be noted that banks do not have to maintain the central bank balances necessary to fulfil the Eurosystem's minimum reserve requirements on a daily basis, but only averaged across a maintenance period of several weeks.

⁹ Given balanced liquidity conditions, the gross interest rate loss, in other words before risk costs, would have been slightly above 100 bps. In actual fact, the Eurosystem's counterparties made no systematic use of the deposit facility until the liquidity and later the financial crisis, with the exception of a transitional phase following the introduction of the euro. Average stocks in the deposit facility were less than €0.3 billion between 2000 and 2006.

¹⁰ Other major central banks achieved similar results in managing short-term interest rates in the interbank money market through an overall comparable use of instruments. See also Bindseil (2014), p. 138 f.

¹¹ For an introduction to money market risk premia, see Deutsche Bundesbank (2014a).

¹² See also European Central Bank (2008).

¹³ Known as full allotment at a fixed interest rate.

Full allotment policy and narrower interest rate corridor: demand-driven excess liquidity

Full allotment policy and narrower interest rate corridor reduce incentives for short-term liquidity transfers in the money market

From this point onwards, fixed-rate full allotment provided a cap for banks' funding costs¹⁴ – and therefore effectively limited the willingness to pay for short-term loans in the interbank money market of institutions with a demand for liquidity. At the same time, the increase in the deposit facility rate relative to the main refinancing rate reduced the interest foregone by banks with excess reserves who made use of the deposit facility rather than offering surplus liquidity to other banks.¹⁵ Against the backdrop of a higher perception of risk, lending in the interbank money market had become less attractive given a narrower corridor width, while holding excess liquidity in the deposit facility had become more attractive than before. Both measures therefore resulted in the Eurosystem partially replacing the trading of surplus liquidity that had previously taken place on the interbank money market. The extent of the intermediation via the Eurosystem's balance sheet was evident in the temporary surge in excess liquidity from close to zero to an average of more than €200 billion in the fourth quarter of 2008. However, this demand-driven increase in excess liquidity soon proved to be largely reversible when the corridor width was widened again in the first half of 2009, essentially shortly after the financial crisis reached its peak.

Excess liquidity: money market rates fall below the main refinancing rate

Institutions enjoying a high level of confidence in the markets continued to use money market transactions for their liquidity management during this period, which meant that there was a certain remaining turnover in the interbank money market. During this phase, short-term interbank money market rates fell below the interest rate on main refinancing operations in some instances.¹⁶ For institutions with excess central bank reserves it was still profitable to pass on their excess liquidity to banks with high creditworthiness. The aggregate excess supply of central bank reserves meant that, at times, interest rates for money market transactions

moved towards the deposit facility rate. When excess liquidity fell in conjunction with the widening of the corridor at the beginning of 2009, money market rates temporarily returned towards the interest rate on the main refinancing operations.

From May 2009 onwards, the Eurosystem reduced the interest rate differential between the main refinancing operations and the deposit facility, until it remained at just 25 bps from November 2013 for roughly two years. This reduced width of the effective interest rate corridor resulted primarily from the Governing Council lowering the main refinancing rate in order to alter the monetary policy stance without at the same time reducing the deposit facility rate. As key interest rates increasingly approached the zero lower bound, the Eurosystem was initially reluctant to lower the deposit facility rate to zero and then into negative territory.¹⁷ For banks, the foregone interest as a result of holding excess central bank reserves (as compared to the main refinancing rate or the representative interbank money market rate) consequently fell sharply. All other things being equal, this further reduced the incentives for horizontal adjustment in the distribution of liquidity¹⁸ among euro area banks.

Narrowing of interest rate corridor: sustained reduction in interest foregone by holding excess reserves

¹⁴ Where an institution was eligible as a monetary policy counterparty for monetary policy credit operations and had sufficient (unencumbered) collateral.

¹⁵ Whereas holding excess liquidity in the deposit facility would, up until then, have involved foregone interest of roughly 100 bps before the cost of risks, the interest rate gap between the EONIA and the Eurosystem's deposit facility averaged roughly 27 bps in the period from 8 October 2008 to 20 January 2009 against a backdrop of significantly positive aggregate excess liquidity.

¹⁶ For more on the behaviour of short-term money market rates and the impact of longer-term Eurosystem credit operations, see also Abbassi, Fecht and Tischer (2017).

¹⁷ It was not until the deposit facility rate was lowered into negative territory at -10 bps and subsequently further reduced up until 2016 that the interest rate differential between the main refinancing rate and the deposit facility rate widened to 40 bps (as of March 2016).

¹⁸ Although demand-driven excess liquidity can generally be considered a suitable indicator for tensions in the interbank money market when only short-term Eurosystem credit operations are utilised, the increasing compression of the maximum possible interest margins in the interbank money market in itself already considerably limited the usefulness of this interpretation of excess liquidity as a crisis indicator.

Favourable long-term refinancing operations and asset purchases: structural excess liquidity

Favourable refinancing operations with long maturities: excess liquidity with structural character

Moreover, the monetary policy framework for the interbank money market changed starting in the summer of 2009 because the Eurosystem repeatedly offered refinancing operations with very long maturities¹⁹ and at very favourable interest rates as compared to market conditions. Overall, the Eurosystem's counterparties reduced their recourse to regular refinancing operations with shorter maturities following the allotment of the long-term tenders. Nevertheless, the large-scale use of long-term credit operations created additional excess liquidity on a large, and in some ways unprecedented scale. The high levels of excess liquidity were no longer predominantly a symptom of tensions in interbank money markets, but were, first and foremost, a consequence of the very favourable conditions of the long-term refinancing operations offered by the Eurosystem. Although the level of excess liquidity was determined by the individual demand of banks, the long maturities of refinancing operations and, at times, the lack of early repayment options meant that it was, for a sustained period, structural in nature.

Further increase in structural excess liquidity through Eurosystem asset purchases

Excess liquidity with a structural character may also be produced by central bank asset purchases. Of the Eurosystem's monetary policy asset purchase programmes, this is particularly true of the APP which the Governing Council of the ECB adopted in early 2015. Asset purchases under this programme led to a strong increase in the central bank reserve balances of euro area banks on a scale far exceeding that of previous increases in excess liquidity as a result of the long-term refinancing operations.

Relationship between excess liquidity and interest rates in the unsecured interbank money market

If central banks use their liquidity operations to produce balanced liquidity conditions, their objective is generally to anchor short-term interest rates roughly at the level of the key interest rate.²⁰ Under the orderly market conditions prevailing before the financial crisis, the Eurosystem and many other central banks were pretty successful: short-term unsecured interbank money market rates were fairly stable and, on average, did not deviate much from the level of key interest rates.²¹ Central banks being able to successfully steer short-term interest rates in the interbank money market is an important prerequisite to ensuring that changes in key interest rates effectively influence the interest rate conditions banks offer their retail clients.²² These conditions are, in turn, relevant factors for developments in the real economy and price dynamics.

Once excess liquidity increases from balanced liquidity conditions, average short-term interest rates on the interbank money market will drop towards the interest rate of the deposit facility

Central bank steers short-term interest rates through liquidity conditions

19 To date, the Eurosystem has conducted four series of such refinancing operations with very long maturities of one year or more: 1. In 2009, a total of around €614 billion was provided in three longer-term refinancing operations using a full allotment procedure, each running for around 12 months. 2. At the end of 2011/beginning of 2012, a total of more than €1 trillion was drawn by credit institutions in two longer-term refinancing operations with a maturity of three years. 3. From the summer of 2014 onwards, a first series of a total of eight targeted longer-term refinancing operations (TLTRO) with maturities of up to four years were offered, which was used by Eurosystem counterparties to the tune of €432 billion in total. 4. From the spring of 2016 onwards, four further targeted longer-term refinancing operations (TLTRO II) with maturities of four years each were carried out (roughly €740 billion).

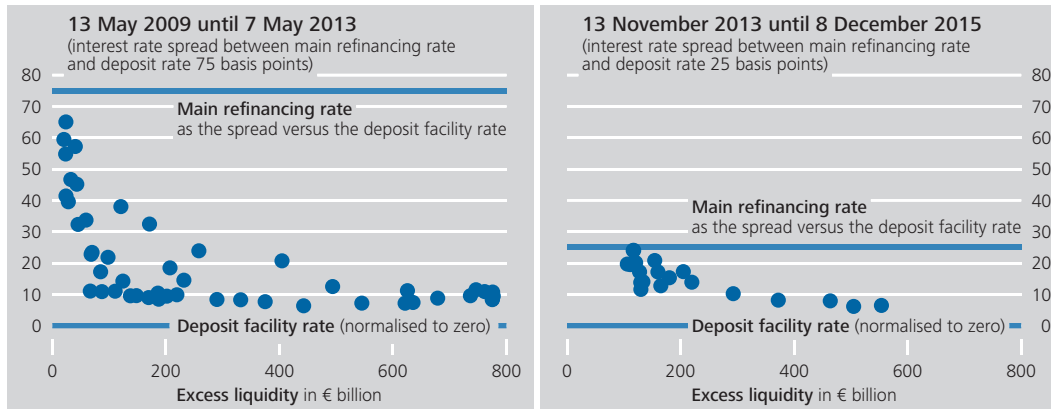
20 The key interest rate is usually also the interest rate which is (at least approximately) used for those liquidity operations with which the central bank manages the banking system's liquidity position. For the Eurosystem, this key interest rate is the interest rate on the main refinancing operations or, where the variable rate tender procedure is applied, the minimum bid rate in the main refinancing operations.

21 See, for example, Nautz and Scheithauer (2011).

22 See Deutsche Bundesbank (2019).

Relationship between EONIA and excess liquidity*: interest rate spread between EONIA and deposit facility rate

Basis points, average for each maintenance period



* Current accounts minus minimum requirement plus deposit facility.
 Deutsche Bundesbank

Increasing excess liquidity: decline in money market rates towards the deposit facility rate

as a result of the excess supply of central bank reserves.²³ The degree to which money market rates converge towards the deposit facility rate at very high levels of excess liquidity likely depends on various different factors.

Lower bound for differential between the unsecured overnight rate and the deposit facility rate as a result of risk premia and regulation

From the perspective of the banks providing loans in the interbank money market, these factors could include the risk premium they demand vis-à-vis a risk-free investment with the Eurosystem. Both for institutions that lend and for those that borrow, regulatory factors might also play a role. Creditors could demand compensation for the capital charges that they must provide for unsecured loans. In turn, debtors that are restricted by the leverage ratio might expect a compensation, in the form of an interest rate deduction, for the extension of their balance sheet. When credit risk premia and a potential surcharge for the regulatory cost of an interbank loan (see the box on p. 67 f.) exceed the opportunity costs equal to the interest rate differential between the interest rate that can be achieved in the interbank money market and the Eurosystem's deposit facility rate, money dealing is no longer profitable for the institution providing liquidity.²⁴

The relationship between the banking system's aggregate liquidity position and interbank money market rates can be illustrated graphic-

ally. As credit risk premia and potential regulatory costs do not vary with the width of the interest rate corridor, it would make sense to examine, in particular, time periods with a constant spread between the main refinancing rate and the deposit facility rate.²⁵ Moreover, the time periods should be characterised by a transition from roughly balanced liquidity conditions to phases of increased excess liquidity. Based on these criteria, the two periods 13 May 2009 to 7 May 2013 (with a policy rate spread of 75 bps) and 13 November 2013 to 8 December 2015 (with a policy rate spread of 25 bps) are especially suitable for graphical analyses (see the chart above).

When liquidity conditions are close to balanced, interbank money market rates converge towards the main refinancing rate and can also

Periods with constant key interest rate differentials a relevant basis for analysis

²³ Or, more generally: towards the interest rate at which excess central bank balances are remunerated.

²⁴ With increasing levels of excess liquidity, by contrast, the absolute interest rate differential between the main refinancing rate and the deposit facility rate is likely to play a comparatively ever decreasing role in determining the remaining gap between measured interbank money market rates and the Eurosystem's deposit facility rate. See also Deutsche Bundesbank (2014b).

²⁵ A comprehensive graphical analysis of the long-term relationship between interest rates and liquidity across periods with varying corridor widths, e.g. by normalising the interest rate spread with the corridor width would, at best, be of limited informative value.

Money markets and financial regulation

Besides monetary policy, changes in the regulatory framework are another key reason why the conditions for banks' liquidity management have changed. In order to meet new liquidity requirements, banks must hold a certain percentage of assets – which depends on the expected inflows and outflows in various types of financing – that can be relatively easily converted into central bank reserves. Likewise, there are, in some instances, tighter risk management and precautionary requirements for banks, especially regarding capital. Many of these rules were introduced or revised since 2008 in response to the financial crisis.

A bank granting an unsecured interbank loan exchanges safe central bank liquidity on the assets side for a claim vis-à-vis another bank. The lending bank must therefore hold additional capital for the event of a potential default of this credit claim. Consequently, the interest rate also has to reflect the opportunity costs of the capital required as backing. While borrowing funds in the interbank money market as a precaution increases the stock of risk-free central bank reserves and allows additional payments to be settled, it also involves a balance sheet extension, which is likewise associated with regulatory costs. A balance sheet extension also affects what is known as the leverage ratio; if binding, this makes intermediation between banks – usually associated only with low margins – significantly less attractive.

The aftermath of the financial crisis also saw comprehensive new liquidity rules being adopted for banks, including the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR). The NSFR aims to ensure that institutions have a sustain-

able funding structure and to limit overreliance on short-term wholesale funding.¹ Short-term financing instruments make banks particularly vulnerable as creditors can withdraw their funds at short notice, if necessary. The LCR requires banks to hold a buffer in the form of high quality liquid assets (HQLA) to cover the net cash outflows over the next 30 days. Ideally, such assets may be sold or exchanged for central bank reserves within a short period of time and without a markdown. Hoerova et al. (2018) show that banks with a lower liquidity position relied more heavily on central bank credit during the two crisis periods 2008-09 and 2011-12.² Had European banks complied with these ratios, they would, in principle, have been more resilient to outflows of liquidity and the need for additional liquidity provided by the central bank would have been at least partially reduced.

The impact of liquidity rules on the interbank money market can be attributed both to payments made in relation to the transactions that fall within the LCR's 30-day horizon and to the classification of central bank reserves as HQLA. The introduction of new regulatory standards thus affects how attractive the provision of and recourse to interbank credit is.³ Interbank loans with a

¹ See also Basel Committee on Banking Supervision (2014).

² The Hoerova et al. (2018) study shows that the use of central bank refinancing during the two crisis periods 2008-09 and 2011-12 was negatively correlated with the LCR and NSFR proxies generated from balance sheet variables.

³ The same applies to the attractiveness of participating in liquidity-providing central bank operations. Using a theoretical model, Bech and Keister (2017) show that liquidity regulation can – depending on the design of the central bank's collateral framework – also have an effect on the transmission of central bank liquidity operations to money market rates.

residual maturity of less than 30 days do not usually affect LCR compliance significantly.⁴ Money market transactions with a maturity of more than 30 days initially improve borrowers' LCR as their stock of HQLA rises, yet they are not required (until 30 days before the loan matures) to record LCR-relevant outflows of central bank liquidity. By contrast, lenders' LCR deteriorates as the inflow of HQLA at maturity will not occur within the next 30 days and can, therefore, not initially be included.⁵

In addition to regulatory costs stemming from liquidity and capital requirements (including the leverage ratio), there may be potential costs for assessing counterparty credit risk (monitoring costs) and possible extra costs related to the establishment of new customer relationships (e.g. checking the identity of new customers or what are referred to as know-your-customer rules). The additional costs incurred by both the lender and the borrower must be compensated by a corresponding interest rate deduction or premium.

In some cases, interactions with the central bank benefit from preferential regulatory treatment. For instance, in terms of liquidity requirements, transactions with the central bank are subject to a roll-over assumption.⁶ In other words, regulators do not assume an outflow of the central bank reserves that an institution has obtained by participating in a monetary policy refinancing operation. Furthermore, in terms of capital requirements, central bank deposits are treated preferentially, with a risk weight of 0%, as compared to a potentially risky provision of central bank liquidity to other commercial banks. Differences in regulatory costs may, therefore, render interbank money market transactions less attractive compared with transactions with the central bank.

⁴ Providing central bank liquidity to other banks for a period of less than 30 days reduces HQLA in the form of central bank reserves. However, unless stipulated otherwise in Article 33 of Commission Delegated Regulation (EU) 2015/61, this is approximately offset by an expected inflow of liquidity within the LCR horizon. Similarly, borrowing central bank liquidity in the interbank money market for a period of less than 30 days does not lead to a substantial change in the LCR given that the borrowed central bank funds (HQLA) will flow back out upon maturity.

⁵ According to the estimates of Bonner and Eijffinger (2013), it was observed that banks close to the regulatory minimum requirement raised more funds and provided less liquidity for more than 30 days following the introduction of a similar liquidity rule in the Netherlands.

⁶ The roll-over assumption presumes that – at the sole initiative of an institution – central bank credit may be extended beyond the initial maturity.

Changing relationship between money market rates and excess liquidity

exceed it.²⁶ By contrast, when there is a marked increase in excess liquidity, money market rates move towards the deposit facility rate. For the periods with a constant key interest rate spread that we consider in our analysis, we find that for levels of excess liquidity of about €50 billion to €200 billion (as much as €400 billion in exceptional cases), forecasts of the average money market rates solely on the basis of the banking system's average liquidity position are, at best, inaccurate.²⁷ This suggests that the relationship between excess liquidity and short-term money market rates varies over time and is influenced by additional factors.

Decline in interest rates dependent on segmentation, corridor width and concentration of excess liquidity

The decline in the money market rates can be slower in segmented markets because it is possible that only part of the excess liquidity is offered on the market. In non-segmented markets, on the other hand, money market interest rates may converge towards the deposit facility rate when excess liquidity is at a relatively low level. Besides any segmentation of the money market, the spread (stipulated by monetary policymakers) between the main refinancing rate and the deposit facility rate also plays an important role. All else being equal, a larger spread between these policy rates would amplify the initial absolute decrease in interest rates due to the creation of excess liquidity. The distribution of excess reserves in the banking system is important as well.²⁸ The higher the concentration of excess liquidity, the more banks are reliant on money market transactions to meet the bank-specific reserve requirements if they do not want to make use of central bank credit operations.²⁹ Thus, because of the greater market power of the few banks holding excess liquidity, the fall of the interest rates towards the deposit facility rate would be slower. Finally, bank-specific risk premia of transactions that were actually carried out and were captured in the Euro OverNight Index Average (EONIA) may also be reflected in the weighted average interest rates and lead to upward pressures at given levels of excess liquidity.

Developments in interbank money market activity based on aggregated indicators

Changing liquidity and interest rate conditions have a major effect on the incentives to lend on the interbank money market and are reflected in money market turnover. Only a limited number of aggregated indicators are available for the development of turnover in the unsecured interbank money market. There is a long time series of daily turnover data available for the transaction-weighted EONIA index, which measures the average interest rates of unsecured interbank loans that mature the next business day (i.e. normally "overnight").³⁰ Apart from short and medium-term fluctuations, the pronounced downward trend in turnover over the last decade is particularly striking (see the chart on p. 72). This decline in turnover was interspersed with temporary recoveries, but remains ongoing. At present, turnover is increasingly approaching zero.

Unsecured overnight turnover on the interbank money market falls to near zero

²⁶ In the period 1999 to 2007, money market rates when liquidity conditions were balanced were, on average, mostly above the minimum bid rate of the main refinancing operations.

²⁷ Thus, excess liquidity totalling around €170 billion may go hand in hand with money market rates of around 9 bps above the deposit facility rate (1st reserve maintenance period 2010) as well as of more than 32 bps above the deposit facility rate (9th reserve maintenance period 2011). When excess liquidity totalled just above €400 billion, there were interest rate spreads of around 6 bps (2nd reserve maintenance period 2013) as well as of 20 bps (12th reserve maintenance period 2011).

²⁸ See Afonso, Armenter and Lester (2018).

²⁹ This may be illustrated by means of the following hypothesis. If the banking system's excess liquidity were held in its entirety at only one institution, the willingness of all the other banks to pay for central bank liquidity would depend on the main refinancing rate. Conversely, if the excess liquidity were distributed evenly across the banking system so that all banks already held excess liquidity, they would hardly be prepared to pay more than the deposit facility rate for it.

³⁰ According to the EONIA Benchmark Determination Methodology of the European Money Market Institute (EMMI), all unsecured interbank money market loans that are granted by EONIA panel banks from one TARGET business day to the following TARGET business day (overnight transactions) are captured. At the end of August 2018, the panel comprised 28 banks domiciled in the EU. Daily turnover from 1999 is available, for example, in the ECB's Statistical Data Warehouse (see the chart on p. 72).

Payments data analysis confirms sharp drop in interbank overnight money market turnover

Evidence of a drop in turnover in the interbank overnight money market can also be obtained from payments data. Central banks are able to determine money market activity by using suitable algorithms.³¹ Depending on market conditions, analyses of this kind are subject to a high level of uncertainty and can only identify money market transactions that are settled using a gross settlement transfer system such as TARGET2. However, secured and unsecured transactions can only be distinguished to a limited extent, if at all. According to recently published evidence, the volume of overnight loans granted on the interbank money market fell from around €80 billion in the years 2009 to 2010 to around €6 billion in September 2017, after daily turnover of well over €100 billion was recorded for mid-2008.³² This is a decline comparable to that of EONIA turnover.

Shift of unsecured transactions to the secured segment?

A variety of reasons may have caused this prolonged downward trend that we observe. One view is that, as awareness of default risk in the banking sector grew in the wake of the financial crisis, transactions that had been conducted in unsecured markets shifted to secured market segments.³³ As an example, secured overnight trading on platforms such as Eurex GC Pooling gained in importance relative to unsecured EONIA turnover. Overall, however, GC Pooling turnover shows a momentum similar to that of EONIA turnover.

Switch to longer maturities?

Moreover, the downward trend in EONIA turnover could be partially attributed to a switch of transactions to longer maturities. The ECB Money Market Survey that was conducted during the period 2003 to 2015 permits inferences with regard to longer-term trends in turnover in the interbank money market in various maturity segments. However, the survey results show that not only overnight transactions but also – and to a particular extent – transactions with longer maturities decreased. From 2015 onwards, the gradual introduction of the liquidity coverage ratio (LCR) as part of the implementation of Basel III probably tended to increase incentives to conclude longer-term

transactions (see the box on p. 67 f.). Aggregate results from the German institutions subject to the Eurosystem's money market statistical reporting (MMSR) indicate that the share of longer-term borrowing in the unsecured interbank money market has increased slightly since 2017. At the same time, this finding is not attributable to an absolute increase in longer-term transactions but to a decrease in shorter-term transactions.

During the early years of the monetary union, from 1999 to 2005, the institutions participating in the EONIA panel provided other banks with overnight transactions of, on average, €39 billion. In the years that followed, the EONIA turnover measured proved to be relatively robust despite the liquidity crisis that was building up in 2007 and, later, the financial crisis, and actually even rose temporarily. This finding, which at first glance does not square with the, at that time, frequently used image of a market that was "freezing" or "drying up" can be explained by the temporary switch from longer-term to shorter-term transactions amid stressed market conditions. However, the decline in turnover which began in 2009 and has followed a steady downward trend since 2015 was accompanied by a marked decrease in indicators of tensions in money markets.³⁴ This could suggest that the long-term decrease in turnover is not primarily a reflection of tensions in the money markets.³⁵

Market tensions?

³¹ Algorithms which allow money market transactions to be identified from payments data are documented, for example, in Furfine (1999), Arciero et al. (2016), and Frutos de Andres et al. (2016).

³² See European Central Bank (2017), p. 9. Use is made here of the Frutos et al. (2016) implementation.

³³ See Wuermeling (2017).

³⁴ Such indicators are based, for instance, on the interest rate spread between secured and unsecured money market rates; see Deutsche Bundesbank (2014a).

³⁵ Based on the Bundesbank's credit register for loans of one million euro or more, Bednarek, Dinger and von Westernhagen (2016) come to the conclusion that there is no evidence to support the assertion that the interbank money market in Germany "either collapsed or succumbed to paralysis". The study documents that outstanding interbank liabilities in the period 2003 to 2012 fluctuated surprisingly little. This is largely consistent with the comparatively stable trend in EONIA turnover during this period.

Inverse relationship between excess liquidity and turnover in the interbank money market

Over the long term, the development of average EONIA turnover has run counter to excess liquidity levels since 2008. This has become particularly apparent since the beginning of 2015. A roughly tenfold increase in excess liquidity, from less than €200 billion to almost €2 trillion as a result of the asset purchases for monetary policy purposes, was accompanied by a decrease in average EONIA turnover from more than €25 billion to about one-tenth of this amount (going to press, the average for 2019 stood at below €2.5 billion).³⁶ The inverse long-term relationship between excess liquidity and money market turnover is not a mere coincidence. On days when refinancing volumes rise sharply, turnover in the unsecured interbank overnight money market falls considerably. Over extended periods, there is a statistically significant link between an increase in the volume of monetary policy refinancing or excess liquidity and a decrease in money market turnover.³⁷ The literature also contains references to these links. Heijmans et al. (2016) show on the basis of turnover figures derived from payments data that total overnight turnover in the euro area interbank money market decreased from around €90 billion to around €75 billion as a result of the two three-year tenders allotted by the Eurosystem at the end of 2011 and the beginning of 2012, which led to a massive rise in excess liquidity. According to Garcia-de-Andoain et al. (2016), the Eurosystem's refinancing operations during the crisis years 2008 to 2011 crowded out demand in the interbank money market. They point out that only during the sovereign debt crisis in the period 2011 to 2013 is it possible that the liquidity provided by the Eurosystem may have supported the provision of interbank loans to banks domiciled in Italy, Greece and Spain.

Evidence from the Eurosystem's money market statistical reporting

A systematic collection of high-frequency (turnover) data of the unsecured interbank money

market transactions has been available since 2016 by means of the Eurosystem's MMSR.³⁸ The MMSR dataset contains transactions of more than 100 banks domiciled in Germany. Money market transactions with other banks have to be reported, as well as transactions with other financial institutions, public institutions and large non-financial corporations.³⁹ The types of transactions include, amongst others, all interbank loans in the form of (overnight) deposits and call accounts. Selected aggregates of these statistics, including in particular unsecured interbank transactions, are regularly published by the Bundesbank.

The decline in unsecured overnight lending by German institutions subject to the MMSR reporting requirement to other banks is particularly striking.⁴⁰ These transactions have slumped by around 66% since mid-2017. Whereas daily turnover initially totalled around €12 billion, unsecured overnight lending at present shows a volume of only around €4 billion (see the chart on p. 73). These transactions are economically comparable to the transactions underlying the EONIA index; however, the reporting population in terms of the reporting institutions is different.⁴¹

During the same period, the volume of overnight borrowing by the German banks subject to the MMSR from other banks was almost

Money market statistical reporting improves coverage of money market transactions

Unsecured overnight lending decreased by around two-thirds

³⁶ To some extent, the decline in EONIA turnover is also likely attributable to a drop in the number of participants on the EONIA panel.

³⁷ This is borne out by a regression of the daily changes in EONIA turnover to the first four lags of the daily changes in refinancing volume or excess liquidity, the EURIBOR-OIS spread, and three lags of the daily changes in EONIA turnover in the period January 2006 to January 2019.

³⁸ See Deutsche Bundesbank (2017b). Aggregated MMSR time series are made available through the Bundesbank's time series database.

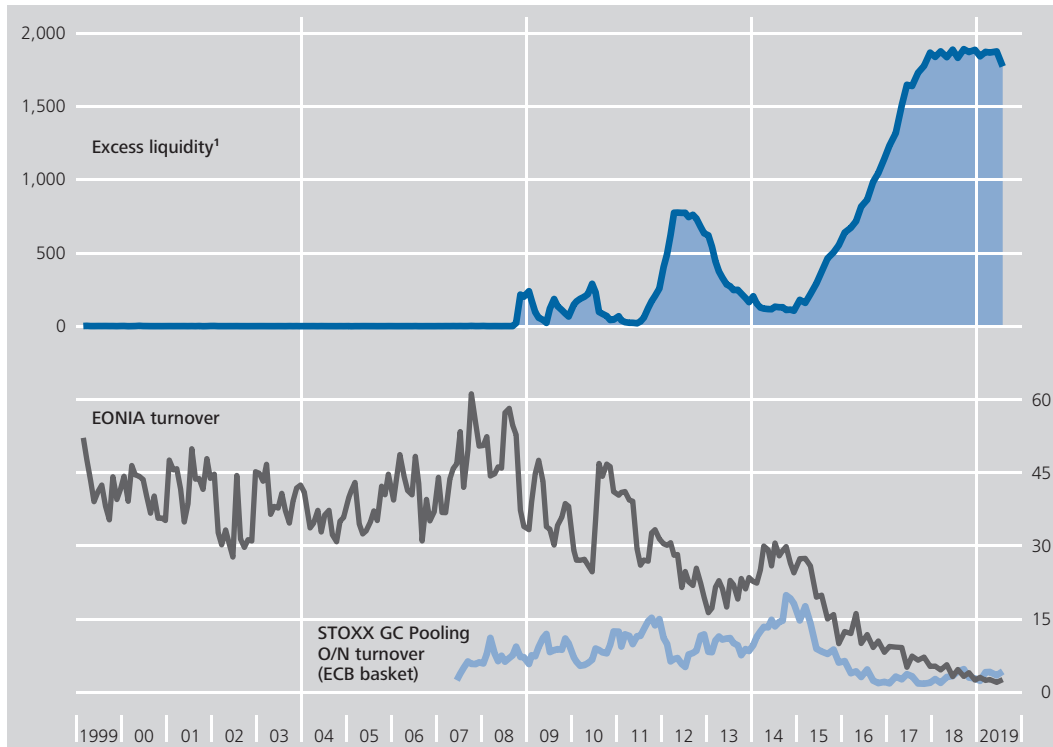
³⁹ Transactions that are classified as "wholesale" pursuant to the Basel III framework are reported. A large share of short-term interbank transactions can be allocated to banks' daily liquidity management. In isolated cases, transactions relating, for instance, to clearing accounts for certain financial transactions etc. are reported.

⁴⁰ These may be banks domiciled within or outside the euro area.

⁴¹ The German MMSR sample comprises banks domiciled in Germany, whereas the EONIA sample comprises a selection of large European banks.

Money market turnover and excess liquidity

€ billion, average for each maintenance period



Sources: ECB, Bloomberg and Bundesbank calculations. 1 Current accounts minus minimum requirement plus deposit facility.
 Deutsche Bundesbank

Banks domiciled outside the euro area earn interest rates below the deposit facility rate for interbank deposits

halved, falling from just under €5 billion to around €2.5 billion.⁴² On average, around 42% of this turnover is accounted for by creditor institutions domiciled in non-euro area countries, with a volume-weighted average interest rate of just under -0.48%.⁴³ The average rate for corresponding transactions with German banks was around -0.38%, which was slightly above the deposit facility rate in that period. The interest rate spread is due to the fact that banks domiciled in the euro area are generally able to hold their euro liquidity directly with the central bank. For this reason, they are usually only prepared to provide other banks with central bank liquidity at rates above the deposit facility rate. For institutions domiciled outside the euro area, this possibility is not given as a matter of principle, which is why they are willing to place euro liquidity with other banks at lower interest rates. Accepting liquidity at interest rates below the deposit facility rate and passing it on is thus a remaining incentive to trade for German banks.⁴⁴

Discussion, conclusion and outlook

The Eurosystem's monetary policy since the financial crisis, but also changes in banking regulation, have significantly altered the environment for the unsecured interbank money market. In particular, the Eurosystem's large-scale asset purchases for monetary policy purposes, which have raised the level of excess liquidity approximately tenfold since the begin-

Tenfold increase in excess liquidity since 2015: interbank market for unsecured overnight money now barely existent

⁴² The collection of deposits from non-banks by institutions subject to reporting under the MMSR increased by around €5 billion over the same period. As opposed to transactions between banks and non-banks, the interbank money market is characterised, amongst other things, by the fact that lenders and borrowers have, in principle, access to central bank accounts under identical terms. By contrast, the prices for transactions between banks and non-banks are influenced by a large number of additional factors. An asymmetry as regards central bank access usually leads to differences in the pricing of interbank transactions compared to transactions with non-banks.

⁴³ Transactions with reference date 1 July 2017 to 31 August 2019.

⁴⁴ See Abbassi, Bräuning and Schulze (2017).

ning of 2015, as well as the narrowing of the interest rate differential between the main refinancing rate and the deposit facility rate have had a profound impact on turnover in the unsecured overnight segment – to the extent that this part of the interbank money market has basically ceased to exist.

Refinancing costs equalised to a large extent

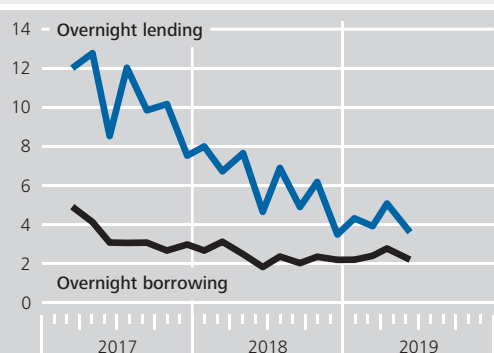
Since a considerable part of the banking system holds surplus central bank reserves, there are fewer banks seeking liquidity in the short-term interbank money market. Therefore, institutions can only invest surplus reserves in the interbank money market on particular occasions and at rates slightly above the deposit facility rate. As a result, interest income from sporadic transactions has decreased to the extent that it often does not suffice to cover the costs of monitoring potential borrowers. The mismatch between counterparty-specific monitoring costs and the interest income that is achievable at low money market turnovers can lead to institutions participating in Eurosystem monetary policy operations at a fixed, uniform interest rate, even when overall excess liquidity is high yet unevenly distributed. As a result, banks' marginal liquidity and refinancing costs are currently harmonised by the Eurosystem, such that a bank's marginal refinancing costs do not always reflect its counterparty risk.

Redistribution of liquidity via the interbank money markets superfluous?

An active money market may involve peer monitoring and can have a disciplining effect on market participants if the counterparty risk is reflected in risk premia.⁴⁵ In recent years, however, the benefits of an active interbank overnight money market have been called into question, especially in the United States.⁴⁶ It is true, the argument goes, that the interbank money market can be efficient in allocating central bank liquidity and, to a certain extent, discipline banks. However, activity in the interbank money market would be a waste of resources if, on the other hand, the central bank were able to supply additional central bank reserves to an unlimited extent and at negligible marginal costs.⁴⁷

Daily transaction volume* of German credit institutions in the unsecured interbank money market

€ billion, averaged across the maintenance period



* Daily transactions according to money market statistics (MMSR).
 Deutsche Bundesbank

With regard to the United States with its strong capital market tradition in comparison to continental Europe, this argument seems worthy of discussion. There, the success or failure of financial institutions is also determined by capital markets, as a loss of confidence can make it more expensive for institutions to obtain financing on a lasting basis. What is more, there is no comparable tradition of borrowing from the central bank, neither in short nor in long maturities. If US banks were forced to borrow central bank funds, they would remain stigmatised and would have to expect the markets to lose confidence in them. Under those circumstances, it is conceivable that institutions are already sufficiently disciplined by the capital markets. A largely efficient allocation of financial and real resources could potentially be achieved by an adequate reflection of the risks

Disciplining of banks through the capital markets sufficient?

⁴⁵ See Blasques, Bräuning and van Lelyveld (2018).

⁴⁶ These ideas originated, amongst others, with Martin and McAndrews (2008) and have recently been revisited in speeches by Dudley (2017) and Bostic (2019).

⁴⁷ The starting point in the euro area at that time already differed considerably from that in the United States. As the Eurosystem has always paid interest on banks' minimum reserve holdings at the main refinancing rate, they do not constitute a cost factor from the banks' viewpoint. Thus, the Eurosystem had always taken into account to a limited extent the thoughts emanating from the United States. In addition, the Eurosystem always made the deposit facility available to banks, which meant that although holding excess liquidity entailed interest foregone for banks in the euro area, the loss was less than for banks in the United States.

on banks' balance sheets in their longer-term financing costs.

Objective of efficient allocation of resources would encourage reduced intermediation by the Eurosystem

However, such conditions do not apply in the euro area. The Eurosystem purchases and holds a sizable stock of covered bank bonds under the APP.⁴⁸ Moreover, for quite some time now, the Eurosystem has replaced a significant fraction of the longer-term financing needs of institutions that they would otherwise cover, at least in part, in capital markets with various series of long-term refinancing operations. And finally, full allotment in the Eurosystem's refinancing operations, recourse to which is not stigmatised in an equivalent manner, is available to a broad range of counterparties in the banking sector at comparatively favourable interest rates. This is why the exercise of market discipline is less pronounced in the euro area compared to the United States. In the interest of an efficient allocation of resources, it seems advisable for the euro area to reduce Eurosystem intermediation and return to a more market-based refinancing of banks, including through the interbank money market.

Future recovery of the interbank money market should not be ruled out

The positive developments in turnover in various intermittent periods with declining levels of excess liquidity since 2009 suggest that the possibility of reviving the interbank money market and simultaneously reducing the Eurosystem's role as an intermediary should not be

ruled out in the long term. Even after 2009 there were episodes in which the interbank money market was hardly impaired by monetary policy conditions. For example, in the period between end-2010 and mid-2011 a significant differential between the main refinancing rate and the deposit facility rate meant that it was unprofitable for the majority of banks that were able to obtain short-term liquidity via the markets to obtain short-term central bank refinancing.

The systematic reduction of excess liquidity, possibly in conjunction with a widening of the differential between the main refinancing rate and the deposit facility rate, could boost incentives for liquidity adjustment between banks in the market. That said, it must be conceded that various adjustments in the regulatory treatment of interbank money market transactions have created conditions that could impede a revival of the interbank money market. However, it would be desirable in the medium term to strengthen market mechanisms in the refinancing of banks and to contain the role of monetary policy operations in the compliance by banks with regulatory standards.

Incentives for the redistribution of liquidity adjustment via the market once excess liquidity declines

⁴⁸ In addition, the Eurosystem also purchases unsecured debt of certain public credit institutions under the public sector purchase programme (PSPP).

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