The two-tier system for reserve remuneration and its impact on banks and financial markets

When operating in a negative interest rate environment, central banks have introduced tiering systems for the remuneration of excess liquidity holdings as a monetary policy measure. These tiering systems enable central banks to exempt a certain part of commercial banks' excess liquidity holdings from negative remuneration or to set a slightly more attractive rate of interest on this part. By contrast, the non-exempt tier of excess liquidity holdings continues to be remunerated at the regular, negative rate. This cuts banks' interest expenditure on excess liquidity held when the tiering system is introduced. In September 2019, the Governing Council of the European Central Bank (ECB Governing Council) decided that the euro area, too, should have a tiering system and introduced a two-tier system for excess reserve remuneration on 30 October 2019.

The aim of this measure was to support the bank-based transmission of monetary policy. At the same time, the ECB Governing Council sought to preserve the positive contribution of negative interest rates to the accommodative stance of monetary policy and thus to the continued sustained convergence of inflation to the ECB's aim. The two-tier system is designed in such a way that euro short-term money market rates are not unduly influenced.

The system prompted some banks to increase their central bank balances in order to take full advantage of their own exemption allowances. The resulting redistribution of liquidity between banks began as soon as the two-tier system was introduced and, to start with, this largely took place via the money market. Redistribution could be observed both domestically and within banking groups as well as across national borders, and it enabled almost all euro area banks to make full use of their allowances. Despite significant liquidity redistribution, short-term money market rates rose only temporarily and to a very small extent, which was also due to a large volume of excess liquidity holdings, which continued to expand over time, still being subject to negative remuneration.

In December 2020, euro area excess liquidity holdings stood at €3,352 billion. Between the introduction of the two-tier system in October 2019 and December 2020, euro area banks' interest expenditure on excess liquidity holdings amounted to €8.9 billion, and was thus €4.7 billion lower than would have been the case without a tiering system but under otherwise identical conditions. At the same time, the lion's share of excess liquidity holdings (€2,498 billion at last report) continued to be subject to negative remuneration.

Introduction

Two-tier system part of large package of measures aimed at …

At its monetary policy meeting on 12 September 2019, the ECB Governing Council decided, in addition to other monetary policy measures, to introduce the two-tier system for reserve remuneration (hereinafter referred to as the "two-tier system"). Since 30 October 2019, banks have no longer been required to pay the Eurosystem negative interest on part of their excess reserve holdings.[1] Thus, for the first time, the Eurosystem has set two different interest rates for holding excess reserves.

… supporting bank-based transmission of monetary policy …

The two-tier system reduces a portion of commercial banks' interest expenditure on holding excess reserves, which had risen as a result of the interest rate on the deposit facility being lowered by 10 basis points on 18 September 2019. By introducing the two-tier system, the ECB Governing Council sought to support the bank-based transmission of monetary policy. Literature on this topic suggests that an exceedingly long-lasting environment of low interest rates could, under certain conditions, hurt lending by banks,[2] meaning that they would no longer adequately fulfil their role in monetary policy transmission. This would impede the ECB Governing Council's intended objective of monetary policy easing.

… without undue influence on money market rates

The ECB Governing Council took care to design the two-tier system in such a way that euro short-term money market rates are not unduly influenced. Tiering systems provide incentives for the redistribution of liquidity between banks: institutions that do not make full use of their exemption allowances under a tiering system can generate additional interest income by borrowing funds at negative interest rates and depositing them in their central bank account at the zero interest rate. Thus, in principle, the additional demand for liquidity from some banks that is triggered by a tiering system could raise short-term money market rates, which may run counter to the central bank's intended monetary policy stance.

Review of first year of two-tier system

Around one year after the launch of the two-tier system, this article examines whether and how this measure has achieved the effect intended by the ECB Governing Council without producing undesirable side effects in the money market. To this end, the article begins by discussing the background and motivation behind introducing the two-tier system, before examining the impact that the two-tier system has on interest expenditure on excess liquidity holdings[3] in the banking sector. It concludes with an analysis of the resulting redistribution of central bank liquidity via money and other financial markets.

The two-tier system in a monetary policy context

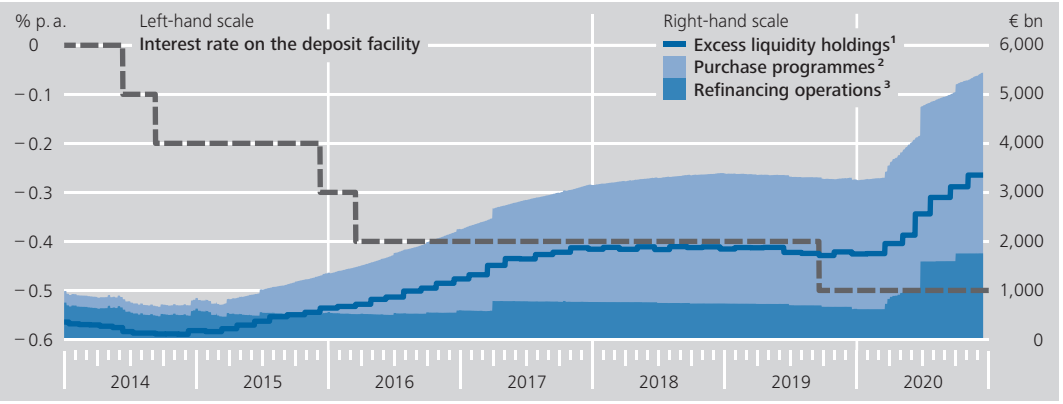
Interest expenditure arising from negative interest rate on deposit facility and excess liquidity holdings

Since the global financial and the European debt crises, the Eurosystem has been providing banks with significantly more central bank liquidity through non-standard monetary policy measures than they need overall.[4] This excess liquidity is held on banks' accounts with the Eurosystem. In June 2014, the ECB Governing Council lowered the interest rate on the deposit facility from 0.0% to -0.1%. Thus, for the first time, the Eurosystem charged banks a negative rate of interest on excess liquidity holdings. Since then, the ECB Governing Council has adopted additional non-standard liquidity-providing monetary policy measures. These non-standard measures have gradually raised excess liquidity holdings even more (see the chart on p. 61). Together with further interest rate cuts, this has led to an increase in

1 Excess reserves are the amount a bank holds on current accounts with the central bank which exceeds its minimum reserve requirements on average over a reserve maintenance period. Excess reserves do not include the deposit facility.
2 See Brunnermeier and Koby (2018).
3 Excess liquidity is the sum of deposits in the deposit facility and excess reserves.
4 Banks need central bank liquidity in the form of reserve holdings with the central bank in order to meet their minimum reserve requirements. Banks' reserve holdings are subject to fluctuations because current payments and the issuance and acceptance of cash by the central bank are ultimately also settled using central bank liquidity.

Excess liquidity holdings and interest rate on the deposit facility

Daily values



Source: Eurosystem. **1** Reserve maintenance period averages. **2** Asset purchase programme (APP), pandemic emergency purchase programme (PEPP), and remaining holdings from the covered bond purchase programmes (CBPP and CBPP1) and the securities markets programme (SMP). **3** Main refinancing operations and longer-term refinancing operations.

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banks' interest expenditure on excess liquidity holdings. The banking system as a whole is scarcely able to lower excess liquidity and therefore cannot reduce interest expenditure stemming from negative remuneration on its excess liquidity holdings in central bank accounts. Transactions between banks only result in excess liquidity being redistributed within the banking system.[5]

Two-tier system in connection with other monetary policy measures

In pursuit of its price stability objective, the ECB Governing Council decided in September 2019 to adopt an additional, comprehensive package of measures, lowering the interest rate on the deposit facility by 10 basis points to -0.5% and also making the interest rate on targeted longer-term refinancing operations (TLTRO-III) more attractive.[6] In addition, the ECB Governing Council resumed net purchases under the asset purchase programme (APP) at a monthly pace of €20 billion starting in November 2019. The interest rate cut and the further rise in excess liquidity resulting from this package of measures pushed up banks' interest expenditure even further. To address this, the ECB Governing Council also introduced its two-tier system for excess reserve remuneration as a new item in its monetary policy toolkit. In an environment of expanding excess liquidity, the two-tier system exempts part of credit institutions' excess liquidity holdings from negative remuneration at the rate applicable on the deposit facility, thereby reducing their interest expenditure. Prior to this, other central banks had already made similar arrangements for the remuneration of banks' excess central bank balances in connection with negative policy rates (see the box on pp. 64 ff.).

Design of the two-tier system

Two-tier system exempts part of excess reserve holdings from negative remuneration

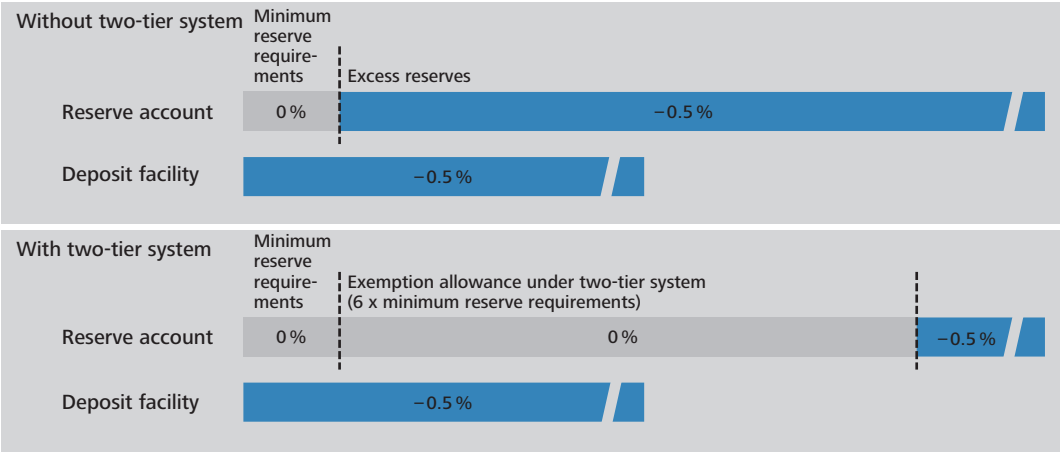
The tiering system established in the euro area on 30 October 2019 introduced two tiers for the remuneration of excess reserve holdings. A certain amount of excess reserve holdings is exempt from remuneration at the applicable deposit rate, i.e. it is remunerated at 0% instead. This exemption allowance is calculated as a multiple of an individual bank's minimum

5 The banking system as a whole can only lower central bank liquidity and thus excess liquidity independently by exchanging liquidity holdings for banknotes or reducing refinancing operations.

6 For more information, see https://www.ecb.europa.eu/mopo/implement/omo/tltro/html/index.en.html.

Remuneration of central bank liquidity holdings with and without the two-tier system

As at January 2021



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reserve requirements.[7] The multiplier is the same for all institutions. The ECB Governing Council stated that it would set the multiplier at a level which ensures that euro short-term money market rates are not unduly influenced. The Eurosystem determines the remuneration rate on and the size of the exempt tier on average over a reserve maintenance period.[8] The ECB Governing Council set the multiplier at six.

Expectations, impact and role in monetary policy

Two-tier system aimed at supporting monetary policy transmission

In the euro area, banks play a key role in transmitting monetary policy impulses. They pass on changes in the policy rates to the real economy by adjusting lending conditions. As a rule, policy rate cuts should encourage banks to ease lending conditions for their customers. In turn, this should raise the demand for and granting of credit, thereby increasing investment, private consumption and, ultimately, the price level. With its two-tier system, the ECB Governing Council aims to support the bank-based transmission of its monetary policy. In particular, it is designed to prevent the costs of borrowing for new loans from rising. In a prolonged period of low or negative interest rates, non-standard monetary policy measures, which generate these high levels of excess liquidity, can have such undesirable side effects.

Persistently negative interest rates could have undesirable side effects; …

So far, banks have largely refrained from passing on negative interest rates to their depositors – households' deposits, in particular, are still largely unaffected.[9] As low interest rates are becoming increasingly entrenched, banks that rely heavily on deposits as a source of funding are seeing their interest margins shrink. While the average lending rate continues to fall, banks are reluctant to lower their interest rate on deposits below zero. Interest income from lending therefore reacts more elastically to changes in interest rates than interest ex-

7 Minimum reserves are compulsory deposits that commercial banks are required to hold with their respective euro area central bank and are calculated using the reserve base. The reserve base comprises deposits from non-banks or banks that are not subject to minimum reserve requirements as well as debt securities that have an agreed maturity or notice period of no more than two years. The Eurosystem applies a positive minimum reserve ratio of 1% at present to the components included in the reserve base. Minimum reserves are remunerated at the weighted average marginal allotment rate on main refinancing operations in the corresponding reserve maintenance period.
8 A reserve maintenance period lasts six or seven weeks, each starting shortly after the monetary policy meetings of the ECB Governing Council. For more information and the indicative calendar for reserve maintenance periods, see https://www.bundesbank.de/en/tasks/monetary-policy/minimum-reserves.
9 For more information, see the euro area monetary financial institution (MFI) interest rate statistics, Heider et al. (2019) and Eisenschmidt and Smets (2019).

penditure on households' deposits.[10] Viewed in isolation, this could worsen banks' profitability. If this decreased profitability has an impact on banks' capital, they could reduce their credit supply or charge higher lending rates.[11]

The exemption allowance is calculated as a multiple of the relevant institution's minimum reserve requirements. Minimum reserves currently comprise 1% of enterprises' and households' deposits subject to reserve requirements. They are largely determined by the amount of deposits held by households, which is roughly three times the amount of deposits held by enterprises. It is precisely those banks with predominantly deposit-based funding that are the main lenders to enterprises and households in the euro area. This is why banks that are involved in lending to enterprises and households tend to be the main beneficiaries of the two-tier system. If the two-tier system helps banks to uphold their credit supply even in the low interest rate environment, it fulfils the ECB Governing Council's objective of supporting the bank-based transmission of monetary policy.

… no negative effects seen so far

So far, there have been no signs either in the euro area or Germany of banks restricting their credit supply because of the negative remuneration on their excess liquidity holdings. Expansionary monetary policy is supporting economic activity and is aimed at meeting the price stability objective in the medium term. The favourable economic situation prior to the coronavirus crisis enabled European banks to compensate for narrower interest margins in the low interest rate environment, allowed them to reduce their loan loss provisions and ensured robust credit demand. Consequently, banks were able to keep their profitability largely stable. Until the onset of the coronavirus crisis, there were no signs of banks being less willing to lend.[12] Bundesbank and ECB analyses confirm that monetary policy continued to have a stimulating effect in this environment.[13]

Two-tier system is intended to reduce likelihood of adverse impact from negative interest rates …

The interest expenditure that banks have to pay for excess liquidity holdings is relatively low compared with their other interest-dependent business. From the beginning of the negative interest rate policy period to the end of 2019, declining interest margins cost banks in Germany around four times as much as interest expenditure on excess liquidity holdings.[14] This interest expenditure is a side effect of the negative interest rate policy in combination with high levels of excess liquidity holdings resulting from other monetary policy measures. Taken in isolation, it is a profit-reducing factor that is affected directly by monetary policy. To avoid monetary policy potentially having unwanted side effects in this area, the two-tier system therefore exempts part of banks' excess liquidity holdings from negative remuneration.

… whilst avoiding undue influence on money market rates

In setting the multiplier, the ECB Governing Council calculated the exemption allowances such that the short-term money market rates would not be unduly influenced.[15] The two-tier system encouraged banks to make use of their allowances and thus the more favourable level of remuneration. In this way, the Eurosystem set interest rate incentives for bank transactions that result in a more even distribution of excess liquidity in the system. Money markets had a key role to play, as this is where banks typically trade liquidity. Given that levels of negatively remunerated excess liquidity holdings remained high, there was indeed no sustained rise in the relevant benchmark interest rates for the money market.[16]

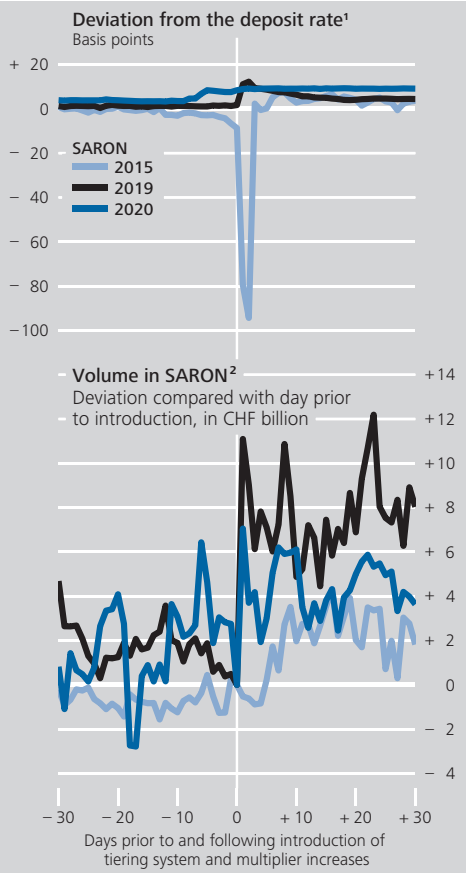
10 See Deutsche Bundesbank (2020).
11 See Brunnermeier and Koby (2018).
12 See European Central Bank (2020).
13 See Deutsche Bundesbank (2020) and Schnabel (2020).
14 See Deutsche Bundesbank (2020).
15 See also European Central Bank (2019).
16 In November 2019, when the two-tier system was introduced, the outstanding volume of negatively remunerated excess liquidity held with the Eurosystem stood at around €1,000 billion, and it has risen since then.

Tiering systems in other currency areas

Other central banks besides the Eurosystem have also cut policy rates, pushing their deposit rates into negative territory: these are the Bank of Japan (BoJ), Danmarks Nationalbank, Sveriges Riksbank and the Swiss National Bank (SNB). Each of these central banks has introduced a tiering system in one form or another. The ways in which these tiering systems differ go beyond remuneration and the size and calculation of exemption allowances. For example, Sveriges Riksbank absorbs a certain amount of excess liquidity, which is otherwise negatively remunerated, by issuing deposit certificates on a weekly basis. This arrangement is therefore not a tiering system in the narrower sense, but it is similar in its effect. The systems adopted by the SNB and the BoJ, which are outlined below, illustrate how differently tiering systems in the narrower sense, too, can be structured and calibrated.

The SNB's tiering system is similar in design to that of the Eurosystem. In January 2015, the SNB had lowered the interest rate on banks' sight deposits held with the SNB from 0% to -0.75% in order to ensure that the appreciation of the Swiss franc following the discontinuation of the minimum EUR/CHF exchange rate did not lead to an inappropriate tightening of monetary conditions.[1] When it introduced its negative deposit rate, it exempted around two-thirds of domestic banks' deposits from this negative interest. The aim of this was to limit the negative interest rate burden on banks to the minimum deemed necessary by the SNB for the implementation of monetary policy while still keeping secured short-term money market rates close to the policy rate.[2] The exemption allowance for domestic banks subject to minimum reserve requirements was initially equal to 20 times their minimum reserve requirements ("multiplier"). The SNB deducted the cash holdings reported in the last reserve maintenance

Short-term money market rates and volumes in Switzerland



Sources: SIX Swiss Exchange and Bundesbank calculations. **1** Difference between the Swiss Average Rate Overnight (SARON) and the SNB's interest rate on sight deposits. SARON is a reference interest rate for the Swiss franc. **2** The volume referred to here is the volume used to calculate SARON.
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1 See Swiss National Bank (2015).
2 See Swiss National Bank (2019) and Maechler and Moser (2020).

Comparison with tiering systems in other currency areas

Currency area	Start of negative interest rate policy	Start of tiering system	Deposit rates	Average remuneration rate[1]	Exempt tier[1]	Calculation of exemption allowance
Denmark[2]	July 2012	–	0% (facility) or – 0.6% (certificates)	– 0.48%	18%	1.55% to 3% of current account deposits[3]
Euro area	June 2014	Oct. 2019	0% or – 0.5%	– 0.37%	25%	6 x minimum reserve requirements
Switzerland	Jan. 2015	Jan. 2015	0% or – 0.75%	[4] – 0.15%	[4] 80%	30 x minimum reserve requirements[5]
Sweden[6]	Feb. 2015	–	0% (certificates) or – 0.1% (facility)	– 0.06%	44%	Set each week based on liquidity surplus
Japan	Jan. 2016	Jan. 2016	0.1%; 0% or – 0.1%[7]	[8] 0.04%	[8] 93%	Range of factors

Sources: Bank of Japan, Danmarks Nationalbank, Eurosystem, Sveriges Riksbank, Swiss National Bank and Bundesbank calculations. **1** Applies to banks' excess liquidity and actual use of exemption allowances. Estimate based on data made available to the public by the respective central banks and may deviate from actual values due to reasons such as the lack of bank-level data. As at (end of reserve maintenance period in) December 2020 (Denmark, euro area, Sweden) or November 2020 (Switzerland, Japan). **2** Negative interest rate policy was suspended for a time. Dual interest rates on the deposit facility and certificates were the norm even prior to the start of the negative interest rate policy period. **3** Depending on the size of current account deposits. **4** Estimate applies exclusively to domestic banks subject to minimum reserve requirements. Full use of exemption allowances is assumed. **5** Less the amount of cash held in the last reserve maintenance period. The exemption allowance is at least CHF 10 million per sight deposit account holder. **6** Sveriges Riksbank had already brought in negative interest rates temporarily back in 2009. The Riksbank absorbs a certain amount of excess liquidity by issuing certificates on a weekly basis. This arrangement is therefore not a tiering system in the narrower sense. **7** For individual regional banks, less 10 basis points in the special deposit facility. **8** The additional interest on deposits held in the special deposit facility for regional banks is not factored into this estimate.

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period from this.[3] In response to the significant increase in total sight deposits, in November 2019 the SNB raised its exemption allowance to 25 times banks' minimum reserve requirements, before raising it further to 30 times the requirements in April 2020 in response to the coronavirus crisis.[4] In terms of volume, the exemption allowances granted to domestic banks subject to minimum reserve requirements comprised around four-fifths of these banks' sight deposits in November 2020, making the average interest rate on the banks' sight deposits held with the SNB likely to have been just under -0.2% per annum.

Trading in the Swiss franc money market increased significantly following the introduction of the tiering system and the subsequent increases in the multiplier. The secured short-term money market rate (Swiss Average Rate Overnight – SARON) rose and temporarily drifted away from the SNB's deposit rate. This was not desirable from a monetary policy perspective. Since November 2019, the SNB has conducted a number of liquidity-providing operations, bringing SARON back into line with the SNB policy rate.[5]

3 Since November 2019, there have been two methods for calculating the exemption allowance, also referred to as the exemption threshold: (i) For domestic banks subject to minimum reserve requirements, the moving average of their minimum reserve requirements over the preceding three years is multiplied by the threshold factor and updated on a monthly basis. Previously, the calculation of individual banks' minimum reserve requirements was static. The cash holdings reported in the last reserve maintenance period are deducted from this. (ii) The SNB sets a fixed threshold for all other sight deposit account holders. The exemption allowance amounts to at least CHF 10 million for all sight deposit account holders. See also Swiss National Bank (2019).

4 The SNB took this action to help banks play their key role in economic developments. See Swiss National Bank (2020).

5 From November 2019 to July 2020 via fine-tuning operations in the overnight segment of the repo market, and since July 2020 by auctioning one-month funds on the repo platform. See Maechler and Moser (2020).

In January 2016, the BoJ introduced a tiering system at the same time as it implemented a negative interest rate policy. The BoJ's intention was to prevent an excessive decrease in Japanese banks' earnings stemming from the implementation of negative interest rates that could weaken their function as financial intermediaries.[6] The Japanese tiering system has three tiers. In the first component of the tiering system, the basic balance, a portion of the deposits held by banks in BoJ accounts is still remunerated at a positive rate of 0.1% per annum. The amount of this positive interest-bearing component for each financial institution corresponds to that institution's average outstanding current account balance at the BoJ in 2015. The minimum reserve requirement is deducted from this. The first component is therefore fixed and amounted to just under half of total deposits in November 2020. In the second component of the tiering system, the macro add-on balance,[7] a zero interest rate is applied to other deposits (also slightly less than half of total deposits in November 2020). The third component, the policy-rate balance, only comes into play if a financial institution's outstanding balance is in excess of the first two tiers: these excess reserves are subject to negative remuneration at -0.1% per annum. The BoJ adjusts the level of the macro add-on balance each month in both directions to ensure that this negative interest-bearing policy-rate balance accounts for a very low share of total deposits: in November 2020, it only comprised around 7% of deposits. At the end of the period under review, the combination of the three tiering system components produced slightly positive average remuneration overall for deposits held with the BoJ. In Japan, too, the tiering system has led to liquidity being redistributed via the money market.

In November 2020, the BoJ added a further component to its tiering system. As a three-year measure, it set up a special deposit facility with interest rates specifically for regional banks that meet certain requirements, namely an additional 0.1 percentage point on each of the three tiering system components. The BoJ hopes that this will strengthen regional economies and ensure financial system stability.[8] For example, the specific eligibility conditions for the more attractive rate of remuneration promote consolidation in the regional banking sector.

The tiering systems of other central banks show how they can differ in terms of structure and specific objectives. All central banks that have introduced negative policy rates in recent years have also adopted a tiering system in one form or another to reduce the potential side effects of the negative interest rate environment. The Japanese tiering system is much more complex and appears, more recently, to have been supporting structural policy in addition to providing interest rate relief. The SNB's experience confirms that a large exempt tier of excess liquidity holdings and significantly negative interest rates can temporarily raise money market rates.

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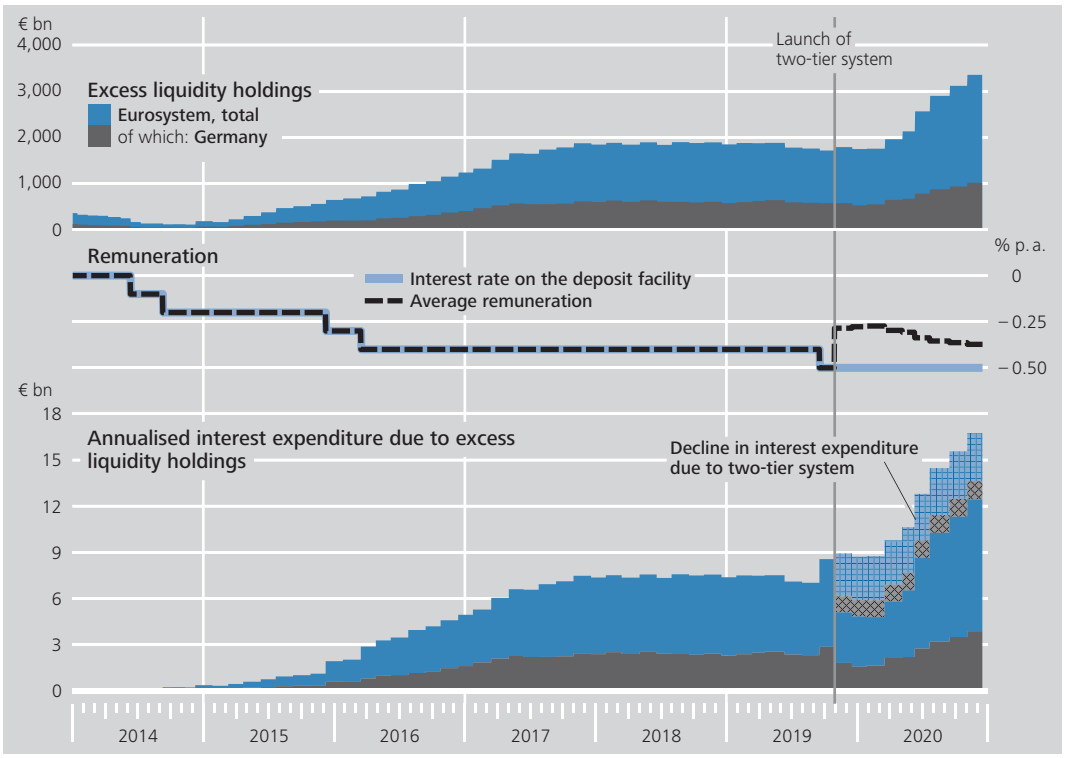
6 See Bank of Japan (2016).
7 The macro add-on balance comprises minimum reserve holdings plus the basic balance multiplied by a benchmark ratio (expressed as a percentage). It also contains other components, such as the amount outstanding of the BoJ's provision of credit through the loan support programme and its funds-supplying operation to support financial institutions in disaster areas. In the past, the macro add-on balance used to be adjusted quarterly, but since May 2020 it has been adjusted on a monthly basis via the benchmark ratio. The macro add-on balance has risen almost continuously since its introduction in 2016.
8 See Bank of Japan (2020).

Excess liquidity holdings and interest expenditure



Sources: Eurosystem and Bundesbank calculations.
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Impact on interest expenditure in the banking system

Rising interest expenditure as a result of negative deposit facility rate and high levels of excess liquidity holdings

When the interest rate on the deposit facility was first lowered into negative territory in 2014, banks in the euro area had to pay just under €0.2 billion per year in interest for holding excess liquidity. In the years that followed, rising excess liquidity holdings led to a continuous increase in the interest paid by banks to the Eurosystem. In September 2019, their annualised interest expenditure on excess liquidity holdings came to €6.8 billion.[17] When the ECB Governing Council lowered the interest rate on the deposit facility by 10 basis points to -0.5% in the same month, this expenditure rose to an annualised figure of €8.6 billion (see the chart above).

Introduction of the two-tier system

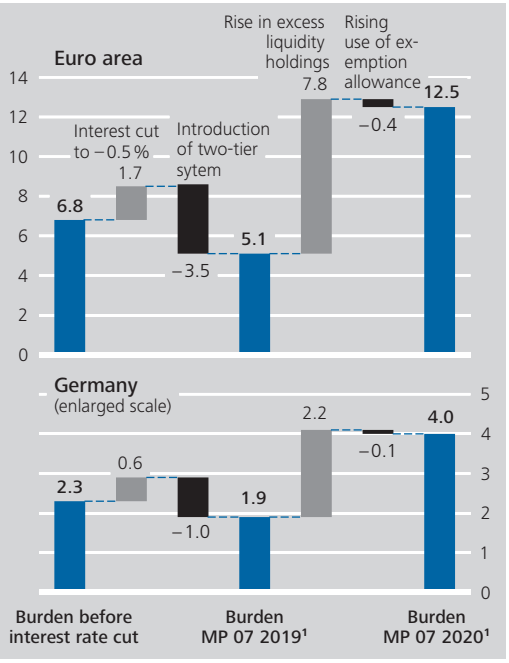
Two-tier system has cut euro area banks' costs by €4.7 billion so far

The introduction of the two-tier system at the end of October 2019 reduced the absolute annualised interest expenditure on excess liquidity holdings of euro area banks to €5.1 billion.[18] This means that the two-tier system reduced banks' annualised interest expenditure by just under €3.5 billion and thus lowered their total annual burden by €1.7 billion net after adjustment for the interest rate cut implemented around the same time. Initially, it thus more than offset the impact of the last cut to the deposit facility rate (see the chart on p. 68). Adding together the savings across all reserve maintenance periods from the introduction of the two-

17 The period referred to here and below is the sixth reserve maintenance period of 2019, from 18 September to 29 October 2019.
18 The period referred to here is the seventh reserve maintenance period of 2019, from 30 October to 17 December 2019.

Development of interest expenditure on excess liquidity holdings*

€ billion



Sources: Eurosystem and Bundesbank calculations. * Interest expenditure on excess liquidity holdings averaged across one reserve maintenance period, annualised. **1** Seventh reserve maintenance period in 2019 and 2020, respectively.

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tier system to December 2020, the interest banks paid on their excess liquidity holdings in this period was, in fact, €4.7 billion lower in total than it would have been without the two-tier system. Around one-quarter of this reduction was accounted for by banks in Germany.

The most recent figures show an increase in the annualised interest expenditure on excess liquidity holdings to around €12.5 billion, which is due to the significant rise in excess liquidity holdings.

Use of the exemption allowances

The liquidity redistribution required for full use of exemption allowances …

The impact of the two-tier system is maximised when all banks make full use of their individual exemption allowances. If the distribution of excess liquidity holdings had been the same as it was before the two-tier system was introduced, banks would have been able to use only 72% of the available allowances. Excess liquidity holdings are distributed heterogeneously both across euro area countries and among banks in individual countries.[19] For example, before the introduction of the two-tier system, the German banking system was holding €571 billion in excess liquidity (around 33% of total excess liquidity holdings in the euro area). However, given the set multiplier of six, only 69% of the €221 billion in available allowances would have been used in the reserve maintenance period before the two-tier system was launched.

… began when two-tier system was introduced

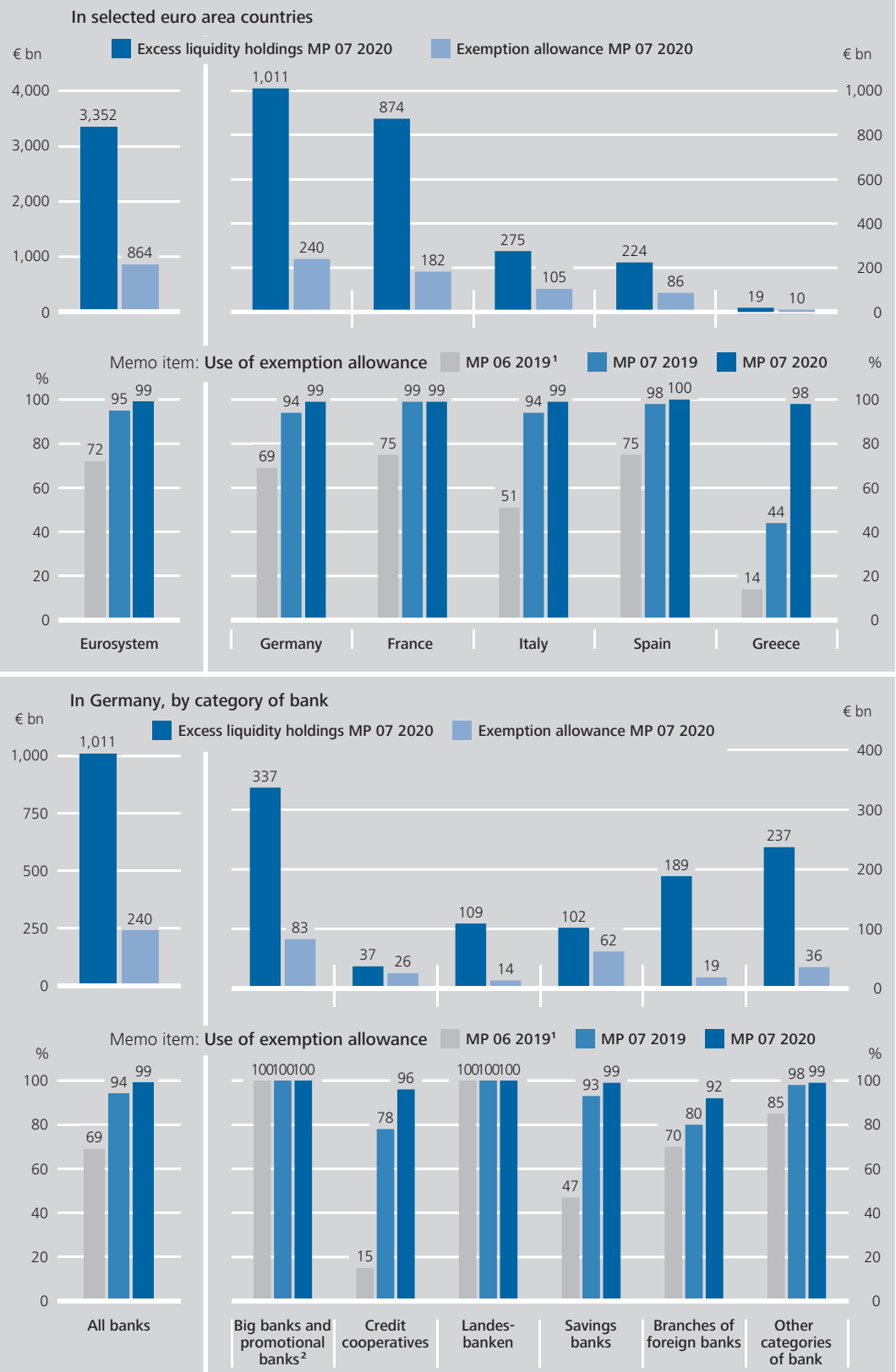
Banks were already using the bulk of their allowances during the introductory phase of the two-tier system in the seventh reserve maintenance period of 2019, both in the euro area as a whole and in Germany. The banking sectors of some euro area countries recorded net inflows of liquidity in connection with allowances being used up. On aggregate, the excess liquidity held by the banking sectors in Italy, Greece, Portugal and Slovakia was initially lower than the allowances granted. In the first reserve maintenance period after the two-tier system was introduced (from 30 October 2019 to 17 December 2019), banks in the euro area were able to use 95% of their allowances as a result of liquidity redistribution. One year later, in December 2020, this figure had risen to 99% (see the chart on p. 69).

In Germany, allowances left partly unused by savings banks, credit cooperatives and branches of foreign banks

Before the introduction of the two-tier system, the volume of excess liquidity held in the German banking system, particularly by some savings banks, credit cooperatives and branches of foreign banks, was in some cases significantly smaller than the allowances granted by the ECB Governing Council. These institutions often hold liquidity indirectly via their central and parent institutions. In the first reserve maintenance period after the two-tier system was launched, some savings banks immediately received inflows of liquidity, above all from Landesbanken, enabling them to use 93% of their exemption

19 See also Baldo et al. (2017).

Excess liquidity holdings and two-tier system exemption allowance



Sources: Eurosystem and Bundesbank calculations. **1** The use of the two-tier system in the reserve maintenance period 06 2019 is a hypothetical value, as the two-tier system was introduced with effect from the reserve maintenance period 07 2019. **2** Big banks and banks with special, development and other central support tasks.

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The two-tier system and liquidity holding in finance associations

German finance associations in the cooperative and savings bank sectors are characterised by special liquidity management and therefore also by special liquidity movements in the two-tier system. In particular, central institutions often assume a liquidity distribution function within the financial group and offer central services, such as indirect holding of minimum reserves. Exemptions specific to finance associations in the supervisory capital and liquidity requirements may apply to these arrangements. In this context, the introduction of the two-tier system triggered special liquidity movements.

Liquidity pooling in accounts with the central bank

Prior to the introduction of the two-tier system, some cooperatives and savings banks did not have large enough balances on their accounts with the Bundesbank for them to make full use of their exemption allowances. By contrast, their central institutions did hold sufficient excess liquidity on their Bundesbank accounts. As an alternative to their accounts with the Bundesbank, savings banks and cooperative banks also hold liquid funds in the form of deposits with the central institution of their association as part of their intra-group liquidity management – e.g. for settling payments. They can transfer balances between these accounts in order to make best use of their allowances in the two-tier system. However, they may also generate additional deposits from other sources (e.g. borrowing on the money market or liquidating securities).

The central institutions themselves are not necessarily dependent on their affiliated institutions' deposits to be able to make use of exemption allowances. They have sufficient liquidity from other sources. Nevertheless, it is in their interest for their affiliated institutions to hold liquidity with them on their current accounts, as intra-group deposits with the central institution are given preferential treatment in the liquidity coverage ratio (LCR) and can therefore improve this ratio.[1]

In some cases, central institutions improved the conditions for their affiliated institutions in order to retain these deposits after the introduction of the two-tier system. This affected both the conditions for deposits held with the central institutions and the interest rates for interbank lending.

Under the two-tier system, affiliated institutions have shifted deposits from their central institution accounts to the Bundesbank and have also procured additional liquidity to make use of their exemption allowances. Around three-quarters of the increase in central bank balances observed in the first reserve maintenance period following the introduction of the two-tier system (30 October 2019 to 17 December 2019) came from shifts and around one-quarter from additional borrowing. This additional liquidity is

1 The LCR defines the minimum stock of high-quality liquid assets credit institutions must hold as liquidity reserves in order to cover their net cash outflows under a severe 30-day stress scenario. Affiliated institutions' deposits are particularly attractive for the central institutions of finance associations with regard to the LCR if these deposits are treated as operational deposits pursuant to Article 27(1) of Commission Delegated Regulation (EU) 2015/61 of 10 October 2014 and are given a reduced outflow factor of 25% (compared with a 100% outflow rate for non-operative interbank deposits). However, this is accompanied by an equally reduced inflow rate (25% instead of 100%) for the association member which provides the deposit.

also largely provided by central institutions as the affiliated institutions are not usually active in the money market themselves.

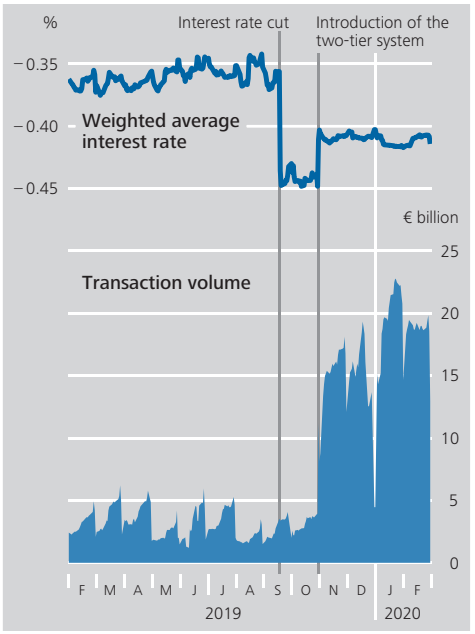
Indirect holding of reserves

Exemption allowances in the two-tier system can also be used more efficiently within finance associations when the affiliated institutions use indirect holding of minimum reserves[2] to pool their allowances at the central institution. With indirect holding of reserves, the affiliated institution transfers the responsibility for fulfilling the minimum reserve requirement to the central institution and thus also its exemption allowance. By combining the management of minimum reserves in this way, the association is able to use its aggregate exemption allowances without having to shift any liquidity. The central institution can pass on the resulting interest rate advantage to the affiliated institutions.

The advantages of this procedure for member institutions with indirect reserve holdings are that they do not necessarily need to have a Bundesbank account, their minimum reserve requirements are met by the central institution and, in some cases, their deposits with the central institution are remunerated more attractively. The disadvantage is that the institutions may only be able to count excess reserves on their current accounts with the central institution as a 25% weighted inflow in their LCR.[3] By contrast, their balances with the Bundesbank in excess of the minimum reserve requirement could always be included at a rate of 100% as high-quality liquid assets in the LCR.

Following the introduction of the two-tier system, more individual institutions switched from holding minimum reserves directly to indirectly than vice versa. It appears that the benefits of indirect holding of minimum reserves outweighed the disadvantages it poses for fulfilling regulatory ratios.

Unsecured lending by central institutions to savings banks and credit cooperatives*

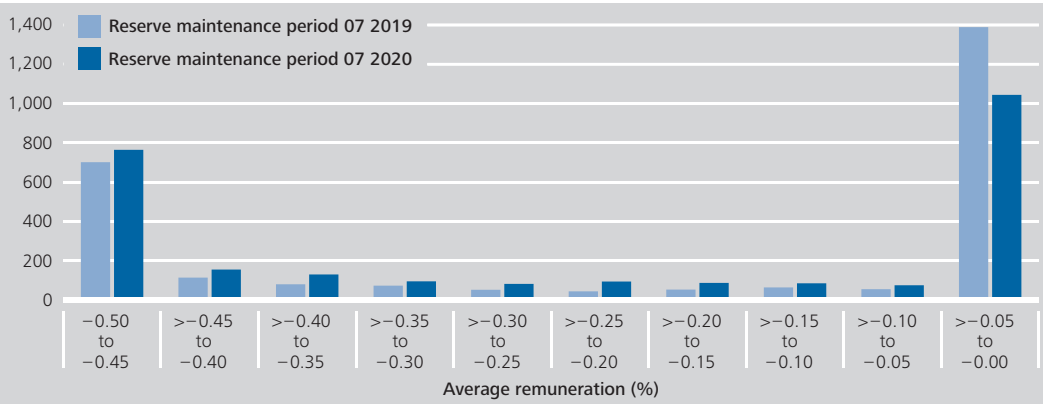


Sources: Money market statistical reporting and Bundesbank calculations. * Volume and interest rate refer to overnight transactions.
Deutsche Bundesbank

2 However, indirect holding of minimum reserves is only possible in the cooperative sector. Landesbanken do not perform this intermediary function for savings banks.
3 Article 27 of Commission Delegated Regulation (EU) 2015/61, in particular Article 27(1) (b) in relation to deposits within a group.

Distribution of the average remuneration on excess liquidity holdings with the Eurosystem

Number of banks



Sources: Eurosystem and Bundesbank calculations.
Deutsche Bundesbank

allowances on average. Credit cooperatives and branches of foreign banks tended to be slower to increase their liquidity and initially used only 78% and 80% of their allowances, respectively. In the months that followed, the institutions in both of these categories used an ever greater proportion of their allowances, with utilisation of these allowances reaching over 90% one year after the launch of the two-tier system (see the chart above). Redistribution in the savings bank and credit cooperative sectors was strongly influenced by liquidity management features specific to these sectors, and by regulatory requirements (see the box on pp. 70 f.). Both factors prevented some of these institutions from using up their allowances more quickly.

On the whole, big banks, promotional banks and Landesbanken did not need any additional liquidity inflows. When the two-tier system was introduced, they already had sufficient excess liquidity holdings to use more than 99% of their allowances.

Aggregated across all institutions domiciled in Germany, the unused allowances in the first reserve maintenance period after the two-tier system was introduced came to €14.3 billion, which corresponds to 94% utilisation. One year later, the respective figures were €2.9 billion and 99%.

Average remuneration on excess liquidity holdings

Two-tier system increased average remuneration on excess liquidity holdings …

By changing the level of remuneration on excess liquidity holdings, the ECB Governing Council is able to directly influence the interest expenditure – and thus also the interest margin – of banks in the euro area. Until the two-tier system was introduced, the rate of remuneration on excess liquidity holdings was the same as the Eurosystem's interest rate on the deposit facility. Prior to the launch of the two-tier system, average remuneration stood at -0.5% beginning in September 2019, whereas once the two-tier system was introduced on 30 October 2019, average remuneration rose from -0.5% to -0.29%. The average interest rate was thus higher than before the interest rate cut in September 2019, when it stood at -0.4% per year. Although the average remuneration on excess liquidity holdings had fallen back to -0.37% per year by December 2020 due to non-standard monetary policy measures increasing excess liquidity holdings to over €3 trillion,[20] it remained higher than before the interest rate cut.

20 Averaged across the sixth reserve maintenance period of 2020.

… with variation across individual banks

In the two-tier system, the average remuneration on the excess liquidity holdings of individual banks varies considerably. For most institutions, average remuneration is either 0% or -0.5% (see the chart on p. 72). This is because smaller institutions, in particular, remain within the scope of their exemption allowance and thus do not hold any excess liquidity subject to negative remuneration. Other institutions do not have an allowance because, for example, they do not hold any liabilities subject to minimum reserve requirements and therefore do not have a minimum reserve requirement from which the allowance would be calculated. These institutions have to pay negative interest from the very first euro of excess liquidity they hold.

Cut-off interest rate on excess liquidity holdings usually the same as deposit facility rate

After most banks had made full use of their allowances, in December 2020 the cut-off interest rate, i.e. the opportunity cost of holding an additional euro of excess liquidity, stood at -0.5% for just under 70% of banks in the euro area.[21] In view of this cut-off interest rate, undue influence on money market rates is unlikely. Consequently, the ECB Governing Council's interest rate policy is likely to continue to deliver an expansionary stimulus.

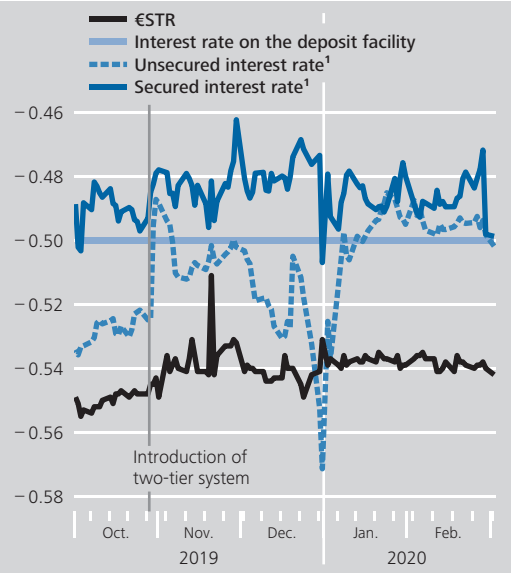
Money market rates and liquidity channels

Negatively remunerated excess liquidity holdings significantly exceeded unused allowances

It was intended that the introduction of the two-tier system and the liquidity redistribution it triggered should not unduly influence short-term money market rates, which would therefore remain close to the interest rate on the deposit facility. For this purpose, it was envisaged that a sufficiently large volume of excess liquidity would continue to be remunerated at the negative interest rate on the deposit facility. The liquidity supply of those banks that made full use of their exemption allowances would thus sufficiently exceed the liquidity demand of banks with unused allowances.

Response of money market rates to the introduction of the two-tier system*

%



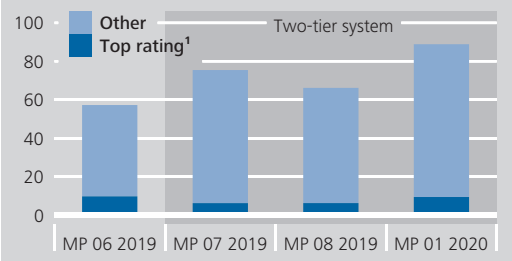
Sources: Eurosystem, MMSR and Bundesbank calculations. * Based on one-day transactions in the money market statistical reporting (MMSR) dataset. In the daily MMSR statistics, the reporting agents report all of their transactions in the secured and unsecured money market segments, amongst others. See Deutsche Bundesbank (2017) for more information. **1** Only banks with hypothetically unused exemption allowances in the reserve maintenance period 06 2019.
Deutsche Bundesbank

When the two-tier system was introduced, banks which would already have been able to make full use of their allowances at that point in time held an additional €1,140 billion in excess liquidity on top of these allowances. By contrast, the hypothetical liquidity demand of banks with unused allowances came to €227 billion in total.[22] Consequently, aggregate potential liquidity demand met with such a large liquidity supply that, given functioning markets, money market rates could be expected to respond only weakly, if at all.

21 This share rises to over 90% when banks are weighted by the size of their minimum reserves as a possible approximation of their economic relevance.
22 These figures are based on the sixth reserve maintenance period of 2019, which ran from 18 September to 29 October 2019 and thus pre-dates the two-tier system. They are therefore theoretical, based on the assumption that the two-tier system had already been adopted at that point in time.

Collateral provided for overnight borrowing by banks with unused exemption allowances, broken down by country rating*

€ billion, weekly average of reserve maintenance periods



Sources: MMSR and Bundesbank calculations. * Bilateral operations only. Only banks with hypothetically unused exemption allowances in the 06 2019 reserve maintenance period. **1** Collateral from countries that have a minimum country rating of Aa/AA+ from Moody's/S&P/Fitch.

Deutsche Bundesbank

Development of short-term money market rates

Short-term money market rates rose only temporarily

In practice, the two-tier system did indeed have barely any impact on money market rates, just as the ECB Governing Council had intended. This was reflected by the euro short-term rate (€STR),[23] which rose only slightly – by around 1 basis point – up to the end of 2019. Secured interest rates such as the STOXX GC Pooling Indices and the RepoFunds Rates[24] likewise saw only minor increases.

Distinguishing between banks with and without unused exemption allowances results in slightly higher interest rates on the borrowing of banks with unused allowances than on the borrowing of banks that would have already made full use of their allowances before the two-tier system was introduced. Banks with unused allowances had a greater interest in obtaining liquidity. The higher interest rates incurred by these banks in the unsecured money market had almost completely receded again within a few days.

They remained elevated for somewhat longer in the secured money market. This is explained by the fact that banks with unused allowances made increasing use of securities, which – all other business conditions being equal – lead to somewhat higher interest rates than, say, German Federal bonds (Bunds) (see the adjacent chart). The slightly higher interest rates in the secured money market are likely to also be due to growth in bilateral transactions.[25]

Increase in secured money market rates owing to modified collateral structure

Channels of liquidity movements

Such a rapid liquidity redistribution of around €200 billion, triggered by an adjustment in the monetary policy framework, is unusual. Investigating it can provide information as to the state of the banking system and the financial markets in the euro area. In this context, the observed shift in liquidity is mainly of interest in terms of its market channels, magnitude, speed and geographical focus. This analysis is principally confined to the fourth quarter of 2019. During this period, liquidity shifts due to the two-tier system had largely been concluded and the financial markets were not yet experiencing the impact of the coronavirus pandemic.

Essentially three channels open for liquidity increase

In the two-tier system, banks with unused exemption allowances were interested in obtaining liquidity as long as the rate of interest on this was lower than the remuneration rate on the allowance. Banks holding excess liquidity subject to negative remuneration were expected to lend some of it, provided that the remuneration was higher than the rate of interest

23 The unsecured transaction-based overnight rate, which is published by the ECB on a daily basis.

24 The STOXX GC Pooling Indices and the RepoFunds Rates are based on secured money market transactions executed via the electronic trading platforms Eurex Repo GmbH (for the former) and BrokerTec and MTS (for the latter).

25 Unlike transactions with a central counterparty (CCP), secured bilateral transactions are not settled centrally. This means that the contracting parties are unable to benefit from the advantages of a CCP (e.g. offsetting various positions, easier provision of collateral) and therefore charge somewhat higher interest rates in some cases. Between the introduction of the two-tier system and the end of 2019, the percentage of bilateral transactions had increased from around 22% to more than 34% for banks with unused allowances.

on the deposit facility. These conditions essentially produce three channels for the redistribution: the money market, the capital market (especially through the sale of highly liquid assets[26]) and participation in the targeted longer-term refinancing operations of the Eurosystem.[27]

Role of the money market

Liquidity initially redistributed within banking groups

In order to offset liquidity differences among themselves, banks can first shift funds within banking groups and close alliances – such as the German associations. In this way, banks were already able to fill more than one-quarter of their unused exemption allowances as soon as the two-tier system came into operation. In Germany, banks filled roughly one-third of their unused allowances through intra-group shifts and shifts within associations (see the adjacent chart).[28]

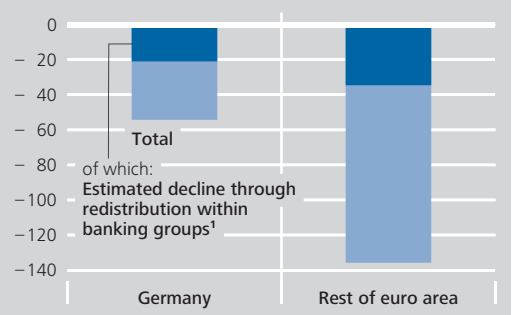
Banks can borrow not only within their group and association but also in the money market.[29] On the first day of the two-tier system, outstanding net borrowing[30] by banks with unused allowances rose significantly. Large institutions were thus able to reduce their unused allowances by roughly one-third.[31] They borrowed around 90% of the additional liquidity in the secured money market. By contrast, banks that made full use of their allowances expanded their lending, thus reducing their net borrowing (see the upper chart on p. 76).[32] Non-banks, too, participated in this redistribution, principally through secured transactions.

Majority of liquidity distributed through money market

When the two-tier system was introduced, the short-term money market was an obvious opportunity for banks to rapidly increase their liquidity holdings. For one thing, the money market rates were (and are) well below 0%, i.e. the rate of remuneration on the exemption allowance. For another, the short-term liquidity coverage of unused allowances introduces flexibility because it can be scaled back again at any time.

Decline in unused exemption allowances

€ billion, change from the sixth to the seventh reserve maintenance period of 2019

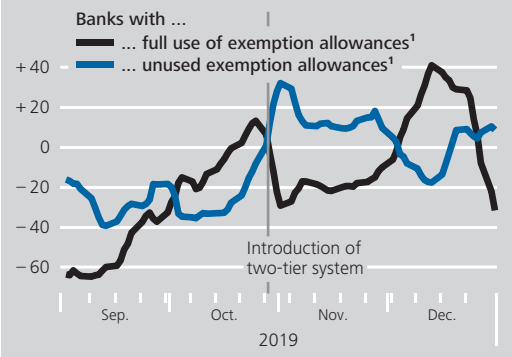


Sources: Eurosystem and Bundesbank calculations. **1** The estimate uses the change in the aggregate unused exemption allowances of a banking group adjusted for the increase in its holdings of excess liquidity. In the case of Germany, both savings banks and cooperative banks are considered as a banking group, respectively.
Deutsche Bundesbank

26 Another possibility would be the sale of other assets such as corporate bonds or shares. Here, however, it is assumed that banks chiefly scale back assets that have particularly low returns. Reducing euro government bonds, in particular, would therefore seem purposeful.
27 Above and beyond that, there are yet further channels for obtaining liquidity, such as accepting customer deposits.
28 An analysis of TARGET2 data confirms this development and shows heightened transactions by banks with unused allowances at the time the two-tier system started, especially within banking groups. Money market transactions in TARGET2 can be identified by an algorithm, described in Arciero et al. (2016) and elsewhere.
29 The money market is that part of the financial market in which short-term liquidity (maturity of up to one year) is traded.
30 The outstanding net volume of borrowed funds is the difference between the outstanding volume of borrowing and the outstanding volume of lending.
31 Estimate for MMSR reporting agents taking into account individual banks' unused allowances from the sixth reserve maintenance period of 2019 and the change in net borrowing in the money market between the sixth and seventh reserve maintenance periods of 2019. If net borrowing rises above the theoretically unused allowance for an individual bank, it is no longer taken into account. The aggregate also takes into account any decrease in net borrowing. The 48 banks for which MMSR data are available represent approximately €63 billion of €227 billion in theoretically unused allowances.
32 The MMSR statistics reflect a large part of the money market operations of the reporting banks and thus also the borrowing of counterparties outside the banking sector. For this reason, even some institutions with clear excess liquidity holdings report net borrowing.

Change in money market net borrowing*

€ billion



Sources: Eurosystem, MMSR and Bundesbank calculations. * Absolute change in outstanding net borrowing, normalised as at 29 October 2019. Centred moving five-day average. All maturities. **1** Hypothetical in the reserve maintenance period prior to the introduction of the two-tier system.

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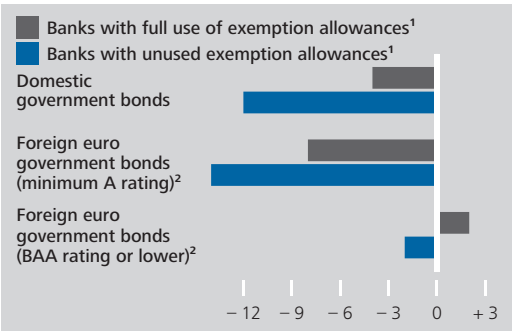
Change in bond holdings from banks' perspective in the final quarter of 2019*

%

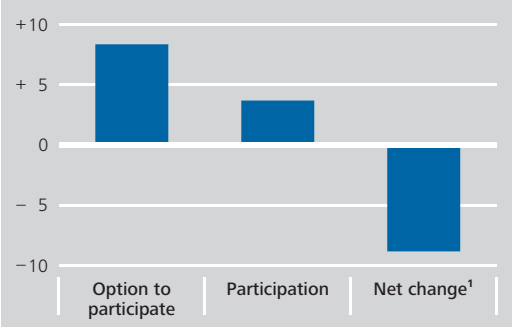


Sources: Eurosystem, securities holding statistics and Bundesbank calculations. * Relative change in own holdings at nominal values compared with previous quarter. **1** Hypothetical in the reserve maintenance period prior to the introduction of the two-tier system. **2** Moody's rating.

Deutsche Bundesbank

Use of second TLTRO-III to reduce unused exemption allowances*

€ billion



Sources: Eurosystem and Bundesbank calculations. * Amounts are shown only if banks were able to use them to fill their unused exemption allowances for the seventh reserve maintenance period of 2019. **1** After deduction of repayments of TLTRO-II operations.

Deutsche Bundesbank

Additional channels for liquidity inflows

Additional liquidity obtained through reduction of securities holdings

Liquidity can also be generated in the capital market, for instance by banks actively selling securities or not reinvesting principal payments. Banks with unused exemption allowances, in particular, have reduced their government bond holdings. This was generally remunerative in the case of securities with a return below 0%. In the fourth quarter of 2019, these securities included the government bonds of several euro area countries. Furthermore, the Eurosystem's resumption of net purchases under its asset purchase programmes boosted market demand. There are indications that banks covered roughly one-quarter of their unused allowances by reducing their own holdings of government bonds.[33] It was mainly domestic government bonds that were sold. There are no signs of banks reducing foreign government bonds with somewhat lower ratings to a greater extent (see the adjacent middle chart). In the aggregate, there is no evidence of any obvious sales of other securities, such as corporate bonds or shares, or of a disproportionate increase in bond issuance, for banks with unused allowances. [34]

Obtaining liquidity through additional Eurosystem refinancing operations insignificant

Another way of obtaining liquidity at a negative interest rate was provided by participation in the Eurosystem's monetary policy refinancing operations. There are no apparent indications, however, of banks with unused allow-

33 Estimate taking account of individual banks' unused allowances in the sixth reserve maintenance period of 2019 and the changes in holdings of euro government bonds between the third and fourth quarters of 2019. Reductions beyond the theoretically unused allowance are not taken into account. Any increase in holdings by individual banks reduces the aggregate estimated value. The estimate is calculated using the market and nominal values from the securities holdings statistics. The 249 banks for which data are available from these statistics account for roughly €93 billion of €227 billion in theoretically unused allowances.

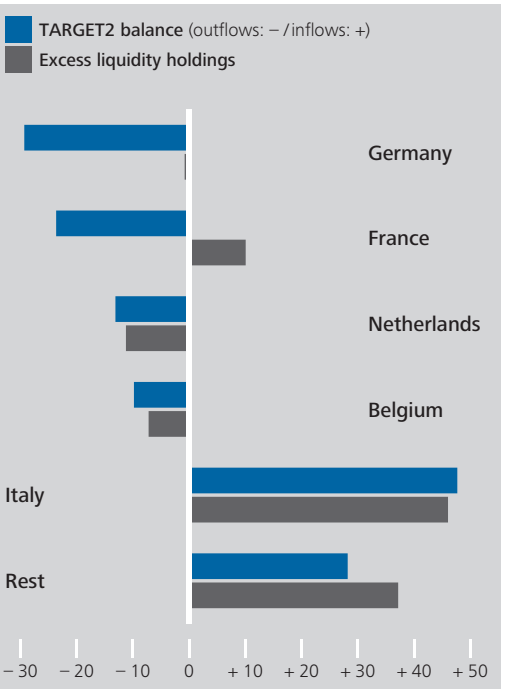
34 Higher net issuance by banks with unused allowances was not observable in the individual balance sheet items (IBSI) dataset. Banks could also have obtained liquidity in the capital market through bond issuance. However, owing to the fact that funds are tied up in bonds for a relatively long period of time compared with other alternatives (in contrast to short-term central bank liquidity), issuing bonds is initially not as attractive for this purpose.

ances participating in greater numbers in the second TLTRO-III operation in December 2019. To fully utilise their allowances, they could have borrowed €8 billion in this operation, but they used only €4 billion of this amount. Taking account of the repayments of the outstanding second series of targeted longer-term refinancing operations (TLTRO-II), the liquidity effect for these banks is in fact negative (see the lower chart on p. 76). Even so, banks with unused allowances made somewhat greater use of their bidding opportunities overall than those that had already made full use of their allowances.

The allotments of the later TLTRO-III operations, which are now also remunerated more attractively, as well as the additional asset purchases by the Eurosystem meanwhile caused excess liquidity to increase further from mid-March 2020. As a result, banks probably do not have to obtain as much additional liquidity to make full use of their still unused allowances.

Change in TARGET2 balances and excess liquidity holdings from MP 06 to MP 07 2019

€ billion



Sources: Eurosystem and Bundesbank calculations.
Deutsche Bundesbank

Cross-border liquidity flows

Cross-border liquidity flows …

As already highlighted, for some countries liquidity had to flow in from outside so that the banks in those countries could utilise their exemption allowances in full.[35] In the first few days following the start of the two-tier system, banks with unused allowances additionally borrowed roughly €16 billion via the money markets in other euro area countries. Cross-border money market transactions within Europe as a percentage of the total volume thus increased by just under 2 percentage points to 20%.

… lead to somewhat more homogenous liquidity distribution and temporarily reduce TARGET2 balances

These cross-border liquidity shifts were reflected not only in an altered distribution of excess liquidity but also in temporarily lower TARGET2 balances.[36] On 30 October 2019, total TARGET2 claims and liabilities fell by €32 billion. During the first few weeks of the two-tier system, there was a reduction especially in the TARGET2 claims of Germany, France, the Netherlands and Belgium and a correlated decline in these countries' relative share of excess liquidity holdings. By contrast, liquidity flowed into the Italian banking system, evidenced in particular by a €48 billion decline in Italian TARGET2 liabilities[37] and a considerable rise in excess liquidity held in the Italian banking system of €46 billion to €115 billion (see the chart above). Following the initial effects of the two-tier system, developments in TARGET2 balances were rapidly again dominated by other cross-

35 As far as liquidity is not created locally, for example through Eurosystem refinancing operations.
36 Countries with TARGET2 claims often correspond to banking systems that hold a relatively large amount of excess liquidity. In line with this, a redistribution from countries with high excess liquidity to countries with relatively low excess liquidity is also accompanied by a decline in the respective TARGET2 claims and/or liabilities. This, in turn, leads to a decline in total TARGET2 claims and/or liabilities.
37 Here and below: on an average of the sixth to the seventh reserve maintenance period of 2019. Liquidity did not necessarily flow directly between the countries mentioned above.

border transactions.[38] The distribution of excess liquidity in the euro area remains exceedingly heterogeneous, too.

Conclusion

With two-tier system, ECB Governing Council has achieved its aims

The data and facts analysed here suggest, as an interim conclusion, that the ECB Governing Council has achieved its intended aims with the introduction of the two-tier system. The two-tier system is likely to have assisted bank-based transmission, for example, through having reduced interest expenditure on holding excess liquidity by €4.7 billion up to December 2020. As was intended, short-term money market rates have not been unduly influenced. They are, in fact, somewhat lower at present than when the two-tier system was introduced. With regard to money market rates, there is therefore no need to charge a negative rate of interest on all excess liquidity holdings. At €2,498 billion at last report, the vast majority of excess liquidity in the euro area is, at present, still subject to the negative interest rate on the deposit facility.

The incentives of the two-tier system led to a redistribution of liquidity in the banking system, resulting in exemption allowances being very largely used up. The banks essentially achieved this directly after the introduction of the two-tier system via the money market, which proved to be stable. Banks carried out a large part of the redistribution within their banking groups and associations. Liquidity shifts also took place internationally. Some banks boosted the amount of liquidity they held by reducing their government bond holdings. Most banks managed to use up their allowances completely without recourse to additional Eurosystem refinancing.

38 Net asset purchases by the Eurosystem, in particular, lead to rising TARGET2 balances. See also Deutsche Bundesbank (2016), Eisenschmidt et al. (2017) and Avdjiev et al. (2019).

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