

## Developments in the German banking system during the negative interest rate policy period

*In June 2014, the ECB Governing Council decided to lower the interest rate on the deposit facility from 0% to -0.10%. This was the first time that a Eurosystem policy rate had been in negative territory. In the years that followed, the interest rate on the deposit facility was gradually lowered to -0.50%. Some market interest rates and yields also turned negative after June 2014: money market rates were the first to follow the interest rate on the deposit facility below the zero mark, while longer-term capital market yields only moved into negative territory with something of a time lag and with interruptions.*

*By contrast, German banks' deposit rates came to a halt at the zero mark for the most part, especially for household deposits. At the same time, lending rates continued to decline in line with general interest rate developments. This narrowed German banks' interest margins in lending and deposit business with the private non-financial sector.*

*Taken in isolation, shrinking interest margins could inhibit banks' willingness to lend, thereby impeding the intended effect of the accommodative monetary policy measures. However, the diminishing interest margins did not coincide with a deterioration in banks' profitability. This is because, up until the beginning of the coronavirus crisis, their adverse impact on earnings was offset by positive income effects originating from favourable economic developments and the low interest rate level. Low loan loss provisions and brisk credit demand are two major factors in this regard. That is also the reason why there has been no indication for Germany thus far that banks' willingness to provide credit might have declined. On the contrary, banks continued to expand their lending and deposit business, with the expansion of lending business driven not only by demand but also by supply.*

*The economic downturn caused by the coronavirus crisis is now likely to dampen the profitability of German banks. Results for German banks for the first and second quarters are already showing an increase in loan loss provisions, and the sharp economic downturn means that this development is likely to continue. As loan loss provisions rise, the pressure that narrowing interest margins exert on profitability becomes more difficult for banks to offset. This increases the likelihood that margin pressure will lead to a tightening of the supply of credit. At the same time, the monetary policy, supervisory and fiscal policy measures taken in response to the coronavirus crisis are counteracting such a risk.*

## ■ Introduction

*Onset of NIRP period in June 2014*

Against the backdrop of a persistently weak inflation outlook in the euro area, the ECB Governing Council decided in June 2014 to lower the interest rate on the deposit facility from 0% to -0.10%. This was the first time that a Euro-system policy rate had been in negative territory. The interest rate on the deposit facility was later gradually lowered further to -0.50% in September 2019. For the purposes of this article, the point in time when the interest rate on the deposit facility was lowered into negative territory for the first time is defined as the beginning of the negative interest rate policy (NIRP) period. Accordingly, in this article, the period from June 2014 to August 2020 stakes out the time frame for analysing developments in the German banking system.

*Alongside negative interest rate on deposit facility, other monetary policy measures relevant to developments in banking system*

In addition to the negative interest rate on the deposit facility, other monetary policy measures are crucial for understanding the developments observed in the German banking system. Most notably, these include the expanded asset purchase programme (APP) and the three series of targeted longer-term refinancing operations (TLTROs) (see the chart on p. 17). The excess liquidity<sup>1</sup> generated by these measures was a key driver behind money market rates following the interest rate on the deposit facility deep into negative territory.<sup>2</sup> Empirical evidence suggests, furthermore, that the APP contributed to the lowering of long-term capital market yields, thereby also flattening the yield curve.<sup>3</sup>

*NIRP could result in lower credit supply; prerequisites are: ...*

In this setting of negative interest rates and further expansionary measures, it became increasingly important over time to keep an eye on the relationship between banks' profitability and their willingness to provide credit in order to assess monetary policy transmission. This is because, in a protracted period of low or negative interest rates, banks' profitability and thus their capital levels may come under pressure. In this vein, banks are reluctant to pass through negative interest rates to their depositors.<sup>4</sup> This seems to be particularly true of household de-

posits.<sup>5</sup> This reluctance to pass on negative market interest rates to depositors, combined with the continued pass-through of interest rate cuts to borrowers, leads to a decline in the spread between lending and deposit rates. This spread is the interest margin that banks generate. All other things being equal, the negative interest rate applied to excess liquidity impairs banks' profitability as well. In combination with the narrowing interest margin, the resulting pressure on profitability could, in principle, lead to capital constraints and a lower credit supply.<sup>6</sup>

This is how a situation can arise in which an accommodative monetary policy turns out to narrow the supply of credit over time. One prerequisite for this is an adverse effect of the NIRP on banks' profitability and thus on their capital levels. However, such a burden does not come about automatically, since the margin pressure caused by the negative interest rate can be offset by the positive effects, if any, that the accommodative monetary policy has on other profitability components. For example, the NIRP has a positive impact on economic developments, which, because credit default risk declines, means that banks set aside less in loan loss provisions. In addition, the NIRP helps stimulate credit demand.

A further prerequisite for the negative interest rate to have a contractionary effect on banks' credit supply is a positive relationship between capital levels and the credit supply. As long as banks are well capitalised, that relationship is unlikely to materialise. However, an adverse effect on the credit supply cannot be ruled out if capital levels are only just above the regulatory minimum.<sup>7</sup>

*... an adverse effect on banks' profitability and thus on their capital, ...*

*... and a positive relationship between capital levels and credit supply*

<sup>1</sup> Excess liquidity is banks' predominantly short-term credit balances on their central bank accounts in excess of their required reserves.

<sup>2</sup> For more information, see Deutsche Bundesbank (2019a).

<sup>3</sup> For more information, see Deutsche Bundesbank (2019b).

<sup>4</sup> See, inter alia, Heider et al. (2019) and Kerbl and Sigmund (2016).

<sup>5</sup> See Eisenschmidt and Smets (2019) and Jobst and Lin (2016).

<sup>6</sup> See Brunnermeier and Koby (2018).

<sup>7</sup> See Brunnermeier and Koby (2018).

*Tightening of credit supply would run counter to monetary policy's intended effect*

If the NIRP in the euro area were to lead to a tightening of the supply of bank credit, this would run counter to the actual intended effect of monetary policy since, during the NIRP period, monetary policy in the euro area sought to ease any existing credit supply constraints in the banking sector. This is reflected, for instance, in the launch of the TLTROs.<sup>8</sup> These operations are currently offering banks the possibility of taking up longer-term funding at favourable rates compared with most of their other sources of funding. For banks that achieve their individual benchmark for loan growth, the interest rate on the TLTRO-III series is between -0.5% and -1% over a given period of time. When viewed in isolation, this supports banks' profitability owing to the lower interest expenditure. The Eurosystem furthermore adopted a two-tier system for remunerating excess liquidity at the end of 2019. This measure also improved banks' profitability because it means that banks' excess liquidity is remunerated at 0% up to a certain level (currently six times their minimum reserve), instead of at the negative interest rate on the deposit facility (currently -0.5%).

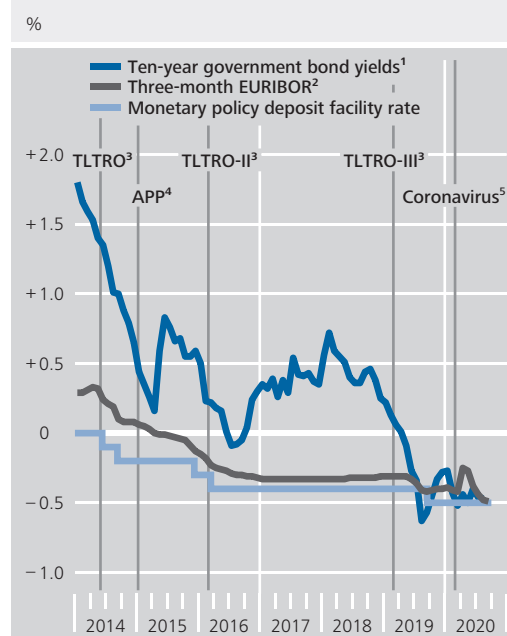
*Article looks at developments in profitability and lending business*

Against this background, this article first looks at how German banks' profitability has evolved during the NIRP period, focusing above all on how the negative interest rate on the deposit facility impacted on margins in lending and deposit business with the private non-financial sector. This is followed by an assessment of developments in German banks' lending business with this sector. The principal focus here is whether signs of supply-side constraints can be found and how developments in lending business in turn impact on profitability.

*Coronavirus crisis has substantial impact on developments in German banking system*

Since March 2020, the coronavirus crisis has been the key factor dictating developments in the German banking system. The spread of COVID-19 and the measures taken to contain it caused a historic decline in economic output in Germany. Monetary and fiscal policymakers and banking supervisors took various measures to cushion the considerably negative impact on

### Selected interest rates, yields and events during the NIRP\* period



\* NIRP stands for "negative interest rate policy". **1** According to the yield curve for listed Federal securities. **2** Monthly averages. **3** Announcement of targeted longer-term refinancing operations (TLTROs). **4** Announcement of the expanded asset purchase programme (APP). **5** Beginning of the coronavirus crisis and comprehensive monetary policy measures in response.

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the economy, thus also supporting the German banking system.

The core function of the monetary policy measures was to ensure the broad supply of liquidity to the private non-financial sector. Given the risks to price stability, the monetary policy stance in the euro area was therefore made even more expansionary. Amongst other things, the ECB Governing Council initiated further non-standard measures with the launch of the pandemic emergency purchase programme (PEPP) as well as pandemic emergency longer-term refinancing operations (PELTROs). In addition, it made the conditions of the pre-existing TLTRO-III series even more attractive.

Supervisory relief granted in the wake of the coronavirus crisis eased banks' capital constraints so that banks do not excessively restrict

*Monetary policymakers responded with broad package of measures, ...*

<sup>8</sup> See, inter alia, Deutsche Bundesbank (2014), particularly p. 32.

*... supervisors reduced capital requirements, and fiscal policymakers reduced credit risk*

*Coronavirus crisis, together with NIRP, could trigger credit supply constraints*

their lending.<sup>9</sup> Fiscal policymakers, too, initiated numerous support measures,<sup>10</sup> including extensive lending programmes by promotional banks with a full assumption of credit risk by government in some cases.<sup>11</sup>

Despite these measures, increased loan loss provisions will probably be the main burden on banks' profitability in the wake of the coronavirus crisis. In addition, an increase in risk weights is expected to put a strain on banks' capital ratios.<sup>12</sup> How great the burden will be very much depends on how the pandemic evolves. Together with the declining interest margin, the strain on profitability could become so intense that there is a greater likelihood of banks cutting back on the supply of credit.

## **Banks' profitability in the NIRP period**

*Profitability stable overall so far in the NIRP period*

The profitability of German banks has so far proved to be stable overall during the NIRP period. Compared with the period from 1999 to 2007,<sup>13</sup> the net interest margin has been lower in the NIRP period.<sup>14</sup> By contrast, the valuation result, the most important component of which is loan loss provisions, moved in banks' favour during the NIRP period (see the upper chart on p. 23).<sup>15</sup> A key factor behind this favourable development was the good state of the German economy up to the onset of the coronavirus crisis. This was also supported by expansionary monetary policy measures, including the negative interest rate on the deposit facility (see the box on pp. 19 ff.).

*Reluctance to pass through negative rates to depositors weighs on interest margin*

The reluctance to pass through negative interest rates to depositors played a key role in the declining net interest margin observed in the German banking system. This reluctance is particularly evident in deposit business with households.<sup>16</sup> In terms of volume, deposit business with households is more significant than deposit business with non-financial corporations (NFCs).<sup>17</sup> At the beginning of the NIRP period, the average interest rate on household deposits

applied by the "median" bank – i.e. the median of the distribution of deposit rates at the individual bank level – was still well above the zero mark (see the lower chart on p. 23). Over the course of the NIRP period, the median then gradually approached the zero mark. In August 2020, it came to only around 0.01%. The 90th percentile of the distribution is also just slightly above this level. By contrast, the average interest rates on NFC deposits have been moving into negative territory since the end of 2016. At the same time, the share of banks that charge negative deposit rates on average has risen steadily since then. In business with NFCs, then, banks are able to charge negative deposit rates across the board. This is particularly true of sight deposits. In this category, around 63% of the reporting banks reported a negative volume-weighted average interest rate in August 2020. However, the growing introduction of negative deposit rates in business with NFCs did not lead to an abrupt drop in these rates deep into negative territory.

<sup>9</sup> For details of the supervisory relief granted to significant institutions, see [https://www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200320\\_FAQs~a4ac38e3ef.en.html](https://www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200320_FAQs~a4ac38e3ef.en.html)

<sup>10</sup> See Deutsche Bundesbank (2020a) for information on the fiscal measures taken in the course of the coronavirus crisis in Germany.

<sup>11</sup> See, for example, <https://www.kfw.de/inlandsfoerderung/Companies/KfW-Corona-Hilfe/>

<sup>12</sup> See Deutsche Bundesbank (2020b).

<sup>13</sup> The reference period covers a window in which the binding effect of the zero mark as regards the interest rates applied to deposits is likely to have played only a minor role, or no role at all, for banks. The three-month EURIBOR's lowest level in the reference period was 2%. In addition, the reference period was characterised by periods of falling and rising policy rates. The beginning of the period was marked by the launch of the euro as book money and the transfer of monetary policy responsibility from the national central banks to the Eurosystem. The reference period ends before the peak of the global financial market crisis.

<sup>14</sup> The net interest margin is defined as net interest income in relation to total assets. Net interest income is the difference between interest income and expenses.

<sup>15</sup> In addition to loan loss provisions, the valuation result also includes write-downs and reversals of write-downs on securities held in the liquidity reserve.

<sup>16</sup> For more information, see Deutsche Bundesbank (2019c). A reluctance to pass through negative interest rates on household deposits is evident in the other euro area countries, too.

<sup>17</sup> According to monthly balance sheet statistics, the volume of household deposits is roughly four times higher than the volume of NFC deposits.

## The effects of a negative interest rate policy on banks' profitability and macroeconomic developments in dynamic stochastic general equilibrium models

As outlined in the main article, a negative interest rate policy (NIRP) affects banks' profitability via various channels. These effects arise not just directly via the policy rate's impact on deposit and lending rates but also indirectly via other economic variables. This is the case, for example, when a negative policy rate stimulates macroeconomic activity, which then has an impact on banks' profitability. In turn, the way in which banks respond to a change in their profitability also affects other macroeconomic variables.

Indirect and feedback effects of this kind can be analysed using dynamic stochastic general equilibrium (DSGE) models. In these models, monetary policy affects bank-specific variables such as interest rates and credit dynamics and also influences the real economy via a range of complementary transmission channels. In this box, two different DSGE models (model A and model B) are used to investigate the effects of a NIRP on banks' profitability.<sup>1</sup>

In both models, the starting point is a stylised negative demand shock. The intensity of this shock is calibrated such that the central bank – in order to stabilise the economy – has to react so forcefully that the policy rate enters negative territory. Three scenarios are analysed, each differing in terms of how flexibly monetary policymakers can adjust the policy rate, and banks their deposit rates, to economic developments. By comparing the three scenarios, it is ultimately possible to determine how the NIRP affects both the economy as a whole and banks' profitability.

In the first scenario, it is assumed that there is no limit on the extent to which both the policy rate and commercial banks' deposit rates can be lowered into negative territory, with neither monetary policymakers nor commercial banks being subject to any constraints in this respect. In the second scenario, the former are unable to lower the policy rate, and the latter their deposit rates, to an unlimited extent. They are both constrained by an effective lower bound on interest rates, which, for the sake of simplicity, is set at zero. In the third scenario (analysed in model A only), it is assumed that the policy rate can be lowered into negative territory, but only as far as -0.5%. By contrast, commercial banks are unable to cut their deposit rates to below zero.<sup>2</sup>

Model A is based on Gerali et al. (2010).<sup>3</sup> This framework contains a financial sector with monopolistic competition among banks. The banks' interest margin is defined as the difference between the lending rate and the deposit rate. In the long-run equilibrium, the lending rate is higher than the policy rate, which, in turn, is above the deposit rate, resulting in a positive interest margin. It is assumed that banks cannot flexibly adjust their deposit or lending rates. Furthermore, banks have to maintain an

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<sup>1</sup> The two models are based on a New Keynesian framework along the lines of Christiano et al. (2005) or Smets and Wouters (2007).

<sup>2</sup> This roughly corresponds to the current data. In Germany, the deposit rate aggregated across all categories of new business with the private non-financial sector as defined in the MFI interest rate statistics stood at around 0% in August 2020. The Eurosystem's deposit facility rate is currently -0.5%.

<sup>3</sup> The model was estimated for the euro area and has already been used in previous Monthly Report analyses. See Deutsche Bundesbank (2015a).

(exogenously) imposed capital ratio and incur costs if they deviate from it. In order to obtain a loan, households and enterprises have to provide collateral (e.g. the value of their stock of housing or physical capital).

The chart on p. 21 shows the consequences of a demand shock in model A for the three outlined scenarios.<sup>4</sup> The same demand shock is assumed in all of the scenarios. It causes a decline in both real economic output and inflation.<sup>5</sup> Monetary policy responds by lowering the policy rate. Consequently, lending and deposit rates fall, as does the interest margin, because lending rates decline more sharply than deposit rates in all scenarios.<sup>6</sup>

Comparing scenarios 2 and 3 provides an insight into the isolated impact of lowering the policy rate into negative territory (down to -0.5%) relative to the effect of just bringing it down to zero. In both scenarios, it is assumed that negative interest rates cannot be applied to deposits at banks. The zero bound on deposit rates is thus binding for banks. Like the policy rate, the lending rates fall more sharply in scenario 3 than in scenario 2. The lower lending rates stabilise investment demand and thus drive up the demand for credit and the lending volume. This mitigates the economic downturn more effectively in scenario 3 than in scenario 2, leading to a smaller decline in inflation. As banks cannot reduce their deposit rate to below zero, the interest margin and bank profits initially decrease more sharply in scenario 3 than in scenario 2.<sup>7</sup> Thus, the stronger expansion of the lending volume in scenario 3 does not fully offset the smaller interest margin. However, the more stable economic developments in scenario 3 are accompanied by a faster recovery in banks' profits.

In scenario 1, both monetary policymakers and banks are unconstrained. Monetary policymakers cut the policy rate to levels far below zero. Consequently, lending rates also fall more steeply than in the second scenario, where the policy rate cannot fall below zero. Although the banks in this scenario lower their deposit rates into negative territory, this, taken in isolation, reduces the interest margin and thus their profits. Nonetheless, the lower lending rates increase the incentive to invest, which means that the economic downturn is less sharp than in the second scenario. Accordingly, the inflation rate falls less steeply. The upturn in scenario 2 comes later than in scenario 1, which is reflected in a delayed stabilisation of banks' profits.

A comparison of scenarios 1 and 2 illustrates that, when the policy rate is subject to a binding zero lower bound, monetary policymakers are less able to mitigate the economic downturn and falling inflation than without this constraint (the effect of non-standard monetary policy measures at the lower bound on interest rates is disregarded here).

Model B is based on Kühl (2018).<sup>8</sup> In this model, non-financial corporations (NFCs) fund their investments with bank loans and capital. Both NFCs and banks are subject to balance sheet constraints which require

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<sup>4</sup> The simulations are based on Gerke et al. (2020).

<sup>5</sup> An exogenous preference shock that increases consumers' discount rate is used. This reduces the preference for consumption in the present and thus also aggregate consumer demand. Conversely, aggregate saving increases.

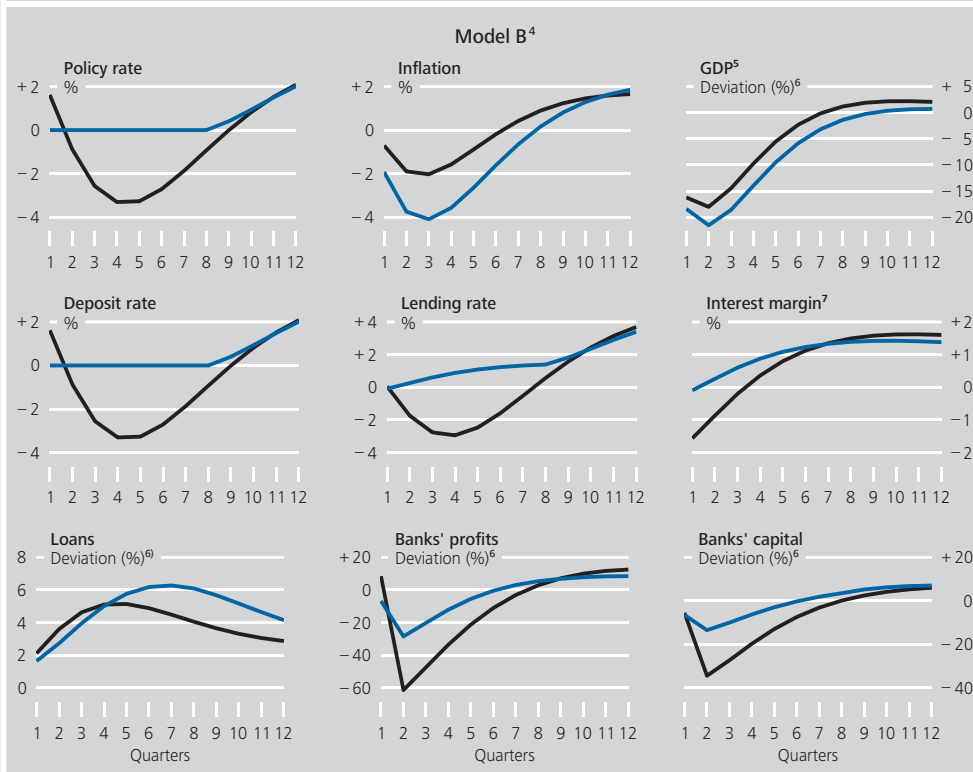
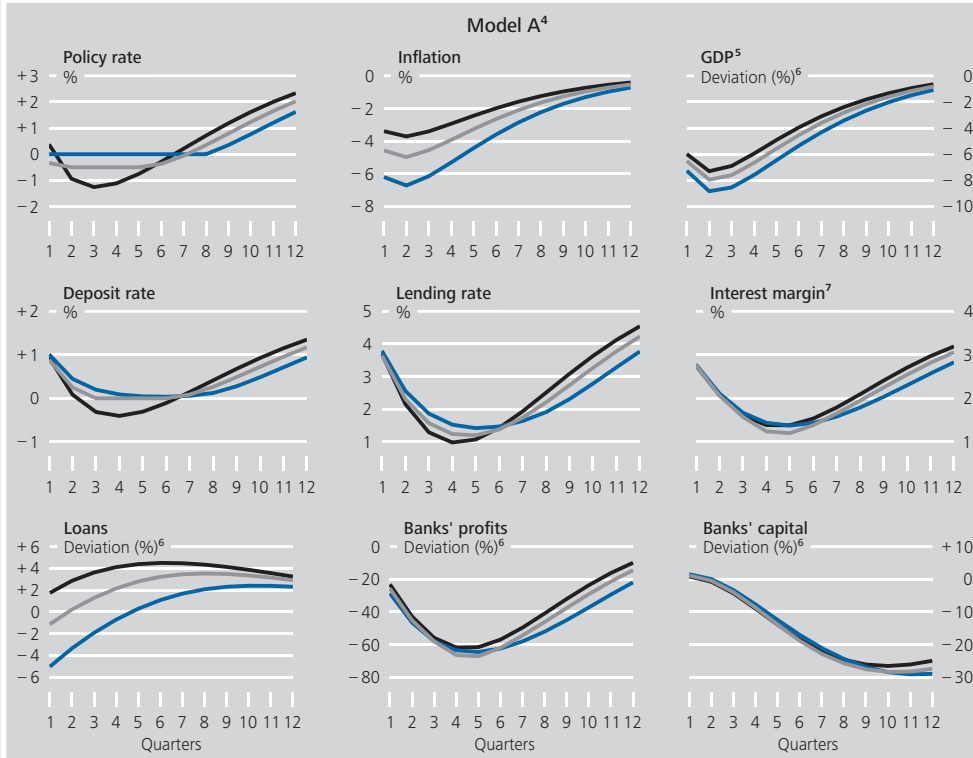
<sup>6</sup> This is due to the parameterisation in Gerali et al. (2010). In particular, the parameters for the adjustment costs for changing interest rates on loans and deposits imply a corresponding reaction in those variables.

<sup>7</sup> Banks' profits are defined as the difference between interest income and interest expenditure.

<sup>8</sup> The model was estimated for the euro area and has already been used in previous Monthly Report analyses. See Deutsche Bundesbank (2016).

### Effects of a demand shock on macroeconomic variables and bank variables

— Scenario 1<sup>1</sup> — Scenario 2<sup>2</sup> — Scenario 3<sup>3</sup>



<sup>1</sup> Scenario 1: Neither policy rate nor deposit rate constrained. <sup>2</sup> Scenario 2: Policy rate and deposit rate constrained by zero lower bound. <sup>3</sup> Scenario 3: Policy rate constrained at -0.5%, deposit rate constrained by zero lower bound. <sup>4</sup> Model A is based on Gerali et al. (2010), model B on Kühl (2018). <sup>5</sup> Gross domestic product. <sup>6</sup> Deviation from the long-run equilibrium (steady state). <sup>7</sup> Lending rate minus deposit rate.

them to hold capital. The level of lending rates is therefore determined by the leverage ratios of banks and NFCs. Unlike in model A, the policy rate and the deposit rate are, by definition, identical. As in model A, banks generate their profits from the interest margin, i.e. the difference between the lending rate and the deposit rate. As the policy rate and the bank deposit rate are identical, scenario 3 cannot be simulated in this model.

As a result of the negative demand shock, output and inflation also decline in scenarios 1 and 2 of model B (see the chart on p. 21). Here, too, the central bank responds by cutting the policy rate. As in model A, lending rates fall more sharply than deposit rates, leading to a smaller interest margin.<sup>9</sup>

In scenario 1, the effects of a demand shock on output and inflation are comparable to those in model A. The interest margin enters negative territory, i.e. losses are incurred. This reduces bank capital. The declining lending rates lead to fixed capital investment and a corresponding increase in borrowing. In scenario 2, there is an effective zero lower bound on both the policy rate and the deposit rate. As the policy rate cannot be lowered as far as in scenario 1, the demand shock leads to a sharper economic downturn in scenario 2. This is in line with model A. Compared with scenario 1, the leverage ratio in the non-financial sector increases. This is primarily due to the fact that capital in the non-financial sector decreases as a result of the sharper economic downturn. The higher leverage ratio in the non-financial sector is associated with greater expected losses for banks. Banks are compensated for their expected losses with higher lending rates. The resulting wider interest margin in comparison with scenario 1 ensures that banks' profits and capital fall less steeply in scenario 2.

A comparison of the two models points to qualitatively similar macroeconomic effects. However, the feedback effect of macroeconomic activity on banks' profitability varies. In model A, the NIRP stimulates credit demand, which leads to comparatively strong growth in the lending volume. Given a positive interest margin, this ultimately has a positive impact on commercial banks' profits. In model B, the NIRP reduces the leverage ratio in the non-financial sector. Lending rates thus fall more sharply, which has a negative impact on banks' profitability.

All in all, three conclusions can be drawn about the NIRP. First, it reduces banks' interest margin, especially when there is a zero lower bound on banks' deposit rates. Second, it stabilises macroeconomic activity by lowering the overall interest rate level. Third, it can stabilise or worsen banks' profitability, depending, above all, on developments in lending rates and the lending volume.

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<sup>9</sup> This is due to assumptions about the specifics of lending conditions. In the model, lending conditions are selected so as to maximise the benefit to borrowers. Following the demand shock, borrowers can thus negotiate a significantly lower lending rate.



*High level of funding through household deposits increases likelihood of negative interest rates being applied to deposits*

The box on pp. 24 ff. uses empirical methods to examine which types of banks charge negative interest rates in deposit business with NFCs. Its findings suggest that a larger share of household deposits in relation to total assets increases the likelihood of negative interest rates being applied to NFC deposits. The analysis presented in the box also indicates that banks adjusted their business strategy in deposit business with households during the NIRP period: banks generated higher net commission income on their outstanding deposit holdings than in the pre-NIRP period.<sup>18</sup> This could be because banks raised their fees in deposit business with households. It might also be because banks used their business relationships with households to cross-sell further banking services from which they generated commission profits.

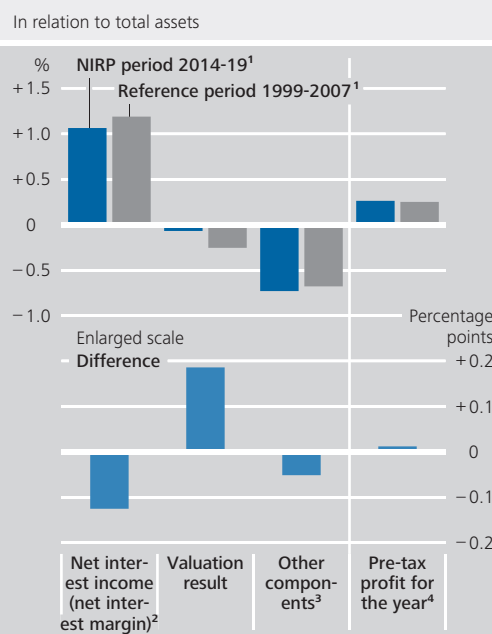
*Unclear why zero mark more binding on household deposits than on NFC deposits*

The reasons why negative deposit rates are a more common occurrence in business with NFCs than they are in business with households are varied and ambiguous. Households are generally in a better position than NFCs to convert a larger proportion of their deposits into cash. Furthermore, the zero mark might represent more of a “psychological” barrier for households and prompt a stronger response if rates fall below that level.<sup>19</sup> It might also be the case that banks fear a loss of their reputation if they introduce negative deposit rates for households.

*Relationship between lending and deposit rates changed in the NIRP period*

Empirical evidence suggests that, in the pre-NIRP period, German banks sought to keep their interest margin in lending and deposit business as constant as possible.<sup>20</sup> To this end, they passed through changes in the interest rates applied to their outstanding loans to households via deposit rates.<sup>21</sup> A separate analysis models interest rates applied to households’ sight deposits and savings deposits depending on the interest rates applied to out-

### Banks' profitability in the NIRP\* period and the period from 1999 to 2007

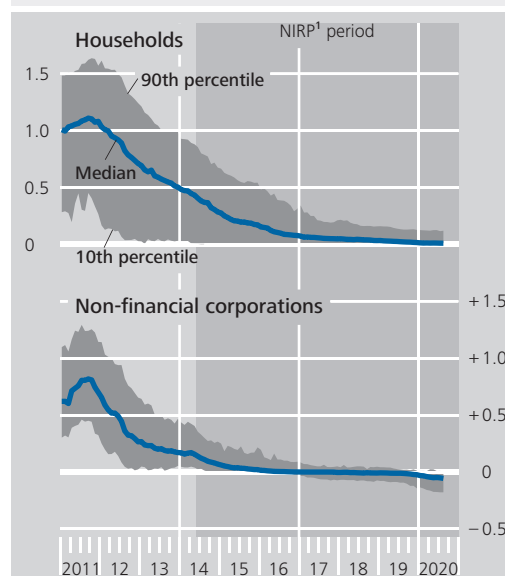


\* NIRP stands for “negative interest rate policy”. **1** Averages over the respective years. **2** Net interest income as a percentage of total assets corresponds to the net interest margin. **3** Net commission income, result from the trading portfolio, other operating result, general administrative spending and extraordinary result. **4** Sum of net interest income, valuation result and other components.

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### Distribution of deposit rates at the individual bank level\*

%, monthly data



\* Volume-weighted interest rate for new business across sight, savings and time deposits (according to MFI interest rate statistics), weighted with new business volumes. For non-financial corporations, only sight and time deposits are considered. For savings and sight deposits, new business volumes correspond to outstanding volumes. Distribution across banks in the MFI interest rate statistics sample. **1** NIRP stands for “negative interest rate policy”.

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<sup>18</sup> See Michaelis (2021).

<sup>19</sup> See Eisenschmidt and Smets (2019).

<sup>20</sup> See Sopp (2018).

<sup>21</sup> See Deutsche Bundesbank (2019b).

## Negative interest rates on corporate deposits and higher fees – what role do retail deposits play?

The negative interest rate policy (NIRP) introduced by the Eurosystem in mid-2014 sent commercial banks' interest margins into decline. There are different ways in which banks can respond to the pressure this places on their profitability. One is to apply negative interest rates to retail deposits; another is to attempt to generate more income from fees and commissions. This box explores these two avenues independently of each other from an empirical angle with a view to finding out what characterises a bank that opts for one of these two paths.

### Which types of banks charge enterprises negative deposit rates?

The first step is to empirically identify the bank characteristics which influence the probability of a bank in Germany, on average, charging non-financial corporations (NFCs) a negative rate of interest on their overnight (sight) deposits. This is achieved by estimating a linear probability model with bank microdata combined with bank and time fixed effects.<sup>1</sup> The estimation covers the period from September 2014 (since when the three-month OIS rate has been below zero) to September 2019.<sup>2</sup>

Linear probability models only allow the dependent variable to have a value of zero or one. In the calculations presented here, this variable is one in month  $t$  if a bank's volume-weighted interest rate on NFC sight deposits is negative<sup>3</sup> and zero otherwise. The benchmark model contains three explanatory bank-specific variables which are the main point of interest in this analysis: a bank's NFC deposit base, household deposit base, and excess liquidity.<sup>4</sup> The three variables are each shown as a percentage

of the respective bank's total assets. In addition, the benchmark model contains two bank-specific control variables: liquid assets<sup>5</sup> as a percentage of total assets, and the bank's size (measured by the logarithm of total assets).

According to the empirical literature, the share of deposit-based funding in relation to a bank's total assets explains a major part of the supply of credit in the NIRP period.<sup>6</sup> Conceivably, then, the share of deposit-based funding will be a factor in the negative interest rates applied to NFC deposits as well. Since banks are significantly more reluctant to apply negative interest rates to household deposits than to NFC deposits,<sup>7</sup> the present analysis adds the deposit shares of NFCs and households to

1 Probit or logit models would be alternative estimation models for binary data. However, it is very difficult to incorporate bank and time fixed effects, and robust standard errors into these model classes, which is why a linear regression model is used in this case (see Altavilla et al. (2019)).

2 Unlike in the main article, a short-term market interest rate, rather than the deposit facility interest rate, is used here to distinguish the period of negative interest rates. Short-term market rates such as the three-month overnight index swap (OIS) rate generally reflect banks' funding costs best of all, which is why they are commonly used for empirical analyses of interest rate pass-through.

3 Data source: MFI interest rate statistics.

4 The term "deposit base" refers to sight and time deposits. "Excess liquidity" denotes banks' predominantly short-term credit balances on their central bank accounts in excess of their required reserves. Excess liquidity is a subset of banks' total claims on the Eurosystem. Unlike excess liquidity, the latter also include longer-term claims. Data source: monthly balance sheet statistics.

5 Liquid assets are calculated as currency in circulation plus foreign and domestic debt securities plus bank claims on the Eurosystem, less required reserves. Excess liquidity has been deducted from claims on the Eurosystem because it is already included in the estimates as a standalone variable. Data source: monthly balance sheet statistics.

6 See Heider, Saidi and Schepens (2019) and Demiralp et al. (2019).

7 See Jobst and Lin (2016) and Eisenschmidt and Smets (2019).

the estimates as separate items. One possibility is that banks with a high share of NFC deposits are more reluctant to apply negative interest rates to this type of deposit because they are uncertain how their customers would react. It is also conceivable that these banks are more inclined to apply negative interest rates to NFC deposits as a way of alleviating the pressure on their shrinking interest margins. This pressure on profitability is likely to be more noticeable still at banks where the share of household deposits is high. Following this line of reasoning, these banks would likewise be more inclined to apply negative interest rates to NFC deposits.

A higher level of excess liquidity will reduce banks' net interest income, all other things being equal, because it is subject to a negative interest rate.<sup>8</sup> For this reason, higher excess liquidity could increase the probability of a bank charging negative interest rates on NFC deposits.

To investigate whether the influence of the main variables of interest has changed over the course of the NIRP period, we divide this period into two roughly equal sub-periods,<sup>9</sup> the first running from September 2014 to December 2016, the second from January 2017 to September 2019. The influence of the main variables of interest in this analysis is estimated for each of these two sub-periods. This is achieved by interacting them with suitable time dummies.<sup>10</sup> The share of the extrapolated NFC sight deposit base of banks applying a negative average interest rate in relation to total NFC sight deposits rises across both sub-periods, climbing from 10% on average during the first NIRP sub-period to just over 60% in the second.

In the robustness check, the benchmark model is extended to include the following

bank-specific variables: the interest rate on household deposits, the interest rate on loans to the private non-financial sector, a measure of profitability, and the capital ratio.<sup>11</sup> As in the benchmark model, these variables are interacted with time dummies.

The table on p. 26 presents the results of the empirical analysis. The two main findings are as follows:

- During the first NIRP sub-period, a higher share of NFC deposits in relation to total assets is associated, to a statistically significant degree, with a lower probability of a bank charging negative interest rates on NFC deposits. A statistically significant correlation no longer exists in the second sub-period.
- By contrast, a higher share of household deposits in relation to total assets is associated, to a statistically significant degree, with a higher probability of a bank charging negative interest rates on NFC deposits.<sup>12</sup>

<sup>8</sup> In the euro area, this is due to the deposit facility rate, which has been negative since June 2014.

<sup>9</sup> The split was timed to coincide with the turn of a year and to create two periods of a similar length.

<sup>10</sup> For the first period (from September 2014 to December 2016) the dummy is one and zero otherwise. The second dummy is one from January 2017 and zero otherwise.

<sup>11</sup> Data source for deposit and lending rates: MFI interest rate statistics. Profitability is measured as operating profit or loss in relation to total assets. Operating profit or loss is the total of net interest income, net commission income, net trading income and net other operating income. Data source: quarterly data provided under the Financial and Internal Capital Adequacy Information Regulation (*Verordnung zur Einreichung von Finanz- und Risikotragfähigkeitsinformationen – FinaRisikoV*). They are interpolated linearly to obtain monthly data. The capital ratio is calculated as tier 1 capital as a percentage of risk-weighted assets. Data source: prudential quarterly data, which are interpolated linearly to obtain monthly data.

<sup>12</sup> The second, "extended" model specification suggests that the influence was weaker here; the coefficient is no longer significant during the first NIRP sub-period.

### Linear probability model on the average negative interest rates applied to NFC deposits<sup>o</sup>

| Variable                   | Benchmark model | Extended model |
|----------------------------|-----------------|----------------|
| NFC deposit share I        | - 2.876***      | - 2.162*       |
| NFC deposit share II       | - 0.248         | - 0.970        |
| Household deposit share I  | 1.324**         | 0.915          |
| Household deposit share II | 1.598**         | 0.997*         |
| Excess liquidity share I   | 0.931           | 1.148          |
| Excess liquidity share II  | 0.397           | - 0.291        |
| Share of liquid assets     | 1.112           | 0.818          |
| Size                       | 0.095           | - 0.034        |
| Household deposit rate I   | -               | 0.232***       |
| Household deposit rate II  | -               | - 0.057        |
| Lending rate I             | -               | - 0.089        |
| Lending rate II            | -               | - 0.161        |
| Profitability I            | -               | - 5.003**      |
| Profitability II           | -               | 8.520***       |
| Capital ratio I            | -               | - 0.605        |
| Capital ratio II           | -               | - 0.59         |
| Constant                   | - 1.868         | 0.918          |
| Observations               | 9,420           | 9,200          |
| Number of banks            | 185             | 181            |

<sup>o</sup> "I" and "II" indicate the first and second negative interest rate policy (NIRP) sub-periods. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1 denote the respective significance levels. Model includes bank and time fixed effects. Standard errors double-clustered (bank level and time level). All variables lagged by three months.

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The estimation results show that banks for which NFC deposits were a relatively important source of funding were less inclined to apply negative interest rates to these deposits at the beginning of the NIRP period than other banks. One explanation for this could be that, at the beginning of the NIRP period, the banks in question were still uncertain how their customers would respond to negative interest rates. However, the more banks and customers became accustomed to negative interest rates on deposits, the less inhibited the individual bank probably was to risk this step and apply a negative interest rate to NFC deposits. The insignificant coefficient in the second NIRP sub-period might be a reflection of this. These results might suggest, furthermore, that the pressure to respond to shrinking interest margins was not yet as intense in the first sub-period as it would become in the second. The estimation results also seem to indicate, above all in the second

sub-period, that banks for which household deposits were a relatively important source of funding were more inclined to apply negative interest rates to NFC deposits. Given banks' reluctance to apply negative interest rates to household deposits, those which make greater use of those deposits as a source of funding are likely to experience more pressure on their interest margins, all other things being equal. Negative NFC deposit rates are one way in which they could attempt to mitigate this pressure on interest margins.

The results suggest, furthermore, that a higher share of excess liquidity in relation to total assets does not influence, to a statistically significant degree, the probability of negative interest rates being applied to NFC deposits. This is consistent with the finding, made in the main article, that the cost of holding excess liquidity is low relative to the burden of shrinking interest margins (see p. 29).

In addition, the robustness check suggests that, in the first NIRP sub-period, a lower interest rate on household deposits reduces the probability of negative interest rates being applied to NFC deposits.<sup>13</sup> It would appear that there was no need to apply negative interest rates to NFC deposits during this first sub-period because the interest rate on household deposits at that time was still far enough away from zero. This changed in the second NIRP sub-period, when interest rates on household deposits reached the zero mark at many banks and remained there (see p. 23). The influence of the coefficient turns statistically insignificant on account of the lack of variability.

<sup>13</sup> The coefficients can be interpreted symmetrically in both directions. The case of a "lower" interest rate, rather than a "higher" one, is considered because banks lowered their deposit rates for the most part during the NIRP period, rather than raising them.

The coefficient of the profitability measure changes its sign as it moves from the first sub-period to the second. Its influence is not economically relevant, though, as a change in this variable hardly affects the probability of negative interest rates being applied to NFC deposits.<sup>14</sup> This does not indicate that mounting pressure on profitability would have led to negative interest rates increasingly being applied to deposits.

### Which types of banks increased their commission margin?

Besides applying negative interest rates to deposits, there are other instruments, such as higher fees and commissions, which banks can use to alleviate the pressure that a declining interest margin exerts on their profitability. The following section examines the extent to which the influence of different bank characteristics on the commission margin has changed over time. The commission margin is computed as net commission income<sup>15</sup> over total assets. The estimation period runs from January 2012 until September 2019, so it includes both the NIRP period and the immediately preceding (pre-NIRP) period, when the short-term market interest rate was only just above zero. This wider observation period allows us to investigate whether the influence of the variables under consideration in the NIRP period was statistically different from that observed in the pre-NIRP period.

A panel model with bank and time fixed effects is used in the estimation,<sup>16</sup> while the independent variables are the same as the ones used in the benchmark model above. As in the benchmark model, this analysis separately estimates the influence of the main variables of interest for the respective periods.

#### Commission margin panel model<sup>o</sup>

| Variable                           | Panel model |
|------------------------------------|-------------|
| Commission margin                  | 0.2294***   |
| NFC deposit share (pre-NIRP)       | -0.0014     |
| NFC deposit share I                | 0.0025      |
| NFC deposit share II               | 0.0014      |
| Household deposit share (pre-NIRP) | 0.0038***   |
| Household deposit share I          | 0.0044***   |
| Household deposit share II         | 0.0049***   |
| Excess liquidity share (pre-NIRP)  | 0.0037      |
| Excess liquidity share I           | 0.0030      |
| Excess liquidity share II          | 0.0022      |
| Share of liquid assets             | 0.0039***   |
| Size                               | -0.0010***  |
| Constant                           | 0.0162***   |
| Observations                       | 13,946      |
| Number of banks                    | 191         |

<sup>o</sup> NIRP stands for negative interest rate policy; "I" and "II" indicate the first and second NIRP sub-periods. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1 denote the respective significance levels. Model includes bank and time fixed effects. Standard errors double-clustered (bank level and time level). All variables lagged by three months.

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The results presented in the above table do not show an empirical correlation between the share of NFC deposits in relation to total assets and a bank's commission margin. By contrast, a larger share of household deposits was already associated with a higher commission margin in the pre-NIRP period. This influence increased significantly in the NIRP period compared with the

<sup>14</sup> The standard deviation of the measure of profitability is very small, at 6.5 basis points. In other words, an increase of one standard deviation in the measure of profitability reduces the probability in the first sub-period by 0.32 percentage point. The influence of the measure of profitability is therefore economically insignificant.

<sup>15</sup> Net commission income is calculated as commission income net of commission expenses. It notably includes fees from giro transactions, payments, and securities and safe custody business. The net commission income figures for 2012 and 2013 are based on annual data from the profit and loss statistics. From 2014, quarterly data are available under the Financial and Internal Capital Adequacy Information Regulation. These figures are interpolated linearly to obtain monthly data.

<sup>16</sup> Standard errors are double-clustered at the bank and time levels.

2012-13 window.<sup>17</sup> While a 1-percentage-point increase in the share of household deposits in the pre-NIRP period was associated with a rise of 0.38 basis point in the commission margin, its effect was stronger during the NIRP period, at between 0.44 and 0.49 basis point.<sup>18</sup> Compared with the pre-NIRP period, in the NIRP period banks were able to increase their net commission income per euro of household deposits by between 0.06 and 0.11 cent.<sup>19</sup>

The influence of excess liquidity is unlikely to be positively significant because the cost of holding excess liquidity is low relative to the burden of banks' shrinking interest margin. The result confirms this theory: in none of the periods under observation does the level of excess liquidity influence the level of the commission margin to a statistically significant degree.

In summary, it can be concluded from the two analyses that banks are generally reluctant to apply negative interest rates to household deposits. The findings suggest that banks for which these deposits are a relatively important source of funding mainly followed two paths: they applied negative interest rates to NFC deposits, and they increased their commission margin.

**17** A hypothesis test based on one-tailed and two-tailed tests (see Michaelis (2021)) also confirms the difference in influence. It shows that the coefficients in both NIRP sub-periods are significantly higher than before.

**18** An increase of one standard deviation in household deposits widens the commission margin by 0.14 basis point in the first sub-period and by 0.13 basis point in the second.

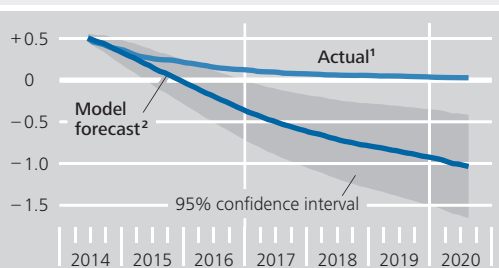
**19** This result can be computed from the difference between the respective coefficients, i.e.  $0.44 - 0.38 = 0.06$  and  $0.49 - 0.38 = 0.11$ . Both the deposit share and the commission margin are calculated as a share of total assets, which is why the figures can be interpreted "per euro of household deposits".

standing loans.<sup>22</sup> Owing to their high volume, these deposit categories are of particular relevance for the interest margin. They can furthermore be repriced by banks on an ongoing basis. The relationship between interest rates applied to outstanding loans and those applied

to household deposits was estimated using data from the pre-NIRP period (January 2003 to May 2014). Subsequently, the relationship estimated by the model was used to forecast deposit rates conditional on the actual development of lending rates from June 2014 onwards. If bank behaviour had remained unchanged during the NIRP period, the aggregated deposit rate for households would have been expected to fall well below zero by mid-2020 (see the adjacent chart). According to the model forecast, banks would have applied an average interest rate of around -1% per year in mid-2020 on deposits. As it turns out, though, the deposit rate was hovering just above the zero mark (see the adjacent chart). This caused German banks' interest margin in lending and deposit business with the private non-financial sector to narrow during the NIRP period (see the chart on p. 29).

### Aggregated interest rate on households' sight and savings deposits

%, monthly data



**1** According to MFI interest rate statistics. Volume-weighted interest rate across sight and savings deposits, weighted with outstanding volumes. **2** Model with a volume-weighted interest rate across sight and savings deposits depending on the lending rate in outstanding business with the private non-financial sector (volume-weighted across sectors and across maturities). Estimation in first differences with up to four lags of the dependent and explanatory variables.

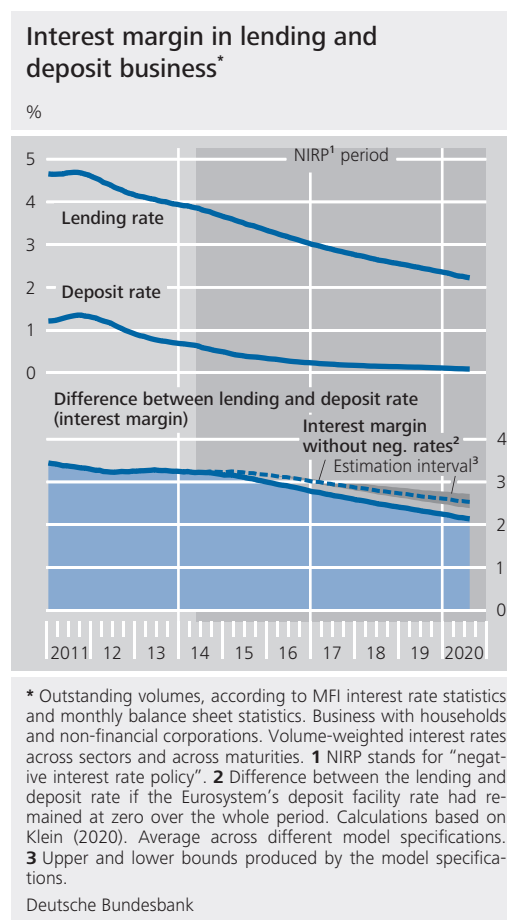
**22** The analysis follows the approach outlined in Sopp (2018).

*Decline in interest margin since June 2014 reinforced by negative interest rate on deposit facility*

However, the decline in the interest margin was due to more than just the negative interest rate on the deposit facility. The effects which the negative interest rate on the deposit facility had on the interest margin are isolated in a further analysis,<sup>23</sup> which takes into account the impact of a lower level of short-term money market rates and of a change in the slope of the yield curve.<sup>24</sup> This approach makes it possible to estimate how the interest margin would have developed if the interest rate on the deposit facility had remained at 0%. The interest margin declines in this hypothetical scenario, too, but less steeply than actually observed (see the adjacent chart). This is because even if the interest rate on the deposit facility had not been negative, older, higher-interest loans would have gradually expired over the course of a low interest rate period and been replaced by new, lower-interest loans. The declining capital market rates, which were also influenced by the monetary policy asset purchase programmes, would have resulted in falling lending rates in the hypothetical scenario as well, as longer-term capital market rates are an important benchmark for pricing longer-term loans.<sup>25</sup>

*Effect of negative deposit facility rate on interest margins increases over time*

Over time, a gap emerged between the interest margin that would have been produced without a negative interest rate on the deposit facility (as outlined in the above analysis) and the actual interest margin (see the adjacent chart). The empirically estimated impact that the negative interest rate on the deposit facility had on the interest margin thus increased over time. Two factors were behind this. First, the interest rate on the deposit facility was lowered deeper into negative territory in several steps. Second, the gradual expiry of older, higher-interest loans has an impact here, too, because it means that the effect of the negative interest rate on the deposit facility will only fully materialise with a time lag. This suggests that the effect will have continued to increase during the period in which the interest rate on the deposit facility remained at its current level of -0.5%. If the findings of the analysis are extrapolated,



assuming that the current negative interest rate on the deposit facility remains constant, its effect is expected to rise further by around one-third over the next five years.

The negative interest rate on the deposit facility implies, furthermore, that banks face costs for holding excess liquidity which increase with the amount of excess liquidity held. These costs were reduced by the introduction of the tiering system at the end of 2019. However, the costs of holding excess liquidity up until the introduction of the tiering system are likely to be rather low compared with the burden of a shrinking interest margin in lending and deposit business. The above analysis on the effect of the negative deposit facility rate on interest mar-

*Cost of holding excess liquidity rather low compared with margin effect*

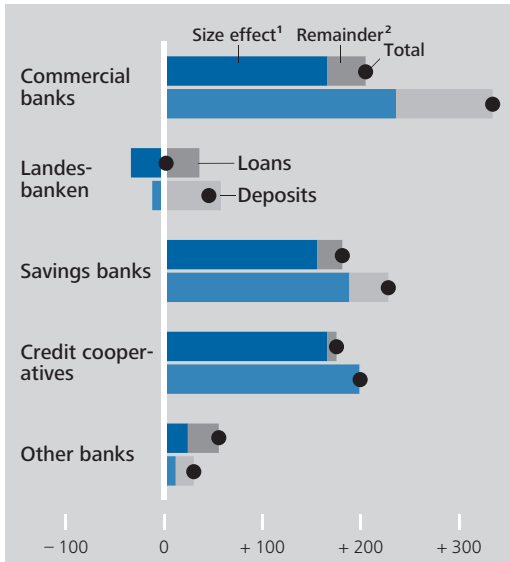
<sup>23</sup> The analysis using German data follows the approach of Klein (2020).

<sup>24</sup> The requisite estimation of the effect of the negative deposit facility rate on longer-term interest rates is based on Geiger and Schupp (2018).

<sup>25</sup> See Deutsche Bundesbank (2019b).

### Changes in volumes in business with the euro area private non-financial sector since June 2014

€ billion, cumulated and adjusted for statistical breaks, as at August 2020

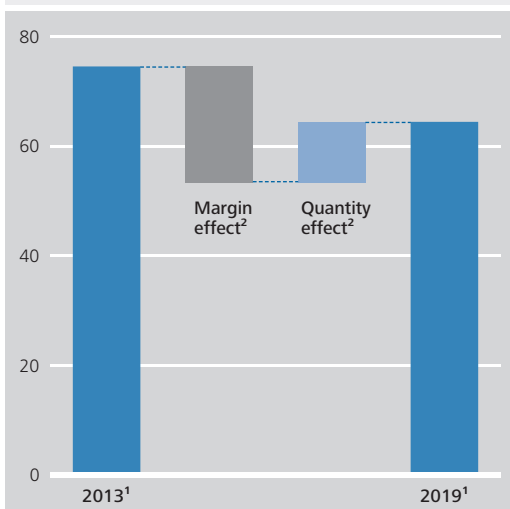


**1** Hypothetical change assuming that loans or deposits grew “passively” in line with total assets or liabilities. Calculated as cumulated adjusted changes in the total assets or liabilities (net of other asset or liability items) since June 2014, multiplied by the share of loans or deposits in total assets or liabilities in May 2014. **2** Difference between total change and size effect.

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### Net interest income of German banks in lending and deposit business 2013 and 2019\*

€ billion



\* Bundesbank calculations for lending and deposit business with the euro area private non-financial sector on the basis of MFI interest rate statistics and monthly balance sheet statistics. **1** Product of aggregated lending rate and outstanding loans, less product of aggregated deposit rate and outstanding deposits. Difference between outstanding loans and outstanding deposits assumed to be remunerated at the yield on German bank debt securities. **2** Effect of the change between 2013 and 2019 in lending and deposit rates and in outstanding loan and deposit volumes, respectively.

Deutsche Bundesbank

gins can be used to roughly estimate the ratio of both variables in absolute figures. This approach finds that, from the beginning of the NIRP period up to end-2019, the burdens that banks in Germany faced from the declining interest margin were around four times higher than the costs of holding excess liquidity.

Overall, then, there is strong evidence for the German banking system that the negative interest rate on the deposit facility, combined with the binding effect of the zero mark as regards the interest rate applied to deposits, weighed on banks’ interest margins. What is also evident, though, is that a combination of circumstances of this kind does not automatically have to lead to a deterioration in profitability. Indeed, the declining interest margin had been offset by low loan loss provisions prior to the onset of the coronavirus crisis, which was probably due in part to the expansionary monetary policy stance.

*Decline in interest margin in NIRP period not accompanied by a deterioration in profitability*

## Developments in German banks’ lending

### Expansion of lending and deposit business

An examination of balance sheet aggregates does not provide any evidence to suggest that banks were restricting their supply of credit in response to mounting margin pressure during the NIRP period. On the contrary, the volume of loans granted to the private non-financial sector increased in absolute terms during this period (see the adjacent upper chart).<sup>26</sup> The increase was stronger in all categories of banks than would have been the case if business with NFCs and households had grown in proportion

*Accelerated growth in lending business in absolute terms*

<sup>26</sup> The private non-financial sector essentially comprises households and NFCs. The aggregate used here also includes non-profit institutions. These will no longer be named separately in the following. The balance sheet data used relate to banks in Germany. The analysis considers loans to borrowers resident in Germany and other euro area countries. For the relevant definition, see the banking statistics presented in the Bundesbank’s Statistical Series.



to total assets. In the NIRP period, banks that had previously attached relatively little importance to lending business also stepped up their operations in this area. At the same time, there was also an increase in the use of private non-financial sector deposits as a source of funding (see the upper chart on p. 30). As a result, lending and deposit business gained in importance for German banks during the NIRP period, both in absolute terms and in relation to total assets. In the case of lending business, the increase in absolute terms was significantly stronger at this time than in the period from the financial crisis to the start of the NIRP period. By contrast, the relative gain in significance of lending business had already been observed in the pre-NIRP period.

*Increased lending volume bolsters net interest income*

Banks' interest income, expressed in absolute terms, is positively related to volumes. Banks were thus able to stabilise their net interest income above all by increasing the volume of lending business. However, this stabilising effect was not sufficient to fully offset the decline in margins (see the lower chart on p. 30).

## No sign of supply-side constraints

*Expansion of lending business driven by both demand-side ...*

The expansion of lending to NFCs and households during the NIRP period is likely to be attributable to both demand-side and supply-side factors. Data from the Bank Lending Survey (BLS), conducted among 34 German banks, indicate that loan demand made a significant contribution here. The surveyed institutions reported strong increases in demand, in part, both in business with NFCs and with households, citing the low interest rate level as the main driver of this development.<sup>27</sup>

*... and supply-side factors*

The BLS also indicates that banks increased the supply of credit.<sup>28</sup> In the survey rounds during the NIRP period, the credit institutions reported that there had been a narrowing of the spread between their lending rates and a suitable reference interest rate in each case (typically a

market interest rate).<sup>29</sup> This applied to both business with NFCs and business with households. The institutions taking part in the BLS identified competition with other banks as the main driver behind the tightening of margins. Such competition-driven pressure on margins, coupled with a simultaneous increase in loan demand, clearly indicate an expansion in the supply of credit. Banks appeared to be using lower lending rates to compete for the rising demand. The expansion of the credit supply has thus tended to increase margin pressure.

If a relationship exists between margin pressure and lending, then it ought to show up in a comparison of lending by banks that are exposed to different degrees of margin pressure. Banks that are heavily reliant on household deposits as a source of funding are more exposed to margin pressure than other banks. This is because these banks' net interest margin fell more sharply than that of the other banks during the NIRP period (see the chart on p. 32). However, this relative decline was already underway beforehand, which probably has something to do with the fact that some banks' interest rates on deposits had already reached zero in the pre-NIRP period (see the lower chart on p. 23). By contrast, the difference in how the return on assets has evolved at banks that are more and less reliant on deposit funding is smaller than it is in the case of the net interest margin. Credit cooperatives and savings banks make up a disproportionately large share of the banks that are heavily reliant on deposit funding. These two categories of banks have the highest return on assets in the German banking system.<sup>30</sup>

*Compared with other institutions, banks heavily reliant on deposit funding see sharper decline in net interest margins, ...*

<sup>27</sup> See also Deutsche Bundesbank (2020c) specifically for loans to NFCs.

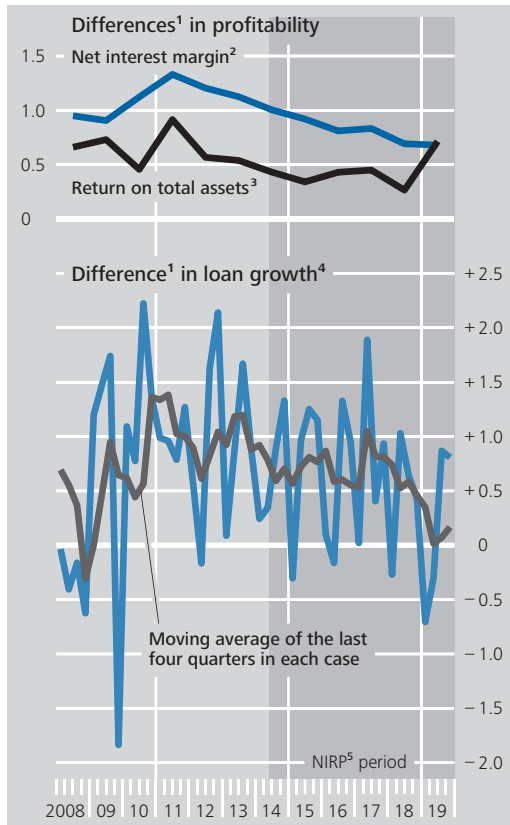
<sup>28</sup> See also Deutsche Bundesbank (2020c) specifically for loans to NFCs.

<sup>29</sup> A distinction should be made between the term "loan margin", as used in the BLS, and the definition of the interest margin as the spread between the lending and deposit rate, as used in this article.

<sup>30</sup> See Deutsche Bundesbank (2020d).

### Differences between banks more and less reliant on deposit funding\*

Percentage points



\* A bank is assigned to the group of banks that are more reliant on deposit funding if its share of household deposits in total liabilities, net of other liabilities, was above the median before the NIRP period (May 2014). **1** The difference is calculated as the value of the relevant indicator for banks that are more reliant on deposit funding, less the corresponding value for banks that are less reliant on deposit funding. **2** Net interest income divided by total assets. **3** Pre-tax profit for the year divided by total assets. **4** Loans to households and non-financial corporations in the euro area, quarterly growth rates. **5** NIRP stands for "negative interest rate policy".

Deutsche Bundesbank

... and consistently strong loan growth, ...

Compared with the other banks, banks that are more reliant on deposit funding saw stronger growth in lending business with the private non-financial sector throughout almost the entire NIRP period. However, this merely represented a continuation of previously observed developments. Overall, the difference between the rates of loan growth at banks that are more dependent on deposit funding and those that are less reliant on deposit funding did not change noticeably during the NIRP period. A straightforward comparison of the two types of banks, then, provides no indication that the margin pressure induced by the binding effect of the zero mark as regards the interest rates

applied to deposits affected the volume of lending.

Margin pressure does, however, appear to have had an effect on the relative riskiness of the loans granted. An analysis based on data from the German credit register indicates that banks with a heavy reliance on deposit funding expanded their credit supply to riskier enterprises to a greater extent than the other banks after the interest rate on the deposit facility had been lowered to negative levels.<sup>31</sup>

... but also a stronger appetite for risk

### Expansion of maturity transformation in lending and deposit business

Increasing the volume of lending business is not the only way to stabilise profitability. Maturities and interest rate fixation periods in lending business are also parameters which banks can potentially use to respond to margin pressure. While long-term loans as a share of all outstanding loans remained relatively constant during the NIRP period, sight deposits as a share of all deposits increased. This marks a continuation of a trend that has been ongoing for some time now (see the chart on p. 33).<sup>32</sup> On balance, maturities of loans increased relative to maturities of deposits. Taken in isolation, the resulting greater maturity transformation stabilised interest margins, as investments with longer maturities usually have a higher rate of interest. However, the APP and PEPP monetary policy asset purchase programmes reduced long-term government bond yields, amongst other things, which in turn are included, as the basic rate, in the calculation of interest rates on long-term loans. These monetary policy meas-

Greater maturity transformation ...

<sup>31</sup> For more information, see Bittner et al. (2020). With regard to larger banks from the euro area as a whole, there are indications, furthermore, that banks with a heavy reliance on deposit funding geared their securities portfolios more towards riskier securities after the interest rate on the deposit facility had been lowered to negative levels. See also Bubeck et al. (2020).

<sup>32</sup> For more information, see Deutsche Bundesbank (2015b).

ures are therefore likely to have played a part in reducing marginal earnings from maturity transformation.

*... and increase in interest rate risk*

Increased maturity transformation was accompanied by a rise in interest rate risk, even after taking hedging transactions into account.<sup>33</sup> It is the interest rate fixation periods of loans and deposits, rather than their maturities, that have a bearing on how interest rate risk develops in lending and deposit business. So while German banks' lending business did not see a notable increase in maturities, there was evidence of longer interest rate fixation periods, however. Since the onset of the NIRP period, the length of these periods has increased, particularly for loans for house purchase (see the adjacent chart).<sup>34</sup>

*Expansion of maturity transformation and increased interest rate risk probably driven by demand-side factors, too*

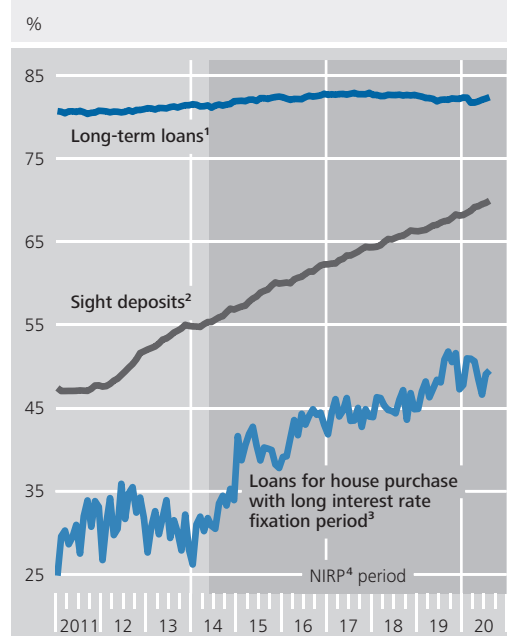
The extent to which the increased use of short-term deposits as a source of funding and the longer interest rate fixation periods of loans for house purchase are more a reflection of banks' business policy decisions or of changes in their customers' demand remains an open question. The increase in short-term deposits is presumably partly due to households' strong preference for liquidity and risk aversion. Their demand for highly liquid sight deposits also came about because alternative forms of investment offered little in the way of superior returns.<sup>35</sup> Customer preferences also play an important role in determining the interest rate fixation periods of loans for house purchase.<sup>36</sup>

## Increased cross-border lending

*Stabilising income by expanding foreign business?*

Expanding foreign business is one way, above all for larger banks, to evade strong competition and margin pressure in domestic lending and deposit business.<sup>37</sup> Foreign business, however, is not more profitable per se. The cost of running foreign branches and subsidiaries, amongst other things, needs to be charged against earnings. In addition, exposures outside the euro area are subject to currency risk, which, if hedged, also reduces income.

**Indicators of maturity transformation and interest rate risk at German banks\***



\* In business with households and non-financial corporations in the euro area. **1** Share of loans with an original maturity of more than five years in all outstanding loans. **2** Share of sight deposits in all outstanding deposits. **3** Share of loans for house purchase with an initial interest rate fixation period of over ten years in all new loans for house purchase. **4** NIRP stands for "negative interest rate policy".  
 Deutsche Bundesbank

During the NIRP period, German banking groups substantially expanded their lending to enterprises and households in other euro area countries, above all.<sup>38</sup> This had still been declining in the pre-NIRP period. By contrast, lending business with NFCs, in particular, has expanded significantly since mid-2018. Compared with the previous year, credit growth accelerated from just under 2.0% in the second quarter of 2018 to a little under 17% in the fourth quarter of 2019 before slowing down again markedly amid the decline in global economic activity. In

*Significant increase in lending to enterprises in other euro area countries*

<sup>33</sup> See Deutsche Bundesbank (2019d), p. 64.

<sup>34</sup> For more information, see Deutsche Bundesbank (2019d).

<sup>35</sup> See Deutsche Bundesbank (2020e).

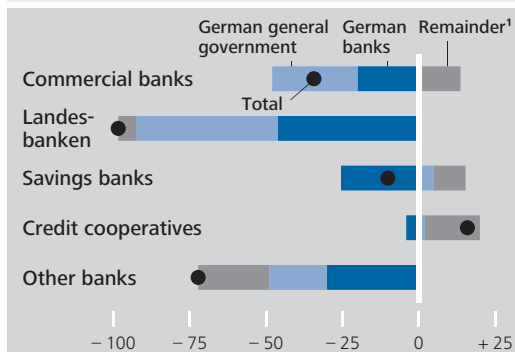
<sup>36</sup> See Memmel (2019).

<sup>37</sup> One part of the foreign business of banks in Germany, namely loans to and deposits from counterparties in other euro area countries, is already included in the aggregates considered so far in this article. However, as explained above, the aggregates considered so far relate only to the domestic part of banks in Germany.

<sup>38</sup> German banking groups increased their exposures above all in Italy and the Netherlands. See German contribution to the BIS consolidated banking statistics.

### Changes in the volumes of debt securities holdings since June 2014, by issuer

€ billion, cumulated and adjusted for statistical breaks, as at August 2020



<sup>1</sup> Including foreign issuers.  
 Deutsche Bundesbank

August 2020, the annual growth rate in this credit segment stood at 5.0%.<sup>39</sup> This is how the rise in lending abroad, taken in isolation, supported the net interest income of banks in Germany.

*Exposures in other euro area countries highly significant for banks in Germany*

The significance of foreign business as a whole for banks in Germany, taking into account their foreign branches and subsidiaries, remained broadly unchanged following the slump during the financial and sovereign debt crisis and has since fluctuated around the 25% mark in terms of total assets. Lending to enterprises and households in other euro area countries is of particular relevance for the German banking system. Its significance has increased, especially since mid-2017, and it accounted for around half of total foreign business on average in 2020.<sup>40</sup>

### Reducing holdings of debt securities supports lending

One alternative to lending is for banks to use their resources to purchase debt securities. Apart from offering a way of generating income, they also play an important role in banks' liquidity management. German banks offloaded debt securities on their books during the NIRP period (see the above chart), the bulk

of which were German general government bonds and German bank debt securities. The reduction in holdings of German bank debt securities marked the continuation of a trend that has been observed since 2008. By contrast, the scaling-back of German general government bond holdings represents a new development. In net terms, German banks had still been increasing these holdings in the period from the financial market crisis to the beginning of the NIRP period.

One reason for the offloading of German general government bonds from German banks' balance sheets is likely to have been the decline in public debt up until the coronavirus crisis. However, the APP probably played an important role as well. The Eurosystem's purchases of these assets caused prices to increase and yields to decrease.<sup>41</sup> This incentivised banks to sell these bonds in order to take advantage of price gains and step up lending to the private non-financial sector. Portfolio rebalancing of this kind is discussed in the literature as an important transmission channel for monetary policy asset purchase programmes.<sup>42</sup> Empirical studies find evidence for Germany of portfolio rebalancing due to the APP: banks that saw a sharper decline in yields in their bond portfolios as a result of the APP increased their lending by more than other banks.<sup>43</sup> Moreover, since the APP was launched, there has been an increasingly positive relationship between the volume of maturing bonds in a bank's portfolio and its lending.<sup>44</sup> Overall, however, portfolio rebalancing is likely to have played a rather minor role in the expansion of credit volumes. In most categories of banks, changes in debt securities holdings were small compared with lending growth (see also the upper chart on p. 30).

*APP likely to have been one factor driving reduction of general government bonds in German banking system*

*Reduction of debt securities holdings in NIRP period*

<sup>39</sup> See monthly balance sheet statistics. These include domestic banks, i.e. also foreign banks whose branches or subsidiaries are located in Germany.

<sup>40</sup> See monthly external position report of banks in Germany.

<sup>41</sup> For corresponding empirical evidence on the APP, see, for example, Altavilla et al. (2015).

<sup>42</sup> See Albertazzi et al. (2018).

<sup>43</sup> See Paludkiewicz (2020).

<sup>44</sup> See Tischer (2018).

## Bank debt securities as a source of funding

*Decrease in yields on bank debt securities more pronounced than decrease in deposit rates*

Besides deposits, banks can also use debt securities as a source of funding. It is precisely during the NIRP period that the issuance of debt securities might have become more attractive from the banks' perspective. After all, as with other marketable debt instruments, the zero mark has no binding effect here, or at least a weaker one than in deposit business for banks in Germany. Greater use of negative-interest-bearing liabilities as a source of funding would counteract the pressure on margins in lending and deposit business by reducing interest expenditure. Indeed, yields on bank debt securities tended to decline more sharply during the NIRP period than interest rates on deposits. That said, in terms of their level, yields on bank debt securities were not below deposit rates across the board. Yields on other bank debt securities<sup>45</sup> were consistently higher. Broadly speaking, yields were only below deposit rates and below zero in Germany for Pfandbriefe.

*Bank debt securities' loss of importance did not continue during NIRP period*

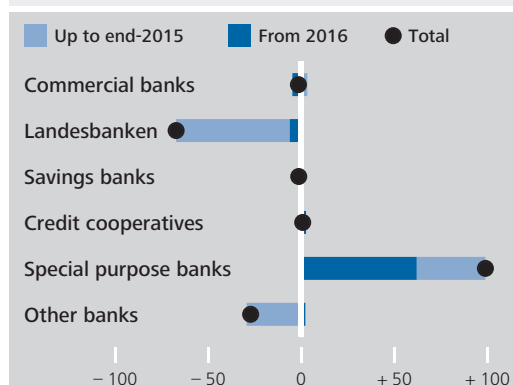
Due in part to banks wanting to retain the option of raising the share of negative-interest-bearing liabilities in their funding mix as needed, bank debt securities might have stopped diminishing in importance as a component in that mix since the onset of the NIRP period. This loss of importance had begun during the financial crisis and was a broad trend observed across various categories of banks.<sup>46</sup> During the NIRP period, by contrast, new issuance of debt securities was roughly in line with redemptions for most categories of banks, meaning that they experienced no major changes in volumes of outstanding debt securities (see the adjacent chart). The marked reduction at Landesbanken was confined to the start of the NIRP period.

*Substitutions of deposits with debt securities not widespread*

Nevertheless, substitutions of deposits with debt securities were not a widespread phenomenon. This is unsurprising insofar as, for most banks, bank debt securities are unlikely to

### Changes in the volumes of bank debt securities\* since June 2014

€ billion, cumulated and adjusted for statistical breaks, as at August 2020



\* Outstanding bearer debt securities issued by German banks.  
 Deutsche Bundesbank

be a much cheaper source of funding than deposits. Over half of banks in Germany did not use debt securities at all for funding purposes during the NIRP period. Small banks, in particular, often do not use debt securities as a source of funding.

## Assessment from a monetary policy perspective

Lending and deposit business in the German banking system has grown in importance since the financial crisis, with lending business as a percentage of the total volume of business being steadily expanded during this spell. In the NIRP period, this relative growth went hand in hand with strong rates of expansion in absolute terms, too. By contrast, expansion in absolute terms had been subdued between the financial crisis and the onset of the NIRP period. The developments in the German banking system during the NIRP period detailed here are thus largely in line with the intended effect of monetary policy. The expansion of lending is likely to have been driven by demand for credit, but also by banks' willingness to lend. The call

*Developments in German banking system in line with monetary policy's intended effect*

<sup>45</sup> These are bank debt securities that are not issued by special purpose credit institutions and are not Pfandbriefe.

<sup>46</sup> See Deutsche Bundesbank (2015b).

for loans and banks' willingness to lend, in turn, were bolstered by accommodative monetary policy. Monetary policy measures of the kind that pushed down yields on alternative forms of investment are also likely to have played a role in banks' willingness to lend. The APP and, in response to the coronavirus crisis, the PEPP are two major examples of these policies. The monetary policy measures and banks' increasing willingness to supply credit had the knock-on effect of driving down lending rates,<sup>47</sup> but the flatter decline in deposit rates meant that interest margins in lending and deposit business narrowed.

*Margin pressure no impediment to lending so far*

However, this pressure on margins does not appear to have been much of an impediment to German banks' lending so far. Despite experiencing margin pressure, banks managed to stabilise and even improve their capital levels up to the onset of the coronavirus crisis,<sup>48</sup> with low credit default rates and the resulting reduced need for loan loss provisions being major factors at play. This positive development in borrower default risk can be put down in part to the favourable economic situation, which in turn was being bolstered by accommodative monetary policy. Thus, while monetary policy led to a narrowing of margins, it also had a positive impact on banks' profitability through other channels.<sup>49</sup>

*Viewed on its own, coronavirus crisis increases risk of negative interest rates having adverse impact on lending, ...*

The economy is now experiencing a downturn as a result of the coronavirus crisis. If, in the wake of the COVID-19 pandemic, many borrowers run into payment difficulties and there is an uptick in defaults on loans, it can be assumed that this downturn will start to weigh more heavily on banks' profitability. In addition, banks' capital ratios could come under pressure if risk weights rise.<sup>50</sup> The comprehensive package of fiscal support measures, the temporary suspension of the obligation to file for insolvency, and supervisory rules have prevented a steep increase in credit defaults for now. However, the negative repercussions are more likely to surface once the assistance programmes come to an end. In this setting, banks will also

find it harder to offset margin pressure in lending and deposit business. If the economic downturn puts pressure on banks' capital levels, a link between capital levels and lending could materialise or grow stronger. This increases the likelihood that the negative interest rate on the deposit facility will inhibit lending if its overall effect on profitability and capital levels is negative.

Conversely, measures that stabilise a bank's profitability and ease capital constraints reduce the likelihood of the negative deposit facility rate having an adverse impact on the credit supply. By introducing the tiering system, the Eurosystem had already adopted a measure at the end of last year, i.e. even before the outbreak of the coronavirus, that contributed to an improvement in banks' profitability. In response to the COVID-19 pandemic, the ECB Governing Council decided on further measures,<sup>51</sup> one of which was to make the conditions for the TLTROs significantly more attractive in order to create additional incentives for lending. The extremely favourable interest rate is likely to have been the main driver behind the brisk demand amongst euro area banks for these operations recently.<sup>52</sup> Even if these measures are not aimed primarily at banks' profitability, they nevertheless probably helped stabilise it by lowering banks' funding costs. The extent of this depends on take-up of the instruments by banks and the costs of alternative funding instruments.

*... while monetary policy, ...*

Supervisory relief measures granted in response to the coronavirus crisis are easing banks' capital constraints. These primarily comprise the release of the Pillar 2 Guidance buffer and the

*... supervisory and fiscal policy measures lower this probability*

<sup>47</sup> For more information for the euro area, see also Deutsche Bundesbank (2019b).

<sup>48</sup> See Deutsche Bundesbank (2019d), particularly pp. 64 f.

<sup>49</sup> See Deutsche Bundesbank (2018) for an overview of the channels through which the interest rate level affects banks' profitability.

<sup>50</sup> See Deutsche Bundesbank (2020b).

<sup>51</sup> For more information, see also Deutsche Bundesbank (2020f).

<sup>52</sup> See Deutsche Bundesbank (2020g).

easing of Pillar 2 Requirements.<sup>53</sup> In addition, the countercyclical capital buffer in Germany was lowered from 0.25% to 0%. The fiscal policy measures adopted in Germany in response to the coronavirus crisis in Germany are also indirectly supporting banks' profitability.<sup>54</sup> This is because the numerous support measures for enterprises and also for households are counteracting a sharp rise in borrower default risk.

In summary, it can be concluded that the Eurosystem's monetary policy measures – including lowering the deposit facility rate into negative territory – had their intended effect in the German banking system up until the coronavirus

crisis. However, the economic downturn resulting from the coronavirus pandemic is increasing the likelihood that the negative deposit facility rate will have an adverse impact on German banks' lending. The measures taken by monetary and fiscal policymakers and banking supervisors during the coronavirus pandemic are reducing this likelihood.

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<sup>53</sup> For significant institutions, see [https://www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200320\\_FAQs~a4ac38e3ef.en.html](https://www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200320_FAQs~a4ac38e3ef.en.html)

<sup>54</sup> See Deutsche Bundesbank (2020a) for information on the fiscal policy measures taken in response to the coronavirus crisis in Germany.

## ■ List of references

Albertazzi, U., B. Becker and M. Boucinha (2018), Portfolio rebalancing and the transmission of large-scale asset programmes: evidence from the euro area, ECB Working Paper, No 2125.

Altavilla, C., L. Burlon, M. Giannetti and S. Holton (2019), Is there a zero lower bound? The effects of negative policy rates on banks and firms, ECB Working Paper, No 2289.

Altavilla, C., G. Carboni and R. Motto (2015), Asset purchase programmes and financial markets: lessons from the euro area, ECB Working Paper, No 1864.

Bittner, C., D. Bonfim, F. Heider, F. Saidi, G. Schepens and C. Soares (2020), Why so negative? The effect of monetary policy on bank credit supply across the euro area, mimeo.

Brunnermeier, M. and Y. Koby (2018), The Reversal Interest Rate, NBER Working Paper, No 25406.

Bubeck, J., A. Maddaloni and J.-L. Peydró (2020), Negative Monetary Policy Rates and Systemic Banks' Risk-Taking: Evidence from the Euro Area Securities Register, *Journal of Money, Credit and Banking* (forthcoming).

Christiano, L.J., M. Eichenbaum and C.L. Evans (2005), Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy, *Journal of Political Economy*, 113(1), pp. 1-45.

Demiralp, S., J. Eisenschmidt and T. Vlassopoulos (2019), Negative interest rates, excess liquidity and retail deposits: banks' reaction to unconventional monetary policy in the euro area, ECB Working Paper, No 2283.

Deutsche Bundesbank (2020a), Public finances, Monthly Report, May 2020, pp. 73 ff.

Deutsche Bundesbank (2020b), Financial Stability Review 2020.

Deutsche Bundesbank (2020c), The upswing in loans to enterprises in Germany between 2014 and 2019, Monthly Report, January 2020, pp. 13 ff.

Deutsche Bundesbank (2020d), The performance of German credit institutions in 2019, Monthly Report, September 2020, pp. 75 ff.

Deutsche Bundesbank (2020e), Acquisition of financial assets and the search for yield in Germany, Monthly Report, May 2020, pp. 38 ff.

Deutsche Bundesbank (2020f), Monetary policy and banking business, Monthly Report, May 2020, pp. 25 ff.

Deutsche Bundesbank (2020g), Monetary policy and banking business, Monthly Report, August 2020, pp. 28 ff.

Deutsche Bundesbank (2019a), Longer-term changes in the unsecured interbank money market, Monthly Report, September 2019, pp. 59 ff.

Deutsche Bundesbank (2019b), Interest rate pass-through in the low interest rate environment, Monthly Report, April 2019, pp. 43 ff.

Deutsche Bundesbank (2019c), Negative interest rates on the deposits of non-financial corporations and households in Germany, Monthly Report, November 2019, pp. 31 f.

Deutsche Bundesbank (2019d), Financial Stability Review 2019.

Deutsche Bundesbank (2018), The importance of bank profitability and bank capital for monetary policy, Monthly Report, January 2018, pp. 27 ff.

Deutsche Bundesbank (2016), The macroeconomic impact of quantitative easing in the euro area, Monthly Report, June 2016, pp. 29 ff.

Deutsche Bundesbank (2015a), The importance of macroprudential policy for monetary policy, Monthly Report, March 2015, pp. 39 ff.

Deutsche Bundesbank (2015b), Structural developments in the German banking sector, Monthly Report, April 2015, pp. 35 ff.

Deutsche Bundesbank (2014), Monetary policy and banking business, Monthly Report, August 2014, pp. 27 ff.

Eisenschmidt, J. and F. Smets (2019), Negative interest rates: Lessons from the euro area, Series on Central Banking Analysis and Economic Policies No 26.

Geiger, F. and F. Schupp (2018), With a little help from my friends: Survey-based derivation of euro area short rate expectations at the effective lower bound, Deutsche Bundesbank Discussion Paper, No 27/2018.



Gerali, A., S. Neri, L. Sessa and F.M. Signoretti (2010), Credit and Banking in a DSGE Model of the Euro Area, *Journal of Money, Credit and Banking*, 42, pp. 107-141.

Gerke, R., S. Giesen and A. Scheer (2020), The effects of negative interest rate policy on bank profitability and the macroeconomy, mimeo.

Heider, F., F. Saidi and G. Schepens (2019), Life below Zero: Bank Lending under Negative Policy Rates, *The Review of Financial Studies*, 32(10), pp. 3728-3761.

Jobst, A. and H. Lin (2016), Negative interest rate policy (NIRP): Implications for monetary transmission and bank profitability in the euro area, *IMF Working Paper*, No WP/16/172.

Kerbl, S. and M. Sigmund (2016), From low to negative rates: an asymmetric dilemma, *Oesterreichische Nationalbank Financial Stability Report*, 32, pp. 120-135.

Klein, M. (2020), Implications of negative interest rates for the net interest margin and lending of euro area banks, *Deutsche Bundesbank Discussion Paper*, No 10/2020.

Kühl, M. (2018), The Effects of Government Bond Purchases on Leverage Constraints of Banks and Non-Financial Firms, *International Journal of Central Banking*, 14(4), pp. 93-161.

Memmel, C. (2019), What drives the short-term fluctuations of banks' exposure to interest rate risk?, *Deutsche Bundesbank Discussion Paper*, No 05/2019.

Michaelis, H. (2021), Going below zero – How do banks react?, *Deutsche Bundesbank*, mimeo.

Paludkiewicz, K. (2020), Unconventional Monetary Policy, Bank Lending, and Security Holdings: The Yield-Induced Portfolio-Rebalancing Channel, *Journal of Financial and Quantitative Analysis* (forthcoming).

Smets, F. and R. Wouters (2007), Shocks and Frictions in US Business Cycles: A Bayesian DSGE Approach, *American Economic Review*, 97(3), pp. 586-606.

Sopp, H. (2018), Interest rate pass-through to the rates of core deposits – a new perspective, *Deutsche Bundesbank Discussion Paper*, No 23/2019.

Tischer, J. (2018), Quantitative easing, portfolio rebalancing and credit growth: Micro evidence from Germany, *Deutsche Bundesbank Discussion Paper*, No 20/2018.