

Developments in bank interest rates in Germany during the period of monetary policy tightening

The monetary policy tightening observed since the beginning of 2022, unprecedented in the euro area, has pushed up market interest rates and also fed into the interest rates on both bank loans and bank deposits in Germany. That is consistent with the monetary policy objective of curbing lending in order, via falling aggregate demand, to bring the excessively high inflation rate down to target. However, there is also a monetary policy interest in knowing whether monetary policy measures are currently being transmitted to the envisaged extent. Is interest rate pass-through still consistent with – or at odds with – the relationships observed in the past between market interest rates and the various bank interest rates?

It is quite normal for different bank interest rates to respond to differing degrees and at differing speeds to changes in market interest rates which, in turn, are determined in part by monetary policy. The present analysis, however, shows that, since May 2022, banks in Germany have raised the interest rate on loans to households for house purchase more strongly than stood to be expected. This was probably due mainly to the significantly higher credit risk. For small-sized loans to enterprises, by contrast, the actual lending rate spent some periods during 2022 at levels that were below the interest rate that would have been normal based on past interest rate pass-through patterns. The increased provision of working capital loans with short interest rate fixation periods is likely to have played a role in this. Since the end of 2022, however, the interest rate on loans to enterprises has been moving in line with historical patterns again.

Unlike lending rates, the interest rate on overnight deposits of non-financial corporations and households has so far registered no more than a marginal rise. Although such a lagged response was also observed in previous monetary policy tightening periods, since September 2022, the pass-through of interest rates has been even slower than in the past.

The relatively rapid rise in lending rates and the stickiness of deposit rates meant that banks were able to widen their interest margins in outstanding lending and deposit business. Widening margins in banks' lending and deposit business, which tend to be unusual during periods of rising interest rates but have been in evidence since 2022, could be a transitory phenomenon, however. Competition for deposits is slowly picking up, which will probably put upward pressure on the interest rate on overnight deposits going forward. If interest expenditure then rises more strongly than banks' interest income, margins could quickly contract again.

■ Introduction

Interest rates on new loans and time deposits up in sync with monetary policy tightening, whilst interest rate on overnight deposits hardly reacted

The change of course in monetary policy in early 2022 necessitated by the rise in inflation is also reflected in the interest rates on bank loans and bank deposits in Germany. The chart on p. 41 shows that, during the preceding period of negative interest rates, banks in Germany cut their interest rates on new loans and for customer deposits to one new all-time low after another.¹ It was from that low level that interest rates on new loans to non-financial corporations and households as well as the interest rate on time deposits began to rise steeply in 2022. As for the interest rate on overnight deposits, however, the banks have thus far hardly responded to the rapid succession of policy rate hikes.²

Has rate-setting behaviour since the beginning of 2022 been consistent with patterns observed in the past?

The observed developments raise various questions: Why was it that bank interest rates were raised to differing degrees and at differing speeds? Was and is the rate-setting behaviour of banks in Germany – measured against the strength of monetary policy tightening – unusual, or is it consistent with the patterns observed in the past?

How is the turnaround in interest rates affecting banks' profitability?

Where the results indicate that the transmission of monetary policy to lending rates has been significantly weaker or stronger than expected, this must be taken into account when assessing the growth and inflation outlook for Germany.³ And then there is the question of how the turnaround in interest rates is impacting on the banking sector. In the light of the turmoil in the US banking industry this spring, the impact of interest rate hikes on banks' profitability has come under growing public scrutiny.

Review using empirical interest rate pass-through models

In order to answer these questions, this article first outlines the factors that guide how banks set interest rates on loans and deposits and the role played therein by market interest rates. The two subsequent sections will then zoom in on developments in, respectively, lending and deposit rates in Germany since the end of the

negative interest rate policy period. Empirical interest rate pass-through models are used to examine banks' rate-setting behaviour since the beginning of 2022 to determine whether it is consistent with – or at odds with – historical patterns. The analysis also illuminates how developments in Germany differ from those in the euro area as a whole. It concludes by illustrating the impact of differences between loans and deposits in terms of interest rate increases on banks' margins in Germany.

■ Banks' rate-setting behaviour

Banks largely set their interest rates on the basis of two factors: the pattern of their funding costs, which is closely tied to developments in market interest rates and thus also the yield curve in the market; and various mark-ups (on loans) and markdowns (on deposits) relative to the level of market interest rates.⁴

Banks' rate-setting behaviour is based on pattern of their funding costs, augmented by mark-ups or markdowns

Most of the time, developments in funding costs are the key determinant of adjustments to lending and deposit rates. As a rule, banks set their rates based on developments in market interest rates for a maturity comparable to the interest rate fixation period of the respective loan or the customer deposit.⁵ This means that interest rates on loans and deposits can develop differently depending on the length of the interest rate fixation period.

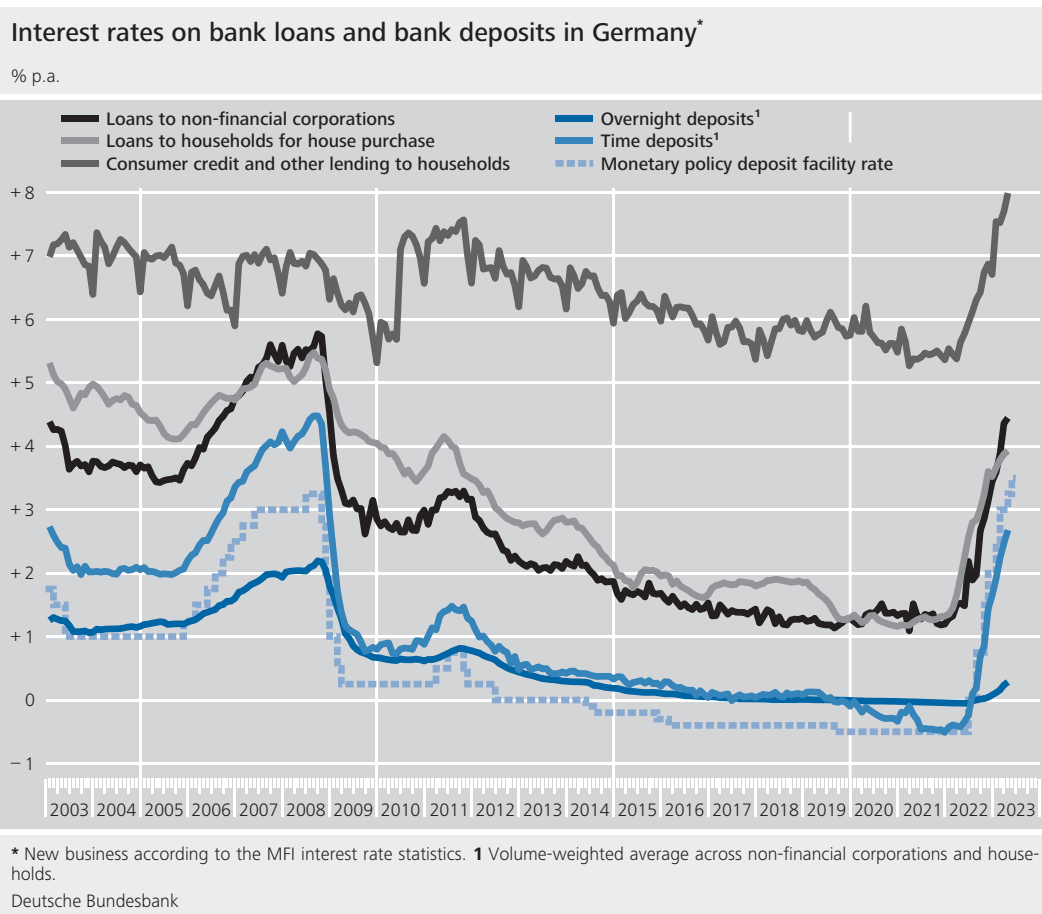
¹ According to the MFI interest rate statistics, the aggregate interest rate on loans to non-financial corporations in Germany reached a historical low in March 2021; for the interest rate on loans for house purchase, this was the case in December 2020. The interest rate on time deposits bottomed out in December 2021, while the interest rate on overnight deposits did not reach its low until May 2022.

² Bank interest rates data are current as at the end of April 2023.

³ For an overview of the transmission of the current monetary policy tightening to the euro area as a whole and its importance for monetary policy decision-making, see Deutsche Bundesbank (2023a).

⁴ See the section entitled "Banks' rate-setting behaviour in the low interest rate environment" in Deutsche Bundesbank (2019), pp. 46 ff.

⁵ Market interest rates of this kind include, for instance, EURIBOR in the shorter-term segment or an OIS rate or sovereign bond yields in the longer-term segment.



Mark-ups and markdowns impact on level of bank interest rates

Mark-ups or markdowns, on the other hand, impact on the level of bank interest rates relative to the level of market interest rates. Compared with the dynamics of market interest rates, mark-ups and markdowns tend to change more sluggishly, but here, too, individual factors can become more or less important over time. This means, first, various components of banks' costs that are not already contained in market interest rates: these include the amount of banks' actual funding costs or – for lending rates – the price allocated to credit risk. Second, banks' price-setting power in the markets for loans and deposits can play a role. That can impact on banks' profit target. Third, regulatory requirements can also affect rate-setting. These include, for instance, the capital requirement for loans.

■ Interest rates on bank loans

Development of lending rates: comparison of periods of monetary policy tightening as from 2005 and as from 2022

The trajectory of market interest rates, which banks mainly use as guidance when setting interest rates on new loans and deposits, is dependent, in turn, on the monetary policy stance: changes in the monetary policy path are transmitted to bank interest rates via market interest rates.⁶ During the current interest rate hike cycle, policy rates have, since July 2022, been raised more quickly and significantly compared with the last longer monetary policy tightening period, which lasted from December 2005 to July 2008 (see the chart on p. 44). Having already been above target since

Key interest rates raised much faster since July 2022 than in last monetary policy tightening period as from 2005

⁶ See the box on monetary policy tightening and market interest rate developments on p. 42 f.

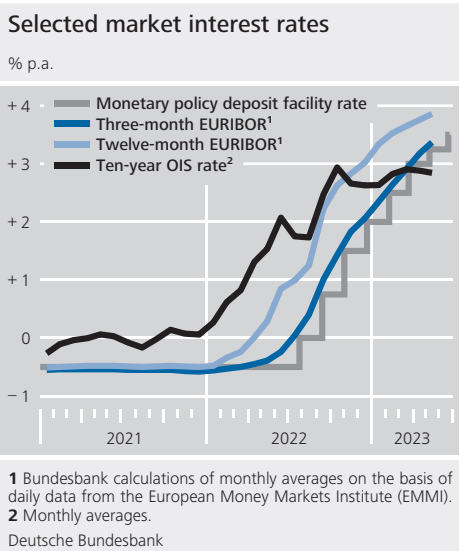
Monetary policy tightening and the trajectory of market interest rates

The trajectory of market interest rates, which banks use as their main source of guidance when setting their interest rates on new loans and deposits, is itself dependent on the monetary policy stance. Changes in the monetary policy stance are thus transmitted via market interest rates to bank interest rates.

As inflation was too low, the ECB Governing Council's monetary policy became increasingly expansionary from 2014 onwards.¹ As a result, market interest rates repeatedly reached new lows.² Because the monetary policy asset purchase programmes³ also considerably lowered longer-term market interest rates, the yield curve was flat. However, over the course of 2021, the rate of inflation rose significantly and exceeded 2% for the first time again from July of that year. Against this background, the ECB Governing Council started to gradually reduce its asset purchase programmes in December 2021.⁴ At the same time, the targeted longer-term refinancing operations (TLTRO III) were discontinued.⁵

This heralded a change in the course of monetary policy that led to a rise in market interest rates from the end of 2021, initially affecting longer-term interest rates (see the chart below). As a result, the spread between short-term and longer-term market rates widened significantly, which made the yield curve considerably steeper.

As inflation had climbed persistently, the ECB Governing Council ultimately started to increase its key interest rates in July 2022. So far, it has raised the key rates by a total of 400 basis points across eight steps. In terms of the magnitude and speed of these interest rate hikes, this tightening cycle is



1 See European Central Bank (2014).

2 Based on data for monthly averages, the three-month EURIBOR reached its minimum in December 2021 and the yield on ten-year German government bonds reached its minimum in August 2019.

3 The expanded asset purchase programme (APP) and the pandemic emergency purchase programme (PEPP).

4 First, the ECB Governing Council announced that it would gradually reduce its net asset purchases under the asset purchase programmes; see European Central Bank (2021). In June 2022, it decided that net purchases under the APP would end on 1 July 2022; see European Central Bank (2022a). In December 2022, it decided that, as of February 2023, the principal payments from maturing securities purchased under the APP would no longer be reinvested in full; see European Central Bank (2022e). Finally, in June 2023, it announced that it would discontinue the reinvestment of principal payments under the APP as of July 2023; see European Central Bank (2023d).

5 The tenth and final operation was allocated in December 2021. As banks are required to repay these loans to the Eurosystem in stages up until the end of 2024, the amount of outstanding funds is gradually declining. In October 2022, the ECB Governing Council decided to recalibrate the interest rate conditions for the third series of TLTROs to ensure consistency with the broader monetary policy tightening process; see European Central Bank (2022d). Based on this decision, the interest rate on all remaining TLTRO III operations was indexed to the average applicable key ECB interest rates from 23 November 2022 onwards. Furthermore, additional dates for voluntary early repayments were offered.

unprecedented for the Eurosystem.⁶ As the market had previously been expecting key interest rate hikes for the near future, short-term interest rates started to rise significantly as early as the second quarter of 2022. As a result, the yield curve flattened again. The increase in short-term market interest rates has continued almost continuously up to the current end since the first key interest rate hike in this cycle. By contrast, the gloomier economic expectations mean that long-term market interest rates have remained largely constant since the fourth quarter of 2022. Consequently, the yield curve flattened further and inverted in the first quarter of 2023, i.e. short-term interest rates exceeded longer-term interest rates.

6 On 21 July 2022, in response to the updated assessment of inflation risks, the ECB Governing Council decided to raise its key interest rates by 50 basis points; see European Central Bank (2022b). The Governing Council decided to raise its key interest rates by an additional 75 basis points each on 8 September 2022 and 27 October 2022, by 50 basis points each on 15 December 2022, 2 February 2023 and 16 March 2023, and finally by 25 basis points each on 4 May 2023 and 15 June 2023; see European Central Bank (2022c, 2022d, 2022e, 2023a, 2023b, 2023c, 2023d). On 8 September 2022, it decided to suspend the two-tier system for the remuneration of excess reserves; see European Central Bank (2022c).

July 2021, the inflation rate rapidly surged even more significantly as a result of Russia's war against Ukraine and the economic fallout thereof, making it necessary to tighten monetary policy more strongly. Unlike in the past, however, policy rates started from an unprecedentedly low, and in some cases even negative, level. As a result of the sharp rise in market interest rates, interest rates on new loans (new business)⁷ in Germany and the euro area rose considerably more steeply in 2022 than in the preceding period of tightening. As is shown by a comparison with the pre-financial crisis years (see the chart on p. 41), interest rates have thus far still not returned to their level back then despite the sharp rise.⁸

already picking up in response to this early on in the second quarter of 2022. The increase in lending rates as from April 2022 for loans to enterprises was only marginally stronger in Germany than in the euro area as a whole. On the other hand, banks in Germany raised interest rates on loans to households for house purchase to a considerably greater extent than

7 Based on the MFI interest rate statistics. In a representative sample of credit institutions in Germany, the Bundesbank collects data on new loans and deposits in Germany on a monthly basis. These data include both interest rates and volumes and are broken down, in particular, by initial interest rate fixation period and loan amount. The bank data are extrapolated and merged to form aggregated and sub-aggregated total results for individual loan and deposit categories for Germany and made publicly available.

8 Consumer credit and other lending to households are an exception. As this loan category is of relatively minor importance for banks, it will not be covered in further detail in this article. On a multi-year average, consumer credit and other lending to households accounts for only around 15% of the loan portfolio of banks in Germany.

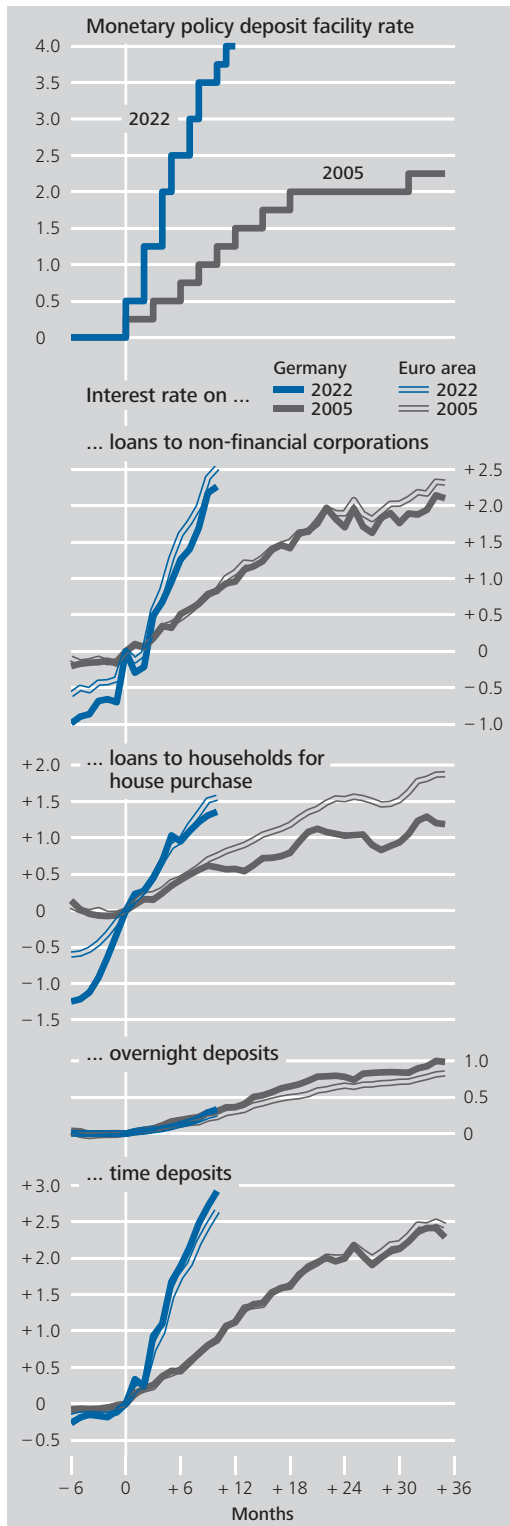
9 Specifically, the expanded asset purchase programme (APP); see the box on monetary policy tightening and market interest rate developments on p. 42 f.

Lending rates likewise up significantly in 2022

In anticipation of the forthcoming tightening of monetary policy and due to the gradual scaling-back of the asset purchase programmes,⁹ market interest rates began to rise even in advance of the first monetary policy interest rate move in July 2022, with interest rates on new loans

Comparison of periods of monetary policy tightening as from 2005 and as from 2022*

Cumulative changes in percentage points



* New business according to the MFI interest rate statistics. Month 0 is the monthly value prior to the first increase in the monetary policy deposit facility rate, normalised to 0 in each case. The monetary policy deposit facility rate started to be hiked in December 2005 and July 2022.

banks in the euro area as a whole.¹⁰ The fact that the usual interest rate fixation periods for housing loans in Germany are significantly longer than in the euro area as a whole contributed to this divergence.

Importance of the various interest rate fixation periods

Loans to households for house purchase in Germany and also in the euro area as a whole predominantly have long interest rate fixation periods. However, an analysis of banks' loan portfolio (see the chart on p. 45) shows that the share of loans to households with a short interest rate fixation period is significantly higher in the euro area than in Germany.¹¹ Whereas in Germany and France very long interest rate fixation periods are quite common, in other countries, such as Spain and Italy, loans generally have variable rates. This means that the weighted average interest rate fixation period for loans for house purchase across all euro area countries is significantly lower than in Germany. Hence, banks in Germany price these loans mostly on the basis of longer-term market interest rates compared with the euro area on average. Because these market interest rates rose earlier and more sharply than shorter-term ones in 2022 owing to the gradual scaling-back of the monetary policy asset pur-

Loans to households for house purchase in Germany predominantly with long interest rate fixation periods

¹⁰ In a comparison of euro area countries, interest rates on loans for house purchase rose most strongly in Germany. However, such rates also rose early on and relatively strongly in other euro area countries in which, as in Germany, long interest rate fixation periods are common practice. France is an exception; there, the rise in the interest rate on loans for house purchase is subject to a statutory cap (taux d'usure) which is adjusted at regular intervals. See Banque de France (2023a).

¹¹ Information on the frequencies of various interest rate fixation periods is available only for new business volumes collected for the MFI interest rate statistics, but not for the loan portfolio. In the monthly balance sheet statistics, however, for the loan portfolio at least the share of loans at variable interest rates or with an initial interest rate fixation period of up to one year is available separately for loans to enterprises and loans to households. These data on the loan portfolio are more meaningful than the corresponding data on new business volumes. This is because, in this category, short interest rate fixation periods have a very high weight since such loans are more frequently rolled over and then re-recorded as new business.

chase programmes, lending rates in Germany likewise rose more rapidly and considerably than in the euro area as a whole.

Loans to non-financial corporations usually with shorter interest rate fixation periods

For bank loans to non-financial corporations, variable rate agreements and short interest rate fixation periods are common in both Germany and the euro area as a whole (see the adjacent chart). However, in this loan category, too, the average interest rate fixation period in Germany is longer than in the euro area as a whole. If long-term market interest rates rise more sharply than short-term ones, consequently aggregate lending rates will rise more strongly in Germany than in the euro area as a whole. This effect is more pronounced for loans for house purchase than for loans to enterprises.¹²

Transmission of changes in market interest rates to lending rates

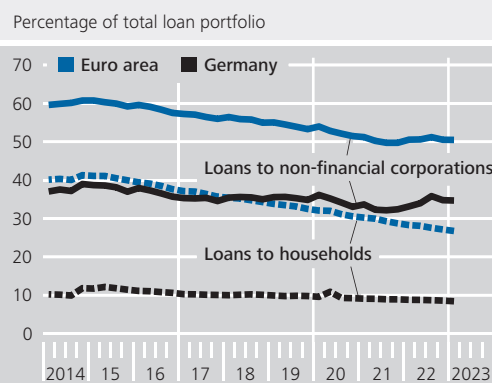
Empirical analysis on interest rate pass-through examines how quickly and to what extent changes in market interest rates are transmitted to bank interest rates

As mentioned above, banks typically pass through changes in their own funding costs to their borrowers. In a normal market environment, developments in banks' funding costs can be modelled well by market interest rate dynamics. The empirical models for bank interest rate pass-through presented in the box on pp. 49 ff. take advantage of this relationship, examining how quickly and to what extent changes in reference interest rates are passed through to bank customers in the form of changes in lending rates. In the case of lending rates in new business, a market interest rate with a similar interest rate fixation period to the respective lending rate is used as the reference interest rate.¹³

Changes in market interest rates passed through almost completely to lending rates, but more quickly into loans to enterprises than into housing loans

The interest rate pass-through models can be used to determine two things: first, how quickly banks responded to changes in market interest rates in the past. These models show that the interest rates on loans to enterprises and loans to households for house purchase in Germany and the euro area alike almost completely re-

Share of loan portfolio with short interest rate fixation periods*



* According to the monthly balance sheet statistics. Share of the loan portfolio (volume) with an original maturity of up to one year, and with an original maturity of over one year plus an interest rate reset within the next twelve months.

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flect changes in the respective reference interest rate. Usually, changes in reference interest rates are largely passed through within the first few months in the case of loans to enterprises, but take longer to be passed through to loans to households for house purchase.

Second, these models can be used to check whether interest rate pass-through in a given period is consistent or at odds with historical patterns. If the latter is true, this suggests that when setting interest rates, banks gave a different weighting to other factors – at least at times – as well as basing their rates on market interest rate developments. The models therefore help to answer the questions raised at the beginning of this article: has banks' rate-setting behaviour been unusual since the start of monetary policy tightening compared with the relationships observed in the past? Why is it that bank interest rates have been raised to different degrees and at different speeds?

Empirical models can help assess whether current interest rate pass-through is consistent with historical patterns

As explained in the box on pp. 49 ff., the interest rate pass-through models are estimated for

¹² See the box on developments in the interest rate differential between loans with long and short interest rate fixation periods on p. 46 f.

¹³ See the box on interest rate pass-through into bank loans and customer deposits on pp. 49 ff. as well as the box on pp. 56 ff. in Deutsche Bundesbank (2019).

Developments in the interest rate differential between loans with long and short interest rate fixation periods

MFI interest rate statistics provide information on aggregate lending rates across all interest rate fixation periods, as well as disaggregated data broken down into different interest rate fixation periods. Lending rates with shorter and longer interest rate fixation periods can take differing paths over time. Since lending rates usually move in line with market interest rates, the interest rate differential between loans with a long interest rate fixation period (more than ten years) and those with a short fixation period (up to one year) depends on the slope of the yield curve. Changes in the slope of the yield curve resulting from monetary policy measures are therefore also largely reflected in developments in interest rate differentials for loans to enterprises and loans to households for house purchase. Loans with a longer interest rate fixation period can theoretically also systematically differ from loans with a shorter fixation period in other ways than the interest rate fixation. However, analyses using credit microdata for loans to enterprises do show that a longer interest rate fixation period actually induces higher lending rates when the yield curve is very steep.¹

In spite of the fact that the interest rate differential in Germany is not the same as that of the euro area (see the chart on p. 47), developments were largely similar. As the yield curve in the market flattened during the period of negative interest rates due to the non-standard monetary policy measures, interest rate differentials for bank loans with different interest rate fixation periods also contracted. In Germany, the rates on loans to enterprises and loans to households for house purchase even fell into negative territory at times.² The historically

low interest rate in Germany on loans to households for house purchase with an interest rate fixation period of more than ten years is likely to have been a key factor in the strong demand for these loans over recent years, as well as in the ever increasing share of volumes of new business.³

From the beginning of 2022, banks again began to raise interest rates on loans to enterprises and loans for house purchase with medium and longer interest rate fixation periods more strongly than on loans with short interest rate fixation periods, in line with the steepening of the yield curve in the market. Interest rate differentials turned positive, standing at particularly high levels in the second and third quarters of 2022. Analyses based on microdata for loans to enterprises also show that the length of the interest rate fixation period was a strong factor in pushing up lending rates, particularly in these two quarters.⁴ The increase in the interest rate differential for loans to households for house purchase was considerably higher in Germany than in the other

¹ See the box on the influence of borrower and loan-related factors on the interest rate for bank loans to non-financial corporations on p. 53 f.

² In 2020 and 2021, new loans to households for house purchase with an interest rate fixation period of more than ten years were over 50 basis points cheaper in Germany than loans with a short interest rate fixation period. Loans to households for house purchase with a medium-term interest rate fixation period of between one and ten years were also more favourable at that time than loans with either a short-term or no interest rate fixation period.

³ The average interest rate fixation period is also likely to have increased considerably during the period of negative interest rates within the reported maturity bands, and particularly in the longest maturity band of more than ten years. Banks are also likely to have issued more loans with an interest rate fixation period of longer than 20 years.

⁴ See the box on the influence of borrower and loan-related factors on the interest rate for bank loans to non-financial corporations on p. 53 f.

large euro area countries and in the euro area as a whole. In the spring of 2022, it was precisely these loans to households for house purchase commonly issued with a long interest rate fixation period that became considerably more expensive in Germany within the space of a few months compared to those with a short interest rate fixation period. As a result, in relative terms, the demand for loans with a short interest rate fixation period began to rise again.

As the market interest rate yield curve flattened again in the second half of 2022 and inverted at the beginning of 2023, interest rate differentials in Germany and the euro area once more followed suit, with those for both loans to enterprises and loans to households for house purchase falling steeply and entering negative territory.

Interest rate differential and volume ratio of loans with long and short interest rate fixation periods*

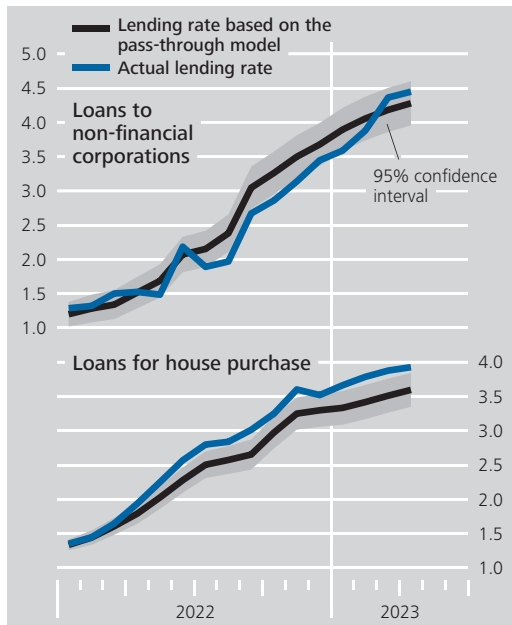
Monthly



* New business according to the MFI interest rate statistics. Loans with an interest rate fixation period of over ten years or up to one year.

Comparison of the actual lending rate and the lending rate based on the pass-through model*

% p.a.



* Out-of-sample forecasts. For details on the interest rate pass-through models, see the box entitled "Interest rate pass-through into bank loans and customer deposits". Estimation period: January 2003 to December 2021.

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Interest rate pass-through to small-sized loans to enterprises in summer 2022 weaker than expected based on the model

the period from the beginning of 2003 to the end of 2021. For the period after that, the actual interest rates set over the period of monetary policy tightening from the beginning of 2022 up to the last available data point in April 2023 are compared with the path that interest rates would otherwise have taken based on actual movements in the reference interest rates¹⁴ and the estimated model relationship. What this shows is that, in 2022, pass-through into the interest rate on loans to enterprises in Germany initially took place as expected (see the above chart). Between August and November 2022, however, the actual lending rate was – to a statistically significant degree – just under the interest rate that would have been expected based on historical interest rate pass-through patterns. A separate analysis traces this deviation back to banks' rate-setting behaviour for small-sized loans to enterprises. The actual interest rate on these loans between May and November 2022 was, in some cases, significantly lower than the rate calculated

based on the model. This did not apply to large-volume loans to enterprises. In the euro area, interest rate pass-through to the lending rate for loans to enterprises has been largely consistent with historical relationships since the beginning of 2022.

What could be behind the unusual rate-setting behaviour of banks in Germany for small-sized loans to enterprises in the second and third quarters of 2022? An analysis of microdata for the period from the fourth quarter of 2021 to the first quarter of 2023 can provide insights into which types of loans were granted at relatively favourable interest rates.¹⁵ There tended to be an interest rate-reducing effect when a loan had a short interest rate fixation period. This was particularly true in the second and third quarters of 2022, when the interest rate for loans with long interest rate fixation periods was raised to a much stronger degree in line with market interest rate developments than for loans with short interest rate fixation periods. This also triggered shifts in volumes towards loans with short interest rate fixation periods (see the chart on p. 47). In addition, loans with a lower default risk tended to be offered at a lower interest rate than those where the risk of default was greater. There were also circumstances in which certain riskier prospective borrowers stopped being serviced altogether. One indication of this may be the multiple increases in the rejection rate for loans to enterprises as shown by the results of the Bank Lending Survey (BLS) in 2022.¹⁶ Lastly, loans intended to be used to finance working capital were granted at a lower interest rate than loans for other purposes. According to the banks surveyed in the BLS, however, demand for precisely these loans was particularly strong in 2022, partly because the global sup-

Loans to enterprises with short interest rate fixation periods and to finance working capital with particularly low interest rates

¹⁴ The model for the interest rate on loans to enterprises in the euro area also contains a risk measure; see the box on pp. 49 ff.

¹⁵ See the box on the influence of borrower and loan-related factors on the interest rate for bank loans to non-financial corporations on p. 53 f.

¹⁶ See Deutsche Bundesbank (2022c).

Interest rate pass-through into bank loans and customer deposits

Interest rate pass-through concerns the degree to which banks pass changes in the monetary policy stance through to bank customers by adjusting their lending and deposit rates accordingly. Since changes in the monetary policy stance are normally transmitted immediately and completely to money and capital market rates, the analysis of interest rate pass-through in the stricter sense of the term focuses on how developments in these markets are transmitted to bank interest rates.

Bank lending and deposit rates usually move in line with market interest rates with a similar interest rate fixation period. Some of the adjustment takes place immediately and another part with a lag. Empirically, error correction models (ECMs) are well suited to investigating the pass-through of interest rates.¹ These models use a market interest rate as a reference interest rate for the corresponding rates on new loans or deposits. ECMs perform two functions. First, they plot the long-term correlation between a bank interest rate and a reference interest rate. This is conditional on a long-term equilibrium relationship (cointegration) existing between the two underlying interest rates. Second, they capture the short-term dynamics of the correlation between the interest rates observed. In this context, the coefficient for immediate interest rate pass-through shows the degree to which changes in the reference interest rate are passed through simultaneously to the respective lending or deposit rate.

The table on p. 50 provides an overview of the specifications and results of the interest rate pass-through models used at the Bundesbank for loans to enterprises and for

loans to households for house purchase. The models are estimated for the period from the beginning of 2003 to the end of 2021, with separate sets of monthly data for Germany and the euro area. Using these empirical models, it is possible to investigate whether interest rate pass-through during the period of monetary policy tightening since the beginning of 2022 is consistent with historical patterns or deviates from them to a statistically significant degree. This is done by comparing the actual interest rates set from the beginning of 2022 up to the last available data point in April 2023 with the path that interest rates would otherwise have taken based on movements in reference interest rates, and also (if applicable) changes in the risk measure as well as the estimated model relationships (see the remarks on pp. 48 ff.).²

A long-term equilibrium relationship (cointegration) with a money market rate is found to exist for the interest rate on loans to non-financial corporations in Germany. For the euro area, a long-term equilibrium relationship between the variables only exists in cases where a yield spread is added to the model as a risk measure.³ A reference interest rate with a longer term needs to be selected in order to model the pass-

¹ See Deutsche Bundesbank (2019), pp. 56 ff., which also presents technical details.

² Out-of-sample forecasts are performed for the period from the beginning of 2022 to April 2023 based on the models estimated up to the end of 2021.

³ Certain risks affect the pass-through of interest rates, particularly during crisis episodes like the sovereign debt crisis. These risks can be modelled by means of a spread. A sovereign risk premium, i.e. the difference between the yield on a ten-year sovereign bond and a risk-free interest rate (OIS rate) for the same maturity, is selected here as a general measure of risk. See Deutsche Bundesbank (2019) and the remarks on pp. 58 ff.

Interest rate pass-through in lending business (estimation period 2003-21)^o

Aggregated interest rate ...	Reference interest rate	Risk measure	Immediate pass-through		Adjustment speed	Long-term constant	Long-term pass-through		Cointegration according to bounds testing procedure
			Reference interest rate	Risk measure			Reference interest rate	Risk measure	
... on loans to non-financial corporations in Germany	Twelve-month EURIBOR	–	0.68***	–	– 0.17***	1.55***	0.82***	–	Yes***
Euro area	Three-month EURIBOR	Ten-year spread	0.70***	– 0.07*	– 0.14***	1.58***	0.84***	0.46***	Yes***
... on loans to households for house purchase in Germany	Ten-year OIS	–	0.09***	–	– 0.10***	1.33***	0.89***	–	Yes**
Euro area	Twelve-month EURIBOR	–	0.13***	–	– 0.03***	1.65***	0.86***	–	Yes***

^o *** p < 0.01, ** p < 0.05, * p < 0.1 indicate the level of significance in each case.

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through of interest rates into loans to households for house purchase in Germany, given the fact that interest rate fixation periods tend to be long in Germany in this loan category. Interest rate fixation periods in euro area countries, meanwhile, vary noticeably, besides being shorter overall than in Germany. A long-term relationship is therefore found to exist with a money market rate.

The long-term pass-through coefficients for the respective reference interest rates are between 0.8 and 0.9 in all the models (see the above table), which means that the degree of interest rate pass-through is almost complete over the long run. At around 70%, the immediate pass-through of changes in the reference interest rate within the same month is significantly higher for loans to enterprises than it is for loans to households for house purchase, where the equivalent figure is no more than approximately 10%. Thus, movements in reference interest rates are largely passed through within the first few months in the case of

loans to enterprises, but take longer to be passed through into loans to households for house purchase.

The remuneration paid by banks for customer deposits can likewise be based on movements in a market interest rate. This is why there may be circumstances in which long-term equilibrium relationships exist between deposit and reference interest rates. Deposits by non-financial corporations and households have either next-day maturity (overnight deposits), a longer maturity (time deposits) or are redeemable at notice (savings deposits). This means that short-term or longer-term money market rates are the best fit for reference interest rates in the empirical interest rate pass-through models.

The table on p. 51 provides an overview of the results of the interest rate pass-through models for overnight deposits, savings deposits and time deposits. In the case of the interest rate on overnight deposits (aggregated across non-financial corporations and households), there is very limited immediate

Interest rate pass-through in deposit business (estimation period 2003-21)⁰

Aggregated interest rate ...	Reference interest rate	Immediate pass-through of reference interest rate	Adjustment speed	Long-term constant	Long-term pass-through of reference interest rate	Cointegration according to bounds testing procedure
... on overnight deposits by households and non-financial corporations in						
Germany	EONIA/€STR ¹	0.13***	- 0.05***	0.19***	0.50***	Yes***
Euro area	EONIA/€STR ¹	0.10***	-	-	-	No
... on savings deposits by households and non-financial corporations in						
Germany	Three-month EURIBOR	0.08***	- 0.02***	0.32***	0.65***	Yes***
Euro area	Three-month EURIBOR	0.03	- 0.03***	0.58***	0.60***	Yes*
... on time deposits by households and non-financial corporations in						
Germany	Three-month EURIBOR	0.63***	- 0.15***	0.26***	0.81***	Yes**
Euro area	Three-month EURIBOR	0.52***	-	-	-	No

⁰ *** p < 0.01, ** p < 0.05, * p < 0.1 indicate the level of significance in each case. ¹ The model estimation used the EONIA rate prior to the transition to the euro short-term rate (€STR) in 2019, after which time €STR plus the EONIA-€STR spread of 8.5 basis points calculated by the ECB was used.
Deutsche Bundesbank

pass-through of changes in the reference interest rate within the same month in Germany and the euro area alike, at approximately 10%. Strikingly, the interest rate tends to respond more rapidly in the case of overnight deposits by enterprises than for deposits by households.⁴ Long-term interest rate pass-through to overnight deposits is only moderate and incomplete for both categories of depositors, at around 50% in Germany. The story is much the same for interest rate pass-through to savings deposits, while for time deposits, changes in the reference interest rate are quicker to pass through to the interest rate. At just over 80%, interest rate pass-through to time deposits in Germany is almost complete over the long term. For the euro area, a cointegration relationship with a market interest rate exists in neither the overnight deposits model nor the time deposits model. Therefore, only the coefficient of

the immediate pass-through of interest rates can be interpreted.

For deposits, too, we investigated how far the actual interest rates set since the beginning of 2022 have differed from the path that interest rates would otherwise have taken based on actual movements in reference interest rates and the estimated model relationships (see the remarks on p. 56 f.).

⁴ In the case of overnight deposits by enterprises, the coefficient for immediate pass-through comes to 0.36 (Germany) and 0.21 (euro area), compared with just 0.05 and 0.06, respectively, for overnight deposits by households.

ply bottlenecks necessitated greater liquidity holdings.

Interest rate pass-through into loans to households for house purchase since May 2022 stronger than expected based on the model

In contrast to the finding for loans to enterprises, interest rate pass-through to the interest rate on loans to households for house purchase in Germany has been stronger, to a statistically significant degree, since May 2022 than historical correlations would suggest (see the chart on p. 48). Another reason why this is striking is that – as was the case with loans to enterprises – it coincided with a shift in volumes towards loans with very short interest rate fixation periods, which were cheaper during this period than those with longer interest rate fixation periods. Absent this shift in volumes, the upside deviation of the interest rate from the historical pattern would have been greater still. The euro area, meanwhile, saw no notable deviations from the usual interest rate pass-through patterns.

Stronger hike in interest rate on loans to households for house purchase in Germany compared with the euro area due to longer-term reference interest rates

As mentioned above, the earlier and stronger increase in the interest rate on loans to households for house purchase in Germany compared with the euro area is attributable, first and foremost, to the fact that the share of new loans with an interest rate fixation period of over one year is higher in Germany than in the euro area as a whole. Longer-term market interest rates – the developments of which banks in Germany are guided by when adjusting the lending rate – rose earlier and more sharply in comparison with shorter-term market interest rates in the first half of 2022 (see the chart on p. 42). In this respect, the upward movement in the interest rate in Germany is also an expression that interest rate pass-through is generally working in line with historical relationships.

Stronger interest rate increase compared with historical patterns the result of higher credit risk

But why was the increase in interest rates in this segment not only stronger in Germany than in the euro area, but also stronger from May 2022 onwards than historical patterns would have suggested? First of all, it should be pointed out that banks significantly raised the interest rate on loans to households for house

purchase with a long interest rate fixation period, in particular.¹⁷ This interest rate had previously been lowered to a particularly significant degree in Germany during the period of negative interest rates. The BLS results suggest that banks' changed rate-setting behaviour during both periods relate to the unusual developments in the residential real estate market. According to the BLS, borrower-side risks in connection with loans to households for house purchase in Germany increased considerably over the course of 2022 against a backdrop of high inflation and intense uncertainty overall. This drove up borrowing costs to a particular extent. In line with this, the BLS results also show that the tightening of credit standards for loans to households for house purchase in Germany, primarily on account of increased risks, was more extensive than in the euro area.¹⁸ The marked deterioration in the outlook for the German residential real estate market, including uncertainty surrounding future price developments, as well as the decline in borrowers' creditworthiness contributed to this. Potential overvaluations of residential real estate in Germany probably also played a role here.¹⁹ However, the strong tightening in Germany is put into perspective when it is compared with the spells of easing in the previous decade, which was when the significant reductions in lending rates mentioned above came about.

¹⁷ See the box on developments in the interest rate differential between loans with long and short interest rate fixation periods on p. 46 f.

¹⁸ See Deutsche Bundesbank (2022b, 2022d, 2023b).

¹⁹ See Deutsche Bundesbank (2020b).

The influence of borrower-related and loan-related factors on the interest rate on bank loans to non-financial corporations

The interest rate on a bank loan depends on many factors. The most relevant factor for the variation in lending rates over time is probably the general level of interest rates. In a cross-sectional analysis – i.e. across loans granted at the same point in time – the variation in lending rates can potentially be explained by numerous factors. In broad terms, these can be broken down into bank-related, borrower-related and loan-related factors. A suitable way of empirically analysing the influence exerted by these factors is to look at loan-level micro data.

The analysis described here uses loan-level micro data from the AnaCredit credit data statistics. They are used to examine the impact of borrower-related and loan-related factors on the interest rates on bank loans to non-financial corporations.¹ Particular attention is paid to the question of whether the influence of these factors has changed since the beginning of the current monetary policy tightening cycle. The estimation therefore covers the period from the fourth quarter of 2021 to the first quarter of 2023. It comprises around 220,000 observations.²

In the econometric estimation, the lending rate (as a percentage per annum) serves as the dependent variable. Explanatory loan-related variables are the maturity of the loan and the length of the initial interest rate fixation period in years, the loan amount (in euro, logarithmic), the degree of collateralisation (as a percentage of the loan amount), whether any assets other than collateral could be seized,³ the type of repayment, the purpose of the loan (such as working capital loan or construction investment), and the type of loan (such as credit line or leasing). Explanatory borrower-

related variables are the borrower's number of employees (logarithmic), sector, and probability of default (as a percentage). In addition, fixed effects at the bank-month level are included in the estimation. These capture bank-related and time-specific factors.⁴ Furthermore, the explanatory variables are interacted with binary variables that assume a value of 1 for a given quarter and 0 for all other quarters. In this way, the effect of an explanatory variable can vary from quarter to quarter.

The results of the estimation suggest that a longer loan maturity is usually associated with a lower lending rate (see the table on p. 54). Likewise, the lending rate falls as the loan amount increases. Both of these relationships could be linked to the fact that a bank incurs fixed costs when granting a

¹ For an analysis of the role of bank-related factors in interest rates on loans to non-financial corporations based on AnaCredit data, see Deutsche Bundesbank (2022a), especially pp. 29 ff.

² Loans to enterprises from the sub-sector "Wholesale and retail trade and repair of motor vehicles and motorcycles" were not included in the sample used for the estimation; see Deutsche Bundesbank (2022a), especially pp. 29 ff. In addition, no loans with volumes of less than €5,000 were included in the estimation.

³ All nominal variables are encoded into binary variables with a value of either 0 or 1 (dummy variables). This includes variables that assume a value of "yes" or "no". It also applies to variables that can have several nominal values. For each value (with the exception of a reference value relative to which the estimated effects are to be interpreted), a dummy variable indicating whether or not the variable corresponds to this value is then added to the estimation.

⁴ In formal terms, the estimation equation can be represented as follows: $R_{i,b,e,m} = \gamma_{b,m} + \beta'_1 L_i + \beta'_2 BR_{e,m} + \varepsilon_{i,b,e,m}$. Here, $R_{i,b,e,m}$ is the interest rate on loan i from bank b to enterprise e in month m , $\gamma_{b,m}$ is a fixed effect at the bank-month level, L_i and $BR_{e,m}$ are vectors containing loan-related and borrower-related variables, β'_1 and β'_2 are vectors with estimated coefficients that describe the influence of these variables, and $\varepsilon_{i,b,e,m}$ is an error term. The error terms are clustered at the enterprise level when calculating the standard deviations of the estimated coefficients.

Direction of the effect of various variables on the lending rate*

Variable	2021 Q4	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1
Maturity	–	–	–	–	–	o
Length of interest rate fixation period	+	+	+	+	+	–
Amount	–	–	–	–	–	–
Degree of collateralisation	o	–	–	–	o	o
Probability of default	+	+	+	+	+	+
Borrower's number of employees	–	–	–	o	o	o
Working capital loan ¹	–	–	–	–	o	o

* The table indicates whether each variable has a positive (+) or negative (–) effect on the lending rate that is significant at the 5% level in the respective quarter. An effect that is not significant at the 5% level is indicated by an "o". ¹ Relative to loans with no explicit purpose.

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loan. These costs can be distributed over a longer period of time if the maturity of the loan is longer. Similarly, the markup on the lending rate needed to recoup these costs is lower if the costs are distributed across a larger loan amount.

A longer interest rate fixation period tends to be associated with a higher lending rate. In particular, the coefficients for the second and third quarters of 2022, when the yield curve was steep, exhibit high positive values in the estimation. By contrast, for the first quarter of 2023, in which an inverse yield curve was observed, the coefficient turns negative. The analysis using loan-level micro data therefore confirms that developments in the yield curve are a relevant factor in the pricing of new loans.

Furthermore, a higher degree of collateralisation is associated with a lower lending rate, although this effect is not statistically significant in every quarter. By contrast, a higher probability of default on the part of the borrower results in a higher lending rate. Both of these results are intuitively clear: a higher degree of collateralisation should, all other things being equal, reduce the loss suffered by the bank in the event of a default by the borrower. If the probability of default is higher, the bank will demand a higher risk premium.

The size of the borrower – measured in terms of its number of employees – is negatively correlated with the lending rate in some quarters. This could be because large enterprises are generally more transparent than small enterprises. Information asymmetries between the bank and the borrower may therefore be less relevant in the case of large enterprises. However, this effect does not appear to play an especially large role if borrower-related risks are already captured by the probability of default.⁵

In addition, the results of the estimation show that, up to the third quarter of 2022, working capital loans were cheaper than other loans. From the fourth quarter of 2022 onwards, this relationship disappears. This may reflect banks' response to higher demand for such loans (see the main text): owing to higher demand, banks may have raised the interest rates they charge for working capital loans as compared to other loans.

⁵ It should be noted that the probability of default is not available for all borrowers. It is available primarily for larger enterprises. Since observations are only included in the sample used for the estimation if the probability of default is available, large enterprises are overrepresented in this sample compared with the overall population.

Interest rates on customer deposits

Development of deposit rates: comparison of periods of monetary policy tightening as from 2005 and as from 2022

Interest rate on overnight deposits has been raised only slightly since monetary policy tightening commenced, while the rate on time deposits has increased more sharply

Interest rates on customer deposits developed differently in the individual deposit categories (see the chart on p. 41). During the period of negative interest rates, the interest rate on overnight deposits by households aggregated across all banks was very close to zero in Germany and the euro area alike. The rate on non-financial corporations' overnight deposits was just below this figure. After negative remuneration on the Eurosystem's deposit facility came to an end in July 2022, banks on aggregate raised the interest rate on overnight deposits for both categories of depositors back into positive territory in September 2022. Since then, however, banks have increased the interest rate on overnight deposits only very moderately in both Germany and the euro area. The picture was similar for savings deposits – another deposit category in which banks have raised the interest rate only slightly thus far.²⁰ Time deposits are a different story: interest rates on enterprises' and households' time deposits rose considerably and also significantly earlier than they did in the case of overnight deposits, starting from the second quarter of 2022. The steep increase went hand in hand with the rapid tightening of monetary policy since 2022 (see the chart on p. 44). By way of comparison, in the tightening period as from 2005, banks were slower to raise the interest rate on time deposits because the monetary policy tightening was also more moderate. The interest rate on overnight deposits, by contrast, was raised only very slowly and only marginally in both tightening periods, fairly independently of the monetary policy interest rate hikes.

The relationship between deposit types and deposit rates

The interest rate differential between longer-term deposits (time deposits) and overnight deposits in Germany was close to zero during the period of negative interest rates up to 2019. It even dipped into negative territory in 2020 and 2021, as enterprises' time deposits were negatively remunerated on aggregate. This pushed the average remuneration of time deposits across households and non-financial corporations into the red as well, leaving it lower than the average interest rate on overnight deposits. When banks started to rapidly raise the interest rate on time deposits in mid-2022 – but did not do the same with the interest rate on overnight deposits – the interest rate differential widened in line with the steepening yield curve in the market.

Interest rate differential between time deposits and overnight deposits wider since mid-2022, ...

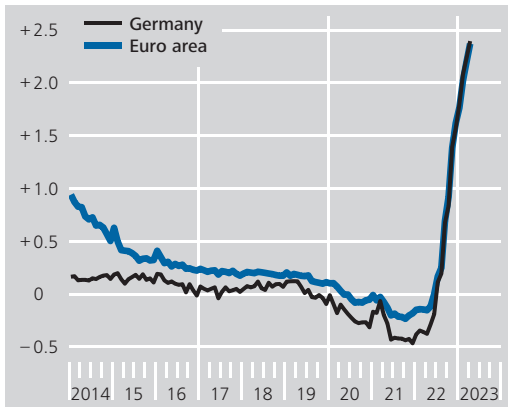
The interest rate differential between the individual deposit categories also had an impact on volume growth in each category: if the interest rate differential is small, there is little reason for bank customers to invest their money as longer-term deposits. If in doubt, they will opt for a more liquid deposit category. If the interest rate differential turns negative, depositors will have a greater tendency to reallocate their deposits. For example, the period of negative interest rates saw more and more time deposits being shifted into overnight deposits. These reallocations went into reverse after banks distinctly raised their interest rate on time deposits again. Since September 2022, time deposits as a percentage of total deposits have increased significantly in both Germany and the euro area as a whole.

... triggering a shift out of overnight deposits into time deposits

²⁰ Savings deposits exist only in some countries, including Germany, France, Italy and the Netherlands. The higher interest rate on savings deposits in the euro area is attributable to the popular "livret A/livret bleu" type of savings deposits in France, the interest rate on which is regulated by the government and is relatively high; see Banque de France (2023b). In the past, this rate was adjusted in three-month cycles. Recently, it has been adjusted on a monthly basis.

Interest rate differential between time deposits and overnight deposits*

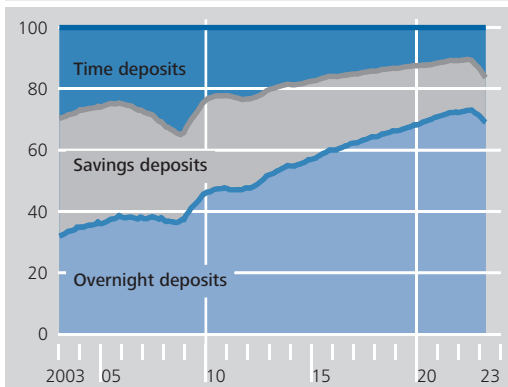
Percentage points, monthly



* New business according to the MFI interest rate statistics.
 Deutsche Bundesbank

Individual deposit categories as shares of total deposits in Germany*

%



* Stock of deposits according to the monthly balance sheet statistics.
 Deutsche Bundesbank

Transmission of changes in market interest rates to deposit rates

Interest rate pass-through to overnight deposits is usually sluggish and incomplete but faster and almost complete for time deposits

The question with interest rates on customer deposits, just as it was in the case of lending rates, is whether banks' rate-setting behaviour has been unusual since monetary policy tightening commenced. The remuneration that banks pay on customer deposits is likewise generally based on movements in market interest rates.²¹ The same empirical analytical methods used to investigate interest rate pass-through to lending rates can be used to explore this rela-

tionship.²² The historical patterns identified by these models indicate that interest rate pass-through to overnight deposits is relatively sluggish and incomplete. This may be related to the fact that overnight deposits are held less for investment and more for payment purposes, meaning they are seen as a substitute for non-interest-bearing cash (liquidity reserve).²³ Unlike with overnight deposits, changes in the reference interest rate are usually passed through to the deposit rate on time deposits not only quickly but also almost completely, as these deposits are in competition with other longer-term investment opportunities.

Since the beginning of 2022, the actual interest rate on time deposits has moved largely as expected from the model (see the chart on p. 57). This was in contrast to overnight deposits; since the beginning of 2022, banks in Germany have raised the interest rate on overnight deposits only marginally, despite sharply rising money market rates. Much the same applies to savings deposits. Therefore, since September 2022, the actual interest rate in these two deposit categories has been significantly lower than the interest rate that would have been expected based on the historical relationship, which was itself comparatively sluggish. This could be, first, a consequence of the de facto zero lower bound that applied to deposit rates in the low and negative interest rate policy period (see the next section). Second, it might be an indication of asymmetric interest rate pass-through dependent on the point within

Interest rate pass-through to overnight deposits since beginning of 2022 even lower than already sluggish model relationship predicted

²¹ See the section entitled "Banks' rate-setting behaviour in the low interest rate environment" in Deutsche Bundesbank (2019), pp. 46 ff.

²² See the box on interest rate pass-through into bank loans and customer deposits on pp. 49 ff.

²³ The interest rate tends to respond more quickly in the case of deposits by non-financial corporations than it does for households' deposits. Differences in households' and enterprises' sensitivity to interest rates and in the market power they wield relative to their bank may be a factor here. Moreover, large enterprises are likely to have different principal banking relationships than their small counterparts. Another factor may be that banks consider it worthwhile to preserve business relationships with enterprises, given that enterprises often also make use of other banking services. The reasons cited above may have different weightings in periods of declining and rising interest rates.

the interest rate cycle. For Germany and other euro area countries, the literature shows that in periods of rising reference interest rates, changes in these rates are passed on to deposit rates to a lesser extent than in periods of falling reference interest rates.²⁴ Some authors suspect this phenomenon is driven by imperfect competition in the banking sector or interest-inelastic demand for banking products on the part of depositors.²⁵ Moreover, it appears that competitive pressure from foreign banks in deposit business has so far been modest. Similarly, no major impact on the deposit rate can be expected at present in connection with the repayment of funds under the third series of targeted longer-term refinancing operations (TLTRO III).²⁶ In Germany, in particular, most banks participated in the TLTROs solely for reasons of profitability and held the funds partly as additional liquidity. The BLS shows that it was mostly maturing debt instruments or loans in the interbank market which were replaced by TLTRO liquidity, rather than customer deposits. Any need to replace TLTRO liquidity with deposits is therefore likely to be limited.

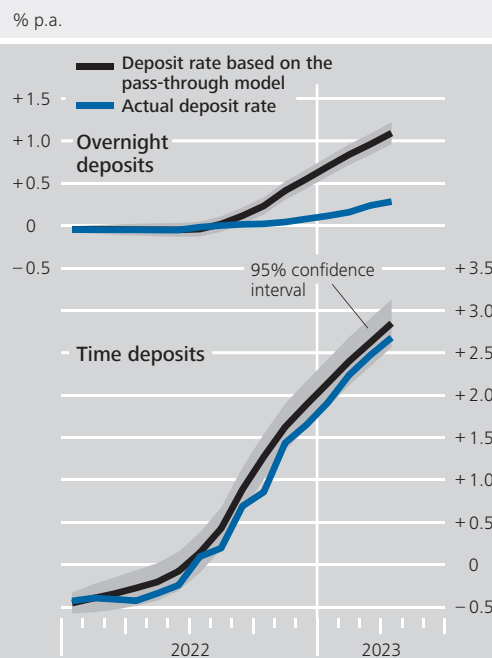
Signs of mounting competition for overnight deposits: interest rate pass-through may be stronger in future

However, heterogeneity in the interest rates paid on deposits has increased across all banks in recent months. This also applies to overnight deposits. The quite significant interest rate increases by individual banks are likely an indication that competition is slowly picking up. Presumably, many banks are monitoring the market closely at present so as to be able to respond quickly to any potential interest rate increases by their competitors, thus avoiding large deposit outflows. The sluggish pass-through of interest rates to overnight deposits observed hitherto could pick up momentum under the influence of increasing competition.

The impact of rising interest rates on the development of bank margins

The interest margin in the outstanding lending and deposit business²⁷ of banks in Germany

Comparison of the actual deposit rate and the deposit rate based on the pass-through model*



* Out-of-sample forecasts. For details on the interest rate pass-through models, see the box entitled "Interest rate pass-through into bank loans and customer deposits". Estimation period: January 2003 to December 2021. Deutsche Bundesbank

contracted steadily during the negative interest rate policy period (see the chart on p. 58). This is because the aggregate lending rate on outstanding amounts fell gradually until 2022, while the aggregate deposit rate barely declined any further after hovering close to the zero lower bound. From the beginning of 2022, the rise in the lending rate had a noticeable im-

Interest margin in outstanding lending and deposit business of banks in Germany has risen since mid-2022, ...

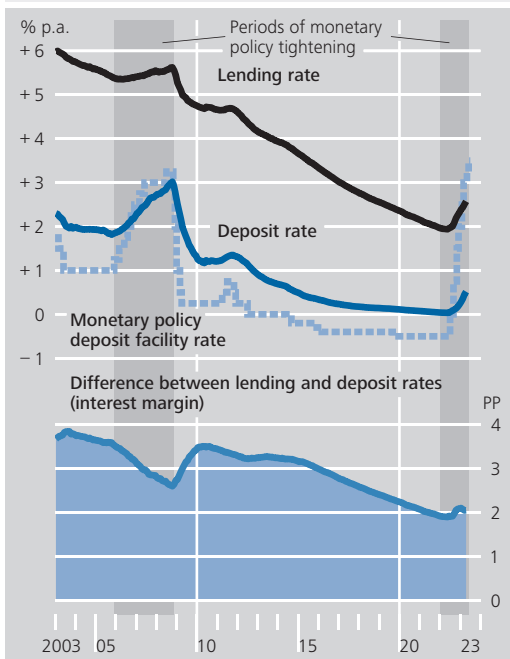
²⁴ For negative sign asymmetry for euro area countries, see, for example, Sander and Kleimeier (2004), de Graeve et al. (2007) and Mojon (2000).

²⁵ See Van Leuvensteijn et al. (2008), Sander and Kleimeier (2004) and Greenwood-Nimmo et al. (2010). Neumark and Sharpe (1992) and Hannan and Berger (1991) already noted a positive relationship between the existence of asymmetries and market concentration in the context of deposit rate pass-through.

²⁶ Early repayments and, from June onwards, repayments of the expiring high-volume operations of June 2020.

²⁷ The difference between the volume-weighted interest rate on banks' outstanding loans to non-financial corporations and households and the outstanding deposits they hold from non-financial corporations and households.

Interest margin in lending and deposit business of banks in Germany*



* Outstanding volumes, according to the MFI interest rate statistics and monthly balance sheet statistics. Business with households and non-financial corporations. Volume-weighted interest rates across sectors and across maturities.
 Deutsche Bundesbank

pact on the margin in new business²⁸ because the deposit rate had not yet begun to pick up. From mid-2022 onwards, the interest margin in outstanding lending and deposit business also responded by expanding, although this has come to a halt since the beginning of 2023. The discrepancy between developments in margins in outstanding and new business can be explained by the fact that a large part of the outstanding loan portfolio in Germany has a relatively long interest rate fixation period and therefore remains in the portfolio for a long time. This is particularly true of the extremely low-interest loans to households for house purchase granted up to the end of 2021.²⁹ Changes in the deposit rate, meanwhile, affect the margin in outstanding business earlier because the average interest rate fixation period for deposits is much shorter. Overnight deposits, where interest rate changes are directly reflected in the entire portfolio, account for a large part of the deposit portfolio. Any increase in this interest rate thus immediately puts pres-

sure on the margins in new and outstanding business.

The interest margin in outstanding lending and deposit business followed a different path during the last major monetary policy tightening phase. After key interest rates began to be raised in December 2005, the interest margin in outstanding business initially entered a three-year decline which lasted the entire length of the tightening period. The deposit rate aggregated across overnight deposits and time deposits increased promptly and to a moderate extent, much as it has done in the recent tightening period. However, the increase in the lending rate at that time was significantly weaker than it was in 2022, mainly owing to the slower pace of monetary policy tightening. As a result of the braking effect of the long interest rate fixation periods, especially for loans for house purchase, the interest margin in outstanding lending and deposit business declined until the end of 2008. It is quite common for the interest margin in outstanding business to decline initially, as it did from 2005, when monetary policy interest rates are increased moderately. By contrast, an almost instant increase in the interest margin in outstanding business as took place starting in 2022 occurs only in the case of very marked monetary policy interest rate increases or in the case of interest rate pass-through that deviates from the usual pattern.

... although it is unusual to see an increase during periods of monetary policy tightening

If interest rates on loans and deposits follow historical interest rate pass-through patterns during a period of interest rate increases, both the new business margin and the interest margin in outstanding business widen, the latter with a lag. This is because both immediate and long-term interest rate pass-through is lower on average for deposit rates than for lending

Widening of interest margin in outstanding business also due to current special characteristics of interest rate pass-through

²⁸ The difference between the volume-weighted interest rate on banks' new loans to non-financial corporations and households and their new deposits from non-financial corporations and households.

²⁹ See the box on developments in the interest rate differential between loans with long and short interest rate fixation periods on p. 46 f.

rates owing to the sluggish and incomplete response of the interest rate on overnight deposits. The fact that, last year, the margin widened earlier than usual in a period of interest rate increases is also due – in addition to the pronounced tightening of monetary policy – to the aforementioned special characteristics of interest rate pass-through in Germany during this period.³⁰ The first of these characteristics is that, since May 2022, interest rate pass-through to loans to households for house purchase in Germany has been stronger than historical patterns would suggest. The second is that interest rate pass-through to overnight deposits, and therefore also to the aggregate deposit rate, continues to lag behind the historical pattern, even more so than it did during the comparatively moderate period of monetary policy tightening from 2005 onwards. Both these characteristics have made the discrepancy in the pass-through of interest rates to loans and deposits widen by more than usual. From a bank perspective, however, the additional widening of margins this produces is put into perspective somewhat by the increased credit risk for loans to households for house purchase.

Interest rate on overnight deposits currently sluggish, partly because it had not been lowered into negative territory during the negative interest rate period, causing margins to shrink

In addition to the reasons mentioned above, there is another explanatory approach for the fact that banks have so far raised their interest rate on overnight deposits only slightly, despite the pronounced key interest rate increases. This approach starts with an alternative model of deposit rates. While interest rate pass-through models describe the relationship between deposit rates and market interest rates, it is also possible to empirically model the pricing of customer deposits as being based on a concept of a bank's target margin and thus on the lending rates in outstanding business.³¹ According to this definition, banks will base the deposit rates they set according to developments in their lending rates on outstanding loans in order to keep their interest margin in outstanding business as steady as possible. This was not possible during the negative interest rate period, as interest rates on customer deposits could not

be broadly reduced to a significantly negative range without risking a deposit withdrawal. However, lending rates on outstanding business declined continuously because new loans with lower interest rates replaced old loans with higher interest rates. Therefore, the interest margin in outstanding business fell below the previous normal, which has yet to be reached again since. While new loans are being granted at significantly higher interest rates, the volume of new loans is decreasing, which means that the interest margin in outstanding business is increasing only gradually. Viewed from this perspective, it is again hardly surprising that banks have not yet raised their interest rates on overnight deposits again to any significant extent, but are instead taking advantage of the low interest rate elasticity of demand for banking products.³²

■ Conclusion

The historically unprecedented increase in key interest rates has pushed up market interest rates and also fed into the interest rates on both bank loans and bank deposits in Germany. This is consistent with the monetary policy objective of slowing lending in order to lower the excessively high inflation rate to the 2% target via falling aggregate demand.

Increase in bank interest rates in line with monetary policy objective of reducing excessively high inflation rate

However, increases in bank interest rates in Germany have varied in strength and speed since the monetary policy tightening period began. In terms of historical patterns, it is certainly the norm for interest rates to be passed through to loans more quickly and more strongly than to deposits. In the case of loans to households for house purchase, however, banks have raised the interest rate even more strongly than usual since May last year. This was probably due mainly to the significantly higher credit risk. For small-sized loans to en-

Rise in interest rate nevertheless unexpectedly stronger for loans for house purchase and weaker for loans to enterprises

³⁰ See the box on the interest rate pass-through into bank loans and customer deposits on pp. 49 ff.

³¹ See Sopp (2018) and Deutsche Bundesbank (2020a).

³² See Deutsche Bundesbank (2019), p. 52.

terprises, on the other hand, the actual lending rate was at times lower than the interest rate that would have been expected based on historical interest rate pass-through patterns. The increased provision of working capital loans with short interest rate fixation periods is likely to have played a role in this.

Interest rate on overnight deposits barely risen so far, but this could change going forward as competition picks up

In contrast to lending rates, the interest rate on overnight deposits has only inched upwards so far. Although such a lagged response was also observed in previous monetary policy tightening periods, since September 2022, the pass-through of interest rates has been even more sluggish than in the past. As competition for deposits gradually picks up and the differential between the interest rates on overnight deposits and time deposits widens, this is also likely to put upward pressure on the interest rate on overnight deposits in the future.

The relatively rapid rise in lending rates and the stickiness of deposit rates meant that banks were able to widen their interest margin in out-

standing lending and deposit business. Banks have been using increased credit risk to partly justify their widening margins since the beginning of 2022. However, increasing lending rates can themselves lead to a rise in default risks. For borrowers, higher interest rates mean a higher interest burden. Owing to their longer interest rate fixation periods, this is likely to become apparent at the macroeconomic level later in the case of loans to households for house purchase than in the case of loans to non-financial corporations. Despite increasing risks, widening margins in banks' lending and deposit business – which tend to be unusual during periods of rising interest rates but have been in evidence since 2022 – could be a transitory phenomenon if competitive pressures increase. As competition for overnight deposits gradually picks up, this could mean that the previously sluggish pass-through of interest rates to these deposits could gain traction, meaning that banks' margins would quickly fall again if lending rates do not rise more strongly than deposit rates.

Banks thus able to widen their interest margin in outstanding lending and deposit business

■ List of references

Banque de France (2023a), Taux d'usure, <https://www.banque-france.fr/statistiques/taux-et-cours/taux-dusure>

Banque de France (2023b), Taux de rémunération des dépôts bancaires, <https://www.banque-france.fr/statistiques/epargne-et-comptes-nationaux-financiers/lepargne-dans-les-banques/taux-de-remuneration-des-depots-bancaires>

De Graeve, F., O. De Jonghe and R. Vander Vennet (2007), Competition, transmission and bank pricing policies: evidence from Belgian loan and deposit markets, *Journal of Banking and Finance*, Vol. 31(1), pp. 259-278.

Deutsche Bundesbank (2023a), From the monetary pillar to the monetary and financial analysis, *Monthly Report*, January 2023, pp. 15-51.

Deutsche Bundesbank (2023b), January results of the Bank Lending Survey in Germany, press release of 31 January 2023.

Deutsche Bundesbank (2022a), Monetary policy in a prolonged period of low interest rates – a discussion of the concept of the reversal rate, *Monthly Report*, March 2022, pp. 17-36.

Deutsche Bundesbank (2022b), April results of the Bank Lending Survey in Germany, press release of 12 April 2022.

Deutsche Bundesbank (2022c), Negative interest rate policy period and pandemic as reflected in the Bank Lending Survey, Monthly Report, September 2022, pp. 17-45.

Deutsche Bundesbank (2022d), October results of the Bank Lending Survey in Germany, press release of 25 October 2022.

Deutsche Bundesbank (2020a), Developments in the German banking system during the negative interest rate policy period, Monthly Report, October 2020, pp. 15-39.

Deutsche Bundesbank (2020b), The protracted rise in residential property prices in Germany from a macroeconomic perspective: transmission channels and fundamental determinants, Monthly Report, October 2020, pp. 67-85.

Deutsche Bundesbank (2019), Interest rate pass-through in the low interest rate environment, Monthly Report, April 2019, pp. 43-75.

European Central Bank (2023a), Monetary policy decisions, press release of 2 February 2023.

European Central Bank (2023b), Monetary policy decisions, press release of 16 March 2023.

European Central Bank (2023c), Monetary policy decisions, press release of 4 May 2023.

European Central Bank (2023d), Monetary policy decisions, press release of 15 June 2023.

European Central Bank (2022a), Monetary policy decisions, press release of 9 June 2022.

European Central Bank (2022b), Monetary policy decisions, press release of 21 July 2022.

European Central Bank (2022c), Monetary policy decisions, press release of 8 September 2022.

European Central Bank (2022d), ECB recalibrates targeted lending operations to help restore price stability over the medium term, press release of 27 October 2022.

European Central Bank (2022e), Monetary policy decisions, press release of 15 December 2022.

European Central Bank (2021), Monetary policy decisions, press release of 16 December 2021.

European Central Bank (2014), Press conference of 5 June – introductory remarks.

Greenwood-Nimmo, M., Y. Shin and T. van Treeck (2010), The Great Moderation and the Decoupling of Monetary Policy from Long-Term Rates in the U.S. and Germany, Macroeconomic Policy Institute (IMK), working paper, 15/2010.

Hannan, T. H. and A. N. Berger (1991), The rigidity of prices: Evidence from the banking industry, American Economic Review, Vol. 81(4), pp. 938-945.

Mojon, B. (2000), Financial structure and the interest rate channel of ECB monetary policy, European Central Bank, Working Paper Series, 40.

Neumark, D. and S. Sharpe (1992), Market structure and the nature of price rigidity: Evidence from the market for consumer deposits, Quarterly Journal of Economics, Vol. 107(2), pp. 657-680.

Sander, H. and S. Kleimeier (2004), Convergence in euro-zone retail banking? What interest rate pass-through tells us about monetary policy transmission, competition and integration, Journal of International Money and Finance, Vol. 23(3), pp. 461-492.

Sopp, H. (2018), Interest rate pass-through to the rates of core deposits – a new perspective, Deutsche Bundesbank Discussion Paper No 25/2018.

Van Leuvensteijn, M., C. Kok Sørensen, J. A. Bikker and A. van Rixtel (2008), Impact of bank competition on the interest rate pass-through in the euro area, European Central Bank, Working Paper Series, 885.