

## ■ Financial markets

### ■ Financial market setting

*Yields rose amid continued high inflation and divergent economic prospects*

International financial markets were shaped by still high but declining inflation rates. In addition, divergent economic prospects for the major currency areas left their mark on financial market developments in general. In this environment, central banks there initially continued their course of monetary policy tightening. While the US Federal Reserve raised its key interest rate by 25 basis points in July, it has since left it unchanged. After two further interest rate moves of 25 basis points each in July and September, the Governing Council of the ECB also decided at its most recent meeting in October not to raise key interest rates any further for the time being. Overall, however, both central banks stressed the need to leave policy rates at a restrictive level for a sufficient period of time and kept open the option of further increases in key interest rates depending on the inflation situation. In this environment, market participants increasingly took the view that key interest rates could remain at a restrictive level for an extended period of time. Given robust US economic data and the fact that the labour market had been resilient for months, this market view was particularly pronounced in relation to the Fed's policy rate outlook.

The higher-for-longer interest rate scenario initially led to rising nominal and real interest rates in both currency areas. In the euro area, however, the increase in yields was weaker given subdued growth prospects. These developments were reflected in a depreciation of the euro against the US dollar during the third quarter of 2023. Since the end of September, there has also been mounting concern among market participants that US fiscal deficits could be higher in the future. This reinforced the rise in yields on US Treasuries, which also spilled over to the euro area through international interest rate linkages, albeit in a somewhat weaker form. Towards the end of the period

under review, the financial markets experienced divergent developments. The tighter financial conditions caused market participants to price in higher downside risks to economic growth in their medium-term policy rate outlook. The somewhat weaker US labour market data and the lower US inflation data have, since the beginning of November, intensified the decline in yields and hurt the US dollar.

The markets for risky asset classes followed the general interest rate trend. Overall, rising real interest rates and diminishing risk appetite on the part of investors led to valuations falling in some cases. In this environment, yield spreads on the government bond markets, in particular, temporarily widened. Looking at euro area government bonds, Italian paper experienced spread widening, driven by upward revisions to forecasts of Italy's fiscal deficit. Equity markets traded little changed on balance after temporary, and in some cases distinct, losses.

*Euro area government bond yields rose at different rates*

### ■ Exchange rates

The euro progressively lost value against the US dollar from mid-July to the first week of October and fell to its lowest level since December 2022, trading at less than US\$1.05. The euro's depreciation was mainly attributable to market participants' growing expectation that the Federal Reserve might raise key interest rates again at the end of the year and that it would not implement any rate cuts until later next year. The Federal Open Market Committee (FOMC) revised up its interest rate projections in September, confirming the expectation that US rates will remain higher for longer. The reassessment of the Fed's monetary policy stance had previously already been fuelled by the publication of a series of US economic data that surprised positively. By contrast, economic data for the euro area were predominantly less favourable than expected in the market. The

*Euro slightly down against the US dollar*

gloomier economic outlook in the single currency area additionally weighed on the euro's exchange rate against the US dollar.

Since the beginning of October, the euro has been trading against the US dollar in a narrow range around US\$1.06 without any clear trend. On the one hand, US government bond yields temporarily spiked so strongly higher during this period that the Fed pointed out in this context that persistently tighter financing conditions could have an impact on monetary policy. On the other hand, higher than expected US inflation figures and initially still surprisingly favourable US economic data supported existing expectations of rising interest rates in October. However, at the beginning of November, a disappointing US labour market report caused sentiment in the foreign exchange markets to turn against the US dollar. The publication of new data showing that US inflation rates had come down unexpectedly clearly put an additional damper on the US currency. Moreover, there is little evidence thus far to suggest that the recent escalation of the Middle East crisis has put significant upward pressure on the US dollar through net capital inflows. At last count, the euro was trading at US\$1.08, which means that it has depreciated by 0.2% since the end of June.

*Euro up against the pound sterling on balance ...*

As of the beginning of the second half of the year, the euro appreciated on balance against the pound sterling. In September, in particular, the pound came under pressure against the euro and other currencies, after the Bank of England decided to leave policy rates unchanged. By contrast, as the inflation rate in the United Kingdom was still exceptionally high in terms of the Bank of England's inflation target and by international standards, most observers had expected a renewed rate hike by the UK central bank. Weaker than expected economic data subsequently intensified economic concerns in the United Kingdom, also dampening interest rate expectations there. Overall, this weighed on the pound sterling. As this report went to press, the euro was trading at



£0.88 and thus 2.0% higher than at the end of June.

Against the backdrop of still sizeable yield spreads, the euro also posted gains against the yen. From mid-August, the single currency had moved in a relatively narrow band around ¥158 with no discernible trend. At the end of October, however, the Bank of Japan further loosened its yield curve control policy, having already raised the ceiling it sets on ten-year government bond yields by 50 basis points to 1% at the end of July of this year. As part of the October decision, the target of 1% will no longer be applied as a rigid cap but as a refer-

*... and against the yen*

## Recalculated weights for indicators of the German economy's price competitiveness

Indicators of price competitiveness are commonly given as the relative price or cost developments of a country compared with the weighted average of major trading partners.<sup>1</sup> In this context, prices or costs in different currency areas are converted into a single currency using nominal exchange rates in order to ensure comparability. The Bundesbank continually calculates and publishes such indicators of price competitiveness for Germany.<sup>2</sup> These indicators are designed and calculated in the same way as the real effective exchange rate of the euro.<sup>3</sup>

The weight assigned to an individual partner country in the indicator is calculated using the intensity of its trade links<sup>4</sup> with the base country in question. The weights are adjusted regularly every three years based on current trade statistics.<sup>5</sup> In order to take account of current developments in foreign trade, a routine recalculation of the weighting schemes also took place recently. Prior to the latest adjustment, the weights for all indicator series from 2016 onwards were based on trade data for the years 2016 to 2018.<sup>6</sup> By contrast, the recalculated indicators from 2019 use weights derived from trade relations prevailing between 2019 and 2021.

The recalculated weights used to calculate the price competitiveness indicator of the German economy against a broad group of 60 trading partners are shown in the table on p. 41. The weights from the previous calculation periods are also shown for this group of countries. They were revised in view of the improved availability of data in the wake of the recalculation. The weights for indicators vis-à-vis narrower groups of countries can be determined by simply re-scaling the weights calculated for the broad group.

For most countries, the current weights (basis: 2019 to 2021) differ only slightly from those of the previous period (basis: 2016 to 2018). Primarily China and Poland, but also Ireland and the Netherlands, have markedly increased in importance for German foreign trade. China, however, still has the highest trade weight of all of Germany's trading partners.<sup>7</sup> Marked declines can be observed for the United Kingdom and France, in particular, and to a lesser extent also for Spain and the United States. The United Kingdom's withdrawal from the European Union is likely to have been one factor that caused a reduction in the relative intensity of trade links with Germany. However, given that the shifts in weights caused by the recalculation remained relatively small overall, they do not have any perceptible impact on developments in the indicator of Germany's price competitiveness.

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**1** For details on a current assessment of price competitiveness in Germany and the euro area using these and other indicators, see Deutsche Bundesbank (2023a).

**2** See, for example, Table XII.11 in the Statistical Section of this Monthly Report.

**3** The calculation method is described in detail in Schmitz et al. (2012).

**4** Trade links take account of trade in goods as well as trade in services. They include not only the direct trade flows between the base country in question and a respective partner country, but also competitive relationships between these two countries in third markets (third-market effects).

**5** Given that the calculated index series are thus based on different weighting schemes at different time periods, they are chain linked. This avoids inherent breaks in the sets of indicators of price competitiveness.

**6** The latest regular adjustments to the weights are collated in Deutsche Bundesbank (2020).

**7** For one, China's export sector benefited from the shift in demand away from contact-intensive services towards goods during the coronavirus pandemic in 2020. For another, China was able to almost fully meet the global increase in demand for pandemic-related products, such as protective equipment, by ramping up production capacity. See Deutsche Bundesbank (2021).

### Weighting scheme for the price competitiveness indicator of the German economy against a broad group of 60 trading partners

‰, as at September 2023

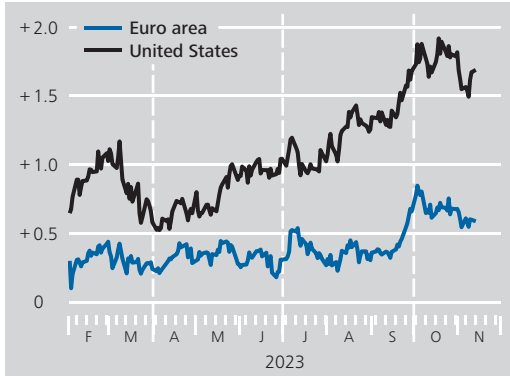
Group of countries/country	Up to 1997 <sup>1</sup>	1998 to 2000	2001 to 2003	2004 to 2006	2007 to 2009	2010 to 2012	2013 to 2015	2016 to 2018	From 2019 <sup>2</sup>
<b>Narrow group of countries</b>	<b>796.0</b>	<b>788.7</b>	<b>764.3</b>	<b>724.8</b>	<b>692.2</b>	<b>657.6</b>	<b>648.2</b>	<b>641.8</b>	<b>628.4</b>
Austria	51.8	48.0	46.8	46.5	45.5	44.0	43.4	43.0	41.5
Belgium	51.7	46.2	49.1	51.2	50.6	44.8	41.4	40.5	41.1
Canada	7.7	8.6	8.7	8.3	7.8	8.1	8.3	7.5	6.9
Croatia	2.7	2.2	2.7	3.0	2.9	2.4	2.5	2.8	2.9
Cyprus	1.0	0.8	0.7	0.9	1.0	0.9	0.8	0.9	0.9
Denmark	17.8	15.7	16.0	15.2	15.0	12.9	13.0	12.7	12.6
Estonia	0.4	0.6	0.8	1.1	1.0	1.0	1.1	1.2	1.6
Finland	9.7	10.5	10.4	10.1	10.6	8.3	8.0	8.3	8.1
France	105.2	101.5	95.2	87.6	83.7	83.8	81.2	73.7	67.6
Greece	8.9	7.8	6.8	6.6	6.3	4.6	4.2	4.1	3.9
Ireland	10.9	15.5	16.1	15.2	14.1	12.9	13.5	16.4	21.7
Italy	84.7	78.4	74.4	69.5	64.5	57.8	52.6	52.7	51.4
Japan	50.0	47.1	40.3	36.6	32.7	31.8	26.0	25.7	23.8
Latvia	0.5	0.7	0.8	0.9	1.0	0.9	1.0	1.0	1.2
Lithuania	0.9	1.1	1.5	1.6	1.8	1.8	2.1	2.3	2.8
Luxembourg	5.8	5.6	6.1	7.1	7.3	7.2	7.8	8.3	9.9
Malta	0.7	0.6	0.5	0.6	0.6	0.7	0.8	1.1	1.3
Netherlands	68.5	67.3	65.0	66.6	67.1	67.2	65.7	68.9	71.8
Norway	7.5	7.0	6.9	7.0	7.2	6.2	5.5	4.8	4.7
Portugal	10.5	10.2	9.4	8.0	7.5	6.7	6.6	7.0	7.2
Slovakia	4.1	5.6	7.2	8.6	9.8	10.9	12.0	12.2	12.5
Slovenia	4.2	4.2	4.2	4.2	4.5	4.5	4.6	4.8	5.4
Spain	42.9	43.1	41.6	41.3	39.6	34.0	32.5	33.6	31.3
Sweden	21.6	20.5	18.6	19.5	19.0	18.3	17.8	16.7	16.2
Switzerland	47.0	42.6	43.4	41.7	41.7	42.3	42.3	40.6	39.4
United Kingdom	81.3	82.2	78.2	71.5	62.7	57.9	60.3	57.4	49.3
United States	98.0	115.1	112.9	94.4	86.7	85.7	93.2	93.6	91.4
<b>Countries additionally included in the extended group</b>	<b>106.6</b>	<b>119.5</b>	<b>142.3</b>	<b>173.2</b>	<b>198.5</b>	<b>224.0</b>	<b>235.6</b>	<b>246.4</b>	<b>265.5</b>
Australia	4.4	4.0	4.1	4.1	4.4	5.1	4.6	4.4	4.0
Bulgaria	1.1	1.3	1.8	2.3	2.6	2.6	2.9	3.2	3.5
China	21.5	25.9	37.0	53.4	69.9	91.4	97.2	98.6	110.0
Czech Republic	14.4	18.3	22.2	24.6	27.6	28.9	29.5	32.2	32.9
Hong Kong SAR	13.0	12.0	12.1	12.6	11.5	11.6	11.0	10.7	9.8
Hungary	9.1	14.5	16.5	17.8	17.3	16.2	17.7	18.6	19.3
Korea, Republic of	13.8	11.6	12.7	16.9	16.2	16.2	15.8	15.7	16.0
Poland	16.6	19.7	22.4	27.3	32.8	34.2	37.0	41.3	47.2
Romania	3.2	3.6	4.6	6.3	8.1	9.0	10.9	12.6	13.0
Singapore	9.5	8.6	8.9	7.9	8.1	8.8	9.0	9.1	9.8
<b>Countries additionally included in the broad group</b>	<b>97.4</b>	<b>91.8</b>	<b>93.4</b>	<b>102.0</b>	<b>109.3</b>	<b>118.4</b>	<b>116.2</b>	<b>111.8</b>	<b>106.1</b>
Algeria	0.5	0.4	0.5	0.6	0.7	0.6	0.7	0.6	0.5
Argentina	2.0	1.8	1.2	1.1	1.5	2.1	1.8	1.6	1.2
Brazil	7.2	6.7	5.8	6.5	7.8	8.5	7.1	5.9	5.2
Chile	1.5	1.2	1.1	1.7	2.0	2.1	1.8	1.5	1.4
Columbia	1.0	0.7	0.7	0.7	0.8	0.9	1.0	0.8	0.8
Iceland	0.4	0.5	0.5	0.7	0.6	0.5	0.4	0.5	0.4
India	6.3	5.4	5.9	7.7	10.3	12.1	11.8	12.4	12.8
Indonesia	5.4	3.7	3.3	3.0	2.9	3.4	3.4	3.2	2.9
Israel	4.0	4.1	3.6	3.0	3.0	3.3	3.2	3.3	3.3
Malaysia	6.2	5.5	5.6	5.2	5.2	5.8	5.9	6.0	5.9
Mexico	4.5	7.0	7.3	6.7	7.2	7.7	8.3	9.2	9.1
Morocco	1.3	1.4	1.3	1.2	1.3	1.3	1.4	1.6	1.6
New Zealand	0.8	0.7	0.8	0.8	0.8	0.9	0.9	1.0	0.8
Peru	0.5	0.4	0.3	0.5	0.6	0.6	0.6	0.6	0.6
Philippines	2.5	2.8	3.0	2.5	2.1	2.0	2.5	2.5	2.4
Russian Federation	11.6	9.1	10.8	14.1	17.1	18.5	16.3	12.9	12.1
Saudi Arabia	1.9	1.8	2.3	2.7	3.1	3.4	3.9	3.1	2.8
South Africa	5.5	5.1	5.4	6.1	5.8	5.9	5.2	5.2	4.8
Taiwan	10.7	11.4	10.2	9.2	7.7	8.3	8.1	8.6	9.2
Thailand	6.4	4.8	4.9	4.8	5.3	5.8	6.0	6.3	5.5
Turkey	13.3	13.5	14.0	16.1	15.5	16.6	17.7	16.3	15.1
Ukraine	1.9	1.7	2.2	3.0	3.4	3.1	2.4	2.2	2.5
United Arab Emirates	2.0	2.1	2.7	4.1	4.6	5.0	5.8	6.5	5.2
<b>Total</b>	<b>1,000.0</b>	<b>1,000.0</b>	<b>1,000.0</b>	<b>1,000.0</b>	<b>1,000.0</b>	<b>1,000.0</b>	<b>1,000.0</b>	<b>1,000.0</b>	<b>1,000.0</b>

<sup>1</sup> Basis: 1995 to 1997. <sup>2</sup> Basis: 2019 to 2021.

Deutsche Bundesbank

### Real interest rates\*

%, daily data



Sources: Bloomberg, Refinitiv and Bundesbank calculations. \* Calculated from the difference between nominal ten-year overnight index swaps and inflation-indexed swaps with the same maturity.

Deutsche Bundesbank

### Implied policy rate cuts in 2024\*

In basis points, moving five-day average



Sources: Bloomberg and Bundesbank calculations. \* Calculated as the difference between the €STR/SOFR forward rate at the end of December 2023 and the end of December 2024.

Deutsche Bundesbank

ence rate and thus more flexibly. However, the subsequent rise in yields was reversed shortly afterwards. As a consequence, the euro gained against the yen. As this report went to press, the euro stood at ¥164, which was 4.4% above its level at the end of the second quarter.

Compared with the beginning of the second half of 2023, the value of the euro as a weighted average against the currencies of 18 major trading partners rose by 0.2% on balance. In addition to the above-mentioned gains against the pound sterling and the yen, the main factors driving this effective appreciation of the euro were its appreciation against the

*Euro somewhat stronger in effective terms*

Canadian dollar and central European currencies. This was partly offset by the single currency's losses against the Swedish krona and the Swiss franc. An appreciation of the euro tends to reduce import prices and thus dampens inflationary pressures in the euro area.

## Securities markets and portfolio transactions

### Bond market

As of the middle of the year, global yields on long-dated government bonds, with the exception of UK government bonds, rose perceptibly in some cases. Interest rates in the United States went up more than in the euro area. In an environment marked by a robust macroeconomic outlook for the United States, market participants mainly revised their view in favour of higher-for-longer US policy rates, having expected significantly earlier policy rate cuts in the first half of the year. As of the end of September, market participants' concerns about persistently high US fiscal deficits also grew. This led to increased selling pressure in the US government bond market and was accompanied by rising yields. The Eurosystem also further tightened its monetary policy stance, raising key interest rates by 25 basis points each in July and September. At their meetings in October and the beginning of November respectively, the ECB Governing Council and the FOMC left key interest rates unchanged. At the same time, they stressed that they would pursue a data-dependent approach to determining the level and duration of restriction. Overall, gloomier growth prospects meant that the general interest rate dynamics in the euro area were weaker than in the United States.<sup>1</sup>

*Yields on ten-year government bonds up in the euro area and the United States*

The restrictive stimulus from long-term interest rates was mainly reflected in an increase in real

<sup>1</sup> According to Consensus Economics surveys, growth expectations for gross domestic product (GDP) for the coming year were revised from 0.9% to 0.6% between July and October.

*Euro area yield increase driven exclusively by real interest rates*

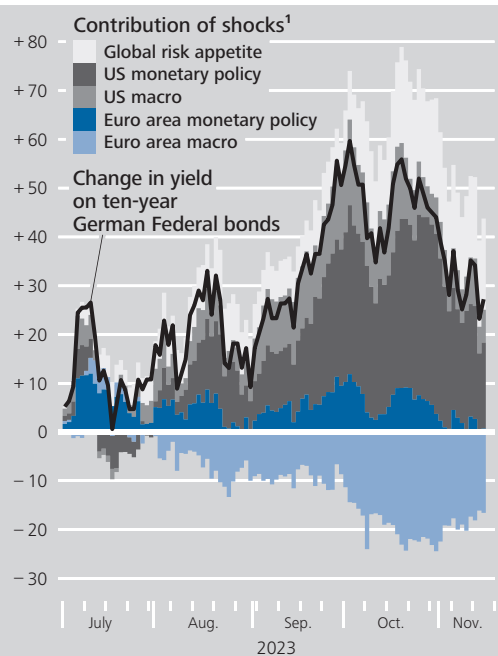
interest rates. Measured by the difference between ten-year overnight index swaps (OIS) and inflation-linked swaps with the same maturity, the real interest rate rose markedly from mid-September onwards (+27 basis points). Given a decline in market-based inflation compensation (-22 basis points), the nominal increase in yields was therefore, on balance, exclusively driven by real interest rates. In the United States, the ten-year real interest rate even rose by 49 basis points, with inflation compensation virtually unchanged on balance. Against the backdrop of these impressions, the notion that the end of the interest rate hike cycle could have been reached in the major currency areas has recently become established among market participants. Looking at the medium-term policy rate outlook, market price developments recently signalled heightened downside risks to economic growth, after the rise in long-term interest rates seen up until the end of October had a tightening effect (see the lower chart). The recently somewhat weaker labour market and inflation data in the United States amplified these trends. Real interest rates have also come back down of late.

*Higher term premia are a major factor in the rise in Federal bond yields*

Ten-year US Treasuries were yielding 4.5% as this report went to press, 61 basis points higher than mid-year. In the same period, yields on ten-year Federal bonds (Bunds) rose by 20 basis points to 2.6%. According to a model breakdown of the yield curve, higher term premia especially have helped drive up yields. The increased term premia are evidence that investors are demanding more compensation for the risk associated with the uncertainty about longer-term interest rate developments going forward. The rise in Bund yields was almost exclusively attributable to the interlinkage with US interest rates (see the upper chart). Yields were driven, in particular, by the path of US policy rates, which was expected to be more restrictive, although there was somewhat of a reversal towards the end of the period under review.

### Historical decomposition of ten-year German Federal bonds

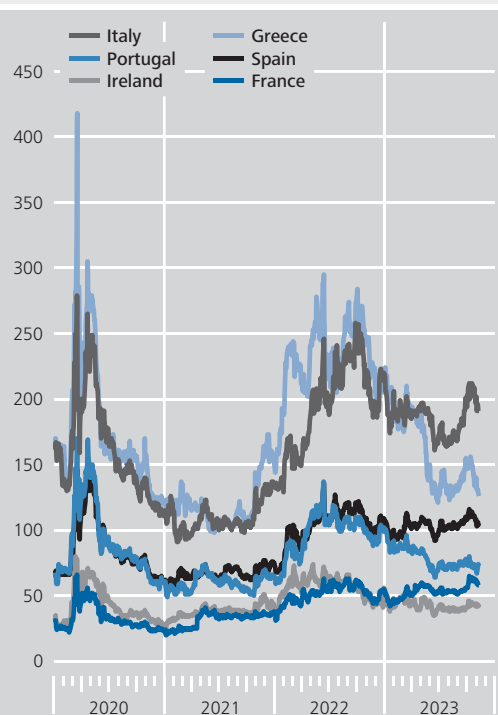
Cumulated change since 31 March 2023 in basis points, daily data



Sources: Refinitiv and Bundesbank calculations. <sup>1</sup> Based on a VAR model with sign restrictions (see Brandt et al., 2021). Estimation period: January 1999 to August 2023. Deutsche Bundesbank

### Spreads of ten-year government bonds over German Federal bonds

Basis points, daily data



Sources: Bloomberg and Bundesbank calculations. Deutsche Bundesbank

### Forward inflation rates\* and expectations in the euro area and the United States

% p.a., weekly averages



Sources: Bloomberg, Refinitiv, Consensus Economics and Bundesbank calculations. \* Derived from the fixed cash flow arising from inflation swaps which is swapped for the actual annual inflation rates (HICP excluding tobacco for the euro area and CPI Urban Consumers for the United States) realised over the next five or ten years.  
 Deutsche Bundesbank

*Yield curve shows higher yields for longer-dated Federal securities*

The increase in long-term yields driven by higher term premia was also reflected in the yield curve. According to the yield curve derived from Federal securities, yields rose from mid-year onwards, especially for maturities of more than six years. As a result, the curve, which was initially flat in this maturity range, assumed a positive slope. By contrast, in the shorter-term maturity segment of up to five years, the yield curve became more inverted in an environment of recently increasing downside risks to the medium-term policy rate outlook. Yields on two-year securities decreased by 14 basis points.

*Yields higher in Japan, lower in the United Kingdom*

In the United Kingdom, the Bank of England raised its key interest rate by 25 basis points to 5.25% in August in response to an inflation rate that was still well above the inflation target and has kept it at this level ever since. After temporarily spiking higher, ten-year gilt yields were trading lower, at 4.2%, as this report went to press (-25 basis points) than in mid-

2023. By contrast, yields on ten-year Japanese government bonds rose significantly (+39 basis points to 0.8%). This was partly due to the Japanese central bank's monetary policy, with the Bank increasing the flexibility of its yield curve control in July and again in October (see also the box on pp. 40 f.). Yields on ten-year bonds are currently at a level last observed in 2013.

While the end of the reinvestment phase of the asset purchase programme (APP) in July 2023 did not lead to any widening of yield spreads, euro area government bond yields widened fairly significantly at times in the context of higher real interest rates and investors' declining risk appetite. Highly indebted issuers intermittently suffered fairly pronounced spread widening. Reflecting the upward revision of Italian fiscal deficit forecasts, ten-year Italian paper saw spreads widen by 9 basis points. Overall, since the end of the second quarter, the GDP-weighted average yield on ten-year euro area government bonds has risen by virtually the same magnitude as that of German Federal securities with the same maturity.

*Yield spreads in the euro area virtually unchanged*

Market participants had at the beginning of the reporting period largely already anticipated the marked decline in euro area inflation data in the course of 2023. They continue to expect an average inflation rate of 5.5% for 2023. In the reporting period, the implied forward inflation rates for 2024 are currently lower, at 2.3%. Market participants therefore expect inflation to exceed the Eurosystem's 2% definition of price stability again in 2024. In the medium term, market-based inflation compensation, which was already above 2%, temporarily rose significantly higher still during the summer. In the context of the tightening of financial conditions and the publication of inflation data for October and November, it declined again, ultimately bringing it somewhat lower on balance. In October, survey-based inflation expectations calculated by Consensus Economics put inflation at 5.6% for 2023 and 2.5% for 2024.

*Market participants expect inflation rates to remain high in the short to medium term*

## Inflation risks based on inflation options: current developments in the euro area

With inflation rates having persistently been too high in the euro area, the Eurosystem is closely monitoring changes in the various measures of inflation expectations. For one thing, inflation expectations play a key role in the spending decisions of households and enterprises and thus also in assessing the effectiveness of monetary policy. Furthermore, analysing inflation expectations provides important information on the degree to which said expectations are anchored to the inflation target and thus on the credibility of monetary policy. Alongside surveys among professional forecasters, households and enterprises, financial market instruments are also available. These allow a timely assessment of the compensation that investors demand for future inflation. This inflation compensation can be measured, for instance, using inflation swaps (see the chart on p. 44). Besides pure inflation expectations (central tendency), inflation compensation encompasses other variables that influence prices, including, in particular, the inflation risk premium. Risk-averse investors are compensated by the inflation risk premium for the perceived uncertainty of future inflation developments.<sup>1</sup>

Moreover, analysing inflation options provides up-to-date information on the probability distributions for future inflation developments as priced in by financial market participants. In particular, it is possible to analyse the probability of the 2% inflation target being missed in one direction or another from a financial market perspective or how likely investors believe the occurrence of extreme inflation events to be.<sup>2</sup>

Market participants' risk assessment can be measured by their willingness to pay for

certain hedging transactions which they conduct using options. Inflation options are used by investors to hedge against certain inflation events. Buyers of options are compensated if the realised inflation rate is above (cap) or below (floor) a certain threshold over a set period. By comparing the different options, statistical methods can be used to derive probability distributions on future inflation.<sup>3</sup>

It is important to emphasise that these probabilities derived from option prices generally do not only contain market participants' assessment of the actual likelihood of a certain event. They also contain information on how valuable market participants deem certain payouts to be for various inflation events. Probabilities based on financial market prices therefore always reflect market participants' risk preferences as well. Risk-averse market participants assign "bad inflation events" higher probabilities of occurrence. They are thus prepared to pay a higher option price in the form of an inflation risk premium as a hedge against these unfavourable inflation events, which must be taken into account when analysing and interpreting the derived probabilities.

Inflation probabilities for individual years in the future can be determined using year-

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<sup>1</sup> For information on the economic determination of inflation risk premia, see Deutsche Bundesbank (2023b).

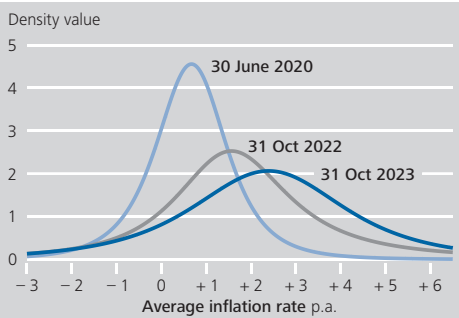
<sup>2</sup> See Deutsche Bundesbank (2015). For technical details on determining market-based probabilities from inflation options, see Bundesbank (2015) and Scharnagl and Stapf (2015).

<sup>3</sup> The method for determining risk-neutral density functions is based on the approach by Breeden and Litzenberger (1978). To determine the implied volatility curve, an interpolation procedure based on a stochastic volatility model (SABR model) by Hagan et al. (2002) is used.



### Risk-neutral density function\* over a period of one year in two years' time

as at 31 October 2023



Sources: Bloomberg, BGC Partners and Bundesbank calculations. \* Risk-neutral density functions, derived from year-on-year inflation options with maturities of one to ten years, on the euro area HICP excluding tobacco (HICPxT).

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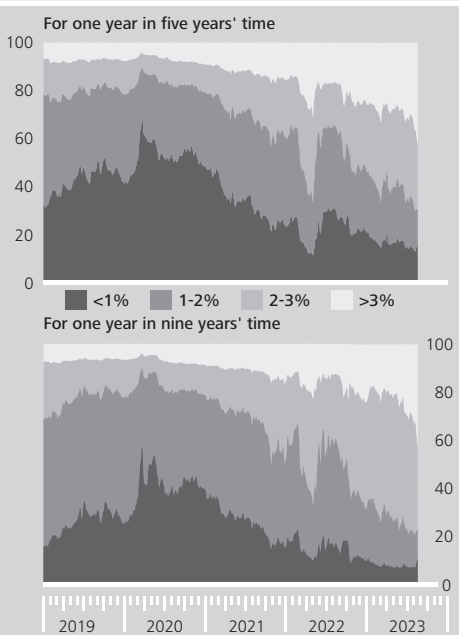
on-year inflation options.<sup>4</sup> For this option type, a payout is made not only at maturity but also annually if the inflation rate was above or below the threshold in the last 12 months. This ultimately allows density functions for annual forward inflation rates to be calculated and the forward inflation path

derived from inflation swaps to be supplemented by a market-based uncertainty band.<sup>5</sup>

The development of the density functions calculated based on year-on-year options shows that the distribution of future inflation rates has changed significantly in recent years (see the adjacent chart). In mid-2020, during the pandemic, the one-year forward inflation rate in two years' time (1y2y) was still just under 1% on average. At the same time, the narrow distribution indicated that market participants were quite certain of a low inflation environment in the medium term, with inflation rates of above 2% being very unlikely. When inflation began to rise in 2021, this market assessment changed rapidly. For instance, the considerable shift in distribution to the right signals that, in the medium term, market participants considered inflation rates of over 2% to be increasingly likely as the year went on.

### Inflation probabilities\*

smoothed over five trading days, as at 31 October 2023



Sources: Bloomberg, BGC Partners and Bundesbank calculations. \* Risk-neutral density functions, derived from year-on-year inflation options with maturities of one to ten years, on the euro area HICP excluding tobacco (HICPxT).

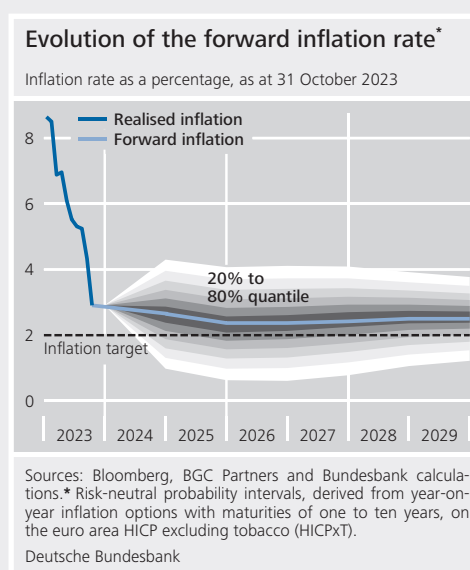
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These developments also spread to longer-term horizons. The lower chart shows the probabilities for various ranges of the one-year inflation rate starting in five years' and nine years' time. The probability mass of inflation rates of over 2% increased markedly for this time horizon, too. Not only did the probability of extreme events with very high inflation rates above 3% increase, but the probability of values between 2% and 3% also increased considerably in some cases.

<sup>4</sup> By contrast, traditional zero coupon inflation options offer only an average of the probabilities over several years (see Deutsche Bundesbank (2015)). Traditional inflation options have a longer history. They are also regarded as more liquid in the market, meaning they have greater information quality. However, the averaging approach in traditional inflation options masks crucial information for monetary policymakers about the path that is covered by the average. This justifies the recourse to year-on-year options.

<sup>5</sup> For the euro area, options and swaps are based on the HICP inflation rate excluding tobacco (HICPxT).

Overall, market participants are expecting a continuous decline in the inflation rate in the coming year, with an expected value of above 2% (see the adjacent chart). Moreover, the one-year forward probabilities for the inflation rate show that market participants tend to fear the inflation rate will be above the inflation target rather than below it in the coming years. Inflation risks therefore remain tilted to the upside from a market perspective and are not distributed symmetrically around the inflation target. Market participants remain willing to buy inflation swaps or options to hedge against unexpectedly high inflation. The markets therefore continue to perceive a risk that inflation could persist above the definition of price stability in the longer term.<sup>6</sup>



<sup>6</sup> For a detailed discussion on using the entire distribution of future types of inflation based on inflation options to assess the risk of inflation expectations becoming unanchored, see Reis (2021) and Hilscher et al. (2022).

*Market participants continue to hedge against long-term upside risks to inflation*

The long-term inflation compensation demanded by investors remains significantly elevated. The five-year forward inflation rate five years ahead derived from inflation swaps latterly stood at 2.4%. However, it temporarily reached 2.7% in July and August, marking the highest level since 2010. This is likely to have been chiefly due to persistently high core inflation in the euro area and international spillover effects. In particular, the unexpectedly robust US economy put upward pressure on market-based inflation expectations in the euro area. Over the remainder of the period under review, the long-term forward inflation rates moved back down to 2.4% (5y5y forward rate). The aforementioned tightening impulse caused by higher long-term real interest rates is likely to have contributed to this decline. Quarterly survey-based inflation expectations calculated by Consensus Economics for the euro area six to ten years ahead remained virtually unchanged. They were still close to the inflation target of 2% in October, too. Consequently,

the difference between market-based and survey-based long-term inflation expectations remains significantly elevated. This difference serves as an indicator of the inflation risk premium. Similarly, option-implied probabilities and estimates from term structure models suggest that the risk of high future inflation remains relevant for investors despite the decline in actual inflation. As a result, they are willing to pay a premium in order to hedge against such unfavourable scenarios (see the box on pp. 45 ff.).

Market-based five-year US forward inflation rates five years ahead rose slightly to 2.7% (+7 basis points). Quarterly survey-based inflation expectations six to ten years ahead calculated by Consensus Economics remained unchanged at 2.2% in October. The inflation risk premium, measured as the difference between market-based and survey-based inflation expectations, therefore increased in the United States in the period under review.

*Long-term inflation expectations up in the United States; survey data unchanged*

Investment activity in the German securities markets			
€ billion			
Item	2022	2023	
	Q3	Q2	Q3
<b>Debt securities</b>			
Residents	8.6	62.8	- 12.9
Credit institutions	8.0	17.2	- 16.2
of which:			
Foreign debt securities	- 3.4	16.3	- 10.4
Deutsche Bundesbank	- 17.5	- 23.8	- 20.1
Other sectors	18.1	69.4	23.4
of which:			
Domestic debt securities	29.9	35.2	9.7
Non-residents	- 0.9	38.9	61.6
<b>Shares</b>			
Residents	- 13.0	6.4	10.2
Credit institutions	- 2.5	- 2.6	0.9
of which:			
Domestic shares	- 0.5	0.5	0.3
Non-banks	- 10.5	9.0	9.3
of which:			
Domestic shares	- 4.5	10.1	3.6
Non-residents	7.7	- 6.3	- 1.3
<b>Mutual fund shares</b>			
Investment in specialised funds	13.6	4.0	12.1
Investment in retail funds	- 2.5	1.2	1.1
of which:			
Equity funds	- 0.7	0.8	1.6

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*Corporate bond  
yield spreads  
wider at times*

Yields on BBB-rated European corporate bonds and high-yield bonds with residual maturities of between seven and ten years also rose initially in the wake of the increase in real interest rates, but fell again towards the end of the period under review. Within the BBB rating category, bond yields of non-financial corporations rose marginally by 3 basis points on balance, while those of financial corporations fell by 18 basis points. However, spreads on Bunds narrowed for both of these bond categories after having widened for a time. The yield spreads on high-yield bonds remained unchanged on balance. Overall, corporate bond markets proved robust against the rise in interest rates.

*Net issuance of  
German debt  
securities*

At €391 billion, gross issuance in the German bond market in the third quarter of 2023 was down considerably on the previous quarter's figure (€465½ billion). Net of redemptions and changes in issuers' holdings of their own debt securities, domestic issuers ramped up their

capital market borrowing by €47 billion. The outstanding volume of foreign debt securities in the German market rose slightly in the third quarter, up €1½ billion. On balance, the total outstanding volume of bonds in Germany thus climbed by €48½ billion in the quarter under review.

In the third quarter of 2023, the public sector issued bonds to the tune of €46½ billion net, following €26½ billion in the previous three-month period. Central Government (including the resolution agency classified as part of it) issued mainly five-year Federal notes (Boblis: €15½ billion), Federal Treasury discount paper (Bubills: €13 billion) and 30-year Federal bonds (Bunds: €11 billion). State and local governments issued bonds worth €½ billion net.

*Net public  
sector issuance*

In the quarter under review, domestic enterprises issued bonds worth €5 billion net, following net issuance on virtually the same scale in the previous quarter. On balance, long-term paper made up the bulk of this issuance. The lion's share of these issues was accounted for by insurance companies (€3 billion), but non-financial corporations also issued bonds worth €1½ billion on balance.

*Net issuance of  
corporate bonds*

The third quarter saw domestic credit institutions slightly reduce their capital market debt by €4 billion, following net issuance of €21 billion in the second quarter. Redemptions mostly affected debt securities issued by specialised credit institutions (-€5½ billion) and other bank debt securities that can be structured flexibly (-€1 billion). These redemptions were partly offset by net issuance of mortgage Pfandbriefe amounting to €2½ billion.

*Fall in credit  
institutions'  
capital market  
debt*

Foreign investors were the main buyers in the third quarter, acquiring German bonds worth €61½ billion net. Domestic non-banks expanded their bond portfolios by €23½ billion on balance, with foreign securities (€13½ billion) making up the bulk of their purchases. By contrast, domestic credit institutions sold debt securities in the amount of €16 billion net. The

*Purchases of  
debt securities*

Bundesbank's bond portfolio decreased by €20 billion net, mainly due to maturing securities from holdings under the Eurosystem's purchase programmes.

## Equity market

*Little change in equity markets on balance*

As of the middle of the year, prices on the international equity markets initially declined significantly, but part of these losses were able to be recovered by the end of the reporting period. The EuroStoxx fell comparatively sharply (-2.3%) on the back of news of weak macro data in the euro area. Although the rise in interest rates in the United States was stronger than in the euro area, the S&P 500 was able to record slight gains (+1.3%) given the robust US economy and the long period of positive signals from the US labour market. Amid divergent earnings expectations from analyst surveys (IBES), the implied return on equity required by investors on both sides of the Atlantic increased by around 1/3 percentage point.

*Equity markets up in Japan and down in the United Kingdom*

Japanese equities also made slight gains on balance (Nikkei index: +0.7%), after falling for a time on the back of downward revisions to market expectations for GDP growth in Japan. By contrast, equities in the United Kingdom recorded slight losses (broad FTSE: -1.4%).

*Bank stocks post gains*

Contrary to overall market developments in the euro area, bank stocks recorded price gains of 5.9%. The fact that these stocks have been able to buck the general trend since the end of June is probably chiefly due to the fact that rising interest rates tend to increase interest margins. The earnings outlook for euro area banks has improved accordingly. By contrast, US bank stocks recorded less substantial gains of +3%. The reporting season for the third quarter was significantly weaker than expected for US banks, and a decline in demand for credit is also likely to have made investors see things more pessimistically.

### Equity market

Beginning of 2020 = 100, log scale, daily data



Sources: Refinitiv and Bundesbank calculations.  
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Looking at the performance of the other sectors represented in the EuroStoxx, only a few have developed positively alongside bank stocks, including first and foremost energy sector stocks (+10%). This is probably partly due to the price of oil rising markedly higher for a while compared with the middle of the year. By contrast, prices of consumer and industrial stocks fell against the backdrop of the sharp rise in interest rates.

*Energy stocks up considerably*

The crisis in the Middle East triggered by the Hamas terrorist attacks on Israel has so far had no noticeable impact on international equity markets. For example, uncertainty about future equity price developments, which can be measured by the implied volatility of broad equity indices, remained at a comparatively low level on both sides of the Atlantic.

*Crisis in the Middle East has had no impact on uncertainty in equity markets thus far*

German stock corporations raised €2½ billion in new funds on balance in the reporting quarter (previous quarter: €4 billion). The volume of

*Equity market funding*

## Major items of the balance of payments

€ billion

Item	2022	2023	
	Q3	Q2	Q3P
I. Current account	+ 23.0	+ 58.9	+ 69.7
1. Goods	+ 23.0	+ 55.9	+ 62.0
2. Services	- 22.2	- 14.3	- 24.7
3. Primary income	+ 39.5	+ 26.7	+ 46.4
4. Secondary income	- 17.4	- 9.3	- 14.1
II. Capital account	- 5.9	- 4.0	- 3.5
III. Financial account (increase: +)	- 30.0	+ 63.8	+ 52.7
1. Direct investment	+ 29.6	+ 13.5	+ 20.9
Domestic investment abroad	+ 54.8	+ 34.9	+ 17.3
Foreign investment in the reporting country	+ 25.2	+ 21.4	- 3.6
2. Portfolio investment	- 31.7	+ 16.5	- 47.9
Domestic investment in foreign securities	- 26.8	+ 49.3	+ 10.7
Shares <sup>1</sup>	- 9.9	- 4.6	+ 0.1
Investment fund shares <sup>2</sup>	- 1.0	+ 4.7	+ 9.0
of which:			
Money market fund shares	- 0.7	+ 1.7	+ 2.1
Short-term debt securities <sup>3</sup>	+ 2.2	+ 2.9	- 0.7
Long-term debt securities <sup>4</sup>	- 18.0	+ 46.3	+ 2.3
of which:			
Denominated in euro <sup>5</sup>	- 6.1	+ 35.4	+ 3.4
Foreign investment in domestic securities	+ 4.9	+ 32.9	+ 58.6
Shares <sup>1</sup>	+ 7.5	- 5.0	- 1.4
Investment fund shares	- 1.6	- 1.1	- 1.6
Short-term debt securities <sup>3</sup>	- 4.0	+ 10.0	- 2.1
Long-term debt securities <sup>4</sup>	+ 3.1	+ 29.0	+ 63.7
of which:			
Issued by the public sector <sup>6</sup>	- 11.1	+ 23.7	+ 39.3
3. Financial derivatives <sup>7</sup>	+ 14.8	+ 11.3	+ 13.0
4. Other investment <sup>8</sup>	- 43.4	+ 21.5	+ 67.5
Monetary financial institutions <sup>9</sup>	- 26.1	+ 10.8	+ 56.1
Enterprises and households <sup>10</sup>	- 53.4	+ 38.4	+ 33.6
General government	- 11.5	- 2.8	- 4.6
Bundesbank	+ 47.6	- 24.9	- 17.6
5. Reserve assets	+ 0.8	+ 1.1	- 0.8
IV. Errors and omissions <sup>11</sup>	- 47.1	+ 8.9	- 13.4

<sup>1</sup> Including participation certificates. <sup>2</sup> Including reinvested earnings. <sup>3</sup> Short-term: original maturity of up to one year. <sup>4</sup> Long-term: original maturity of more than one year or unlimited. <sup>5</sup> Including outstanding foreign Deutsche Mark bonds. <sup>6</sup> Including bonds issued by the former Federal Railways, the former Federal Post Office and the former Treuhand agency. <sup>7</sup> Balance of transactions arising from options and financial futures contracts as well as employee stock options. <sup>8</sup> Includes, in particular, loans and trade credits as well as currency and deposits. <sup>9</sup> Excluding the Bundesbank. <sup>10</sup> Includes the following sectors: financial corporations (excluding monetary financial institutions) as well as non-financial corporations, households and non-profit institutions serving households. <sup>11</sup> Statistical errors and omissions resulting from the difference between the balance on the financial account and the balances on the current account and the capital account.

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foreign shares in the German market rose by €6 billion over the same period. On balance, equities were purchased chiefly by domestic non-banks (€9½ billion) and domestic credit institutions (€1 billion). By contrast, foreign investors downsized their equity portfolios by €1½ billion in net terms.

## Mutual fund shares

In the third quarter of 2023, domestic investment companies recorded a net inflow of €13½ billion, compared with €5 billion in the previous quarter. On balance, specialised funds reserved for institutional investors were by far the primary beneficiaries (€12 billion). Of the various asset classes, mixed securities funds, in particular, registered significant inflows of capital (€9½ billion), with open-end real estate funds (€2½ billion), funds of funds (€1½ billion) and money market funds (€½ billion) also attracting capital. The outstanding volume of foreign mutual fund shares in Germany rose by €9 billion in the period under review. Mutual fund shares were bought on balance almost exclusively by domestic non-banks, which added €24 billion worth of fund shares to their portfolios. Most of these shares were issued by domestic mutual funds. Non-resident investors trimmed their share portfolios in Germany by €1½ billion net.

*Sales and purchases of mutual fund shares*

## Direct investment

Transactions in cross-border portfolio investment resulted in net capital imports of €48 billion in the third quarter of 2023. Monetary policy decisions of the major central banks and predominantly subdued economic prospects in many countries formed the background to this development. In this environment, direct investment recorded net capital exports of €21 billion, following net capital exports of €13½ billion in the second quarter.

*Direct investment sees net capital exports*

*German direct investment abroad predominantly results in capital exports*

Enterprises domiciled in Germany expanded their direct investment abroad by €17½ billion on balance between July and September 2023, compared with €35 billion in the previous three months. They injected their foreign affiliates with additional equity capital (€21½ billion), the vast majority of which was attributable to reinvested profits. By contrast, redemptions predominated in intra-group lending (€4½ billion). However, this only concerned trade credits; additional funding was granted via loans. Direct investment flows to other EU countries were comparatively high (€23 billion). Relatively large amounts of direct investment were made above all in the Netherlands (€5½ billion), Denmark (€4½ billion) and Luxembourg (€3½ billion). By contrast, the United States (€7½ billion) and China (€2 billion) recorded larger return flows of funds in the third quarter of 2023.

*Foreign direct investment in Germany predominantly results in capital outflows*

In the third quarter, foreign enterprises reduced their direct investment in Germany by €3½ billion (following inflows of €21½ billion in the previous quarter). This was down to redemptions predominating in intra-group lending (€3½ billion). In this direction, too, only the volume of trade credits declined, while foreign enterprises granted additional funds to domestic subsidiaries via loans. On balance, foreign investors made virtually no changes to their equity capital in German affiliates. Particularly

large return flows of direct investment funds were recorded in the Netherlands (€19 billion), China (€3 billion) and the United States (€2½ billion). By contrast, enterprises from Switzerland (€8½ billion), the United Kingdom (€7 billion) and France (€3 billion) considerably boosted their direct investment in Germany.

Overall, although enterprises domiciled in Germany have expanded their foreign direct investment in 2023 to date, this expansion has only been half as strong as in the same period of the previous year. For example, the cumulative direct investment abroad up to September amounted to €80 billion, compared with €158½ billion between January and September 2022. Developments in foreign direct investment in Germany were also noticeably weaker, increasing by €7½ billion on balance between January and September 2023, compared with €59½ billion in the same period of the previous year. According to an initial assessment by the United Nations Conference on Trade and Development (UNCTAD), data for the first half of 2023 point to a continued downturn in cross-border direct investment worldwide.<sup>2</sup> UNCTAD had already found evidence of a slowdown in global direct investment flows for 2022.<sup>3</sup>

*Cumulative data up to September thus far indicate a slowdown for 2023 on the year*

<sup>2</sup> See United Nations Conference on Trade and Development (2023a).

<sup>3</sup> See United Nations Conference on Trade and Development (2023b).

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