

Bonds are back with carry

The bond sell-off and aggressive monetary policy allow for a new look at the segment

IN A NUTSHELL

- Central banks have swung from accommodative to restrictive in a matter of months - giving bonds record losses this year.
 - Now that markets have been convinced of the seriousness of the inflation fight, the surprise potential of monetary policy seems limited.
 - Bond yields are once again tempting. In the face of a looming recession, they might even become more attractive. But we believe they may already be worth looking at now.
-

Buying bonds at a time of record inflation?

Worst start to a year in decades

Global investment grade (IG) bonds have fallen by a full 19%¹ since the start of the year. Measured from the historical high at the beginning of 2021, the index is in a bear market – a decline of more than 20% from its peak – as the negative total return is more than minus 23%¹. And since long-dated bonds tend to suffer most from interest rate hikes, it is no surprise that 30-year U.S. Treasuries have experienced a negative return of almost 40% since August 2020, while the value of 30-year Bunds almost halved at one point.² On the other hand, those who had bet on high-yield (i.e. non-investment grade, HY) bonds in these troubled times have suffered a slightly less decline, with a loss of 19% from the peak, thanks to their higher coupons and generally shorter maturities.² This is the view in the rear-view mirror. The road ahead hardly looks more promising. The Federal Reserve (Fed) is expected to raise its key interest rate to 4.2%³ by the end of the year, given that U.S. inflation, even if it has peaked, is still likely to remain well above the Fed's desired 2% target for some time. The European Central Bank (ECB) is not faring much better. Inflation has yet to peak in the Eurozone. And then there is the threat of recession, particularly high given the zone's proximity to the conflict in Ukraine.

Equities no longer have "no alternative"

In this environment should one consider investing in bonds? Yes, we think. Because, to put it briefly, fixed income is finally living up to its name again and is paying out a good income component, as a logical consequence of the price losses mentioned above. However, the fact that some bond segments now look attractive again does not mean that bonds will not become even more attractive – cheaper, in other words – over the next twelve months, for two reasons. **First**, from an investment cycle perspective, bonds are usually at their best when the economy is moving from downturn towards upturn. During this period "risk-free" government bonds have historically tended to do relatively well. As markets bet on Central banks to cut interest rates to get the economy moving again bond prices should rise accordingly. Once the economy has turned around and investors no longer have to fear insolvencies or widening risk premiums, corporate bonds are likely to also start to do better again. At present, however, we have not yet reached that point. The central banks are still putting the brakes on the economy. **Second**, we expect volatility to continue. Even without further escalation of the war in Ukraine and worsening energy scarcity, we expect that the earnings estimates of European listed companies will still have to be revised

¹ Bloomberg Global Aggregate Unhedged Index. Source: Bloomberg Finance L.P., as of 9/26/22

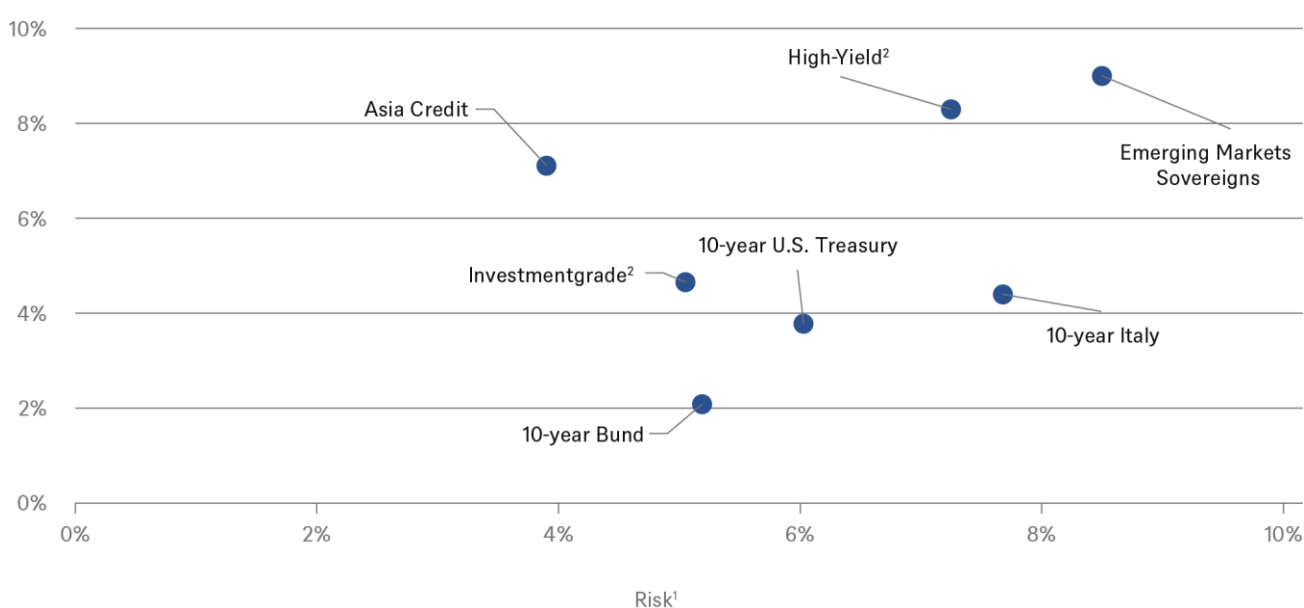
² Source: Bloomberg Finance L.P.; as of: 9/23/22

³ As derived from Fed Fund Futures. Source: Bloomberg Finance L.P., as of 10/4/22

downwards for the second half of the year. We believe talk of insolvencies will also become louder again as energy prices put pressure on margins, especially in Europe. Last but not least, the hefty price reaction of the pound and of gilts after the new government issued a “mini” budget that investors deemed too expansionary, showed how nervous investors still are in this environment. Nevertheless, we feel fixed income deserves a closer look, as perfect timing is almost impossible to achieve. Unlike just 12 months ago, yields on 10-year Bunds are no longer negative, and the real yield (which accounts for inflation) in Germany has recently touched positive terrain for the first time in years. However, this also makes holding cash less attractive as inflation eats into its real value. In the U.S., even real yields are now positive again. Over 4% is currently available for Treasuries, namely for short-dated 2-year papers with correspondingly low interest rate and volatility risk. For non-U.S. investors, however, the appeal is somewhat diminished if they want to protect themselves against currency fluctuations: hedging costs have risen to 2.4%.

Risk and return (yield-to-maturity) for different bonds

Yearly Return



¹10-year volatility

²average of EUR and U.S.

Sources: Bloomberg Finance L.P., DWS Investment GmbH as of 9/23/22

Bonds have fallen further in response to the surprisingly high August U.S. core inflation numbers and the Fed's comments at the September meeting, and bond yields have largely moved closer to our target levels; we believe this means the risk of further big price setbacks seems lower. The following three examples⁴ show how rapidly yields have moved since the beginning of the year:

- For two-year U.S. Treasuries, the effective yield was less than 0.75% at the beginning of the year but is now over 4.0%.
- At the beginning of the year, you had to pay 18 basis points per year for the privilege of owning 10-year German Bunds. Now you receive around 2% for doing so.
- And the higher risk of non-investment grade, high yield (HY) corporate bonds was compensated with a yield of just 3% at the beginning of the year in Europe – and one of more than 8% now.

⁴ Source: Bloomberg Finance L.P.; as of: 10/4/22

We have summarized the returns for the main asset classes in the table above, which also shows the level of risk (measured by volatility over the past 10 years) for the different asset classes. Due to the very flat yield curves in the U.S. and Germany, we took 10-year sovereign bonds as a proxy for all maturities. Also, for the sake of simplification, we have combined U.S. and Euro-denominated corporate bonds, despite some yield differentials.

The trend in yields this year of course reflects important fundamental developments, the most crucial of which we believe is tighter monetary policy. For our outlook on bonds, we make the following fundamental assumptions:

- Inflation will peak this year on both sides of the Atlantic.
- In 2023 we believe inflation rates will likely come down significantly, though not to pre-crisis levels.
- The U.S. Federal Reserve (Fed) benchmark interest rate will likely peak next year. But, unlike the market, we do not expect any rate cuts as early as next year.
- The recession on both sides of the Atlantic will be short and shallow. Surely, this assumption will be tested in the coming months.

Before we take a closer look at the individual bond classes, we summarize our short- and long-term economic view.

1 / Economic Environment

A shallow recession, followed by higher inflation and weak growth

China remains wobbly

The continuing dominant influence of central banks' policy decisions on the capital markets is undisputed. But broad economic developments are also being watched very closely by the markets. The pandemic, supply difficulties, fast-rising inflation and Russian aggression have disrupted normal supply and demand patterns so that economic forecasts are even more uncertain than usual.⁵ An illustration of the dramatic level of uncertainty is that not long ago no Fed rate hike was expected until 2024.

GDP growth and inflation U.S. and Eurozone for 2023

Forecast Region	GDP Growth*	Inflation**
Germany	0.0%	6.2%
Eurozone	0.7%	5.0%
U.S.	0.7%	3.3%

Source: DWS Investment GmbH as of 8/18/22
Forecasts are based on assumptions, estimates, opinions and hypothetical models that may prove to be incorrect.

⁵ See also <https://www.dws.com/insights/cio-view/cio-view-quarterly/q3-2022/202209-cio-view-focus/>

This information is subject to change at any time, based upon economic, market and other considerations and should not be construed as a recommendation. Past performance is not indicative of future returns. Forecasts are not a reliable indicator of future performance. Forecasts are based on assumptions, estimates, opinions and hypothetical models that may prove to be incorrect. Source: DWS Investment GmbH.

There is no denying that inflation forecasts are currently the biggest challenge for market participants and central banks alike. We expect high inflation and rate hikes to push the major economies into a shallow recession over the next six months. In Europe, in particular, we see downside risks in Germany and Italy, two large economies that are particularly dependent on Russian gas. However, we also cannot rule out the "risk" that things may go better than expected. So far, nominal consumer spending has proven to be quite resilient, but spending in real, inflation-adjusted terms, has already stalled. In the U.K., plagued by particularly high inflation, the new prime minister, Liz Truss, has already announced a far-reaching cap on energy bills for private households. We are convinced that central banks will focus on fighting inflation, even if this exacerbates an economic downturn. In Europe, there remains a risk that energy supplies will deteriorate further, and so the inflation peak may still be ahead, while in the U.S. annual inflation seems already to have peaked. But inflation, coming not only from energy and food prices but also stickier long-term price drivers such as wages and rents, is likely to keep us busy for some time. As a result, we expect the Fed to keep on raising rates into 2023. We think it will stick with its final rate level for the full year, unless labor markets show clear signs of weakening (which is not our baseline scenario). Inflationary pressures and the risk of de-anchoring inflation expectations have also forced the ECB to raise rates more aggressively than the markets had expected until recently. Even after the 75-basis point hike in September, unprecedented in ECB history, further rate hikes of this magnitude, or at least of 50 basis points this year, can no longer be ruled out. We expect a deposit rate of 2% this year with significant upside potential still in 2023.

At the same time, however, a number of factors suggest the central banks may have a better hand than generally assumed. First, both the Fed and the ECB will have raised their key interest rates by next year at the latest to a level that could be described as restrictive, assuming the neutral interest rate is around the level the central banks assume (less than 3% in the U.S., 2% in the Euro area). Second, the main drivers of inflation are shifting away from the supply side to the demand side, which central banks are much better able to control. And finally, monetary policy usually takes 12 to 18 months to feed through to the economy. And so, the medicine may already be beginning to work (as seen, for example, in the real estate markets) without showing up yet in the labor market or inflation figures.

Unlike the Fed and the ECB, the Bank of Japan (BoJ) is sticking to its loose monetary policy. But we believe the pressure on the BoJ to act is likely to increase, not least because of the weak yen. In trade-weighted terms, it is trading at its lowest level against a basket of currencies since 2007, and it was last this weak against the dollar in 1990.⁶ Whether imported inflationary pressure will force the BoJ to make a sudden U-turn remains to be seen. We do not expect it to. In China stringent zero-covid policy measures continue to pose a risk to economic growth and supply chains. In addition, the government seems to be struggling to get a grip on the nervous real estate market. We believe a further escalation of the Taiwan dispute, while unlikely at present, poses an incalculable risk to our growth forecasts.

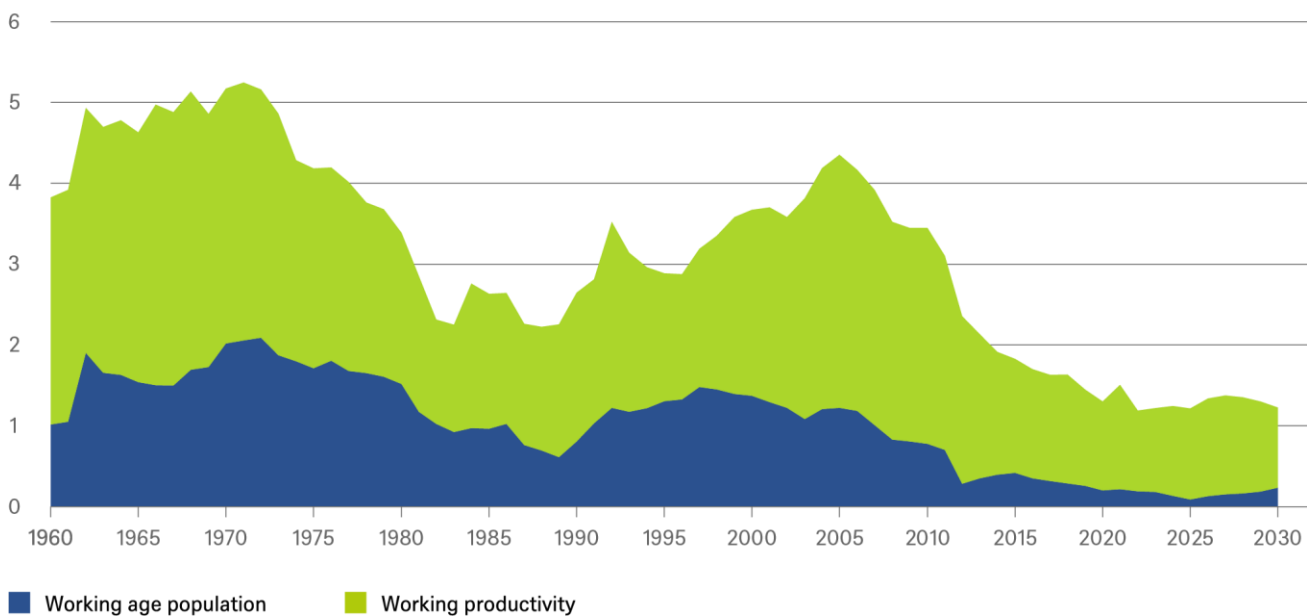
Some evidence points to structurally higher inflation and lower growth rates

Even in 2024 we believe that inflation rates in the U.S. and Europe are unlikely to reach the 2% level desired by central banks, despite the probable inflation-reducing base effects in commodities and a gradual easing in supply chain problems. A number of factors argue for a tendency toward higher price pressures: a) continuing labor shortages; b) receding globalization as a result of geopolitical tensions, particularly between China and the U.S., but also between Russia and much of the world, generating a desire to repatriate/reshore production for security of supply reasons; and c) the end of deflationary exports from China. In addition, we believe the increasing aging of societies in industrialized countries and elsewhere is also likely to create inflationary pressures.

⁶ Source: Bloomberg Finance L.P.; as of: 9/23/22

Forecast - Productivity gains and population growth in decline in the U.S. – and major parts of the developed world

year-on-year change in %

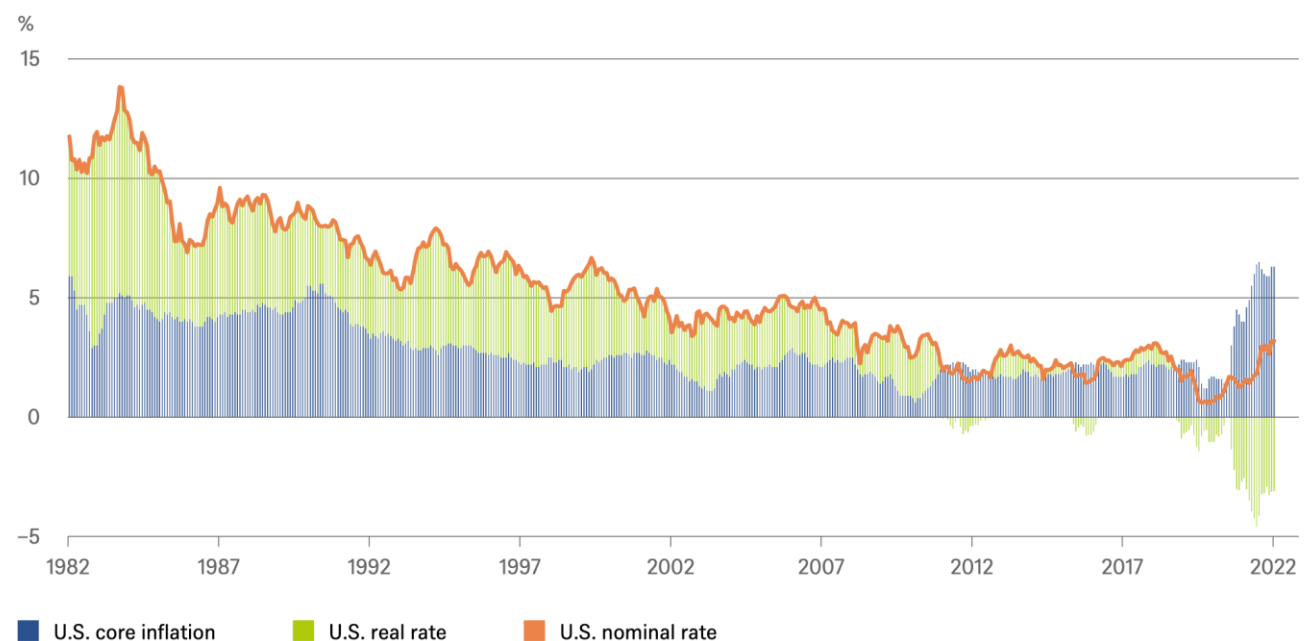


Sources: Haver Analytics, DWS Investment GmbH as of 9/19/22
 Forecasts are based on assumptions, estimates, opinions and hypothetical models that may prove to be incorrect.

The aging and even shrinking of the population in some economies is also a key reason why we expect real economic growth to slow further in structural terms. The chart above shows this using the U.S. as an example; in Europe, Japan and China, lower migration figures exacerbate the problem.

However, declining growth and inflation rates have been a concern for the industrialized countries for some time. The lower chart shows how nominal 10-year interest rates have developed, broken down into real interest rates and core inflation.

U.S. 10-year Treasury yield decomposition



Sources: Bloomberg Finance L.P., DWS Investment GmbH as of 9/19/22

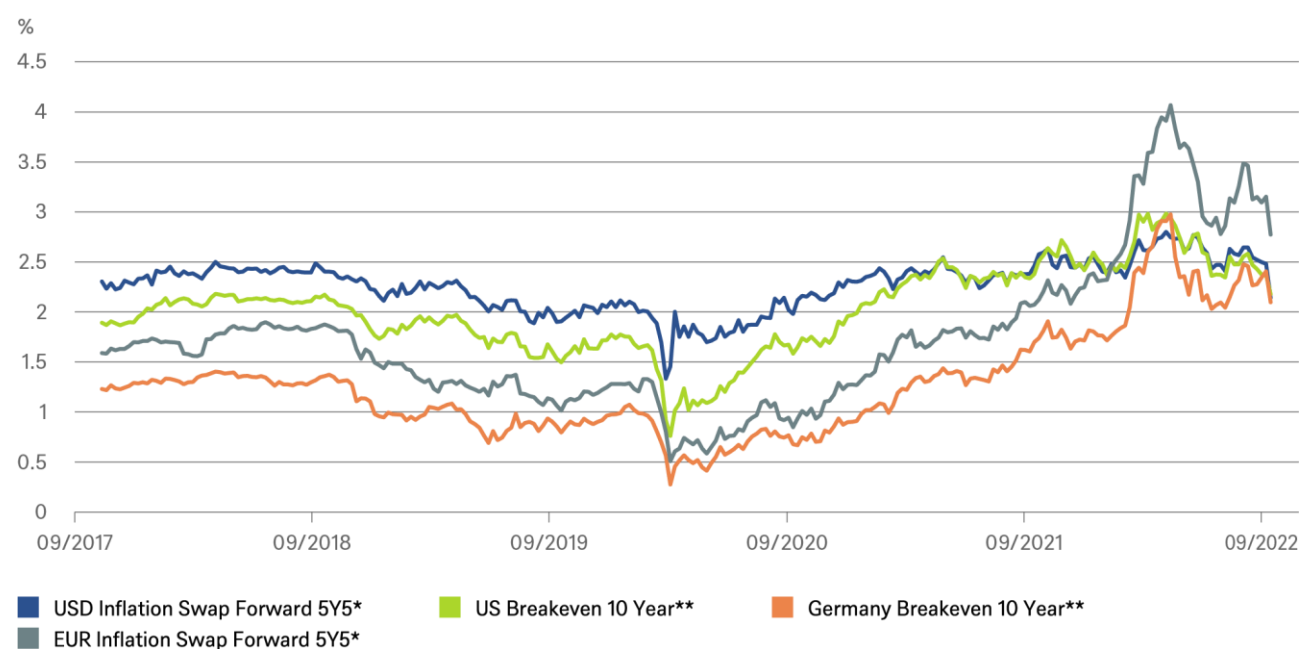
This information is subject to change at any time, based upon economic, market and other considerations and should not be construed as a recommendation. Past performance is not indicative of future returns. Forecasts are not a reliable indicator of future performance. Forecasts are based on assumptions, estimates, opinions and hypothetical models that may prove to be incorrect. Source: DWS Investment GmbH.

2 / Bond segments

Decades of low inflation and generous central banks have made investors sluggish

More than thirty years since the so-called "Greenspan Put" became associated with Fed monetary policy, one cannot blame investors for not wanting to believe that central banks would jump to their side if equities were to plunge into a bear market or it became apparent that the economy was sliding into recession. Although it had been obvious for several quarters that inflation would be much less "transitory" than initially assumed and the Fed had already announced a more restrictive interest rate stance by the end of 2021, it took Jerome Powell's speech in Jackson Hole at the end of August to finally convince the markets that the Fed was serious this time. The U.S. core inflation rate in August completed the job. The market now expects a fed funds rate of around 4.2% by the end of this year and a peak of over 4.3% in spring 2023. The market had also expected two rate cuts before 2023; this has now shrunk to a 25 basis-point move after the Fed's September meeting. We still do not expect an interest rate cut.

Financial markets' inflation expectations seem to have stabilized



* Inflation expectations for the 5 years following the next 5 years

** Inflation for next 10y as derived from 10y inflation protected sovereign bonds
 Sources: Bloomberg Finance L.P., DWS Investment GmbH as of 9/21/22

We think that where their main dilemma is concerned - fighting inflation versus supporting the economy - central banks are more likely to remain restrictive longer than absolutely necessary this time, having stuck to their loose monetary policy longer than necessary in recent years. The structural deflationary forces of the past two decades made loose policy possible. Central banks can at least draw some relief from the fact that inflation expectations have not yet soared, as can be seen, for example, from the 5y5y forwards in the U.S. which, at around 2.6%, are only slightly above the pre-pandemic 5-year average of 2.2%. Inflation expectations have not gone through the roof either in 10-year inflation-indexed government bonds, although, as the chart shows, a certain upper bound seems to have already formed, especially in the U.S..

But the extent of bond market uncertainty is, however, reflected in the MOVE Index, which tracks volatility in the U.S. Treasury market. Aside from a short period of turbulence in March 2020, it is now the highest it has been since the 2007/8 financial crisis.⁷

⁷ Source: Bloomberg Finance L.P.; as of 10/4/22

Sovereign bonds

U.S. – decent yield and positive real yields

Since the beginning of the year Treasury yields have vaulted many bars that were previously thought to represent an upper limit. The 10-year went from 1.5% to over 3.5%; the 2-year from just over 0.5% to over 4%, and the yield curve inverted (see chart). At minus 0.55%, the spread between 2-year and 10-year bonds was as low as it had last been in April 2000 – and that had been the only occasion on which the spread had been this negative. In the U.S., the past 10 recessions were all preceded by an inverted yield curve, with a lag of 18 months on average. A similar time lapse now would take us to the second half of 2023 (as the curve inverted in July 2021), but the predictive power of such averages should not be overestimated.

What makes the current situation different from the beginning of the year is the fact that yields are already very close to the levels that the market might consider to be the peak of the interest rate cycle, i.e. around 4% for 10-year bonds. However, if a 5% rate were to appear in 2023 we believe the surprise would be no greater than those seen so far this year.

Like the Fed, we believe that inflation in the U.S. is likely to remain well above the 2% target in 2023 and 2024. Together with the expected impact of quantitative tightening – reduction in the Fed's bond holdings – we expect moderate upward pressure on government bonds with longer maturities, although they already trade well above the inflation-neutral rate⁸ now. The rise in 2-year U.S. Treasury yields on a 12-month horizon is likely to be limited by market expectations of easing from late 2023. However, the asset class has become less attractive for foreign investors as currency hedging costs have risen significantly.

Yield curves (2 years / 10 years) in Germany and the U.S.

basis points



Sources: Bloomberg Finance L.P., DWS Investment GmbH as of 9/19/22

Europe – a more mixed picture

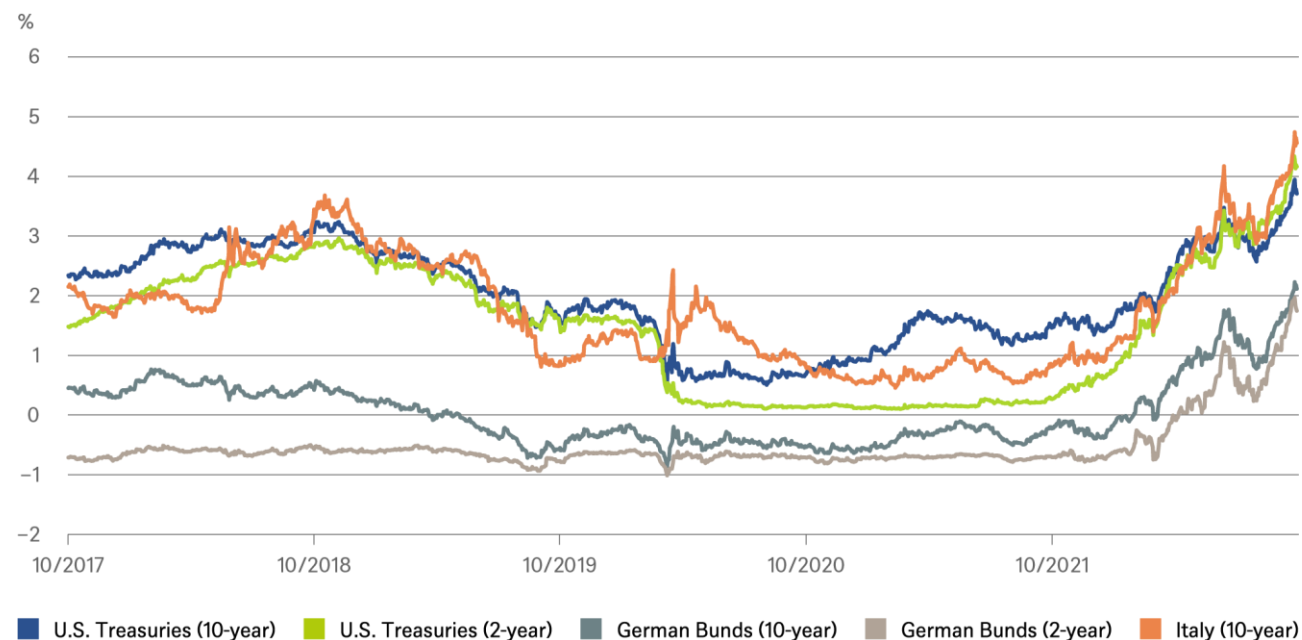
In Europe we remain cautious on Bunds and expect yields to rise further, despite the sharp increase so far, following the ECB's recent significant stepping up of its interest rate rhetoric. The ECB's tighter stance in tandem with the moderate growth outlook has now led to the yield curve flattening that we have been expecting for some time. We expect the ECB to raise the key interest rate to 2% before the end of this year.

⁸ Where the neutral rate is, is a question of heated debates. The Fed believes it to be around 2.5% longer term, but probably higher at the moment.

This information is subject to change at any time, based upon economic, market and other considerations and should not be construed as a recommendation. Past performance is not indicative of future returns. Forecasts are not a reliable indicator of future performance. Forecasts are based on assumptions, estimates, opinions and hypothetical models that may prove to be incorrect. Source: DWS Investment GmbH.

For the EU periphery the new transmission protection instrument (TPI) should help contain risk premiums on Italian and Spanish government bonds. However, a post-Mario Draghi government in Italy and a weaker growth outlook are negatives, and so we do not expect any narrowing of Italian risk premiums, at least. The current risk premium is already enough for Italy's 10-year inflation-indexed government bonds to trade at more than 2% (thus "real" rates), while the real interest rate in Germany still remains in negative territory⁹ – although coming from minus 2% at the beginning of the year.

Sovereign bond yields in the U.S., Germany and Italy



Sources: Bloomberg Finance L.P., DWS Investment GmbH as of 9/13/22

Emerging markets – a highly complex picture

Reconciling the emerging market picture is more difficult than ever. The economic slowdown in the EU, U.S. and China is affecting emerging economies in varying degrees. EM countries are also on different sides of commodity market dislocations – some are net exporters, some net importers. China meanwhile is pursuing a counterproductive Covid strategy and geopolitical flashpoints, such as the war in Ukraine, which has an impact far beyond the immediate region – through food exports from Ukraine, for example. Other factors too are weighing on all emerging markets, such as rising U.S. interest rates, a stronger dollar and faltering global trade. All these risks are leading investors to demand higher risk discounts for emerging markets – or even withdraw their funds altogether. All these factors should be kept in mind before being blinded by the higher yields.

However, this does not necessarily mean that there are no interesting bonds in the sector, depending on country selection. We are taking a closer look at current account balances and debt levels again, now that countries have had to put together aid programs in response to Covid and commodity and food price explosions. Among investment grade sovereign bonds, we are looking in particular at Chile, Uruguay, Romania and Indonesia.

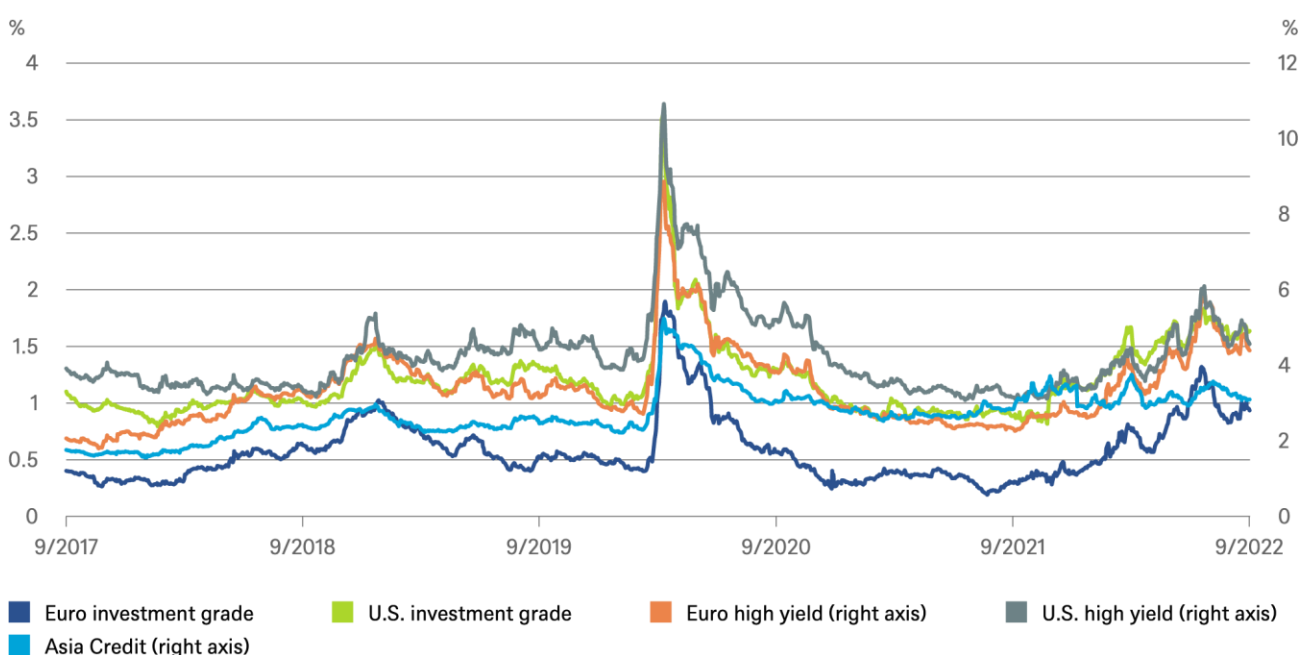
⁹ Bloomberg Finance L.P.; as of 10/4/22.

Corporate bonds

U.S. – decent carry, but some obstacles

We expect the U.S. investment grade (IG) market to be increasingly affected by structural issues during the remainder of the year, including persistent inflation, geopolitical tensions, and more aggressive central bank policy, via the rising fed funds rate and the Fed's balance sheet contraction. Credit fundamentals are relatively strong on a historical basis, especially as companies have had ample time to prepare for an impending storm. As a result, we expect only a moderate default rate of 3.5% in the high-yield (HY) segment this cycle. Markets might think otherwise, as this segment offers a yield-to-maturity of almost 10%¹⁰ currently. Maybe, as the threat of recession continues to intensify, we may see some credit tightening in lower quality cyclical companies. We expect risk premiums to rise slightly on a 12-month horizon for both IG and high-yield bonds. But the asset class has become less interesting for foreign investors as currency hedging costs have risen significantly.

Interest yields do not seem to have peaked yet for Euro-, U.S.- and Asian Credit



Sources: Bloomberg Finance L.P., DWS Investment GmbH as of 9/13/22

Europe – decent carry, decent challenges

The combination of the Ukraine war, upcoming interest rate hikes and the ECB's phasing out of purchases hit European corporate bonds hard in the first half of the year. The big sell-off, which has driven yields to highs last seen at the beginning of the Covid crisis, has made this bond class attractive again in our eyes, especially as we believe it already prices in a recession sufficiently. Moreover, we believe even the more cyclical sectors are quite well funded, so they should be able to weather sales and margin declines. In the high-yield segment investors now receive a yield of 8.5%, despite balance sheet numbers that are good for this part of the cycle, and we expect defaults to rise to a still historically moderate rate of 3.0%. However, there could be fresh nervousness in the market in the fall and winter, arising from the energy crisis and higher insolvencies. But from a 12-month perspective we are reasonably positive on both IG and HY. The risk premiums on both asset classes are likely to narrow if it becomes apparent next year that the inflation picture is improving and the ECB is going to become more predictable again in its interest rate steps.

¹⁰ Bloomberg Finance L.P.; as of 10/4/22.

This information is subject to change at any time, based upon economic, market and other considerations and should not be construed as a recommendation. Past performance is not indicative of future returns. Forecasts are not a reliable indicator of future performance. Forecasts are based on assumptions, estimates, opinions and hypothetical models that may prove to be incorrect. Source: DWS Investment GmbH.

Emerging Markets – mixed basket

The global environment for emerging market bonds is highly uncertain, as described above. But many commodity exporters have proven resilient. We believe strong credit fundamentals in the corporate sector, with robust liquidity and low leverage, offer a cushion against a potential slowdown. We favor HY over IG as the much higher interest income should more than offset the expected credit losses. In the short term, however, we have become a bit more cautious overall following these sector's outperformance of the global index in recent months. We believe tightening Fed policy, along with rising concerns about a U.S. recession, is likely to make investors more cautious again about EM corporate bonds. Issuers must be scrutinized closely. We prefer companies with pricing power, high cash holdings and good access to capital markets or bank loans.

Asian Credit

Strong fundamentals in many parts of Asia with the exception of some sectors in China

Asian bonds currently offer a 7.1% yield, despite solid corporate balance sheets on average and better credit quality compared to developed markets. This is especially true for Asian investment grade (IG) bonds, which have been quite stable despite high global market volatility. We remain cautious on Chinese bonds, not only because of the zero-Covid policy, which should, however, be largely priced in. High-yield (HY) bonds from the real estate market sector are particularly weak, as there are few signs that pressure on the sector is easing. As long as the real estate market is not more strongly supported by the government, valuations look only superficially attractive. Outside Chinese credit, we believe structural growth and positive commodity dynamics offer better opportunities, for example in India and Indonesia.

Currencies

Unstoppable dollar – for now

We believe the global economic slowdown and energy crisis will keep the Euro under pressure. Furthermore, the current risk-off modus of markets supports the dollar which is seen by investors as safe-haven. At the same time, the nominal yield differential against the dollar looks likely to play a more important role again in the future. As we believe the yield differential may have peaked, the euro may find some support going forward.

EUR/USD vs yield gap of 2y sovereign bonds U.S./ Germany



Sources: Bloomberg Finance L.P., DWS Investment GmbH as of 9/23/22

Glossary

The **Bank of Japan (BoJ)** is the central bank of Japan.

One **basis point** equals 1/100 of a percentage point.

Technically, a **bear market** refers to a situation where the index's value falls at least 20% from a recent high.

The **carry (of an asset)** is the cost or benefit from holding the asset.

Core inflation excludes items which can be susceptible to volatile price movements, e.g. food and energy.

Coupons are interest rate payments made on a bond.

The **default rate** refers to the proportion of borrowers who cannot service their loans.

Emerging markets (EM) are economies not yet fully developed in terms of, amongst others, market efficiency and liquidity.

The **European Central Bank (ECB)** is the central bank for the Eurozone.

The **Eurozone** is formed of 19 European Union member states that have adopted the euro as their common currency and sole legal tender.

The **federal funds rate** is the interest rate, set by the Fed, at which banks lend money to each other, usually on an overnight basis.

The **U.S. Federal Reserve**, often referred to as "**the Fed**," is the central bank of the United States.

A **hedge** is an investment to reduce the risk of adverse price movements in an asset.

High-yield bonds are issued by below-investment-grade-rated issuers and usually offer a relatively high yield.

Inflation is the rate at which the general level of prices for goods and services is rising and, subsequently, purchasing power is falling.

Investment grade (IG) refers to a credit rating from a rating agency that indicates that a bond has a relatively low risk of default.

The **Japanese yen (JPY)** is the official currency of Japan.

The final payment date of a financial instrument is its **maturity**.

The **Merrill Lynch Option Volatility Estimate (MOVE)** Index reflects a market estimate of future U.S. Treasury bond yield volatility.

In economics, a **nominal** value is not adjusted for inflation; a real value is.

Periphery countries are less developed than the core countries of a specific region. In the Eurozone, the euro periphery consists of the economically weaker countries such as Greece, Portugal, Italy, Spain and Ireland.

The term "Powell-Put" derives from the more flexible monetary policy announced by Fed Chairman Jerome Powell to lower key interest rates in the light of declining capital markets.

Quantitative Tightening (QT), as opposed to Quantitative Easing, describes the process of a Central Bank reducing its monetary stimulus by shrinking its balance sheet.

In economics, a **real** value is adjusted for inflation.

A **recession** is, technically, when an economy contracts for two successive quarters but is often used in a looser way to indicate declining output.

The **risk premium** is the expected return on an investment minus the return that would be earned on a risk-free investment.

The **Transmission Protection Instrument (TPI)** authorizes the European Central Bank (ECB) to purchase government bonds of individual eurozone countries on a targeted and unlimited basis in order to lower the borrowing rates of these government bonds.

Treasuries are fixed-interest U.S. government debt securities with different maturities: Treasury bills (1 year maximum), Treasury notes (2 to 10 years), Treasury bonds (20 to 30 years) and Treasury Inflation Protected Securities (TIPS) (5, 10 and 30 years).

The **U.S. Federal Reserve**, often referred to as "**the Fed**," is the central bank of the United States.

Volatility is the degree of variation of a trading-price series over time. It can be used as a measure of an asset's risk.

Important information – EMEA, APAC & LATAM

DWS is the brand name of DWS Group GmbH & Co. KGaA and its subsidiaries under which they do business. The DWS legal entities offering products or services are specified in the relevant documentation. DWS, through DWS Group GmbH & Co. KGaA, its affiliated companies and its officers and employees (collectively "DWS") are communicating this document in good faith and on the following basis.

This document is for information/discussion purposes only and does not constitute an offer, recommendation or solicitation to conclude a transaction and should not be treated as investment advice.

This document is intended to be a marketing communication, not a financial analysis. Accordingly, it may not comply with legal obligations requiring the impartiality of financial analysis or prohibiting trading prior to the publication of a financial analysis.

This document contains forward looking statements. Forward looking statements include, but are not limited to assumptions, estimates, projections, opinions, models and hypothetical performance analysis. No representation or warranty is made by DWS as to the reasonableness or completeness of such forward looking statements. Past performance is no guarantee of future results.

The information contained in this document is obtained from sources believed to be reliable. DWS does not guarantee the accuracy, completeness or fairness of such information. All third party data is copyrighted by and proprietary to the provider. DWS has no obligation to update, modify or amend this document or to otherwise notify the recipient in the event that any matter stated herein, or any opinion, projection, forecast or estimate set forth herein, changes or subsequently becomes inaccurate.

Investments are subject to various risks. Detailed information on risks is contained in the relevant offering documents.

No liability for any error or omission is accepted by DWS. Opinions and estimates may be changed without notice and involve a number of assumptions which may not prove valid. DWS does not give taxation or legal advice.

This document may not be reproduced or circulated without DWS's written authority.

This document is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction, including the United States, where such distribution, publication, availability or use would be contrary to law or regulation or which would subject DWS to any registration or licensing requirement within such jurisdiction not currently met within such jurisdiction. Persons into whose possession this document may come are required to inform themselves of, and to observe, such restrictions.

For institutional / professional investors in Taiwan:

This document is distributed to professional investors only and not others. Investing involves risk. The value of an investment and the income from it will fluctuate and investors may not get back the principal invested. Past performance is not indicative of future performance. This is a marketing communication. It is for informational purposes only. This document does not constitute investment advice or a recommendation to buy, sell or hold any security and shall not be deemed an offer to sell or a solicitation of an offer to buy any security. The views and opinions expressed herein, which are subject to change without notice, are those of the issuer or its affiliated companies at the time of publication. Certain data used are derived from various sources believed to be reliable, but the accuracy or completeness of the data is not guaranteed and no liability is assumed for any direct or consequential losses arising from their use. The duplication, publication, extraction or transmission of the contents, irrespective of the form, is not permitted.

© 2022 DWS Investment GmbH

Issued in the UK by DWS Investments UK Limited which is authorised and regulated in the UK by the Financial Conduct Authority.

© 2022 DWS Investments UK Limited

In Hong Kong, this document is issued by DWS Investments Hong Kong Limited. The content of this document has not been reviewed by the Securities and Futures Commission.

© 2022 DWS Investments Hong Kong Limited

In Singapore, this document is issued by DWS Investments Singapore Limited. The content of this document has not been reviewed by the Monetary Authority of Singapore.

© 2022 DWS Investments Singapore Limited

In Australia, this document is issued by DWS Investments Australia Limited (ABN: 52 074 599 401) (AFSL 499640). The content of this document has not been reviewed by the Australian Securities and Investments Commission.

© 2022 DWS Investments Australia Limited

as of 9/23/22; 092148_1 (09/2022)

Important information – North America

The brand DWS represents DWS Group GmbH & Co. KGaA and any of its subsidiaries, such as DWS Distributors, Inc., which offers investment products, or DWS Investment Management Americas Inc. and RREEF America L.L.C., which offer advisory services.

This document has been prepared without consideration of the investment needs, objectives or financial circumstances of any investor. Before making an investment decision, investors need to consider, with or without the assistance of an investment adviser, whether the investments and strategies described or provided by DWS, are appropriate, in light of their particular investment needs, objectives and financial circumstances. Furthermore, this document is for information/discussion purposes only and does not and is not intended to constitute an offer, recommendation or solicitation to conclude a transaction or the basis for any contract to purchase or sell any security, or other instrument, or for DWS to enter into or arrange any type of transaction as a consequence of any information contained herein and should not be treated as giving investment advice. DWS, including its subsidiaries and affiliates, does not provide legal, tax or accounting advice. This communication was prepared solely in connection with the promotion or marketing, to the extent permitted by applicable law, of the transaction or matter addressed herein, and was not intended or written to be used, and cannot be relied upon, by any taxpayer for the purposes of avoiding any U.S. federal tax penalties. The recipient of this communication should seek advice from an independent tax advisor regarding any tax matters addressed herein based on its particular circumstances. Investments with DWS are not guaranteed, unless specified. Although information in this document has been obtained from sources believed to be reliable, we do not guarantee its accuracy, completeness or fairness, and it should not be relied upon as such. All opinions and estimates herein, including forecast returns, reflect our judgment on the date of this report, are subject to change without notice and involve a number of assumptions which may not prove valid.

Investments are subject to various risks, including market fluctuations, regulatory change, counterparty risk, possible delays in repayment and loss of income and principal invested. The value of investments can fall as well as rise and you may not recover the amount originally invested at any point in time. Furthermore, substantial fluctuations of the value of the investment are possible even over short periods of time. Further, investment in international markets can be affected by a host of factors, including political or social conditions, diplomatic relations, limitations or removal of funds or assets or imposition of (or change in) exchange control or tax regulations in such markets. Additionally, investments denominated in an alternative currency will be subject to currency risk, changes in exchange rates which may have an adverse effect on the value, price or income of the investment. This document does not identify all the risks (direct and indirect) or other considerations which might be material to you when entering into a transaction. The terms of an investment may be exclusively subject to the detailed provisions, including risk considerations, contained in the Offering Documents. When making an investment decision, you should rely on the final documentation relating to the investment and not the summary contained in this document.

This publication contains forward looking statements. Forward looking statements include, but are not limited to assumptions, estimates, projections, opinions, models and hypothetical performance analysis. The forward looking statements expressed constitute the author's judgment as of the date of this material. Forward looking statements involve significant elements of subjective judgments and analyses and changes thereto and/or consideration of different or additional factors could have a material impact on the results indicated. Therefore, actual results may vary, perhaps materially, from the results contained herein. No representation or warranty is made by DWS as to the reasonableness or completeness of such forward looking statements or to any other financial information contained herein. We assume no responsibility to advise the recipients of this document with regard to changes in our views.

No assurance can be given that any investment described herein would yield favorable investment results or that the investment objectives will be achieved. Any securities or financial instruments presented herein are not insured by the Federal Deposit Insurance Corporation ("FDIC") unless specifically noted, and are not guaranteed by or obligations of DWS or its affiliates. We or our affiliates or persons associated with us may act upon or use material in this report prior to publication. DB may engage in transactions in a manner inconsistent with the views discussed herein. Opinions expressed herein may differ from the opinions expressed by departments or other divisions or affiliates of DWS. This document may not be reproduced or circulated without our written authority. The manner of circulation and distribution of this document may be restricted by law or regulation in certain countries. This document is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction, including the United

States, where such distribution, publication, availability or use would be contrary to law or regulation or which would subject DWS to any registration or licensing requirement within such jurisdiction not currently met within such jurisdiction. Persons into whose possession this document may come are required to inform themselves of, and to observe, such restrictions.

Past performance is no guarantee of future results; nothing contained herein shall constitute any representation or warranty as to future performance. Further information is available upon investor's request. All third party data (such as MSCI, S&P & Bloomberg) are copyrighted by and proprietary to the provider.

For Investors in Canada: No securities commission or similar authority in Canada has reviewed or in any way passed upon this document or the merits of the securities described herein and any representation to the contrary is an offence. This document is intended for discussion purposes only and does not create any legally binding obligations on the part of DWS Group. Without limitation, this document does not constitute an offer, an invitation to offer or a recommendation to enter into any transaction. When making an investment decision, you should rely solely on the final documentation relating to the transaction you are considering, and not the [document – may need to identify] contained herein. DWS Group is not acting as your financial adviser or in any other fiduciary capacity with respect to any transaction presented to you. Any transaction(s) or products(s) mentioned herein may not be appropriate for all investors and before entering into any transaction you should take steps to ensure that you fully understand such transaction(s) and have made an independent assessment of the appropriateness of the transaction(s) in the light of your own objectives and circumstances, including the possible risks and benefits of entering into such transaction. You should also consider seeking advice from your own advisers in making this assessment. If you decide to enter into a transaction with DWS Group you do so in reliance on your own judgment. The information contained in this document is based on material we believe to be reliable; however, we do not represent that it is accurate, current, complete, or error free. Assumptions, estimates and opinions contained in this document constitute our judgment as of the date of the document and are subject to change without notice. Any projections are based on a number of assumptions as to market conditions and there can be no guarantee that any projected results will be achieved. Past performance is not a guarantee of future results. The distribution of this document and availability of these products and services in certain jurisdictions may be restricted by law. You may not distribute this document, in whole or in part, without our express written permission.

For investors in Bermuda: This is not an offering of securities or interests in any product. Such securities may be offered or sold in Bermuda only in compliance with the provisions of the Investment Business Act of 2003 of Bermuda which regulates the sale of securities in Bermuda. Additionally, non-Bermudian persons (including companies) may not carry on or engage in any trade or business in Bermuda unless such persons are permitted to do so under applicable Bermuda legislation.

© 2022 DWS Investment GmbH, Mainzer Landstraße 11-17, 60329 Frankfurt am Main, Germany.
All rights reserved.

as of 9/23/22; 092149_1 (09/2022)