



March 2023

DWS LONG VIEW

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Central banks and stagflation

Introduction

Entering 2023, the global macroeconomic backdrop is noticeably different from previous years. After a decade of easy monetary policy—made possible with the backdrop of low, and perhaps more importantly, stable price inflation, 2022 forced central banks to adopt significant monetary tightening measures, hiking interest rates at an unprecedented pace and engaging in the gradual reduction of balance sheets holdings. This tightening, combined with economic uncertainty, has weighed on financial assets. While real economic data remains resilient for the time being, anticipated demand destruction has put a damper on the shorter-term outlook for corporate profitability. Further, uncertainty around the duration and magnitude of this rate hiking cycle has translated into uncertainty around discount rates and consequently fair values across equity and credit markets.

On a nominal basis, repricing across fixed income and equity markets creates a less challenging valuation environment relative to long-term history. Sovereign bond yields across developed economies are, in some cases, 200bps higher versus a year ago. Inflation-linked securities are also now paying positive real interest rates, with the real yield on a 10-year Treasury Inflation Protection Security now exceeding 1.5 percent for the first time since 2010. Following a decade of historically expensive multiples, global equity market valuations also look less demanding, reflecting higher embedded discount rates over the next 10 years relative to the last decade.

After the initial round of interest rate hikes, the market’s pricing of Fed Funds rate hikes has slowed despite inflation remaining well above its targets. Further, the inflation breakeven pricing across Treasury Inflation Protected Securities (“TIPS”) and Consumer Price Index (“CPI”) swap rates has come down considerably, indicating complacency over the trajectory of interest rates and inflation going forward. Real interest rates, while having moved back into positive territory following quantitative tightening measures, remain susceptible to persistence in price pressures.

The extent to which sovereign debt balances have expanded in recent decades complicates the job of central bankers. An underappreciated benefit of the decade of Quantitative Easing (“QE”) was the flexibility of governments to engage in fiscal expansion at negative real interest rates. Monetary policymakers now face inflationary pressures while considering the potential impact of higher real interest rates on bloated sovereign debt balances, a topic we explore in further detail.

Elsewhere, environmental sustainability remains the single

most significant secular risk factor over the coming decades. In our 2022 Long View report: The return implications of climate risk, we went through the exercise of leveraging the Bank of England (“BoE”) 2021 Climate Biennial Exploratory Scenarios (“CBES”) to produce return forecasts across global asset classes. As an additional step, the BoE solicited responses from large banks and insurers operating in the UK on the potential impact of climate risk on their profitability outlook. We revisit this topic in brief.

Relative to the previous year, our nominal return forecasts across asset classes are noticeably higher, largely due to higher starting yields across fixed income asset classes and less prohibitive valuations in equity markets.

Table 1: Forecasted vs. realized returns, annualised (10 years)

	Forecasted returns (2023-2032)	Change from last year's 10Y forecast	Realized returns (2013-2022)
Equity			
ACWI Equities	6.8%	2.3%	9.4%
World Equities	6.7%	2.3%	10.0%
EM Equities	7.5%	2.0%	4.6%
US Equities	6.8%	2.3%	11.8%
Europe Equities	6.7%	2.6%	7.0%
Germany Equities	7.2%	3.1%	4.9%
UK Equities	7.5%	1.6%	6.2%
Japan Equities	4.7%	1.5%	10.5%
Fixed Income			
EUR Treasury	2.7%	2.9%	0.8%
EUR Corporate	4.0%	3.5%	0.9%
EUR High Yield	6.2%	3.8%	3.3%
US Treasury	4.1%	2.8%	0.6%
US Corporate	5.0%	3.1%	2.0%
US High Yield	6.8%	3.8%	4.0%
EM USD Sovereign	7.6%	3.1%	1.2%
EM USD Corporate	7.1%	3.0%	1.9%
Alternatives			
World REITS	5.3%	1.5%	5.2%
United States REITS	6.2%	2.0%	6.4%
Global Infra. Equity	6.8%	1.7%	6.4%
US Infra. Equity	6.9%	1.9%	4.2%
Private RE Equity US	3.8%	-3.6%	10.9%
EUR Infrastructure IG	3.8%	3.2%	0.9%
Private EUR Infra. IG	4.8%	3.0%	2.2%
Broad Commodities Fut.	4.1%	3.6%	-1.3%

Source: DWS Investments UK Limited. Data as of 12/31/22. All returns (incl. forecasts) are in local currency. See appendix for the representative index corresponding to each asset class

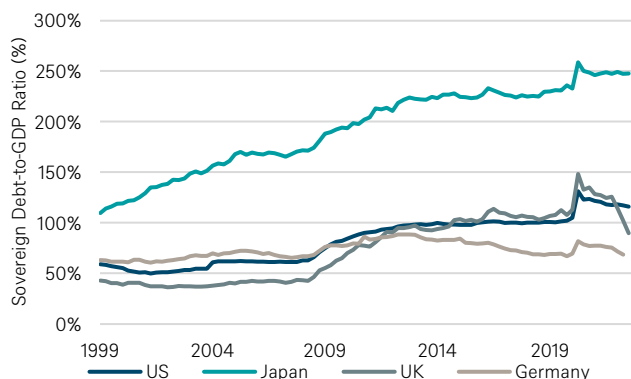
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The risk of a high inflation/low growth environment

Capital market returns, even over the intermediate-to-long-term period, make assumptions about mean reversion. While these assumptions, in our estimation, are very reasonable and likely given empirical data, there are observed periods of anomaly, such as the 1970s when the sustained high inflation/low growth regime created a tough environment for corporate profitability and economic growth while rapidly increasing consumer prices further weighed on real asset returns.

With this in mind, we find it prudent to explore the possibility of an unlikely but potentially impactful macroeconomic path forward, where inflationary pressures are not properly addressed by global central banks. In our Q3 piece: The Long View: The importance of the discount rate, we discussed how the uncertainty around the long-term real cost of equity is meaningful in determining fair value levels across equity markets. Here, we consider the fiscal constraints that may impact central bankers' willingness to aggressively hike interest rates and further reduce balance sheet holdings.

Figure 1: Sovereign debt-to-GDP ratios (%)

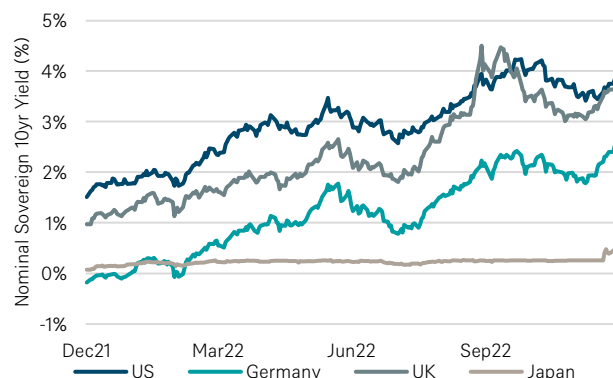


Source: Haver Analytics. Data as of 9/30/2023.

As global central banks continue to combat inflationary pressures through raising interest rates, they must be considerate of the more precarious fiscal balances that weigh on their respective economies. Decades of deficit spending and debt accumulation were far more palatable with low and stable levels of inflation which allowed for monetary easing measures that pushed global interest rates across the yield curve significantly lower versus historical and neutral levels and, in many cases, far into negative territory on a real basis. As global central bank balance sheet accumulation moderates and reverses in an effort to dampen price pressures, risk-free interest rates have moved materially higher across developed market economies, as shown in Figure 2.

As inflationary pressures have prompted an abrupt shift by global central banks toward monetary tightening measures, the ballooning size of sovereign debt balances, particularly in relation to economic growth, introduces additional complexities for central bankers looking to increase interest rates

Figure 2: Nominal sovereign 10yr yields (%)



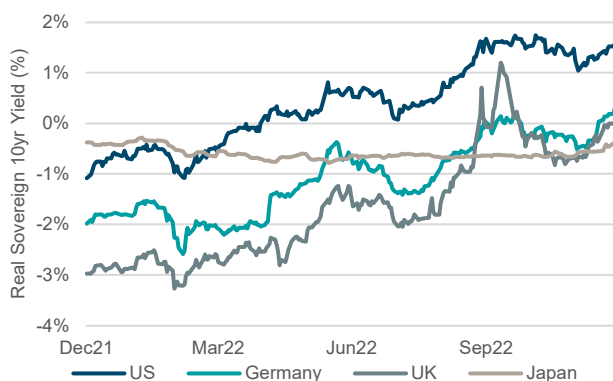
Source: Bloomberg Finance L.P. Data as of 9/30/2022.

Whereas stopping rate hikes too early may allow inflationary pressures to remain, increasing interest rates too aggressively could risk increasing the real cost of government borrowing dramatically in the event that consumer demand and prices decelerate too rapidly.

While unlikely, we therefore believe there is a risk of central banks not raising interest rates sufficiently to address inflation, particularly as significant debt burdens place constraints on their ability to hike interest rates. In our view, the risk of this sustained high inflation/low growth environment could have meaningful implications for capital market returns with similarities to the 1970s stagflationary regime, where nominal interest rates rose significantly but failed to stem inflation, leading to widening bond and equity risk premia.

Over the past year, the real risk-free cost of borrowing has already increased considerably across global developed economies, with the 10-year real US Treasury yield increasing 1.5 percent in just a 12-month period (see Figure 3). Tightening in monetary conditions will ultimately translate into higher net interest expenses across sovereign, consumer, and corporate borrowing, albeit over a longer time horizon.

Figure 3: Real sovereign 10yr yields (%)

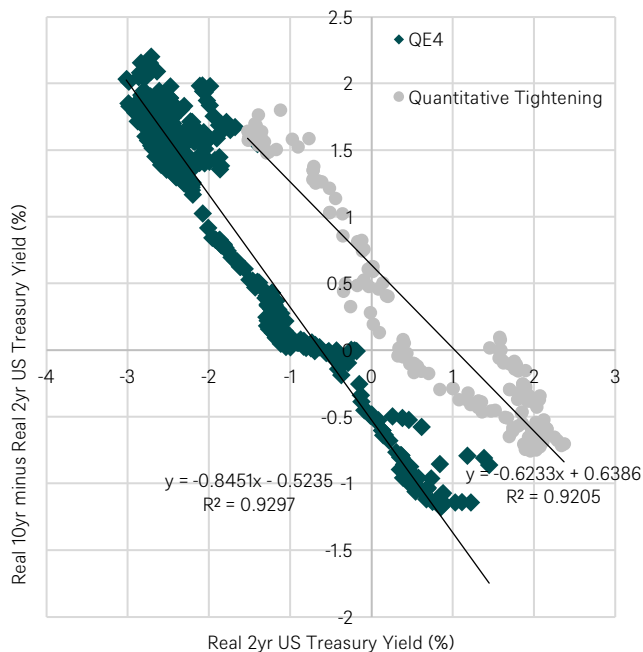


Source: Bloomberg Finance L.P. Data as of 12/31/22.

In addition to raising overnight rates, central bankers are also engaging in monetary tightening in the form of reducing their balance sheet holdings. Thus far, Quantitative Tightening (“QT”), has been implemented through changes to reinvestment policy, letting Treasuries and mortgages mature and not reinvesting the cash proceeds. The Fed has not yet engaged in the outright selling of its balance sheet holdings, although the option remains as an additional lever to tighten monetary conditions.

We observe the effects of QT to mirror QE insofar as changes to the pace of balance sheet accumulation or decumulation impact the real term structure in the US Treasury curve (see Figure 4). Over a decade of Open Market Operations (“OMOs”) have demonstrated this effect in quite a formulaic fashion, whereby announcements to changes in the Fed’s pace or direction of asset purchases has shifted the relationship between the real 10-year yield and short-term real interest rates.

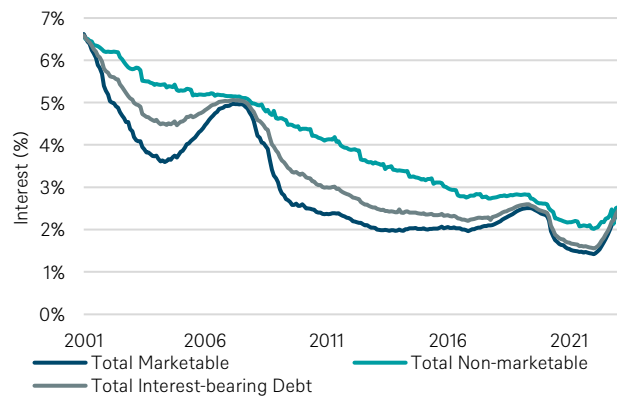
Figure 4: 10-2 real yield differential versus 2yr real yield (%)



Source: Bloomberg Finance L.P., DWS Calculations. Data as of 12/31/22.

Still, risk-free cost of borrowing remains well below historical averages, which has provided the backdrop for fiscal expansion via ballooning sovereign liabilities. Figure 5 shows the average nominal interest rate across different Treasury securities, where increases back toward historical levels would meaningfully increase the Treasury’s interest obligations.

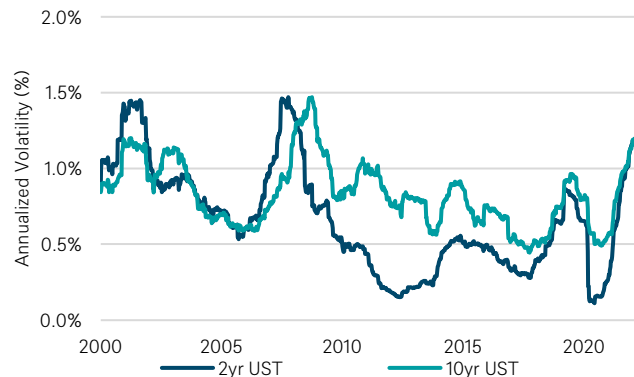
Figure 5: US Treasury average interest rate on debt (%)



Source: Bloomberg Finance L.P., DWS Calculations. Data as of 12/31/22.

The cause-effect between the OMOs and the real term premium over the past 15 years has been achieved in a backdrop of low and relatively stable realized inflation and inflation market pricing. Controlling the real long-term cost of borrowing has not yet been accomplished in a regime of inflation uncertainty, where pivoting between QT and QE may cause investors to demand higher levels of bond risk premium (“BRP”). Already we have seen the realized volatility on the 10-year US Treasury yield return to levels not seen since the Global Financial Crisis (“GFC”) and the implementation of QE (see Figure 6)

Figure 6: Annualized volatility of 2yr and 10yr yield (%)



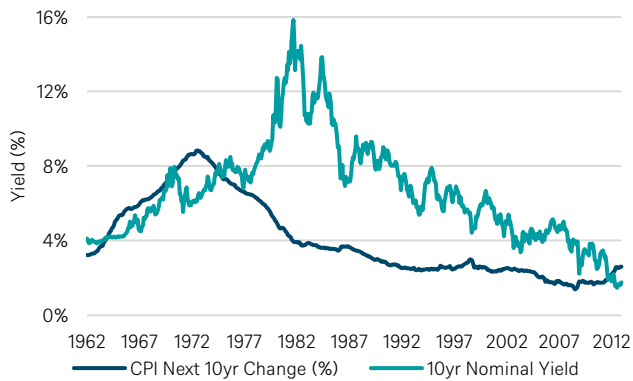
Source: Bloomberg Finance L.P., DWS Calculations. Data as of 12/31/2022.

Despite structural differences—fewer supply-side risks, higher debt balances—versus the 1970s, there is a risk that central bankers once again become too complacent with the repricing in market-implied inflation measures and are forced to address inflation pressures in a reactive rather than in a proactive way.

In this type of hypothetical risk scenario, our expectations for the macroeconomic environment would be for negative real interest rates but materially higher nominal interest rates. From July 1972 to July 1982, the starting 10-year nominal Treasury yield exceeded 6.1 percent but was lower than annualized CPI of 8.84 percent over the same decade-long period. Subsequent periods saw nominal interest rates move materially higher, although, in our view, the structural dynamics (high debt-to-

GDP ratios) in the economy make this later period of very high nominal and real interest rates far less probable today.

Figure 7: Next 10yr CPI and 10yr US Treasury yield (%)



Source: Bloomberg, DWS Calculations as of 12/31/2022.

Over this same decade starting 1972, US GDP growth was modestly below the trend, growing at an annualized rate of 2.4 percent. as shown in Figure 8.

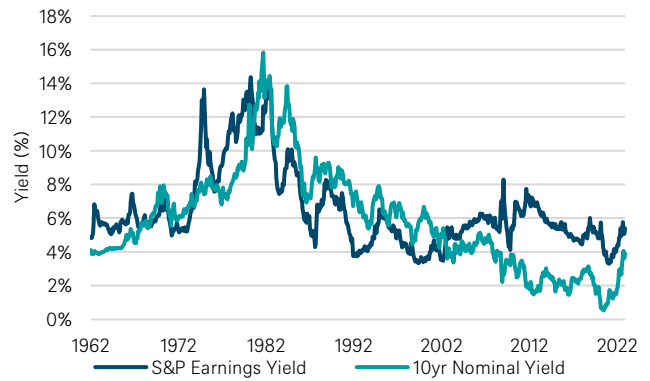
Figure 8: Next 10 years US GDP annualized (%)



Source: Bloomberg Finance L.P., DWS Calculations. Data as of 12/31/2022.

This period was also characterized by rising risk premia driven in large part by economic and interest rate uncertainties, resulting in a drag on real risk asset returns. Figure 9 shows the equity earnings yield for the S&P 500 rising significantly in the 1970s alongside US Treasury yields as investors demanded more risk compensation.

Figure 9: Equity risk premium (%)



Source: Bloomberg Finance L.P., DWS Calculations. Data as of 12/31/2022.

Sensitivity analysis of asset class returns in case of high inflation/low growth

Leveraging this empirical data from the 1972 to 1982 timeframe, we construct sensitivity analysis around macroeconomic data and nominal real asset class returns to better understand the potential return implications of central banks falling behind the curve. The impact of such a scenario on asset class returns would reflect persistent uncertainty on interest rates, which would adversely impact valuations across risk assets. Our assumptions for this sensitivity analysis, in summary, are:

- Inflation of roughly 4.5 to 5 percent above the trend levels
- Real economic growth of -0.5 percent below trend levels
- Nominal interest rates of 2.5 to 3 percent above current levels (resulting in mostly negative real rates)
- Increase in the equity risk premium of 1.5 to 2 percent
- Change in credit spreads as a function of change in equity risk premium
- Default losses for High Yield implying default rates in line with historical recessionary periods

Table 2 summarizes the sensitivity of nominal and real returns for key equity and fixed income markets in this high inflation/low growth case as compared to our core return forecasts.

Table 2: Forecasted nominal and real returns in high inflation/low growth environment, annualised (10 years)

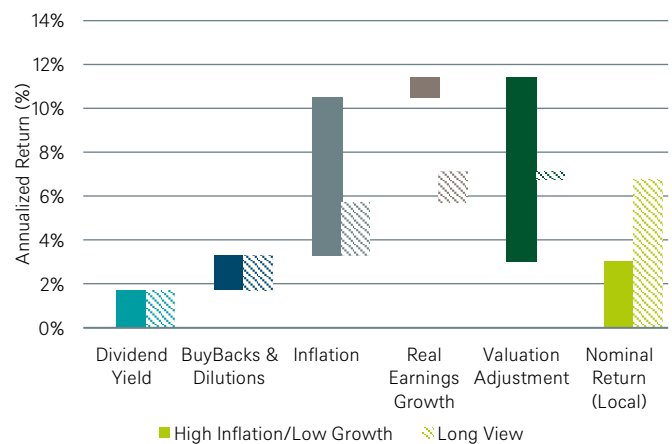
	Nominal returns		Real returns	
	Long View forecasts	High Inflation / Low Growth Case	Long View forecasts	High Inflation / Low Growth Case
Equity				
World Equities	6.7%	3.5%	4.3%	-3.6%
EM Equities	7.5%	6.4%	4.5%	-1.4%
US Equities	6.8%	3.0%	4.4%	-3.9%
Europe Equities	6.7%	4.3%	4.0%	-3.2%
Germany Equities	7.2%	6.4%	4.6%	-1.1%
UK Equities	7.5%	5.4%	4.2%	-2.7%
Japan Equities	4.7%	2.5%	3.7%	-3.3%
Fixed Income				
EUR Treasury	2.7%	2.1%	0.1%	-5.3%
EUR Corporate	4.0%	3.7%	1.4%	-3.7%
EUR High Yield	6.2%	5.3%	3.6%	-2.1%
US Treasury	4.1%	3.8%	1.7%	-3.4%
US Corporate	5.0%	3.7%	2.6%	-3.5%
US High Yield	6.8%	5.4%	4.4%	-1.8%

Source: DWS Investments UK Limited. Data as of 12/31/22. All returns (incl. forecasts) are in local currency. See appendix for the representative index corresponding to each asset class

Across global equity markets, nominal return forecasts are 1 to 4 percent lower, whereas real returns are significantly lower and quite negative across regions. This significantly lower return forecast is largely a function of a significant valuation hurdle, where our valuation adjustment goes from -0.4 percent

to -7.8 percent (for global equities), reflecting both an increase in the discount rate and an increase in the equity risk premium commensurate with the decline in valuations experienced from 1972 to 1982. While equities are an inflationary asset, higher inflation levels (and their contribution to nominal earnings growth) are more than offset by valuation hurdles in this macroeconomic environment. Figure 10 shows the pillar breakdown.

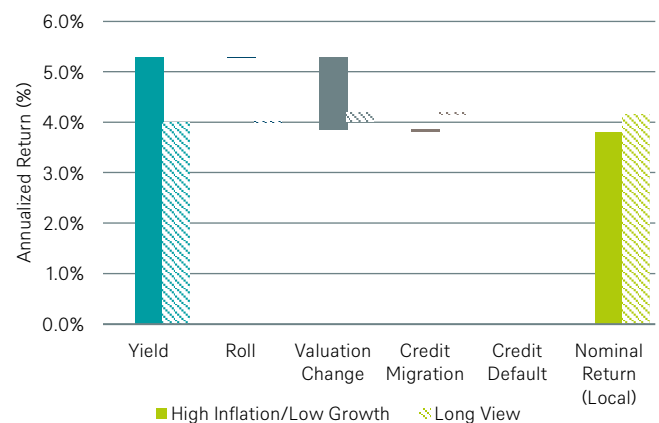
Figure 10: S&P 500: Contribution to 10-year forecasted hypothetical annualised returns



Source: DWS Calculations. Data as of 12/31/2022.

In the modelling for the high inflation case, interest rates move higher over time and the corresponding negative impact on bond valuations offsets the increase in average yield levels for core fixed income asset classes (see Figure 11). While nominal total returns are not materially different in this circumstance, real rates of return are quite negative as shown in Table 2.

Figure 11: US Treasury Bond Index: Contribution to 10-year forecasted hypothetical annualised returns

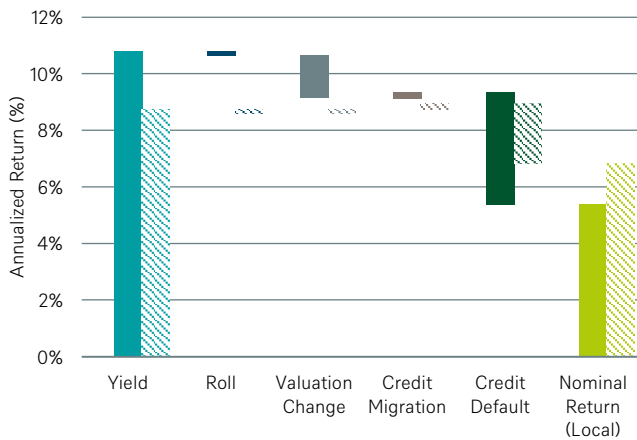


Source: DWS Calculation. Data as of 12/31/2022.

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Across credit asset classes, the nominal return outlook is somewhat more modest, with our US High Yield nominal forecast declining by 1.4 percent, reflecting -1.9 percent more drag from credit migration and credit default losses. This is partially offset by higher average yield levels as we would expect higher credit spreads throughout the decade in this high inflation environment. Figure 12 illustrates the breakdown of our return pillars across both the Long View forecasts and this macroeconomic scenario.

Figure 12: US High Yield Bond Index: Contribution to 10-year forecasted hypothetical annualised returns



Source: DWS Calculations. Data as of 12/31/2022.

In aggregate, we believe that the risk of central banks being unable or unwilling to tighten policy sufficiently to bring inflation fully back under control is non-zero, with considerable implications for real investment returns over the next decade should inflation not be properly addressed. In nominal terms, increases in yields and increasing required risk premia resulting in cheaper risk asset valuations creates headwinds for returns, although higher average yield levels and higher dividend earnings yields help to partially offset this impact when looking across a decade-long period. Moreover, when adjusting for the high inflation levels in this environment, real asset class returns are even more challenging: negative real return forecasts across all asset types in such a hypothetical stagflation environment serve as an important reminder of the potential debilitating impact of inflation (on financial returns as much as on purchasing power), should central banks fall behind the curve.

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Return forecasts for ESG indices

We continue to view addressing environmental risks as essential to mitigating the negative impacts of climate change on economic growth and, by consequence, stability and return on capital investments. In our previous annual report *DWS Long View - 2022*, we examined the return implications of climate risk by translating the Bank of England's Climate Biennial Exploratory Scenarios ("CBES") into 10-year nominal and real return forecasts across major global asset classes. At a glance, adverse climate scenarios resulted in higher risk premia, lower growth potential, and in some cases, the risk of higher structural inflation levels.

We continue to put significant emphasis on considering the financial impact of ESG policy, as evolution of sustainability policies across global economies is paramount to mitigating significant environment risks. As we discussed in considerable detail in the 2022 Long View, significant and early adoption of climate transition policy is tantamount to mitigating climate-related losses across both the real economy and corporate profits.

As part of our ongoing analysis of financial materiality related to sustainability, we present our set of return forecasts for 13 ESG equity and fixed income indices to help investors construct strategic long-term portfolios with consideration to both traditional financial metrics as well as ESG impact metrics. Table 3 shows our updated 10-year return forecasts across these ESG and traditional indices.

Table 3: 10Y return forecasts, annualised, in local currency

	ESG	Traditional
Equity		
ACWI Equities	6.6%	6.8%
World Equities	6.6%	6.7%
EM Equities	6.7%	7.5%
US Equities	7.2%	6.8%
Europe Equities	7.0%	6.7%
Japan Equities	4.3%	4.7%
Fixed Income		
EUR Treasury	2.6%	2.7%
EUR Corporate	3.9%	4.0%
EUR High Yield	5.9%	6.2%
US Corporate	4.8%	5.0%
US High Yield	6.8%	6.8%
EM USD Sovereign	5.8%	7.6%
EM USD Corporate	5.6%	7.1%

Source: DWS Investments UK Limited. Data as of 12/31/22. See appendix for the representative index corresponding to each asset class.

For the ESG index return forecasts, we utilize the same three-pillar approach that we use for traditional indices. The forecasted returns for these ESG indices do not therefore embed any ESG-specific factor risks, although it is reasonable to

believe that the negative return implications of adverse climate scenarios we discuss in the next section may depend on the resilience of respective companies and industries to climate transition risk.

Bank of England CBES update

As a follow-up to the 2021 Biennial Exploratory Scenario: Financial risks from climate change report, the Bank of England ("BoE") published additional findings on the potential climate risk drag on key industries, focusing on UK banks and insurers. Consistent with our scenario analysis from last year's Long View report, projections made by the banks and insurers participating in the BoE surveys indicated that the lowest overall climate-related cost was associated with the Early Action ("EA") scenario, whereas the No Additional Action ("NAA") yielded the most physical climate risk vulnerabilities which could incur a cost on households and businesses as well. Table 4 shows a summary of the three CBES climate scenarios used to model economic and financial impact.

Table 4: Summary of impacts in the CBES scenarios

	Early Action	Late Action	No Additional Action
Transition risks	Medium	High	Limited
Transition begins in	2021	2031	n.a.
Nature of transition	Early and orderly	Late and disorderly	Only policies that were in place before 2021
Peak UK shadow carbon price (carbon tax and other policies) (2010 US\$/tonne carbon dioxide equivalent)	\$900	\$1,100	\$30
Physical risks	Limited	Limited	High
Mean global warming relative to pre-industrial times by the end of scenario (°C)	1.8	1.8	3.3
Mean sea level rise in the UK (m)	0.16	0.16	0.39
Impact on output	Temporarily lower growth	Sudden contraction (recession)	Permanently lower growth and higher uncertainty
Average annual output growth in the UK (per cent)			

Source: Met Office, Network for Greening the Financial System and Bank calculations.

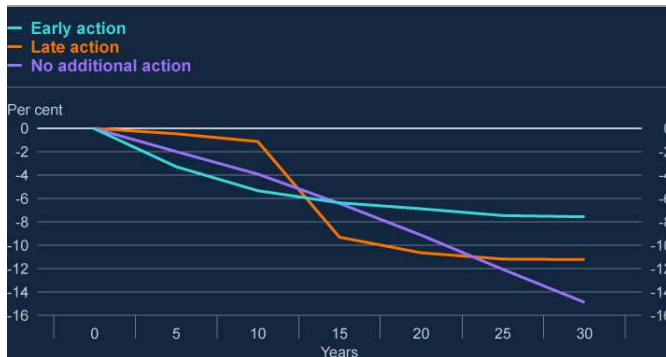
An objective of the CBES is to help insurers and banks identify and manage risks in accordance with the aforementioned climate risk scenarios. UK bank and insurer participants in the CBES engaged in initial projections for the climate scenarios, although the BoE found that banks and insurers "still need to do

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much more fully to understand and manage their exposure to climate risks, including through getting data and understanding their counterparties' and customers' transition plans". The efficacy of these climate risk assessment initiatives is ultimately dependent upon both the further development of internal modelling but perhaps more importantly, the accuracy of the data and projections supplied by third-party providers. Standardization remains a key component to assessing consumer and corporate counterparty risk.

This CBES update provides an aggregation of initial loss estimates by banks and insurers that assumes balance sheets stay fixed over the scenario horizon, although there is a recognition that bank and insurer business models are likely to respond to climate risks over time, thus changing the business and balance sheet mix. Loss estimates across scenarios via participants' projections show material drag on profitability, averaging around 10 to 15 percent annual reduction in profits. The significant dispersion between loss estimates by different participants (even for the same corporate customer), however, indicates a need for data and modelling improvements going forward.

Figure 13: Projected investment losses for insurers across CBES scenarios



Source: Met Office, Network for Greening the Financial System and Bank calculations.

Bank projections showed credit losses 30 percent higher in the Late Action ("LA") versus the Early Action ("EA") scenario, attributable to large increases in carbon prices, leading to "large corporate loan losses across energy users and energy producers, and the economy-wide recession, including a rise in unemployment and fall in house prices caused by the sharp adjustment process, leading to significant mortgage impairments." Figure 14 shows projected losses for banks, life insurers, and general insurers across the three scenarios.

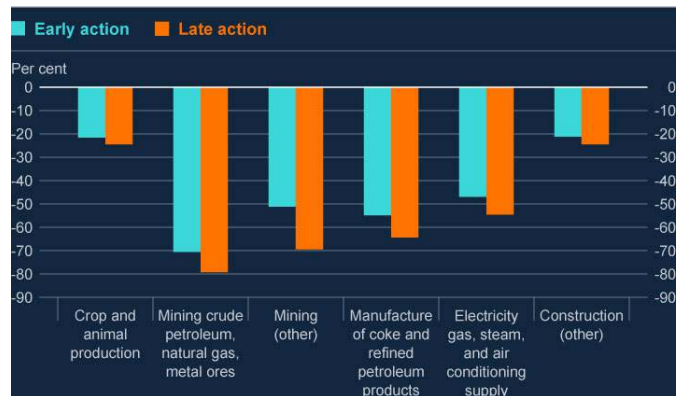
Figure 14: Projected losses across CBES scenarios



Source: Met Office, Network for Greening the Financial System and Bank calculations.

Across these scenarios, the expected losses were unsurprisingly concentrated in carbon-intensive industries, shown in Figure 15 below. Per the CBES analysis, "on average these sectors were projected by banks to have cumulative impairment rates of 35 percent, more than twice the aggregate projected impairment rate on corporate portfolios".

Figure 15: Percentage losses across industries



Source: Met Office, Network for Greening the Financial System and Bank calculations.

As the BoE expands on its efforts to evaluate and monitor the financial risks resulting from climate transition, engagement with lenders and asset owners is paramount to the success of this and other workstreams. It is clear that an adverse climate transition scenario bears meaningful negative impacts on global economic growth, ultimately feeding into financial conditions and financial asset returns. In order to avoid significant loan impairment risks, asset managers, banks, and insurers should find it prudent to properly monitor, analyse, and address climate-related risks across their portfolios. A more comprehensive understanding of these systemic risks can provide investors with better insight into how capital allocation needs to shift at a more fundamental level in order to both limit climate impact and curtail climate-related investment risks.

The Long View

We enter the new year with a visibly different macroeconomic environment versus the previous decade. Following the momentum of the post-COVID economic reopening, global central banks have begun pivoting away from unprecedented balance sheet accumulation, with some uncertainties on the horizon. Nonetheless, investing is about patience, diversification and maintaining a long view. Our framework uses fundamental building blocks for establishing return forecasts of various asset classes. These can provide investors with a strategic baseline view. The following sections take the reader through our framework and findings.

Francesco Curto

Global Head of Research

Contributors

Jason Chen

Research Institute

Dirk Schlueter

House of Data (Systematic Investment Solutions)

Bhavesh Warlyani

House of Data (Systematic Investment Solutions)

Vivek Dinni

House of Data (Systematic Investment Solutions)

Ajay Chaurasia

House of Data (Systematic Investment Solutions)

Martin Moryson

Chief Economist Europe

DWS Multi Asset

EMEA/APAC

[Bjoern Jesch](#)

bjoern.jesch@dws.com

[Klaus Kaldemorgen](#)

klaus.kaldemorgen@dws.com

[Henning Potstada](#)

henning.potstada@dws.com

[Hartwig Kos](#)

hartwig.kos@dws.com

[René Penzler](#)

rene.penzler@dws.com

[Gunnar Friede](#)

gunnar.friede@dws.com

[Guido Lombardi](#)

guido.lombardi@dws.com

[Peter Warken](#)

peter.warken@dws.com

Americas

[Dokyoung Lee](#)

dokyoung.lee@dws.com

[Nikita Patil](#)

nikita.patil@dws.com

Executive summary

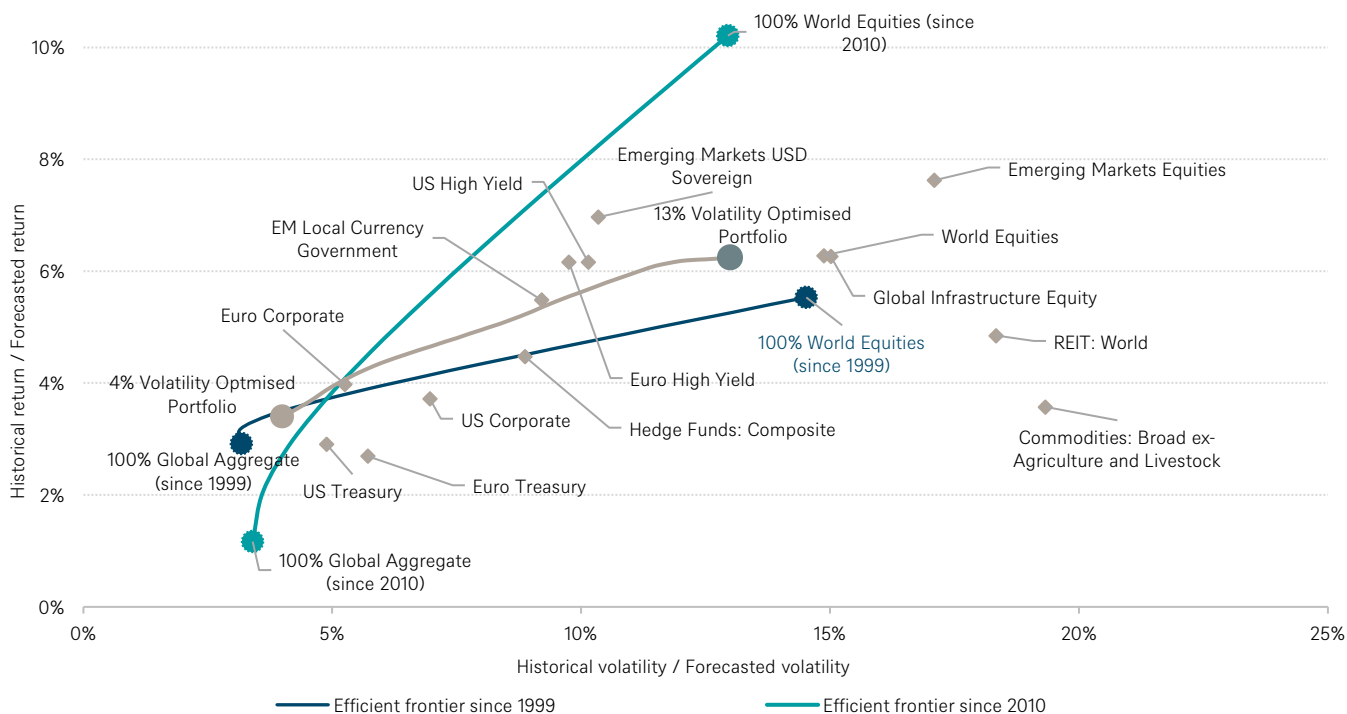
Market conditions look drastically different than even a year ago. Stubborn price pressures and an unexpectedly resilient labor market have necessitated a historically aggressive interest rate cycle from global central bankers. As a result, nominal yields across the fixed income complex have moved significantly higher. Market-implied real interest yields have also moved back to significantly positive levels not seen in over a decade. Valuations across equities and credit markets have also become less demanding after a period of market weakness, reflecting both higher and less certain discount rates.

In aggregate, we start 2023 with asset price valuations at much less prohibitive levels relative to recent years. Uncertainty exists in the macroeconomic landscape, where resilient labor and consumer demand is now the focal point for policymakers. As interest rate policy transitions back toward a more normal environment, the neutral level of real interest remains a key question that will ultimately impact fair value across asset classes. Over a strategic time horizon, global growth prospects continue to trend downward, reflecting a shifting demographic

landscape, with working-age populations in secular decline. Nonetheless, positive real interest rates across many developed economies and less expensive valuations across equity and credit complexes leaves investors at a far more favorable starting point for this coming decade. Taking these factors into consideration, we present our long-term ten-year return forecasts across asset classes which we refer to as our “Long View”.

In our Long View, we show our forecasted returns across asset classes and regions on the efficient frontier, which represents the trade-off investors must make between risk and returns. Figure 16 depicts the efficient frontier over the last thirteen years since the credit crisis and compares it to the efficient frontier over the past two decades. As seen, the post-financial crisis efficient frontier is steeper. What this suggests is on a relative basis, investors received far greater compensation for commensurate levels of risk in the decade following the financial crisis.

Figure 16: Efficient frontiers: 10 year forecasted and historical returns and volatilities, annualised



Historical Efficient Frontiers are noted above as “Efficient Frontier” and are calculated using historical returns and volatilities over the time frame noted through 12/31/22. Each historical efficient frontier represents the risk-return profile of a portfolio which consisted of two asset classes: World Equities (in euro, unhedged) and Global Aggregate Fixed Income (euro-hedged). The Long View Efficient Frontier represents a forecasted optimal portfolio (EUR) using the various asset classes represented in the figure, subject to certain weighting/concentration constraints that result in component asset classes being able to trade above the line in this instance (please see page 28 for more details on these optimization techniques). Source: DWS Investments UK Limited. Data as of 12/31/22. See appendix for the representative index corresponding to each asset class. Past performance may not be indicative of future returns. Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect. Any hypothetical results may have inherent limitations. Among them are the sharp differences which may exist between hypothetical and actual results which may be achieved through investment in a particular product or strategy. Hypothetical results are generally prepared with the benefit of hindsight and typically do not account for financial risk and other factors which may adversely affect actual results.

This publication details the long-term capital market views that underpin the strategic allocations for DWS's multi-asset portfolios. These estimates are based on 10-year models and should not be compared with the 12-month forecasts published in the DWS CIO View.

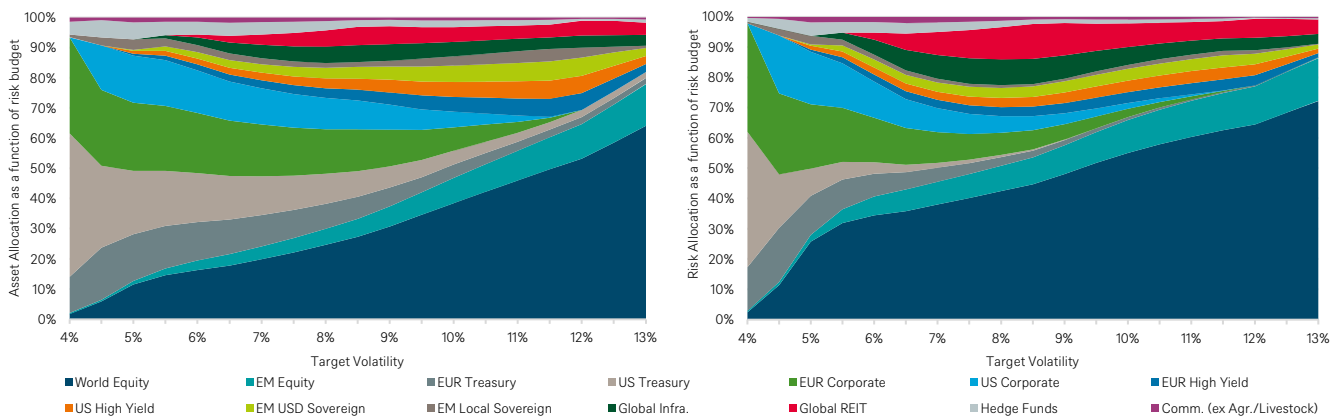
Central to this document is our belief that clients should consider a long-term perspective beyond 1-5 years when it comes to constructing investment portfolios. Perhaps, counterintuitively, extending the investment horizon has, in the past, produced less volatile, more precise forecasts, as shown in Figure 18: while risk still matters and there is still a distribution of investment outcomes around any central forecast, this distribution has tended to become narrower when investing for longer investment horizons. One consequence of this is that entry points become less relevant (even though of course by no means irrelevant) for longer investment horizons (because cyclical and tactical drivers are overtaken by fundamental, structural drivers of asset class returns). This is true even at times of extreme valuation: taking one of the biggest previous bubbles (the dot.com boom) as an example, the difference between buying US equities exactly at the peak of the dot.com boom in April 2000 vs. a year later (after valuations had

collapsed) only amounts to one percent compounded annually when investing with a 15-year time horizon (as we show in Figure 22 on page 18). However, if an investor had had a shorter horizon of five years, the difference in returns generated from buying at the peak versus one year later was far greater, amounting to roughly six percent per annum. Thus, the longer the holding period for an investment, the stronger the case that its return is primarily driven by the underlying fundamental building blocks.

Looking at rolling one-year price returns of the S&P 500 from 1871 to 2022, a negative two-standard-deviation move equated to a 27 percent decline in prices (Table 5 on page 19). When calculating a negative two-standard-deviation move using rolling 10-year returns over this same time frame, the decline in prices is less than 1 percent per annum. More stable long-run returns can be helpful in establishing more stable strategic-asset-allocation targets.

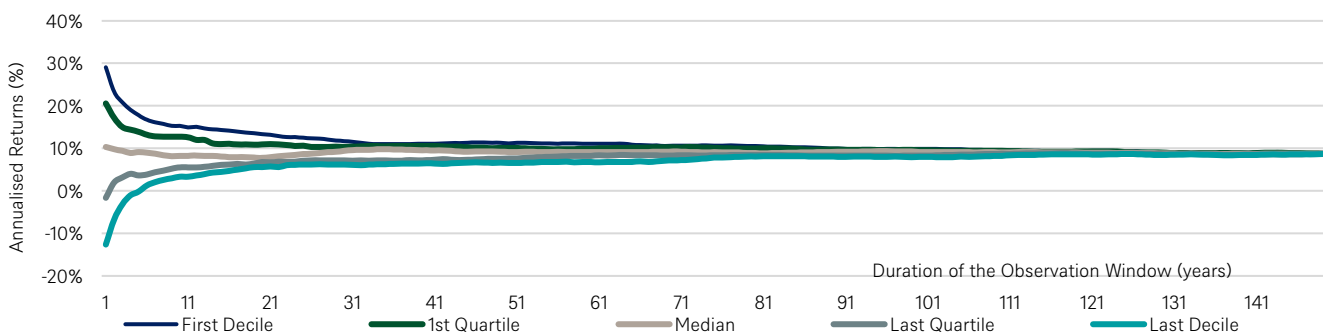
Hence, sceptics may be surprised to learn that the volatility of returns historically has been lower when using long-term horizons, although past performance may not be indicative of future results.

Figure 17: Asset allocation and risk allocation by target volatility



Source: DWS Investments UK Limited. Data as of 12/31/22. For illustrative purposes only. See page 29 for details. See appendix for the representative index corresponding to each asset class.

Figure 18: Distribution of U.S. equities: Historical returns over different holding periods, annualised



Source: Robert J. Shiller, DWS Investments UK Limited. Data from 1871 to 2022.

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. Past performance, [actual or simulated], is not a reliable indication of future performance.

Framework

We use the same building-block approach to forecasting returns irrespective of asset class. We believe this approach brings consistency and transparency to our analysis and also may help clients to better understand the constituent sources of forecasted returns.

The Long View framework breaks down returns into three main pillars: income + growth + valuation, each with their own sub-components. The pillars and components for the traditional

asset classes under our coverage (equities, fixed income and commodities) are shown in Figure 19.

Meanwhile, alternative asset classes under our coverage (listed real estate, private real estate, real estate debt, listed infrastructure equity and private infrastructure debt) are forecasted using exactly the same approach, sometimes with an added premium to account for specific features, such as liquidity.

Figure 19: Long View for traditional asset classes: Pillar decomposition

Asset class	Income		Growth		Valuation		
Equity	Dividend yield	Buybacks & dilutions	Inflation	Earnings growth	Valuation adjustment		
Fixed income	Yield		Roll return		Valuation adjustment	Credit migration	Credit default
Commodities	Collateral return		Inflation	Roll return	Valuation adjustment		

Source: DWS Investments UK Limited.

Figure 20: Long View for alternative asset classes: Pillar decomposition

Asset Class	Income	Growth		Valuation			Premium
Hedge funds		Hedge funds' full exposure to each pillar are calculated by means of a multi-linear regression of hedge fund performance vs all liquid asset classes					Hedge-fund premium
Listed real estate equity	Dividend yield	Inflation		Valuation adjustment			
Private real estate equity	Dividend yield	Inflation		Valuation adjustment			
Private real estate debt	Yield	Roll Return		Valuation change	Credit migration	Credit default	Liquidity premium
Listed infrastructure	Dividend yield	Inflation	Earnings growth	Valuation adjustment			
Private infrastructure debt	Yield	Roll Return		Valuation change	Credit migration	Credit default	Liquidity premium

Source: DWS Investments UK Limited.

Return forecasts

Our Long View forecasts for all asset classes can be seen below. The bars are ranked by ascending forecasted return within each asset class.

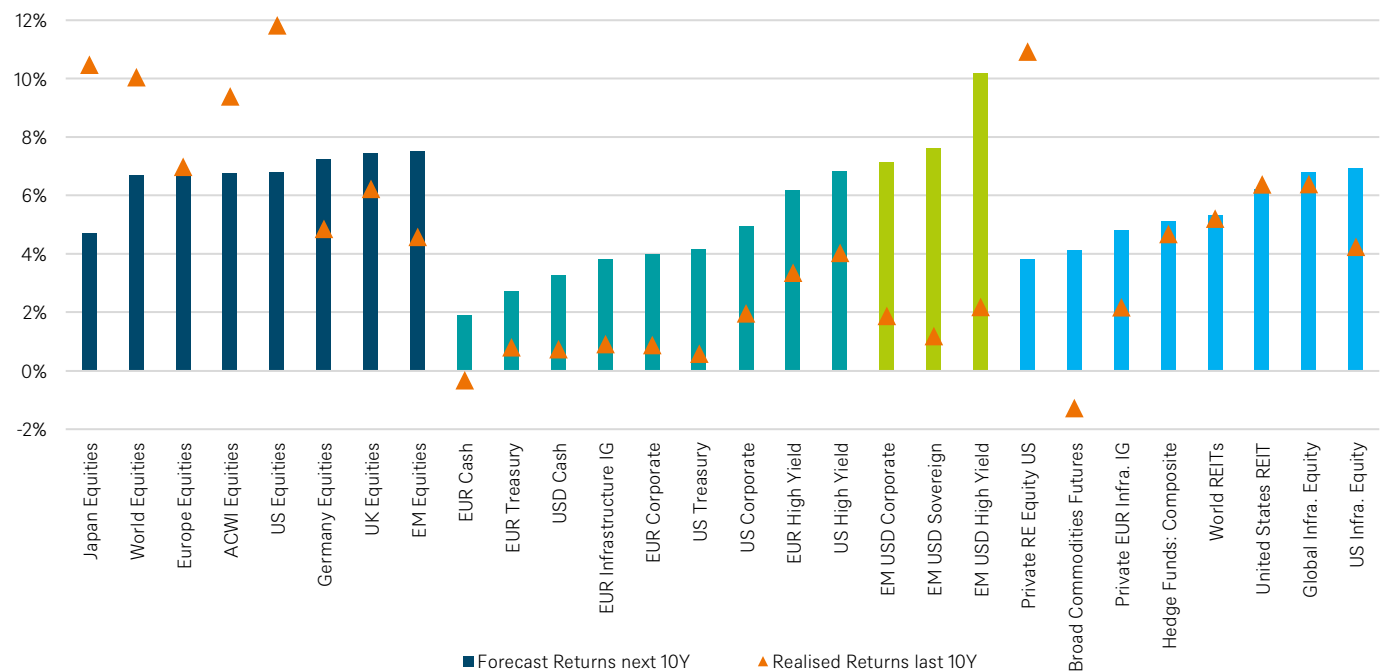
In summary, we make the following key observations from the results:

- Return forecasts across equities have significantly increased from last year's forecasts; in Europe and EMs they are now in line with or modestly above the realized returns over the past decade, whereas in US equities they are still well below the strong realized returns over the past 10 years.
- Across regional equity markets, the emerging markets are expected to offer the highest forecasted returns, but only marginally ahead of some European markets and the US.
- Fixed income return forecasts show the most positive change, both versus the previous year's forecasts and relative to the previous decade. Both core fixed income and credit offer higher nominal return outlooks, given high current starting yield levels.

- Within credit, (across IG and HY corporates as well as sovereign and corporate EMD), return forecasts are well above previous decade returns. EM USD sovereign and corporate debt in particular are the highest across credit asset classes.
- Alternative asset class return forecasts are in line with to modestly below traditional asset class forecasts. Within alternatives, infrastructure equity has the highest return outlook. Decline in private RE equity forecasts reflect both a methodology change to earnings contribution but more importantly less attractive valuations relative to TIPS yields.
- Commodity future return forecasts are healthier now than the very poor realized returns of the previous decade and could provide useful diversification benefits and potential inflation protection.

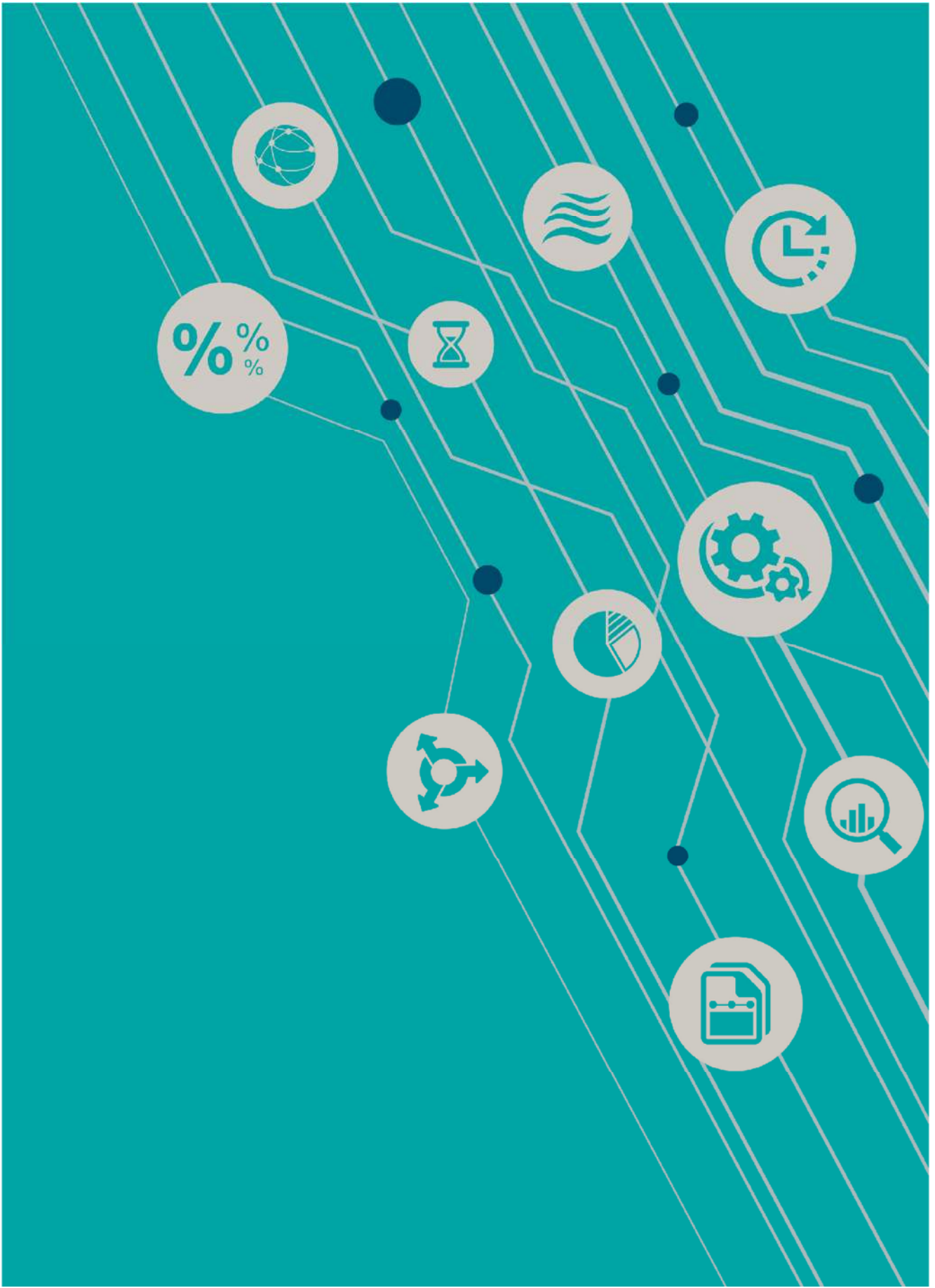
Investors should be conscious of the impact of foreign-exchange (forex) risk on base-currency returns and volatilities. Depending on risk appetite and return objectives, investors may want to consider hedging currency risk.

Figure 21: Forecast and realised returns for 10 years, annualised (local currency)



Source: DWS Investments UK Limited. As of 12/31/22. See appendix for the representative index corresponding to each asset class.

Past performance, [actual or simulated], is not a reliable indication of future performance. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect. Any hypothetical results may have inherent limitations. Among them are the sharp differences which may exist between hypothetical and actual results which may be achieved through investment in a particular product or strategy. Hypothetical results are generally prepared with the benefit of hindsight and typically do not account for financial risk and other factors which may adversely affect actual results.



The DWS Long View

Patience, diversification and forecasted returns

Long-term investors could enjoy less volatility

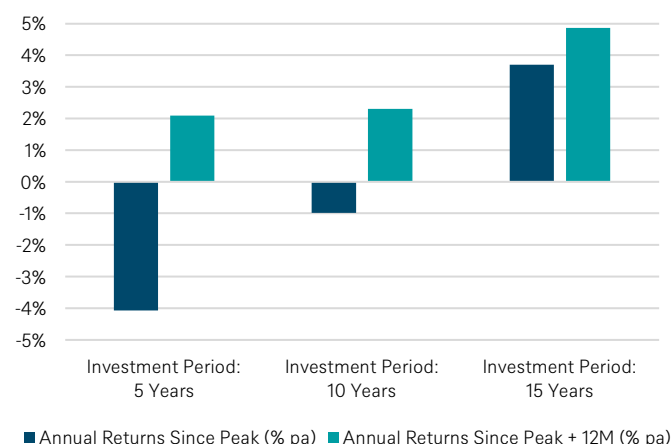
A long-term view reduces the problem of market timing

Why is it so important to have a long-run perspective? For us, the reason is simple. We believe that only over a market cycle can an investor potentially capture the risk premium⁶⁶ available for each asset class.

To illustrate this, Figure 22 compares the annual return for an investor buying U.S. stocks either in April 2000 or 12 months later. April 2000 was one of the most expensive valuation points for most equity indices and, as such, it represented a challenging period for investors. Surely, this was a terrible time to buy the market?

Indeed, it was. If we look at returns over the subsequent five years from the market peak on April 28, 2000, performance was significantly impacted by market timing. If an investor had waited and instead bought into the market 12 months after the peak, subsequent annual returns would have increased by 6 percent per annum, turning negative 4 percent return per annum into a more comfortable 2.1 percent annual return over the ensuing five-year period.

Figure 22: U.S. equity performance over various time periods, annualised



Performance based on the 5 worst equity months (for U.S. equities) from 1992-2018. Total return performance represented by S&P 500 TR
Source Bloomberg Finance L.P., DWS Investments UK Limited. Data from 4/28/00 to 4/28/15.

However, if we take the same example over a 15-year investment horizon, Figure 22 shows that an investor's total return would have been much less sensitive to market timing as prices reverted to their long-run trend and fundamentals over time. What is more, it has been suggested that about 90 percent of portfolio returns come from asset allocation. In other words, taking a Long View means portfolio allocation decisions are usually far more critical than trying to time the market by picking the highs and lows. These portfolio allocation decisions are of course not time-independent: a strategic asset allocation crucially depends on long-term expectations for return and risk (and these evolve over time), but the key is that taking a long view enables investors to focus on how to invest rather than whether or when to invest (which may be the overriding concerns for short horizons). For many investors, not being invested in financial markets at all for long periods is not an option.

Under the assumption of past behaviour of market cycles and the tendency for prices to revert to their long-term trend, returns measured over long periods of time (15 or more years) may establish a more reasonable expectation of future performance compared to shorter time frames (5 or fewer years). However, we recognise the real world is rarely so patient. Hence, our Long View forecasts are based on a ten-year horizon, which we believe is near term enough to be relevant, while still a reasonable timeframe for a full market cycle to occur

⁶⁶ We often use the term risk premium in this publication. We define risk premium as the excess return an asset class is expected to deliver compared to other asset classes, usually carrying a low or null risk, like cash or government bonds. "Equity risk premium" usually refers to the past or

expected excess returns of equities compared to risk-free money markets, and "Bond risk premium" refers to the same concept applied to bonds, usually referring to the incremental returns expected for a higher level of duration risk borne by the investor.

Measuring returns over longer timeframes (five or more years) can reduce volatility

Consider the performance of U.S. equities since 1871 (Figure 23) based on Robert Shiller data.⁷

This equity composite has delivered a 9.2 percent annualised nominal return, which translates into 6.9 percent real return – outperforming real output growth in the U.S. by 3.7 percent.

Figure 23 makes clear that over most of the time periods covered in this chart, equities have historically produced steady above-inflation returns, despite some nasty short-term⁸ losses.

To quantify historical return versus short-term risk, Figure 24 shows the distribution of annualised U.S. equity returns across different time horizons. It illustrates that with a longer investment horizon, realised returns converged towards their long-run average.

We continue to believe that a longer time horizon reduces the range of volatility of U.S. equities

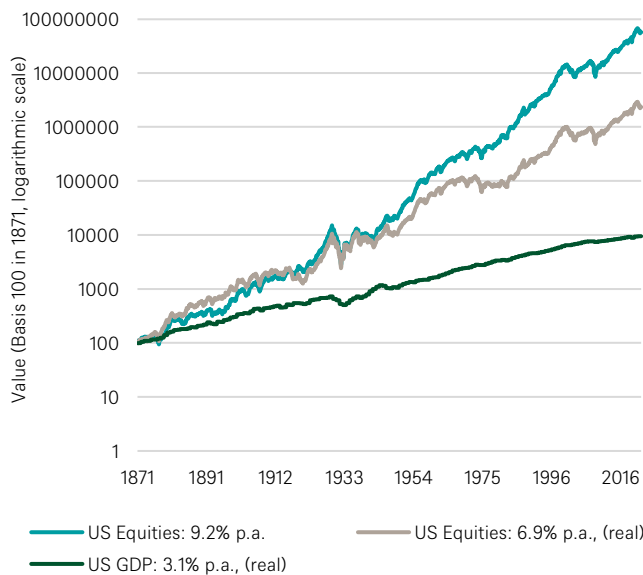
How does the Long View’s ten-year time frame look in terms of return stability? Table 5 provides average and various standard deviation levels for annualised returns across different time periods for U.S. equity investors. As can be seen, the range of returns becomes narrower as the time horizon increases.

Table 5: Average and standard deviation of realised U.S. equity returns over different time periods, annualised

Maturity (year)	1	5	10
Average (IRR) – 2 St Dev	-27.3%	-5.9%	-0.4%
Average (IRR) – 1 St Dev	-9.3%	1.4%	4.2%
Average (IRR)	8.8%	8.8%	8.8%
Average (IRR) + 1 St Dev	26.8%	16.1%	13.4%
Average (IRR) + 2 St Dev	44.8%	23.4%	18.0%

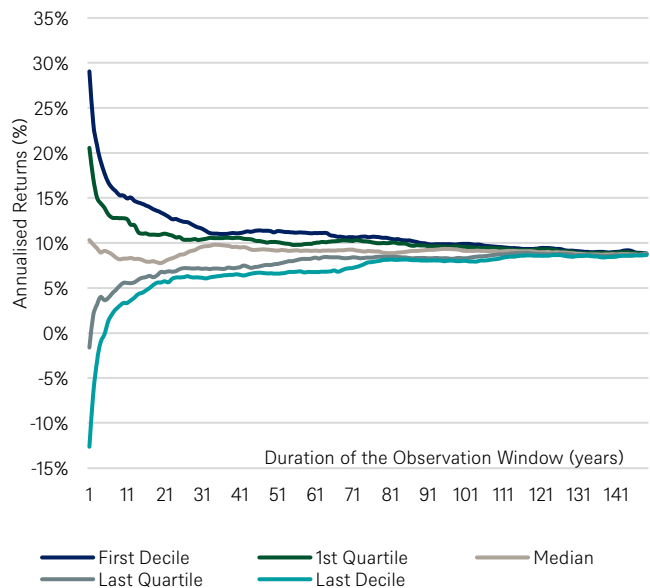
Source: Robert J. Shiller, DWS Investments UK Limited. U.S. equity returns for respective time periods between 1871 and 2020 Data as of 12/31/22

Figure 23: U.S. equity returns and U.S. GDP growth (1871–2022)



Total-return performance represented by S&P 500 TR
Source: Robert J. Shiller, Maddison Project Database 2021, DWS Investments UK Limited.

Figure 24: The longer the holding period, the more consistent the average return of U.S. equities (January 1871 to December 2022)



Total-return performance represented by S&P 500 TR
Source: Robert J. Shiller, DWS Investments UK Limited

⁷ Long-term U.S. equities data is available at (Shiller, Online Data Robert Shiller 2022) and long-term macro-economic data is sourced from (Maddison 2022).

⁸ "Short term" for the purpose of this publication refers to a time frame of up to five years, while "long term" refers to a time frame of at least ten years. Past performance, [actual or simulated], is not a reliable indication of future performance.

A longer time frame leads to more consistent equity-return forecasts

Equity returns as a function of economic growth

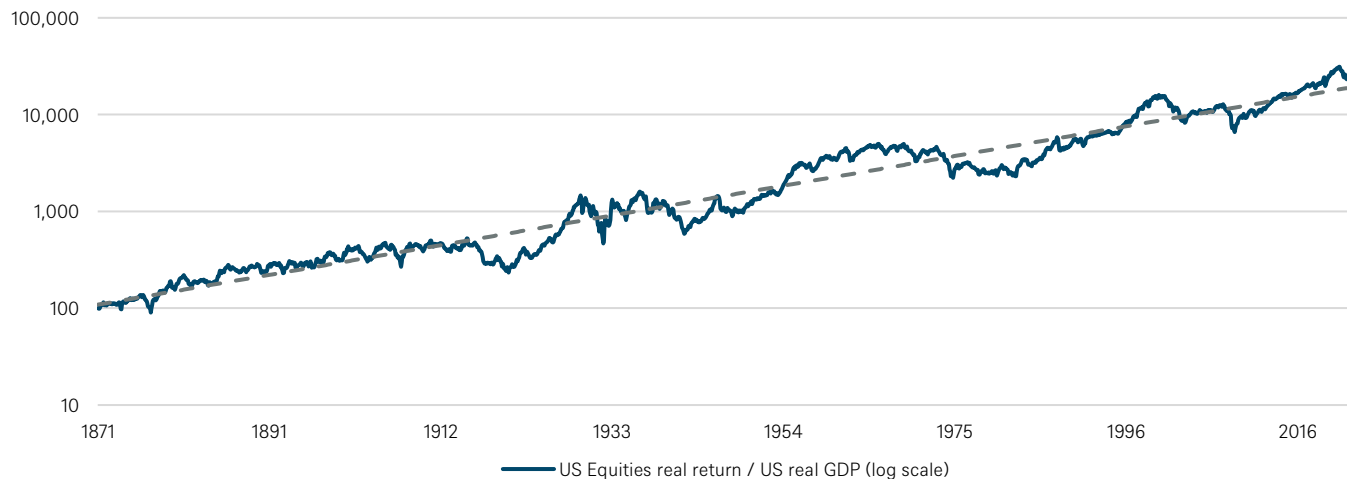
Many believe forecasting market returns is a fool's errand, but over extended time horizons it has been shown that returns have historically tended to revert to their average. As a result, when examining long-term relationships with various economic variables, such as economic growth (GDP) and inflation, trends can be identified. Take the ratio between real total returns for U.S. equities and real output,

Figure 25 suggests that U.S. equities outperform economic growth over the long run by 3.7 percent per annum as reported by Robert Shiller. This relationship does not guarantee future

outperformance, but it does provide some long-term evidence of the behaviour of equities over time relative to these variables.

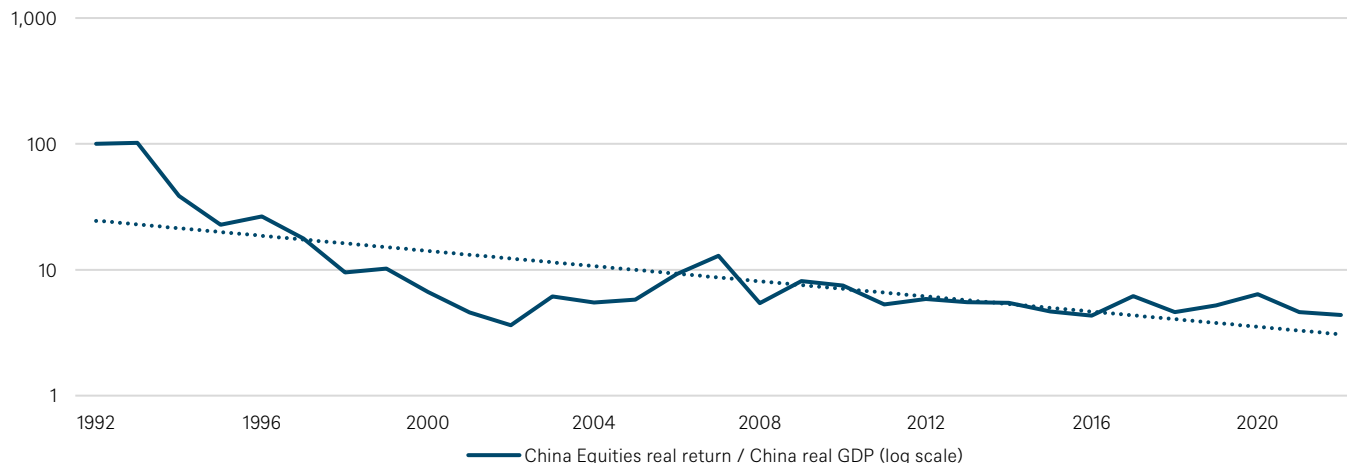
In emerging markets, however, our analysis suggests that for certain countries, GDP growth has not translated proportionately into earnings growth for broader equity indices (see the ratio for the MSCI China in Figure 26 as an example). One potential reason for this divergence, in our view, is the difference in the structure of the economy and the composition of equity benchmarks.

Figure 25: The ratio between the real total return of U.S. equities and U.S. real GDP has grown at 3.9% (1871-2022), log scaled and indexed: 01/1871 = 100



Source: Robert J. Shiller, Maddison Project Database 2020, DWS Investments UK Limited. Data from 1871 to 2022.

Figure 26: The ratio between the real total return of MSCI China and China real GDP growth (1992-2022), log scaled, indexed: 01/1992 = 100



Source: Bloomberg Finance L.P., IMF World Economic Database, DWS data as of 1992 to 2022.

An equity forecast

To support the claim above, we back-tested our own Long View equity forecast methodology to test its reasonableness over the long run. We utilised long-term return and fundamental data (Shiller, Online Data Robert Shiller 2019) and decomposed performance into the building blocks as described in Figure 27.

Figure 27: Pillar decomposition: Equities



Source: DWS Investments UK Limited.

For this exercise, we made two adjustments and applied the following assumptions, described below:

- For historical expectations of future ten-year inflation expectations (a so-called backcast) we followed the methodology developed by (Groen and Middelcorp 2009).
- This gives a theoretical estimate for breakeven inflation based on all inflation forecast data that has been made available since 1971. We use this backcast until the respective dates where Treasury Inflation-Protected Securities (TIPS) prices and then inflation swaps quotes are available.
- In the absence of robust historical data, earnings growth is estimated from its long-term trend observed during the testing period.

Subject to these adjustments and assumptions, we created a data set that we used to examine the necessary data to provide forecasted return backcasts from 1971 to 1981 and rolled this ten-year forecast forward each year thereafter. This is long enough to cover at least one market cycle.

Long-term equity forecasts

The results suggest the return forecast of our Long View equity methodology appears to provide a reasonable estimate of future performance. Figure 28 shows the return forecasts versus realised returns. While there are periods where divergence exceeds one standard deviation, we would highlight

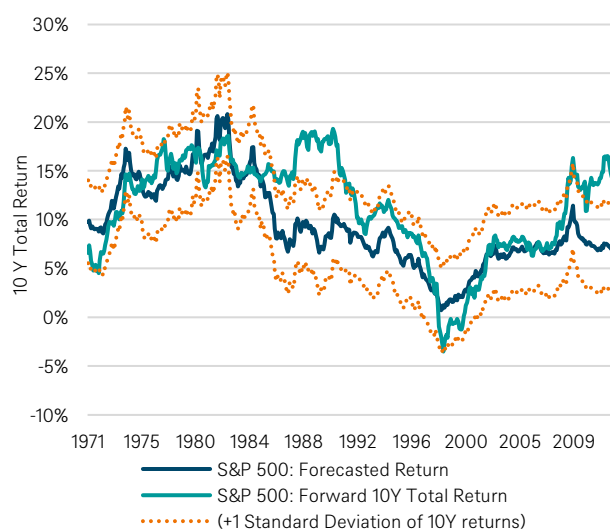
two statistics in support of the methodology.

The first is that in 85 percent of the observations the forecasted return has been within one standard deviation of the subsequent actual ten-year realised return.

Second, the gap between the return forecasts and subsequent realised return has been less than half of one standard deviation 60 percent of the time.

To conclude, we believe Figure 28 illustrates what investors may observe from our ten-year forecast methodology: a reasonable indicator of long-run market trends.

Figure 28: Our forecast would have provided estimates for U.S. equity returns within one standard deviation (1971 through 2012)



Total return performance represented by S&P 500 TR. Source: Robert J. Shiller, Maddison Project Database 2022, DWS Investments UK Limited. Data from 1971 to 2022. The forward 10Y return show the realised return over the subsequent 10 years. The first 10-year forecast and actual results represent the compound annual return from September 1971–September 1981. A simplified forecast would have provided estimates for S&P 500 returns within a standard deviation interval with an 85 percent probability.

Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect. Past performance, actual or simulated, is not a reliable indicator of future results. Any hypothetical results may have inherent limitations. Among them are the sharp differences which may exist between hypothetical and actual results which may be achieved through investment in a particular product or strategy. Hypothetical results are generally prepared with the benefit of hindsight and typically do not account for financial risk and other factors which may adversely affect actual results. Back-tested performance is NOT an indicator of future actual results. The results reflect performance of a strategy not [historically] offered to investors and do NOT represent returns that any investor actually attained. Back-tested results are calculated by the retroactive application of a model constructed on the basis of historical data and based on assumptions integral to the model which may or may not be testable and are subject to losses. General assumptions include: Firm would have been able to purchase the securities recommended by

the model and the markets were sufficiently liquid to permit all trading. Changes in these assumptions may have a material impact on the back-tested returns presented. Certain assumptions have been made for modelling purposes and are unlikely to be realized. No representations and warranties are made as to the reasonableness of the assumptions. This information is provided for illustrative purposes only. Back-tested performance is developed with the benefit of hindsight and has inherent limitations. Specifically, back-tested results do not reflect actual trading or the effect of material economic and market factors on the decision-making process. Since trades have not actually been executed, results may have under or over-compensated for the impact, if any, of certain market factors, such as lack of liquidity, and may not reflect the impact that certain economic or market factors may have had on the decision-making process. Further, back-testing allows the security selection methodology to be adjusted until past returns are maximized. Actual performance may differ significantly from back-tested performance.

Forecasted returns and long-term insights

Our forecasted returns for the next decade

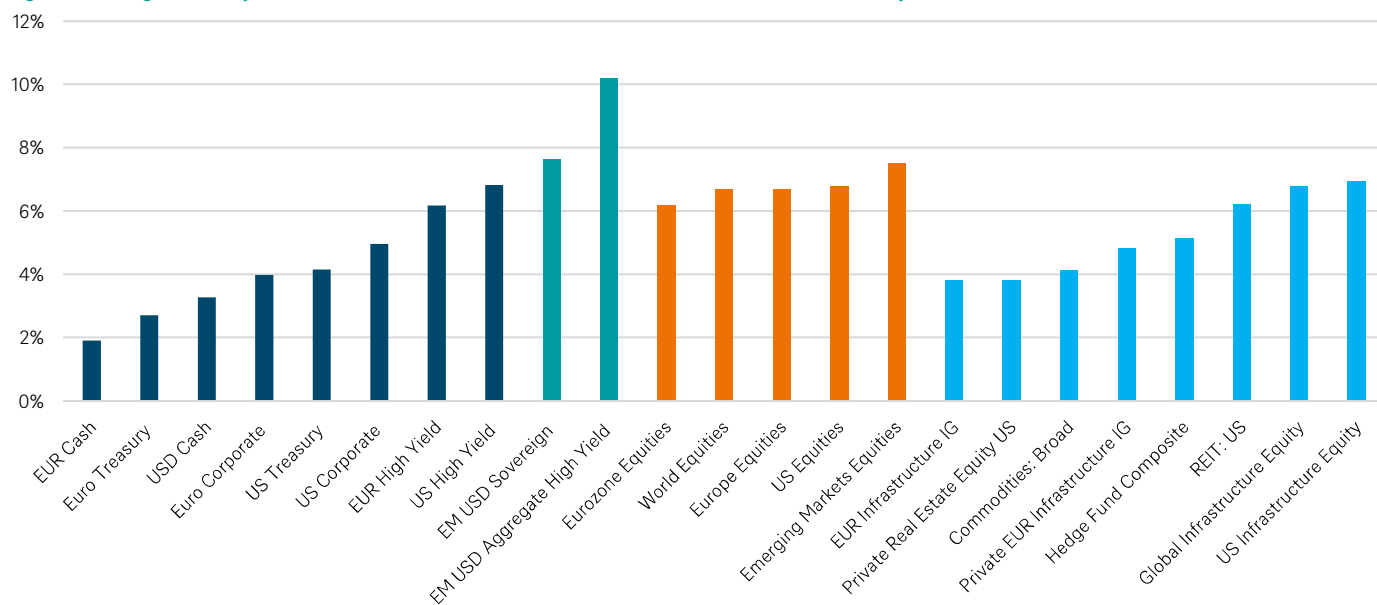
In this section, we summarize our Long View forecasts. Figure 29 shows the total-return forecasts for each asset class.⁹

Across asset classes, return forecasts are noticeably higher versus previous years both in absolute and real terms. Our return forecast for global equities in local currency is 6.6 percent per annum, with local currency emerging markets equities modestly higher at 7.1 percent. Fixed income returns look significantly more constructive versus previous years, reflecting significant increases in starting yield levels across both sovereign and credit asset classes. US Treasury forecasted returns now exceed 4.0 percent, and US high yield and emerging markets sovereign bond forecasts are now 6.8 percent and 7.6 percent, respectively. For historical context,

these return forecasts now exceed the previous decade realized returns across all fixed income asset classes.

Across the alternative asset classes, returns are still constructive, although less so on a relative basis versus traditional assets as compared to previous years. Among the listed segments of alternative assets, US REITs and US Infrastructure equity are 6.8 percent and 6.9 percent, respectively, largely in line with broad equity market return forecasts. US Private RE equity is somewhat more muted, at 3.8 percent, where valuations have become more challenging. The commodities return outlook, while still below equities, reflects a much more constructive view at 4.1 percent.

Figure 29: Long-term (10-year) forecasted returns for the next decade, annualised (local currency)



Source DWS Investments UK Limited. Data as of 12/31/22. See appendix for the representative index corresponding to each asset class.

Comparing our current return forecasts to the downward trend in our nominal return forecasts over the previous couple of years illustrates a significant change in the strategic outlook for asset class returns across both global equities and global bond markets (see Figure 30).

As compared to the previous year, in equities, the valuation adjustment has become less prohibitive reflecting equity price decline in 2022. Dividend yield contribution is also modestly higher, increasing from 1.6 percent to 2.3 percent from the

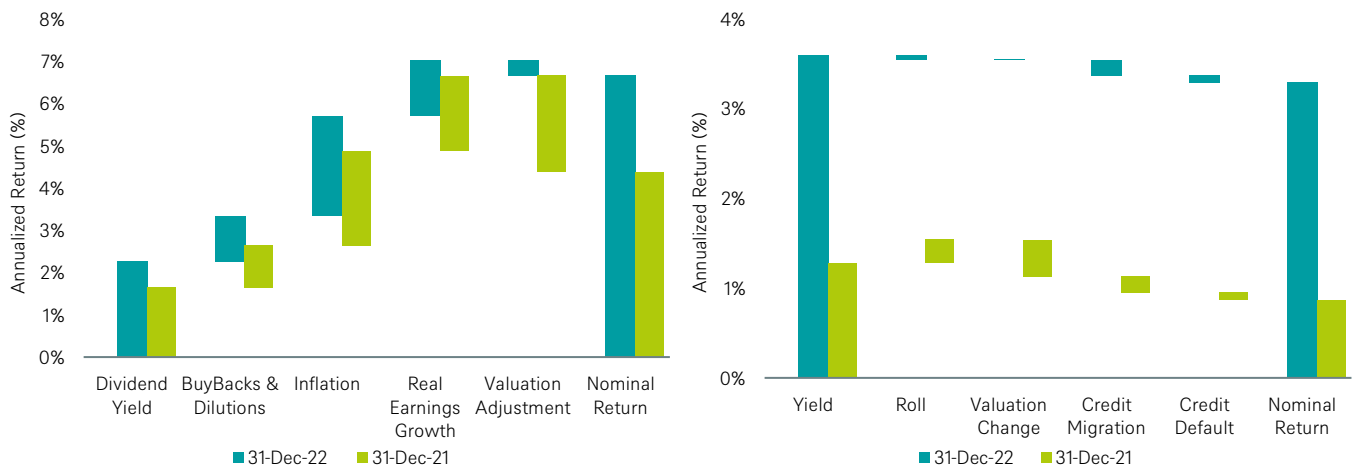
previous year.

Across fixed income markets, starting yield levels embed a much more comfortable income buffer for investors. Particular across core fixed income asset classes, nominal return forecasts imply both higher income contribution and also, to a lesser degree, more modest valuations (in this case, yields) relative to history.

⁹ Please see from page 32 for an exhaustive explanation on how we have formed these long term return estimates. Past performance, [actual or simulated], is not a reliable indication of future performance. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect. Any hypothetical results presented in this report may have inherent limitations. Among them are the sharp differences which may exist

between hypothetical and actual results which may be achieved through investment in a particular product or strategy. Hypothetical results are generally prepared with the benefit of hindsight and typically do not account for financial risk and other factors which may adversely affect actual results of a particular product or strategy. There are no assurances that desired results will be achieved.

Figure 30: 10 year forecasted total returns for MSCI World (Left) and Global Aggregate Bond Index (Right) now vs two years ago, annualised and in local currency, with the contributions from individual pillars



Source DWS Investments UK Limited. Data as of 12/31/22. See appendix for the representative index corresponding to each asset class.

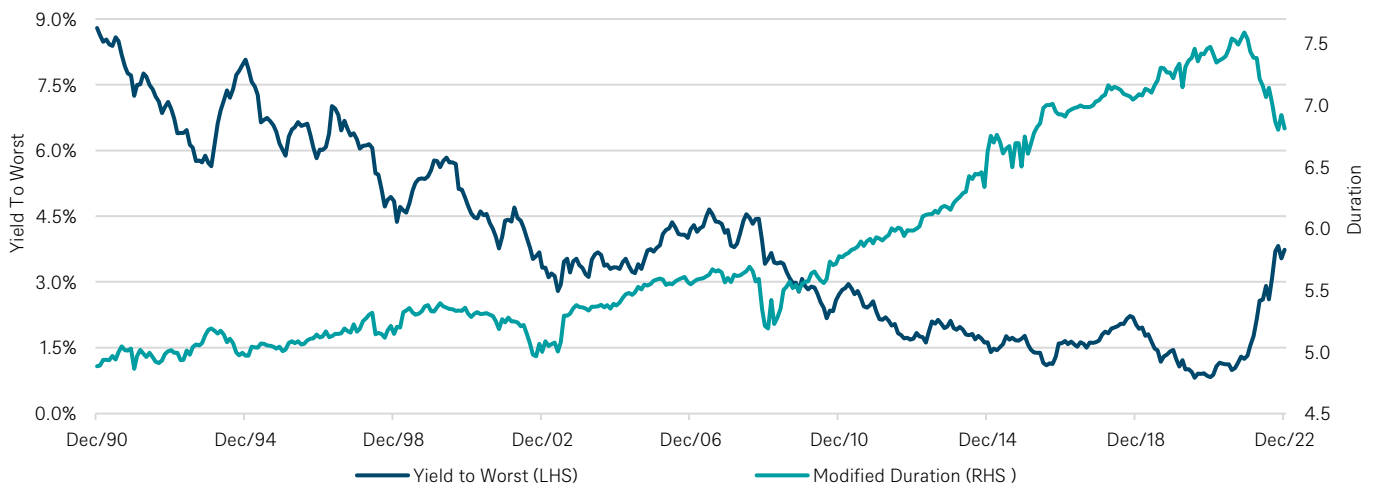
After years of secular decline in our strategic return forecasts across asset classes, driven increasing valuations and declining interest rates, market repricing over the course of 2022 has, to some extent, normalized financial markets. The sharp reversal in accommodative central bank policy brings some semblance of normality back to investors and savers, at least for the time being. Figure 31 shows the sharp reversal in the multi-decade downtrend in interest rates across global fixed income in 2022.

Still, there remain secular trends toward lower potential growth rates globally, but particularly across many developed countries

where ageing populations not only affect long-term economic growth prospects, but also likely mean increasing savings requirements and increasing retiree demand for fixed income assets.

Whether the shift in central bank policy away from compressing real interest rates is temporary or permanent will depend on the pace and extent to which inflationary pressures moderate. For the time being, both nominal and real interest rates are materially higher versus recent history, reflecting a more sanguine environment for savers and fixed income investors.

Figure 31: Global Aggregate Bond Index, Yield to Worst (left-hand side) and modified duration (right-hand side), 12/31/1990 – 12/31/2022



Source DWS Investments UK Limited. Data as of 12/31/22.

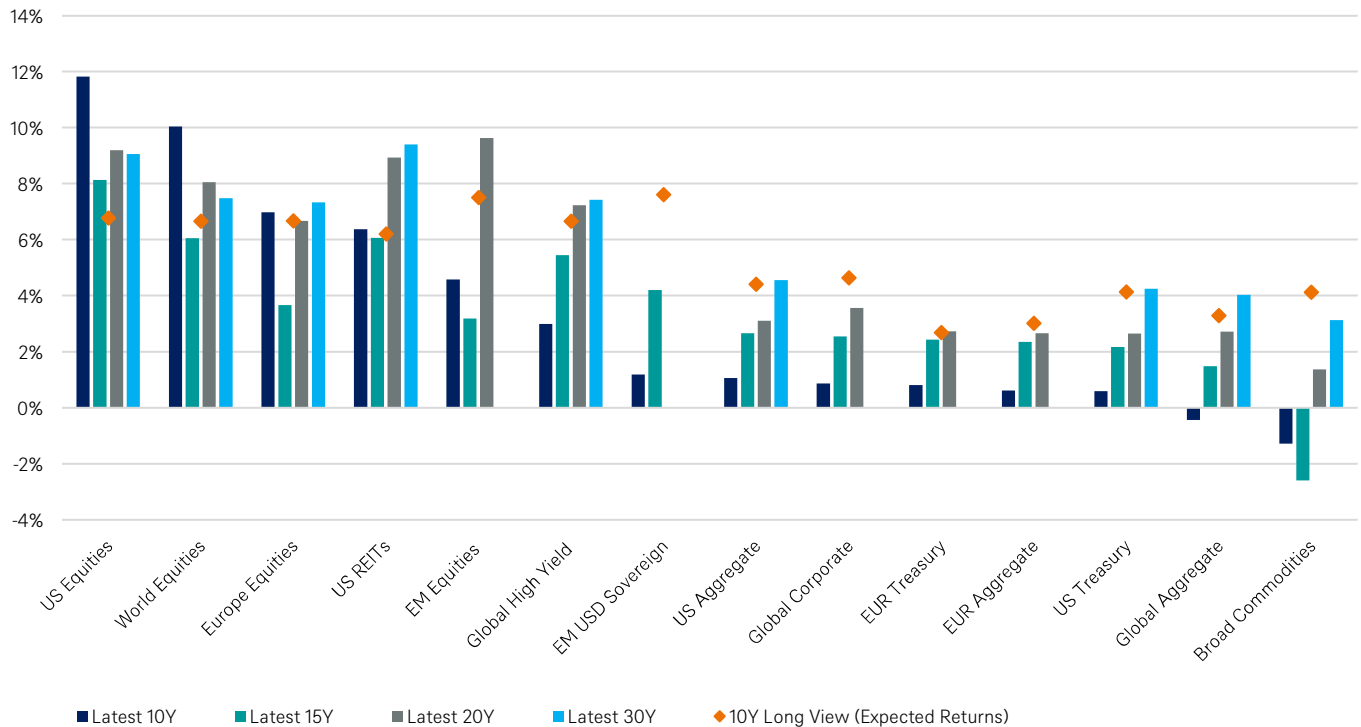
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Forecasted returns vs. the past

We find it useful to compare the forecasted returns of our main asset classes with their realised performance, which is shown in Figure 32. Again, it can be seen that the past 10 years have been positive for equities and higher-risk fixed-income

investments, such as emerging-market and high-yield debt. For most risk assets, our forecasts are moderately below historical returns, whereas forecasts for core fixed income are moderately higher than realized returns of recent long-term periods.

Figure 32: Forecasted and historical returns by asset class, annualised (over 10-, 15-, 20- and 30-year time periods ending 12/31/22)



Source Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/22. See appendix for the representative index corresponding to each asset class.

Where is the most attractive risk compensation across asset classes?

Financial theory tells us riskier asset classes are likely to compensate the investors via higher forecasted returns. This well-known trade-off between risk and return is the main conclusion from Figure 33.¹⁰ We observe that the usual relationship is presented over our 10-year horizon, with a compensated risk premium for most asset classes.

Using the same data, we can calculate and compare forecasted Sharpe ratios (Figure 34), taking into account our forecasts for money-market instruments. Regarding both of these charts, we would make the following comments:

- Based on our research, we believe risk in equities may be compensated reasonably well on a relative basis – only infrastructure equity and, to some extent, High Yield and EM USD Sovereigns offer higher or comparable Sharpe ratios.
- We forecast corporate bonds to realize higher Sharpe ratios

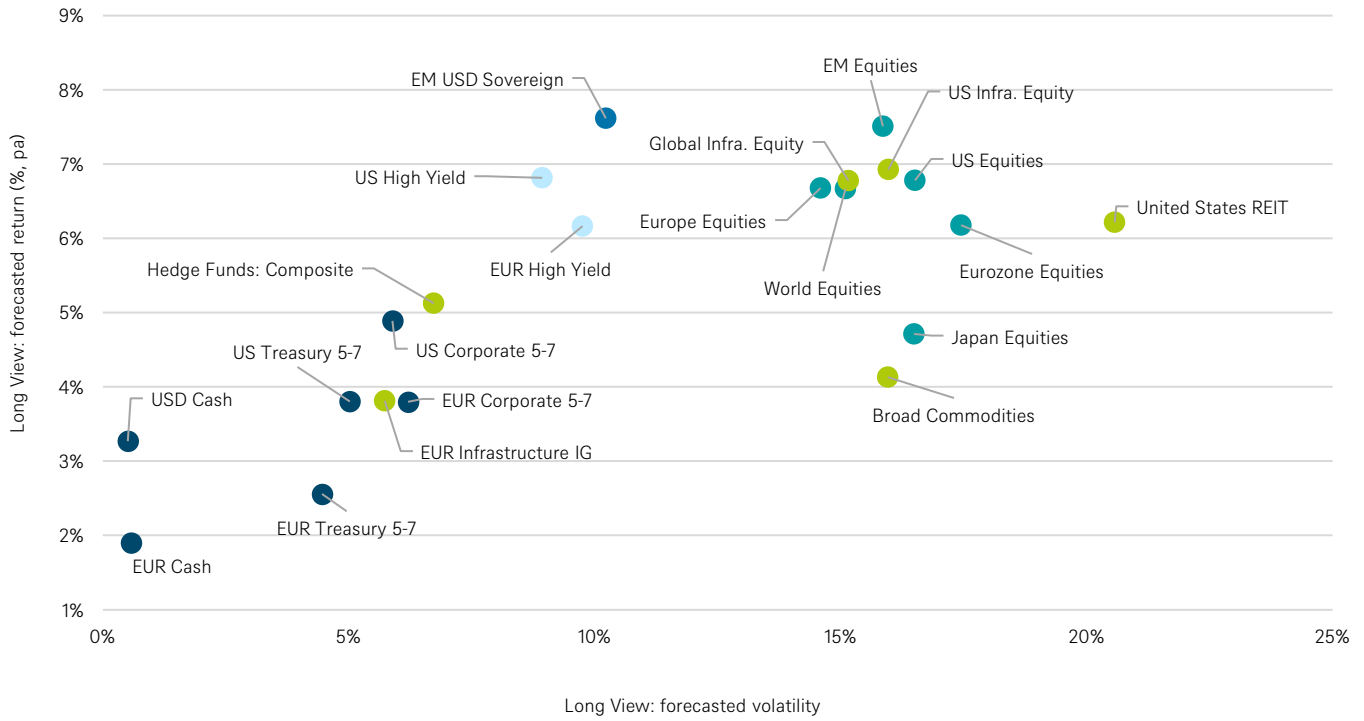
than equities going forward, reflecting much higher return expectations in IG and HY corporates.

In the alternative space, it appears that risk is still compensated in REITs and particularly infrastructure equity at a level comparable to equities, offering important investment alternatives in a low-return environment across traditional asset classes.

When translating local currency returns, investors should be conscious of the impact of foreign-exchange (forex) risk on base-currency returns and volatilities: the forecasted returns and volatility metrics underlying Figure 33 and Figure 34 are all based on local currency at the individual security level. Depending on risk appetite and return objectives, investors may want to consider hedging currency risk.

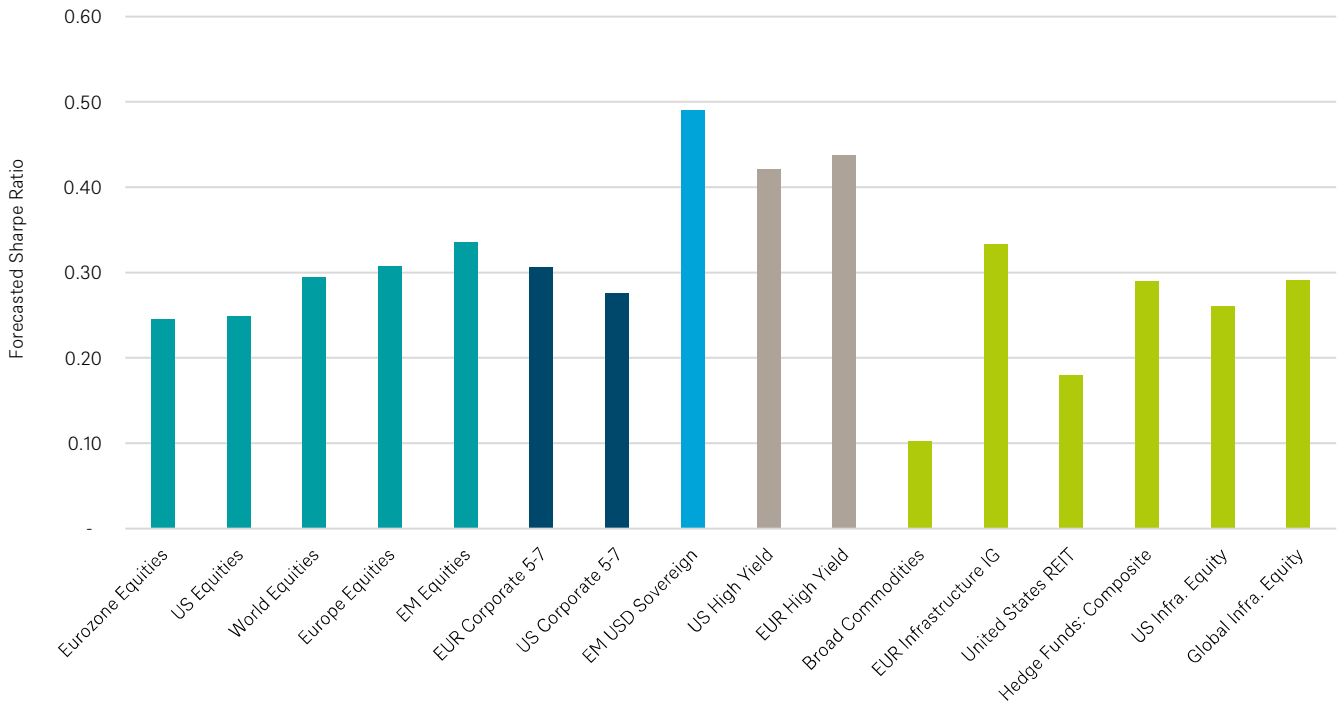
¹⁰ This chart utilises our approach, a macro-level forecasting method, for calculating the forecasted returns and the appropriate expected forecasted volatility and for the performance ratio. Past performance, [actual or simulated], is not a reliable indication of future performance. This information 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

Figure 33: 10-year forecasted return and risk by asset class, annualised (local currency) (2023–2032)



Source DWS Investments UK Limited. Data as of 12/31/22. See appendix for the representative index corresponding to each asset class.

Figure 34: 10-year forecasted Sharpe ratio by asset class in euro (EUR), annualised (2023–2032)



Source: DWS Investments UK Limited. Data as of 12/31/22. See appendix for the representative index corresponding to each asset class.

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.

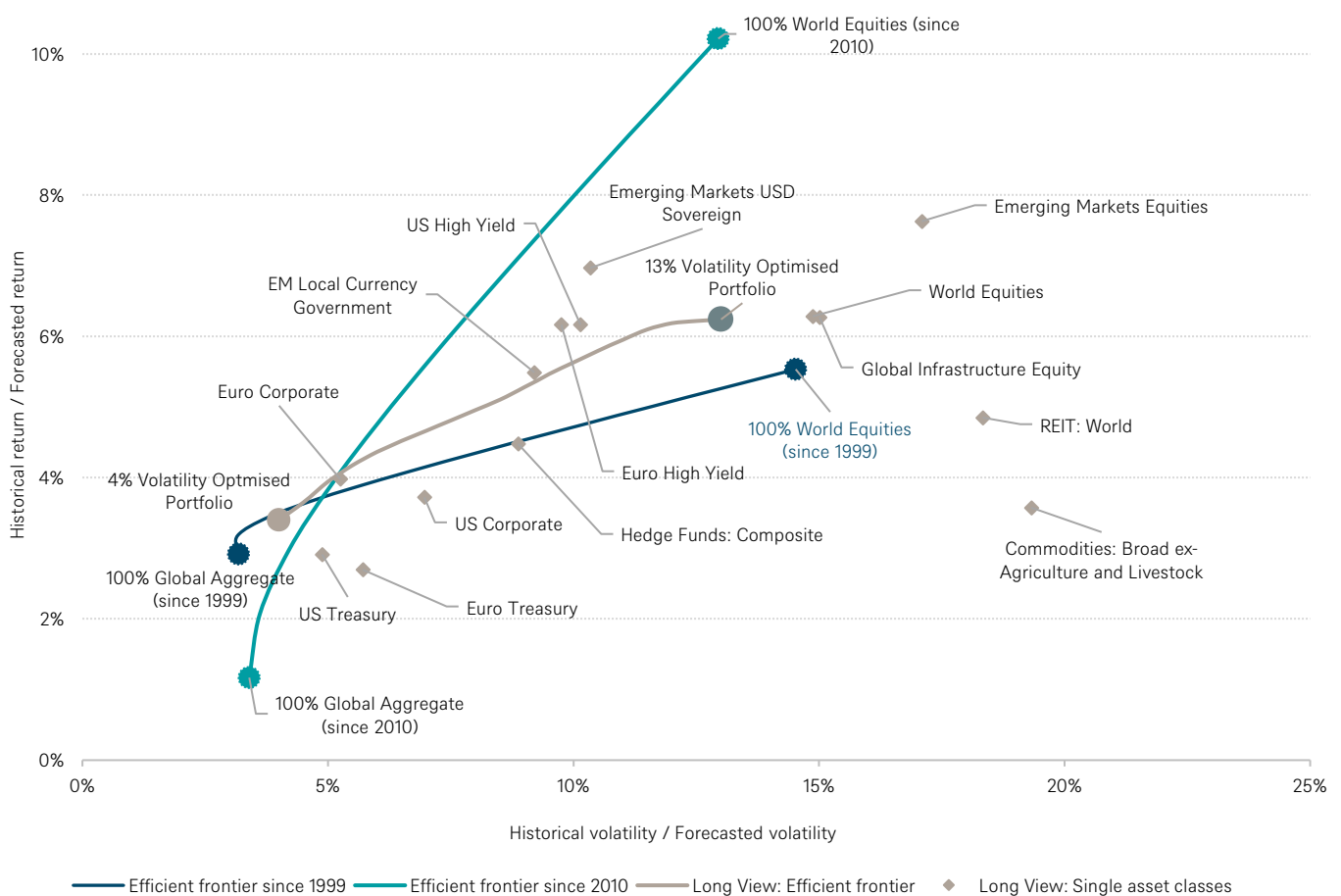
Strategic allocation

Connecting our Long View with portfolios in practice

Since the turn of the century, nominal returns across the efficient frontier have been quite robust, with a steep relationship between realized volatility and realized returns. (Figure 35). Outsized global equity returns combined with low starting nominal yield levels resulted in quite a steep trade-off between historical return and historical realized volatility, particularly in contrast to the long-term efficient frontier, which is notably flatter.

Using our Long View forecasts to construct a hypothetical efficient frontier, forecasted multi-asset returns over the next ten years are above the longer-term efficient frontier but below returns over the previous decade¹¹. For investors wanting to pursue robust returns, the higher risk required may be concerning. Therefore, in order to keep risk at reasonable levels, dynamic overlays and tactical adjustments may be useful in managing risk.

Figure 35: Efficient frontiers: 10 year forecasted and historical returns and volatilities, annualised



Historical Efficient Frontiers are noted above as "Efficient Frontier" and are calculated using historical returns and volatilities over the time frame noted through 12/31/22. Each historical efficient frontier represents the risk-return profile of a portfolio which consisted of two asset classes: World Equities (in euro, unhedged) and Global Aggregate Fixed Income (euro-hedged). The Long View Efficient Frontier represents a forecasted optimal portfolio (EUR) using the various asset classes represented in the figure, subject to certain weighting/concentration constraints that result in component asset classes being able to trade above the line in this instance. Source: DWS Investments UK Limited. Data as of 12/31/22. See appendix for the representative index corresponding to each asset class.

¹¹ Hypothetical performance results have many inherent limitations, some of which are described herein. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently achieved by any particular trading program. One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or adhere to a particular trading program in spite of trading losses are material points which can also adversely affect actual trading results. There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results and all of which can adversely affect actual trading results.

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.

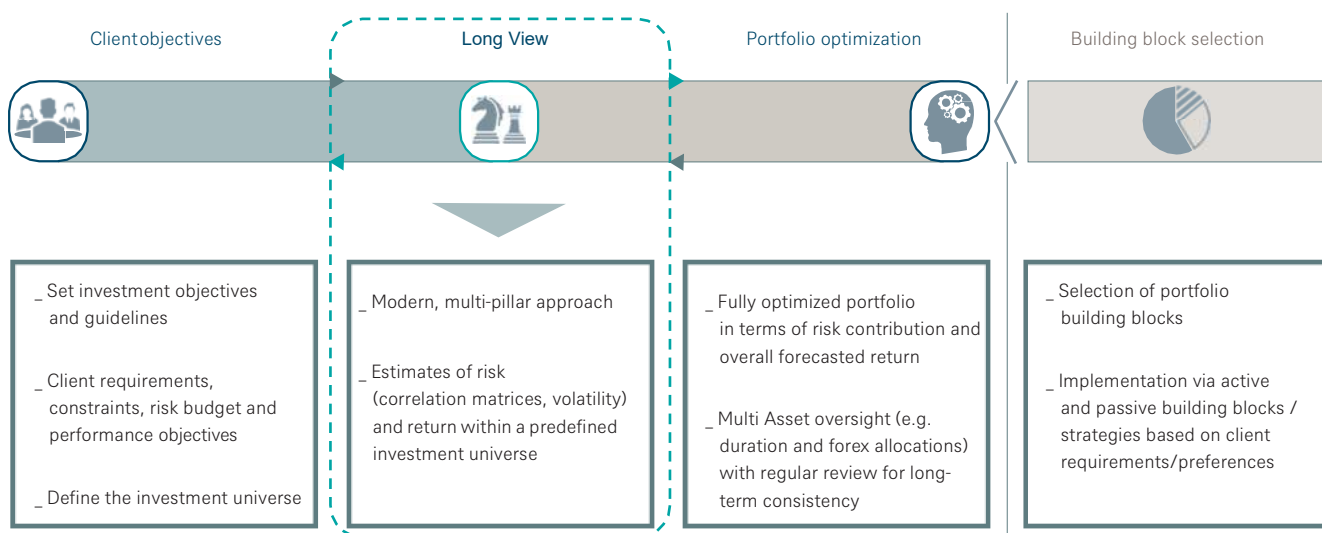
In this section we reiterate our strong belief in strategic asset allocation (SAA). This process endeavours to examine investment strategies in an ongoing effort to assist investors in pursuit of their investment objectives.

A SAA framework is based on:

- The risk and return objectives of the investor
- The historical and/or forecasted risk and return profiles of available asset classes
- The allocation process

Our risk-based investment approach to strategic asset allocation is further described in Figure 36. We believe this multi-pillar approach provides additional insights versus other forecasted return-based approaches and aims to provide stability across parameter changes.

Figure 36: Decomposition of the Strategic Asset Allocation process



Source: DWS Investments UK Limited. As of 12/31/22. For illustrative purposes only.

Any hypothetical results presented in this report may have inherent limitations. Among them are the sharp differences which may exist between hypothetical and actual results which may be achieved through investment in a particular product or strategy. Hypothetical results are generally prepared with the benefit of hindsight and typically do not account for financial risk and other factors which may adversely affect actual results of a particular product or strategy. There are no assurances that desired results will be achieved.

Combining the Long View with our portfolio construction approach

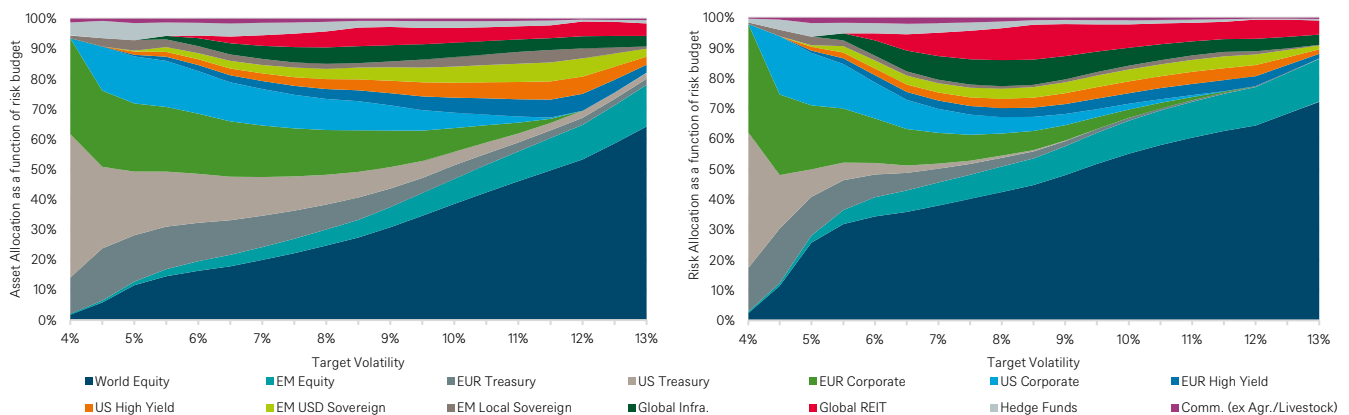
Relying on the GRIP (Group Risk in Portfolios) approach developed by DWS Multi-Asset, in Figure 37, we show a concrete example of a portfolio construction exercise, based on an investor's targeted risk level.

The chart on the left shows an asset-allocation as a function of the targeted risk budget, while the chart on the right shows the corresponding risk allocation. Further analysis¹² shows that by moving beyond the usual risk parity framework, it may be possible to construct allocations that are diversified from a

capital-allocation as well as a risk-contribution perspective, with a higher number of uncorrelated exposures, and less extreme weights and risk allocations.

And at the same time, all of this can be achieved while offering a great degree of flexibility. For example, calibrations can be adjusted to only hold long-only positions and ensure that the overall portfolio volatility equals a given target. It is also possible to add further rules or constraints based on the risk profile and specific requirements of an investor.

Figure 37: Asset allocation and risk allocation as a function of the target volatility



Source: DWS Investments UK Limited. Data as of 12/31/22. For illustrative purposes only. See appendix for the representative index corresponding to each asset class.

¹² See DWS Publication "Time to get a GRIP", 2020: <https://www.dws.com/insights/global-research-institute/time-to-get-a-grip2/>

Appendix 1

Representative indices and their historical returns

Table 9: Each asset class in this publication is forecasted as per its corresponding representative index*

Broad Asset Class	Asset Class	Representative Index	2022	2021	2020	2019	2018
Fixed Income	EM USD High Yield	Bbg Barclays EM USD Aggregate High Yield	-12.36%	-3.18%	4.25%	11.48%	-4.73%
Fixed Income	EM USD Sovereign	Bbg Barclays Emerging Markets USD Sovereign	-17.43%	-2.32%	5.17%	13.35%	-4.20%
Fixed Income	EUR Aggregate	Bbg Barclays Euro Aggregate	-17.17%	-2.85%	4.05%	5.98%	0.41%
Fixed Income	EUR Cash	EUR 3M Libor TR	-0.27%	-0.57%	-0.55%	-0.47%	-0.46%
Fixed Income	EUR Corporate	Bbg Barclays Euro Aggregate Corporate	-13.65%	-0.97%	2.77%	6.24%	-1.26%
Fixed Income	EUR Corporate 1-3	Bbg Barclays Euro Aggregate Corporate 1-3 Years	-4.77%	0.02%	0.69%	1.34%	-0.23%
Fixed Income	EUR Corporate 3-5	Bbg Barclays Euro Aggregate Corporate 3-5 Years	-11.10%	-0.18%	1.56%	4.00%	-0.65%
Fixed Income	EUR Corporate 5-7	Bbg Barclays Euro Aggregate Corporate 5-7 Years	-15.89%	-0.78%	2.97%	7.52%	-1.42%
Fixed Income	EUR Corporate 7-10	Bbg Barclays Euro Aggregate Corporate 7-10 Years	-21.18%	-1.96%	4.38%	10.92%	-2.36%
Fixed Income	EUR High Yield	Bbg Barclays Pan-European High Yield (Euro)	-10.64%	3.43%	2.29%	11.33%	-3.82%
Fixed Income	EUR Treasury	Bbg Barclays Euro Treasury	-18.46%	-3.46%	4.99%	6.77%	0.98%
Fixed Income	EUR Treasury 1-3	Bbg Barclays Euro Aggregate -Treasury 1-3 Years	-4.82%	-0.70%	0.02%	0.28%	-0.09%
Fixed Income	EUR Treasury 3-5	Bbg Barclays Euro Aggregate - Treasury 3-5 Years	-9.95%	-1.18%	1.29%	1.88%	0.09%
Fixed Income	EUR Treasury 5-7	Bbg Barclays Euro Aggregate Treasury 5-7 Years	-14.34%	-1.81%	2.83%	4.23%	0.17%
Fixed Income	EUR Treasury 7-10	Bbg Barclays Euro Aggregate Treasury 7-10 Years	-19.36%	-2.87%	4.52%	6.74%	1.37%
Fixed Income	Global Aggregate	Bbg Barclays Global Aggregate	-16.25%	-4.71%	9.20%	6.84%	-1.20%
Fixed Income	Global Corporate	Bbg Barclays Global Aggregate Corporate	-16.72%	-2.89%	10.37%	11.51%	-3.57%
Fixed Income	Global Government	Bbg Barclays Global Aggregate Treasuries	-17.47%	-6.60%	9.50%	5.59%	-0.38%
Fixed Income	Global High Yield	Bbg Barclays Global High Yield	-12.71%	0.99%	7.03%	12.56%	-4.06%
Fixed Income	US Agg Intermediate	Bbg Barclays US Aggregate Intermediate	-9.51%	-1.29%	5.60%	6.67%	0.92%
Fixed Income	US Aggregate	Bbg Barclays US Aggregate	-13.01%	-1.54%	7.51%	8.72%	0.01%
Fixed Income	US Corporate	Bbg Barclays US Corporate	-15.76%	-1.04%	9.89%	14.54%	-2.51%
Fixed Income	US Corporate 5-7	Bbg Barclays US Corporate 5-7 Years	-11.17%	-1.24%	9.45%	12.68%	-0.74%
Fixed Income	US High Yield	Bbg Barclays US High Yield	-11.19%	5.28%	7.11%	14.32%	-2.08%
Fixed Income	US Treasury	Bbg Barclays US Treasury	-12.46%	-2.32%	8.00%	6.86%	0.86%
Fixed Income	US Treasury 5-7	Bbg Barclays US Treasury: 5-7 Years	-11.23%	-2.87%	8.48%	6.79%	1.44%
Fixed Income	USD Cash	USD 3M Libor TR	1.18%	0.04%	0.58%	2.36%	1.73%
Fixed Income	USD IL Treasuries	Bbg Barclays US Govt Inflation Linked Bonds	-12.60%	6.00%	11.55%	8.75%	-1.48%
Equities	AC Equities	MSCI ACWI	-15.98%	20.89%	14.21%	26.24%	-7.69%
Equities	EM Equities	MSCI EM	-15.54%	-0.19%	19.12%	18.05%	-10.07%
Equities	EMU Small Cap Equities	MSCI EMU Small Cap	-12.47%	22.16%	-1.02%	25.47%	-12.70%

*Realised Returns referenced in this table represent the last five years 2017-2022. It is intended to represent a snapshot in time and not exhaustive for all time periods. Source: Bloomberg Finance L.P., DWS Investments UK Limited. As of 12/31/22. Past performance, actual or simulated, is not a reliable indicator of future results.

Table 9: Each asset class in this publication is forecasted as per its corresponding representative index*

Broad Asset Class	Asset Class	Representative Index	2022	2021	2020	2019	2018
Equities	Europe Equities	MSCI Europe	-8.54%	22.61%	-2.21%	23.75%	-10.59%
Equities	Europe Small Cap Equities	MSCI Europe SmallCap	-20.64%	20.97%	5.88%	29.01%	-15.56%
Equities	Eurozone Equities	MSCI EMU	-12.49%	22.14%	-1.00%	25.44%	-12.75%
Equities	Japan Equities	MSCI Japan	-4.10%	13.81%	9.17%	18.94%	-14.85%
Equities	Switzerland	MSCI Switzerland	-17.06%	22.97%	1.91%	29.98%	-8.03%
Equities	US Equities	MSCI USA	-19.85%	26.45%	20.73%	30.88%	-5.04%
Equities	US Small Cap Equities	MSCI USA Small Cap	-17.55%	19.11%	18.32%	26.74%	-10.40%
Equities	World Equities	MSCI World	-16.04%	24.17%	13.48%	27.34%	-7.38%
Alternative	Australia REIT	S&P AUSTR REIT	-21.11%	26.08%	-3.88%	18.14%	4.52%
Alternative	Broad Commodities	Bbg Commodity	16.10%	27.11%	-3.12%	7.69%	-11.25%
Alternative	Crude Oil	Bbg Composite Crude Oil	32.53%	63.34%	-41.92%	34.88%	-17.64%
Alternative	Energy	Bbg Energy	36.22%	52.12%	-42.71%	11.76%	-12.69%
Alternative	EUR Infrastructure IG	Markit iBoxx EUR Infrastructure Index	-15.91%	-1.55%	3.15%	6.91%	-1.24%
Alternative	Global Infra. Equity	DJ Brookfield Global	-6.62%	19.87%	-6.97%	28.69%	-7.87%
Alternative	Gold	Gold Futures	-0.70%	-3.58%	23.97%	17.96%	-2.50%
Alternative	Hedge Funds: Composite	Hedge Funds	-4.20%	10.16%	11.83%	10.45%	-4.75%
Alternative	HF - Equity Hedge	HFRI Equity Hedge	-10.21%	11.67%	17.89%	13.71%	-7.14%
Alternative	HF - Equity Market Neutral	HFRI EH: Equity Market Neutral	1.57%	7.05%	-0.11%	2.33%	-0.98%
Alternative	HF - Event-Driven	HFRI Event-Driven	-4.65%	12.41%	9.26%	7.49%	-2.13%
Alternative	HF - FoF Composite	HFRI Fund of Funds Composite	-5.25%	6.17%	10.88%	8.39%	-4.02%
Alternative	HF - Macro	HFRI Macro	8.99%	7.72%	5.38%	6.50%	-4.08%
Alternative	HF - Macro: Systematic	HFRI Macro: Systematic Diversified	12.16%	6.43%	2.61%	7.08%	-6.62%
Alternative	HF - Merger Arbitrage	HFRI ED: Merger Arbitrage	2.86%	10.63%	5.20%	6.81%	3.29%
Alternative	HF - Relative Value	HFRI Relative Value (Total)	-0.80%	7.59%	3.38%	7.42%	-0.43%
Alternative	Japan REIT	S&P Japan	-5.72%	19.37%	-13.66%	24.74%	10.29%
Alternative	Private EUR Infra. IG	Private (Markit iBoxx EUR Infrastructure)					
Alternative	Private RE Equity Asia Pac	Private real Estate Equity Asia Pac					
Alternative	Private RE Equity UK	Private real Estate Equity UK					
Alternative	Private RE Equity US	Private real Estate Equity US					
Alternative	Private USD Infra. IG	Private (Markit iBoxx USD Infrastructure Index)					
Alternative	United States REIT	S&P USA REIT	-24.36%	43.05%	-7.52%	24.45%	-3.79%
Alternative	US Infra. Equity	DJ Brookfield US	-5.45%	23.69%	-12.30%	27.86%	-10.53%
Alternative	USD Infrastructure IG	Markit iBoxx USD Infrastructure Index	-16.64%	-0.47%	10.30%	15.25%	-3.33%

*Realised Returns referenced in this table represent the last five years 2017-2022. It is intended to represent a snapshot in time and not exhaustive for all time periods.

Source: Bloomberg Finance L.P., DWS Investments UK Limited. As of 12/31/22. Past performance, actual or simulated, is not a reliable indicator of future results.

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