RESEARCH INSTITUTE

DWS

February 2021

DWS LONG VIEW

Table of contents

The green decade

"The stock market is a device for transferring money from the impatient to the patient."
Warren Buffet[1]

There is no shortage of challenges for long term investors. The strong performance of risk assets in 2020 has further compressed return expectations, and there exists ongoing concern about (i) how economies will emerge from the current crisis and (ii) who will foot the final bill for COVID-19. In 2008, expectation were that changes would be required, driven by the reallocation of wealth and shifting focus away from debt as a driver of growth. In the end, the only sector affected by the financial crisis was 'financials'. As for other industries and the broader global economy, we have seen a continuation of pre-2008 trends, i.e. increasing debt and wealth disparity. Will it be different this time around?

What is for sure different this time around is the issue of ESG and climate change. The Dasgupta Review, commissioned by the UK Government, makes it clear that since the 1950s, the growth in life expectancy, decrease in poverty, and growth in GDP have been to the detriment of the stock of 'natural capital', and continuing along this path is not sustainable. On the back of the US re-entering the Paris Agreement, investors should expect a new impetus on 'sustainability' and ESG. However, there is still much confusion.

Currently, most ESG investments are considered 'outside-in', meaning they focus on integration or 'risk management' (as per the PRI definition) around ESG or impact metrics. This approach to ESG investing faces some ongoing challenges including inconsistencies across both ESG factors and the litany of ESG data providers, but we are making important progress on many fronts. The European Securities and Markets Authority (ESMA) is calling for legislative action on ESG ratings and assessment tools to remove some of the ambiguity about measurement, and IFRS is seriously considering setting up a Sustainability Standard Board.

The second approach, termed 'inside-out', focuses on investing through activate engagement, facilitating changes that drive positive impact. The prevalence of 'inside-out' investing is likely to grow meaningfully in the coming decade, as evidenced by the IFRS consultation on sustainability launched late last year. We have submitted our own views but recognize that the journey to ESG investing through active engagement will take time.

For now, we conducted researched on two fronts: first on how best to integrate ESG into Strategic Asset Allocations ("SAAs")[2] and second on how integrating ESG risks into portfolios affects long term expected returns. In this edition of the *Long View*, we introduce 10-year risk, return, and correlation assumptions for a set of ESG indices. In this report, our analysis indicates, on average, investors should expect a modestly better return when using ESG versions of major indices. While valuations are higher for ESG, EPS growth has empirically favoured companies with better ESG scores.

These capital market assumptions, in combination with our ESG SAA portfolio construction framework, may provide investors with the tools necessary to holistically pursue desired objectives, both financial and ESG. Table 1 presents our return forecasts for various asset classes.

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

	Forecasted returns (2021-2030)	Change from last year's 10Y forecast	Realized returns (2011-2020)
Equity			
ACWI Equities	4.9%	-0.5%	10.1%
EM Equities	4.9%	-1.6%	6.6%
US Equities	5.1%	-0.3%	13.4%
Europe Equities	4.5%	-0.6%	6.3%
Germany Equities	4.3%	-0.2%	6.5%
UK Equities	6.5%	-1.0%	4.4%
Japan Equities	3.0%	-0.5%	9.4%
Fixed Income			
EUR Treasury	-0.5%	-0.4%	4.7%
EUR Corporate	0.0%	-0.6%	3.9%
EUR High Yield	1.5%	-0.7%	6.4%
US Treasury	0.8%	-1.3%	3.3%
US Corporate	1.2%	-1.3%	5.6%
US High Yield	2.3%	-1.2%	6.8%
EM USD Sovereign	3.8%	-2.1%	6.0%
EM USD Corporate	3.1%	-1.1%	5.7%
Alternatives			
World REITS	5.5%	-0.1%	7.5%
United States REITS	6.1%	-0.2%	8.2%
Global Infra. Equity	6.0%	0.3%	8.1%
US Infra. Equity	6.5%	0.6%	5.5%
Private RE Equity US	7.4%	0.6%	10.3%
EUR Infrastructure IG	0.0%	-0.6%	4.5%
Private EUR Infra. IG	1.1%	-0.3%	6.9%
Hedge Funds: Composite	2.3%	-1.2%	4.2%
Broad Commodities Fut.	-0.1%	-2.1%	-6.5%

Source: DWS Investments UK Limited. Data as of 12/31/20. All returns (incl. forecasts) are in local currency. See appendix for the representative index corresponding to each asset class.

[1] https://grow.acorns.com/investing-rules-that-warren-buffett-thinks-everyone-should-follow/
[2] DWS Group. (December 2020). "ESG in Strategic Asset Allocation (SAA): a practical implementation framework."
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.

ESG

The growing importance of ESG and impact investing can be observed via the significant flow of assets into ESG investments. In order to best equip investors to think strategically about ESG, we are introducing 10-year return forecasts across 13 ESG indices[3] In tandem with empirical risk/return analysis and ESG impact[4], this set of ESG-specific capital market assumptions can help investors construct strategic long-term portfolios with consideration to both traditional financial metrics as well as ESG impact metrics.

As ESG and climate change are further integrated into investment policies and objectives, investors are increasingly applying a finer microscope to ESG impact within their investment portfolios. Focusing first on the 'outside-in' approach, Table 2 presents our 10-year return forecasts across these ESG and traditional indices.

Table 2: 10Y return forecasts p.a. in local currency

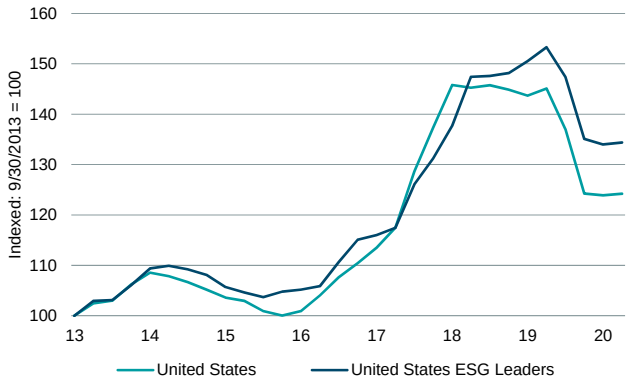
	ESG	Traditional
Equity		
ACWI Equities	5.4%	4.9%
World Equities	5.6%	4.9%
EM Equities	4.8%	4.9%
US Equities	6.0%	5.1%
Europe Equities	5.4%	4.5%
Japan Equities	2.6%	3.0%
Fixed Income		
EUR Treasury	-0.5%	-0.5%
EUR Corporate	0.0%	0.0%
EUR High Yield	1.5%	1.5%
US Corporate	1.1%	1.2%
US High Yield	2.8%	2.3%

Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

For ESG index return forecasts, we utilize the same three-pillar approach that we use for traditional indices. Although the forecasted returns for these ESG indices do not go beyond our building blocks framework for traditional asset classes—i.e. we do not go as far to present ESG as a distinct, identifiable alpha factor in the *Long View*—there are a few specific considerations of which ESG investors should be aware of strategically:

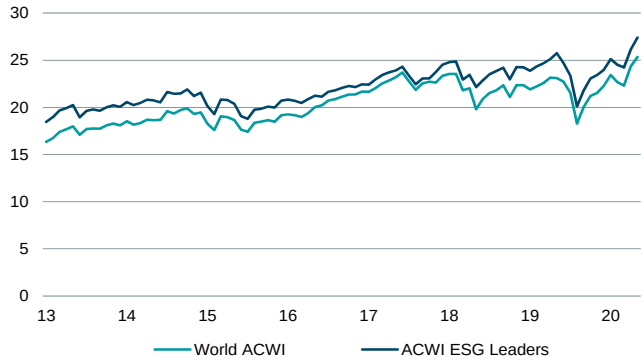
- Equity return forecasts for ESG indices are modestly higher across most regions.
- This is primarily due to more resilient buyback yields amid fundamental pressure and a lesser impediment from valuation normalization.
- ESG equity indices do trade on higher valuations than their traditional counterparts, but this has been the case consistently over the past decade; in fact, the ESG indices today trade at a lesser premium to their own historical valuations than do traditional indices (see Figure 2). Thus, valuation adjustments are less significantly negative for regional ESG indices.
- Empirically, EPS growth has been higher for better ESG-rated companies (see Figure 1), which provides support for structurally higher valuations
- Across fixed income asset classes, ESG and traditional return forecasts are broadly comparable

Figure 1: Historical EPS growth of MSCI ESG USA and MSCI USA



Source: Bloomberg Finance L.P. Finance L.P. Data as of 12/31/20

Figure 2: Historical P/E ratios of MSCI ESG ACWI and MSCI ACWI



Source: Bloomberg Finance L.P. Finance L.P. Data as of 12/31/20.

[3] ESG coverage includes EM USD Sovereign and EM USD Corporate, which are excluded from the table as the ESG and traditional indices are not broadly comparable based on index construction methodology. US Treasuries are not included as they are already considered ESG compliant.
[4] DWS Group. (December 2020). "ESG in Strategic Asset Allocation (SAA): a practical implementation framework."
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.

We find that the above subset of ESG indices can be used to establish a deep, impactful approach that is consistent with our firm-wide policy, which places significant focus on the climate change and engagement topics along the lines of the UN Sustainable Development Goals (SDGs). Certain exclusions are also enforced across these indices (e.g. controversial weapons exclusion "CCW"). Within a ESG 'outside-in' framework, metrics include but are not limited to Climate Transition Risk ("CTR") and UN Global Compact ("UNGC") risks, minimization of DWS Overall ESG Score F and E-rated securities (see Table 3), —or correspondingly, maximization of A and B-rated securities CO2 intensity, and minimization of controversial sectors.

By combining the Long View risk, return, and correlation forecasts for this universe of ESG indices with DWS' approach to constructing ESG SAAs, investors may be able to pursue desired ESG metrics through a risk-efficient process or optimize ESG impact for a given level of relative or absolute ex ante portfolio risk.

Table 3: Percentage of ESG and traditional indices that are CTRR E/F-rated

	ESG	Traditional
Equity		
US Equities	3.1%	5.6%
Europe Equities	1.7%	8.6%
Japan Equities	4.8%	5.8%
EM Equities	10.1%	14.4%
Fixed Income[5]		
EUR Aggregate	0.6%	2.2%
US Aggregate	4.5%	4.5%
Euro Corporates	8.9%	11.3%
US Corporates	14.4%	11.5%
Euro High Yield	8.8%	15.9%
US High Yield	22.8%	22.0%
EM USD Sovereign	8.1%	10.3%

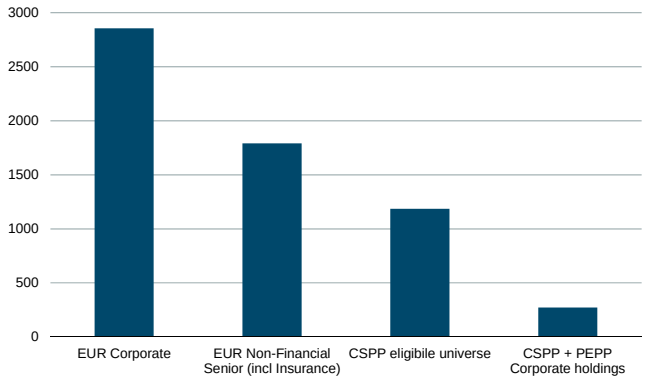
Source: Source: DWS Investments UK Limited. Data as of 12/31/20.

[5] We use different index providers when comparing ESG to non-ESG for Euro High Yield, US High Yield, and EM USD Sovereign asset classes.

Central-bank policy and volatility

Coming into 2020, historically low global government bond yields reflected the significant magnitude of quantitative easing programmes initiated by central banks in the decade following the Global Financial Crisis. Any expectation of gradual normalization of interest rates has likely been delayed, at least in the shorter term. The Federal Reserve (the Fed) decision to raise interest rates from 2015 to 2018 seems like a distant memory. Not only is the Federal funds target range back at 0-25bps, the Fed has expanded on its asset purchase program by accelerating the rate of its purchases of treasuries and mortgages to $80bn and $40bn per month, respectively. The Fed's balance sheet has expanded to over $7.3tr from $4.2tr [6]. Immediately following the Fed's decision to cut U.S. interest rates back to zero percent in March, the Bank of Japan ("BoJ") committed to doubling its purchasing of exchange-traded funds ("ETFs"") to ¥12tr and increase the target of its commercial paper and corporate bond purchases by ¥2tr. The BoJ has since extended its special support programs until at least mid-2021 to counteract the continued negative impacts of the pandemic on business-related activity.

Figure 3: EUR corporate market and ECB holdings within CSPP



Source: Bloomberg Finance L.P. Finance L.P. Data as of 12/21/20.

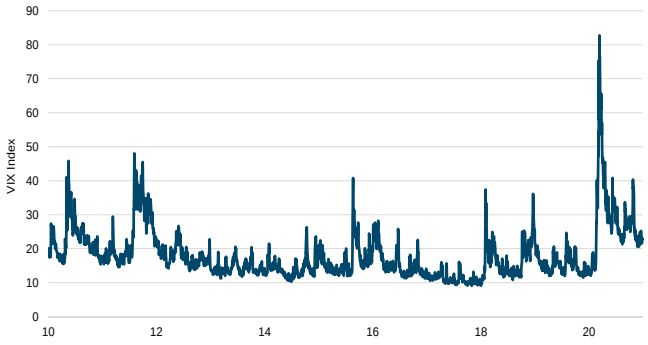
While gradual central bank policy normalization is to be expected over the longer term, the magnitude of asset purchases by global central banks is likely to have at least some residual effects on financial markets and the broader economy as a whole. Asset price reflation has been rapid, leading to valuations that are elevated by any historical standard despite the aforementioned outstanding downside risks to longer term global growth. While investors and borrowers have reaped the benefits of reduced costs of funding, savers have sacrificed their returns.

Interestingly, market volatility has been somewhat atypical of such a strong rally in risk markets. Prior to 2020, apart from momentary bouts of volatility during the European debt crisis, just a year ago. Further, at the height of the March market turmoil, the CARES Act approved the purchasing of corporate bonds as part of the Fed's asset purchase program, further intertwining risk assets with central bank policy.

In March, the European Central Bank ("ECB") announced a €750bn Pandemic Emergency Purchase Program ("PEPP") targeted toward private and public sector securities and has since expanded PEPP to €1.85tr and extended the horizon for net purchases under the PEPP to at least the end of March 2022

the taper tantrum, the collapse of crude oil prices and the energy sector, and the China trade war, the post-GFC environment has marked a period of low and seemingly declining market volatility. Despite an arguably unprecedented period of market strength following the March selloff, equity implied volatility remains elevated above long-term average levels. Implied correlations within the S&P 500, perhaps one of the main causes for historically low volatility in recent years, remain elevated above multi-year averages. With the backdrop of continued easy monetary policy, it remains to be seen if this observation challenges the broadly-accepted argument that central bank support helps keep equity price volatility muted. This argument relies, to an extent, on central bank policy helping to reduce uncertainty about future corporate cash flows, thus reducing the risks of disorderly adverse outcomes. While increases in central bank balance sheets in tandem with fiscal stimulus packages help to mitigate these risks, some uncertainties remain about the fundamental impact of the COVID-19 crisis.

Figure 4: VIX levels (1/1/10 to 12/31/20)



Source: Bloomberg Finance L.P. Finance L.P. Data as of 1/4/21.

Short term growth pickup with longer term headwinds

With the severest recession in post war history just behind us and the justified hope of vaccinating large parts of the

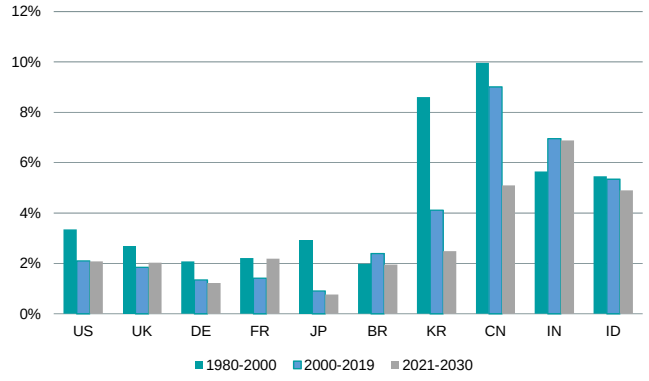
[6] https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.mp201210~8c2778b843.en.html

population in front, economic growth will probably look very strong for the next few quarters. However, this will be a short-lived high. As soon as the output gap has narrowed, growth may slow substantially as two fundamental impediments to growth may start to bite.

Labor force growth was a long-term tail wind for the growth potential. Now the demographical tide may turning and the tail wind may turn into headwind, in particular in developed markets. However, also in emerging markets the working age population is growing at slower speed or even declining, as in China.

Unfortunately, the other factor that drives long-term growth, namely labor productivity growth, has been in structural decline for many decades. This may come as a surprise for many but productivity growth is far duller than most think. It is therefore highly unlikely that a boost in productivity may offset the demographical challenges the world faces. However, there are regions that still profit from a demographical dividend and outstanding productivity growth. These are found in some emerging markets, in particular emerging Asia (see Figure 5).

Figure 5: Real GDP growth rates across countries, annual



Source: Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21. Arithmetic mean of annual growth rates. Forecasts are not a reliable indicator of future returns. Forecasts are based on assumptions, estimates, views, and hypothetical models or analyses, which might prove inaccurate or incorrect.

More optimism in some alternative asset classes

While we expect economic and market fundamentals to continue to recover over the ensuing quarters, the recovery in asset prices leaves investors with a challenging return outlook going forward for the next decade.

Across equity markets, forecasted annual global equity (4.9 percent) returns are led by the US (5.1 percent) and emerging markets (4.9 percent). Structural growth rates remain a challenge for equity investors, with valuations becoming an increasing obstacle as risk asset prices have continued to rally. Segments of the alternative equity do offer a more sanguine return outlook. US Private RE equity (7.4 percent) and US Infrastructure Equity (6.5 percent) among others offer higher return potential for investors.

Across fixed-income securities, apart from the extreme market stress in the early stages of the COVID-19 crisis, the search for yield amid unprecedented central bank asset purchases has left many markets at or near all-time low yield levels. The safety valve provided by global central banks to reintroduce order to capital markets earlier in the year has only increased dependencies of investors on persistent accommodative monetary policy. Return forecasts across corporate credit markets face even greater hurdles than they did just a year ago amid low starting yields and continued headwinds from ratings migration and default losses, with US High Yield (2.3 percent) and EM USD Sovereigns (3.8 percent) offering the highest return potential. Unsurprisingly, developed market treasury bond returns are forecasted to be low in real and nominal terms, highlighted by US Treasuries (0.8 percent) and Euro Treasuries (-0.5 percent). This is all with the backdrop of extended interest rate duration across these markets.

Elsewhere, commodity return forecasts may offer few incentives for long term investors, even when considering their diversification benefits. Valuations across the precious metals complex present some challenges while commodity carry has generally trended down alongside global interest rates. Meanwhile, the inflation outlook—a key driver for commodity return expectations—remains benign for now, but it is worthwhile, in our opinion, for investors to keep an eye on the longer term impacts of debt-funded fiscal and monetary stimulus.

The Long View

As we enter the new decade, there is no shortage of challenges but investment 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

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.

Contributors

Jason Chen
Research Institute

Rob Bush
Research Institute

Eric Legunn
Research Institute

Gianluca Minella
Alternatives Research & Strategy

Martin Moryson
Chief Economist Europe

Ajay Chaurasia
Research House

Vivek Dinni
Research House

Mital Parekh
Research House

Dirk Schlueter
Research House

Bhavesh Warlyani
Research House

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

Americas

Dokyoung Lee
dokyoung.lee@dws.com

Lloyd Ayer
lloyd.ayer@dws.com

Nikita Patil
nikita.patil@dws.com

Executive summary

There is no shortage of challenges as we officially enter a new decade. While economic growth is likely to gradually normalize over the next few years, the potential for longer lasting COVID-19 impact remains. Many restrictions on goods production may remain, with production diversified to more locations at the cost of some economies of scale. Similarly, more inventory requirements are likely to be required. The prioritization of addressing climate change will likely shift the composition of the global economy toward one more focused on long-term environmental sustainability.

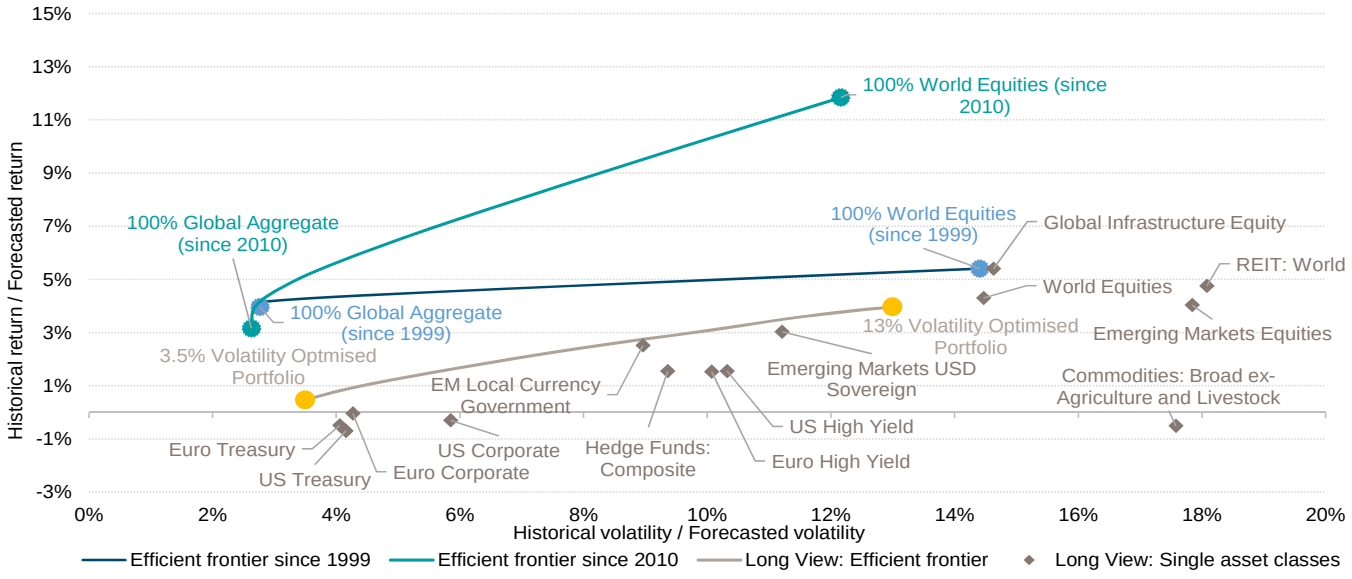
At the outset of the year, asset prices remained elevated, carrying momentum from the continued sanguine economic growth and a decade of supportive monetary policy. Growth prospects remain challenged, particularly across developed economies, due to intensifying demographic shifts as baby boomers continue to retire and working-age populations continue to shrink. To close out the year, valuations across assets—elevated equity multiples, compressed credit spreads, and historically low treasury yields—reflected little anticipated change in economic or market conditions. These elevated valuations reflect the magnified support for financial markets provided by global central banks over the course of this year. 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 have to make between risk and returns. The chart below depicts the efficient frontier over the last ten 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 greater compensation for commensurate levels of risk in the decade following the financial crisis.

In an environment of more conservative asset-class return expectations, strategic asset allocation becomes increasingly important, utilizing a rigorous and disciplined approach to portfolio construction. The prevalence of ESG investing over the past year alone has been quite dramatic across almost all segments of asset markets and will continue to be a building block for investor portfolios. Thus, for the first time, we incorporate a number of important regional ESG indices into our return forecasts.

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.

Figure 6: 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 12/31/20. 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 25 for more details on these optimisation techniques). Source: DWS Investments UK Limited. Data as of 12/31/20. 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.

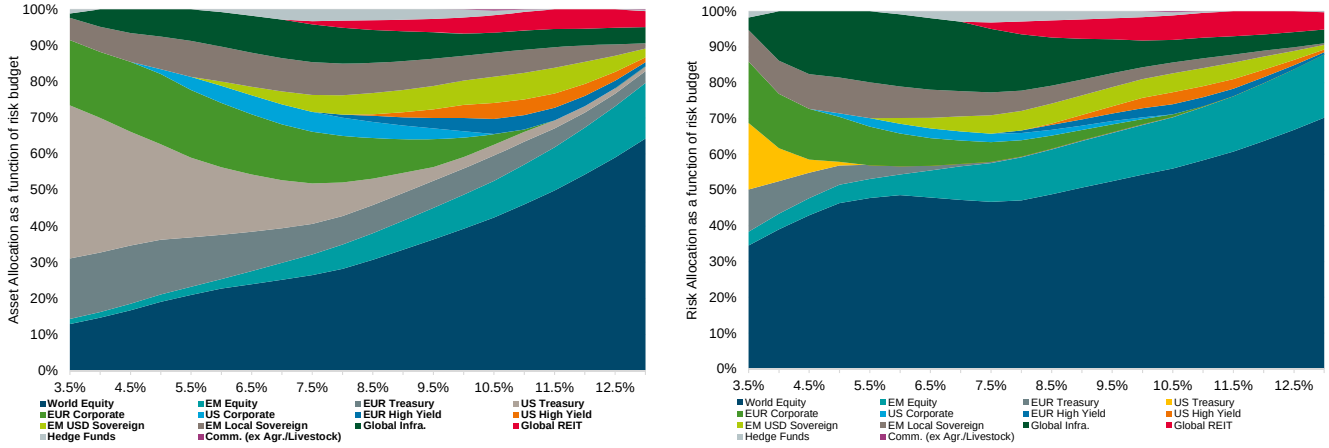
Central to this document is our belief that clients should consider a long term perspective beyond 1–5 years when it comes to constructing investment portfolios. Perhaps, counterintuitively, extending the investment horizon has, in the past, produced less volatile, more precise forecasts, as shown in Figure 8: 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).

For example, we believe that many asset-class valuations are high today relative to history. But taking one of the biggest previous bubbles (the dot.com boom) as an example, the difference between buying exactly at the peak of the dot.com boom in April 2000 vs. a year later only amounts to one percent compounded annually when investing with a 15-year time horizon (as we show on page 16). 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 greater, amounting to roughly six percent per annum. Thus, while asset prices may be high today relative to history, over long-run periods (15 years in this example), returns seem to be driven by their underlying fundamental building blocks.

When looking at rolling one-year price returns of the S&P 500 from 1871 to 2019, a negative two-standard-deviation move equated to a 27 percent decline in prices. 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.

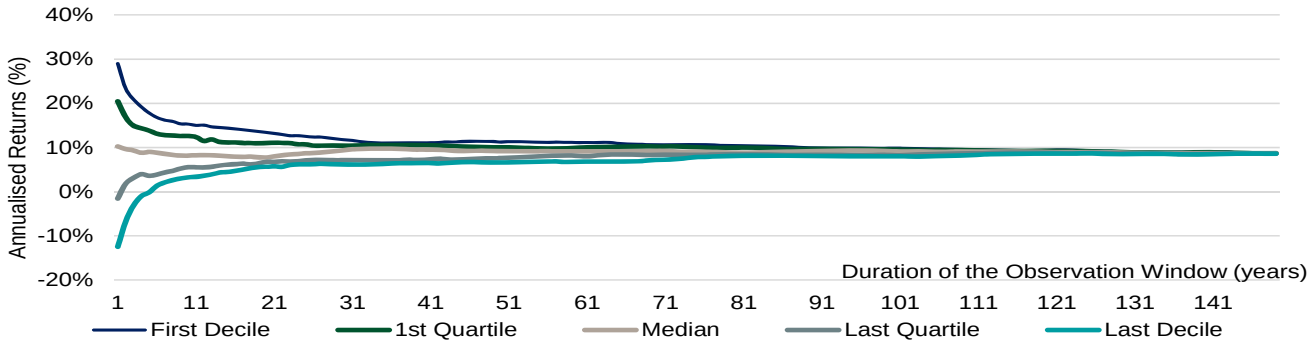
Hence, sceptics may be surprised to learn that the volatility of returns historically has been lower when using long-term horizons, although past performance may not be indicative of future results.

Figure 7: Asset allocation and risk allocation by target volatility



Source: DWS Investments UK Limited. Data as of 12/31/20. For illustrative purposes only. See page 25 for details. See appendix for the representative index corresponding to each asset class.

Figure 8: Distribution of U.S. equities: Historical returns over different time periods, annualised



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

Forecasts are not a reliable indicator of future returns. 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 indication of future performance.

Framework

We use the same building-block approach to forecasting returns irrespective of asset class. We believe this brings consistency and transparency to our analysis and also may help clients better understand the constituent sources of 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 show in Figure 9.

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 9: 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. As of 12/31/20.

Figure 10: 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	Earnings growth	Valuation adjustment			
Private real estate equity	Dividend yield	Inflation	Earnings growth	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 infra-structure debt	Yield	Roll Return		Valuation change	Credit migration	Credit default	Liquidity premium

Source: DWS Investments UK Limited. As of 12/31/20.

Forecasts are based on assumptions, estimates, views and or analyses, which might prove inaccurate or incorrect.

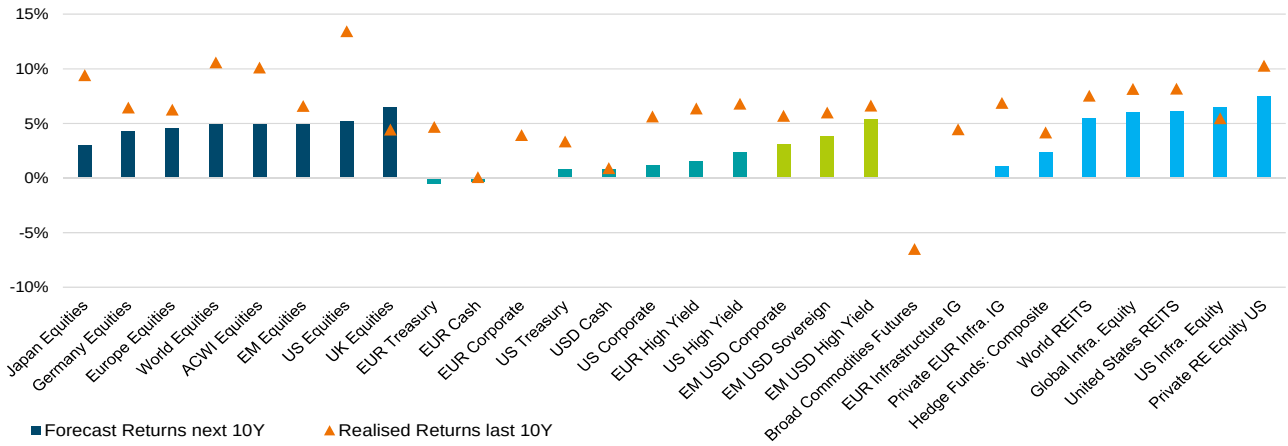
Return forecasts

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:

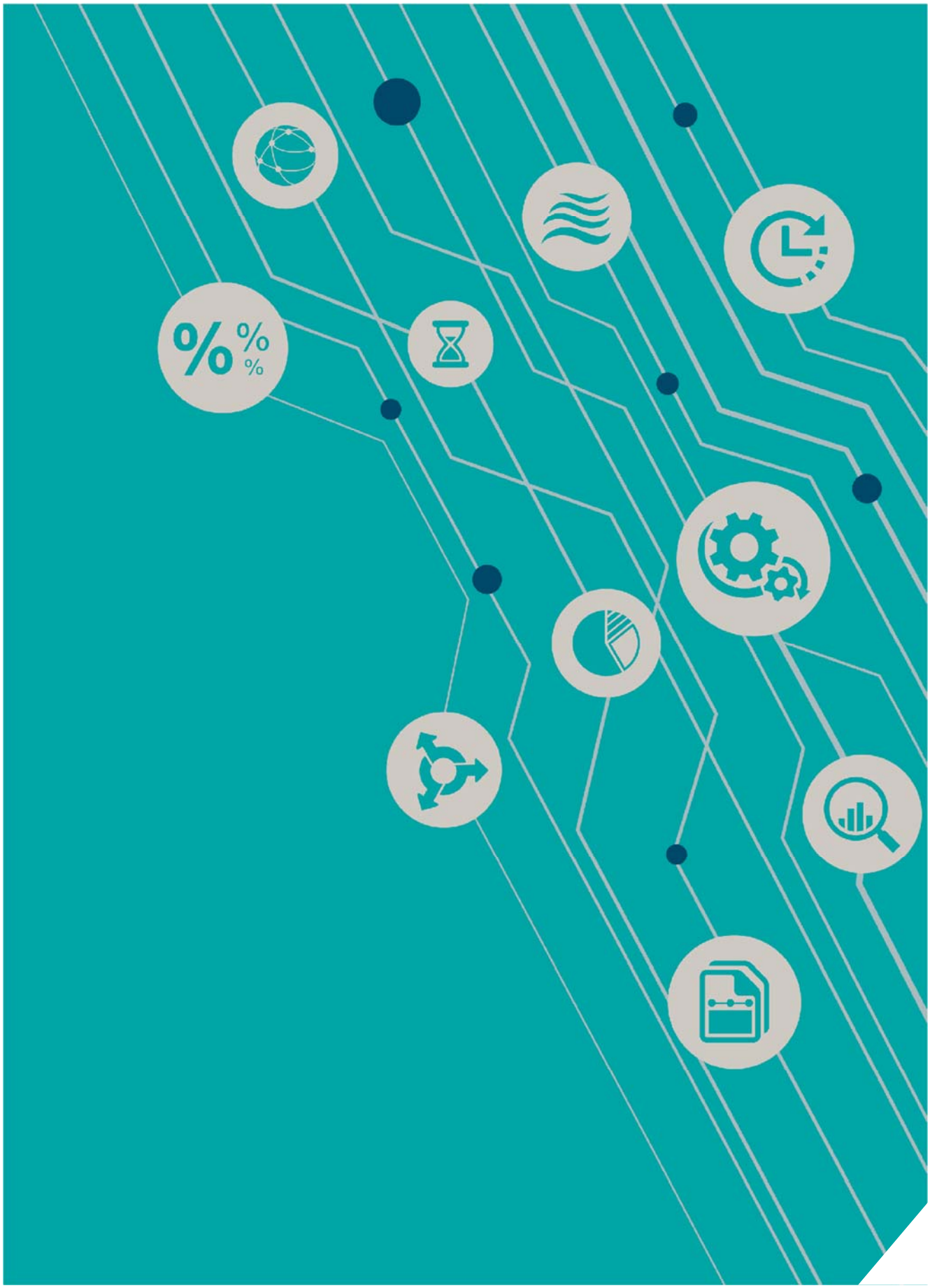
- Return forecasts in almost all asset classes are well below the returns achieved over the past decade, illustrating ongoing challenges for long-term investors.
- Across regional equity markets, the US and emerging markets are expected to offer the highest forecasted returns.
- ESG equity forecasts are modestly higher than are market cap-weighted indices across regions (see Table 2).
- Fixed income returns may be challenging, with emerging-market U.S. dollar (USD) sovereign and corporate bonds appearing to offer the highest forecasted returns.
- Relative to history, the return forecasts for credit (across IG and HY corporates as well as sovereign and corporate EMD) are near or below the lowest 10-year returns realized by these asset classes over the past several decades, including the financial crisis.
- Relative to many other asset classes, we forecast higher returns in many of the alternative asset classes covered (even though this premium has shrunk somewhat versus traditional risky asset classes); the highest return forecast in the major asset classes is currently found in private real estate.
- Return forecasts from commodities are low (especially in real terms) but they could provide useful diversification benefits.
- 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 (see page 31).

Figure 11: Forecast and realised returns for 10 years, annualised (local currency)



Source: DWS Investments UK Limited. As of 12/31/20. 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

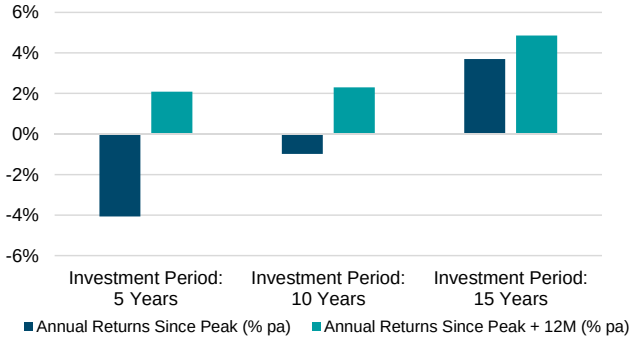
A long-term view reduces the problem of market timing

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 premium[7] available for each asset class.

To illustrate this, Figure 12 compares the annual return for an investor buying U.S. stocks in April 2000 and 12 months later. April 2000 was one of the most expensive valuation points for most equity indices until late 2007, 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, turning negative 4 percent return per annum into a more comfortable 2.1 percent annual return over the ensuing five-year period.

Figure 12: U.S. equity performance over various time periods



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 12 shows that an investor's total return would have been much less sensitive to market timing as over time, prices reverted to their long-run trend. What is more, it has been suggested that about 90 percent of portfolio returns come from asset allocation.[8] 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 time-frame for a full market cycle to occur.

[7] 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.
[8] See, among others, (Brinson, Singer and Beebower 1991) for an in-depth analysis of the relative impact of Strategic Asset Allocation in portfolios' performance.
Past performance, [actual or simulated], is not a reliable indication of future performance.

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

Consider the performance of U.S. equities since 1871 (Figure 13) based on Robert Shiller data.[9]

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 13 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-term[10] losses.

To quantify historical return versus short-term risk, Figure 14 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

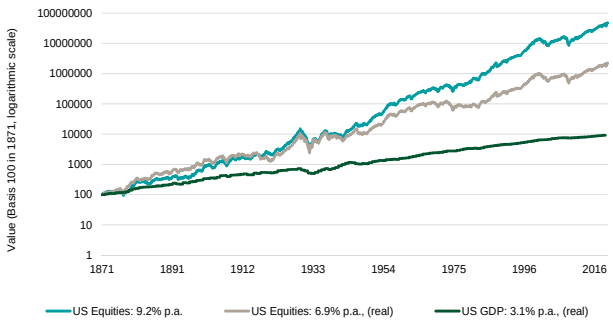
How does the Long View's ten-year time frame look in terms of return stability? Table 4 provides average and various standard deviation levels across different time periods for U.S. equity investors. As can be seen, the range of returns becomes narrower as the time horizon increases.

Table 4: Average and standard deviation of realised U.S. equity returns over different time periods, annualised

Maturity (year)	1	5	10
Average (IRR) – 2 StDev	–27.3%	–6.0%	–0.4%
Average (IRR) – 1 StDev	–9.3%	1.3%	4.1%
Average (IRR)	8.7%	8.7%	8.7%
Average (IRR) + 1 StDev	26.7%	16.0%	13.3%
Average (IRR) + 2 StDev	44.7%	23.4%	17.9%

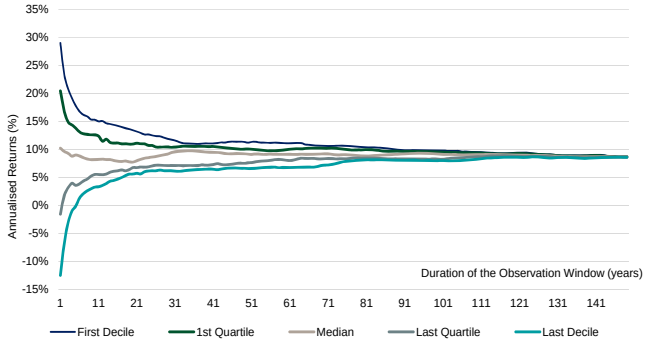
Source: Robert J. Shiller, DWS Investments UK Limited. U.S. equity returns for respective time periods between 1871 and 2020 Data as of 12/31/20

Figure 13: U.S. equity returns and U.S. GDP growth (1871–2020)



Total-return performance represented by S&P 500 TR
Source: Robert J. Shiller, Maddison Project Database 2020, DWS Investments UK Limited.

Figure 14: The longer the holding period, the more consistent the average return of U.S. equities (January 1871 to September 2020)



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

[9] Long-term U.S. equities data is available at (Shiller, Online Data Robert Shiller 2019) and long-term macro-economic data is sourced from (Maddison 2019).
[10] "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

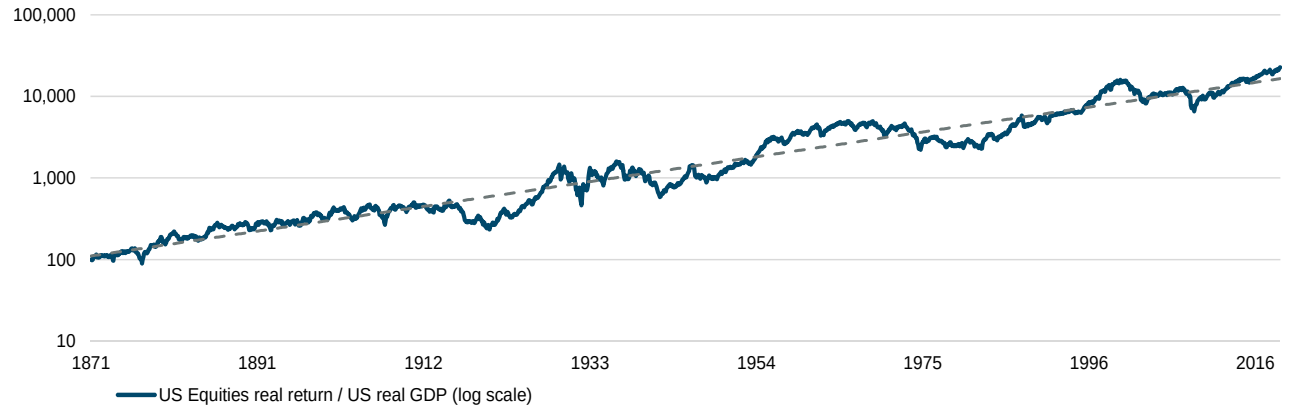
Equity returns as a function of economic growth

Many believe forecasting market returns is a fool's errand, but over extended time horizons it has been shown that returns have historically had a tendency 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 15 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.

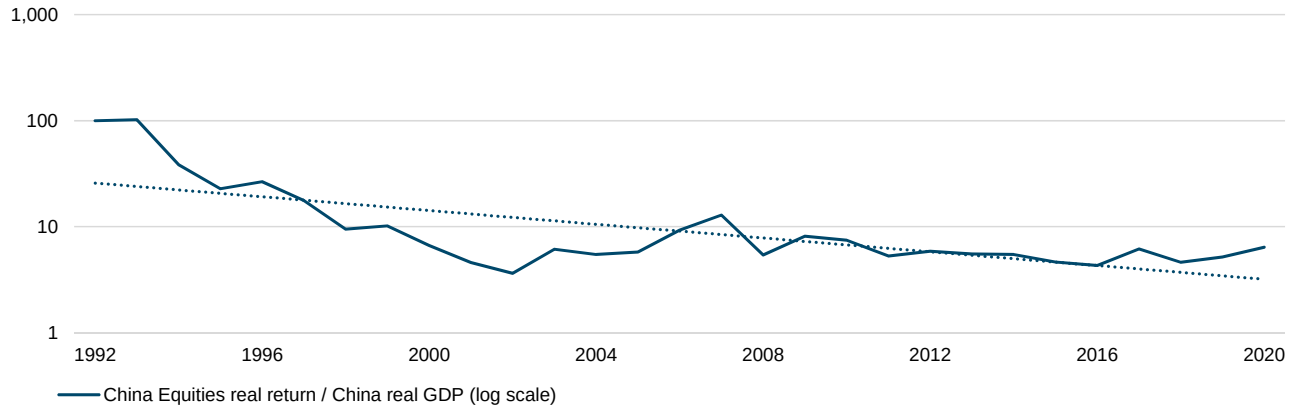
In emerging markets, however, our analysis suggests that for certain countries, GDP growth has not translated proportionately into earnings growth for broader equity indices (see the ratio for the MSCI China in Figure 16 as an example). One potential reason for this divergence, in our view, is the difference in the structure of the economy and the composition of equity benchmarks. However, careful analysis is required regarding the structure of each benchmark: in the current edition, we introduce long-term return forecasts for China A shares (CSI 300) for the first time, and we find that these have tended to display a better link with China GDP growth (see page 44).

Figure 15: The ratio between the real total return of U.S. equities and U.S. real GDP has grown at 3.7% (1871-2019), log scaled and indexed: 01/1871 = 100



Source: Robert J. Shiller, Maddison Project Database 2020, DWS Investments UK Limited. Data from 1871 to 2019.

Figure 16: The ratio between the real total return of MSCI China and China real GDP growth (1992-2020), log scaled, indexed: 01/1992 = 100



Source: Bloomberg Finance L.P., IMF World Economic Database, DWS data as of 1992 to 2020.

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

An equity forecast

In an effort 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 17.

Figure 17: Pillar decomposition: Equities

Source: DWS Investments UK Limited. As of 12/31/20.

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

- For past expectations of future ten-year inflation expectations (a so-called backcast) we followed the methodology developed by (Groen and Middeldorp 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

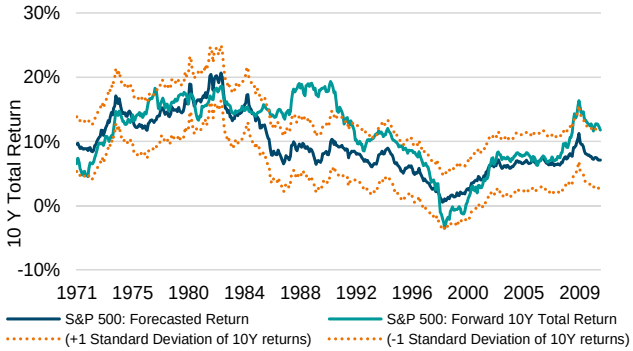
The results suggest the return forecast of our Long View equity methodology appears to provide a reasonable estimate of future performance. Figure 18 shows the return forecasts versus realised returns. While there are periods where divergence exceeds one standard deviation, we would highlight two statistics 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 18 illustrates what investors may observe from our ten-year forecast methodology: a reasonable indicator of long-run market trends.

Figure 18: Our forecast would have provided estimates for U.S. equity returns within one standard deviation (1971 through 2010)



Total return performance represented by S&P 500 TR. Source: Robert J. Shiller, Maddison Project Database 2020, DWS Investments UK Limited. Data from 1971 to 2020. The forward 10Y return show the realised return over the subsequent 10 years. The first10-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 modeling 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

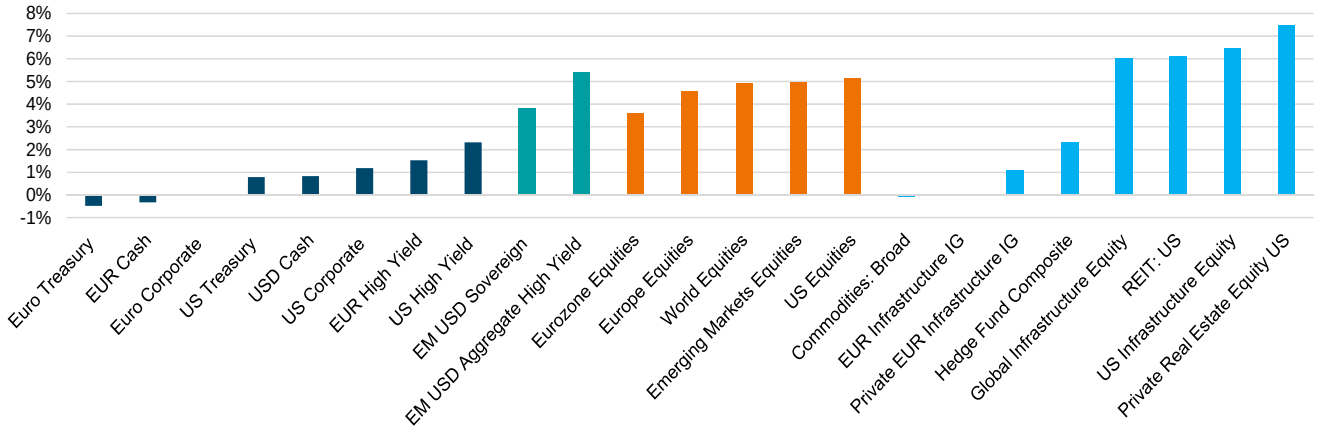
Our forecasted returns for the next decade

In this section, we summarize our Long View forecasts. Figure 19 shows the total-return forecasts for each asset class.[11]

Across asset classes, returns look disappointing in both absolute and real terms. Return forecasts for global equity markets fall short of 5 percent per annum and across many developed markets are even lower in local-currency terms. Fixed-income returns offer perhaps an even less rosy outlook, with sovereign bond forecasted returns below 1 percent (and in some cases, negative) and US high yield and emerging markets sovereign bonds at 2.3 percent and 3.8 percent, respectively. For context, this would put total returns on US high yield into the lowest percentile of all 10-year returns since 1983 (with only the decade to the peak of the financial crisis delivering even lower total returns). US investment grade corporates offer an even more drastic example: our current forecasted 10-year return of 1.2 percent is two-thirds lower than the lowest realized 10-year return for US IG since at least 1973 (even the decade prior to 2008 saw an annual return of 3.7 percent).

Among the riskier assets, segments of alternative assets are still expected to offer a somewhat compelling—albeit shrinking—value proposition. US Private RE equity (7.4 percent), US Infrastructure Equity (6.5 percent) and US REITS (6.1 percent) in particular are expected to offer higher forecasted returns, along with their global peers in these asset classes. However, return forecasts in alternative fixed income as well as in hedge funds are also low.

Figure 19: Long-term (10-year) forecasted returns for the next decade, annualised (local currency)



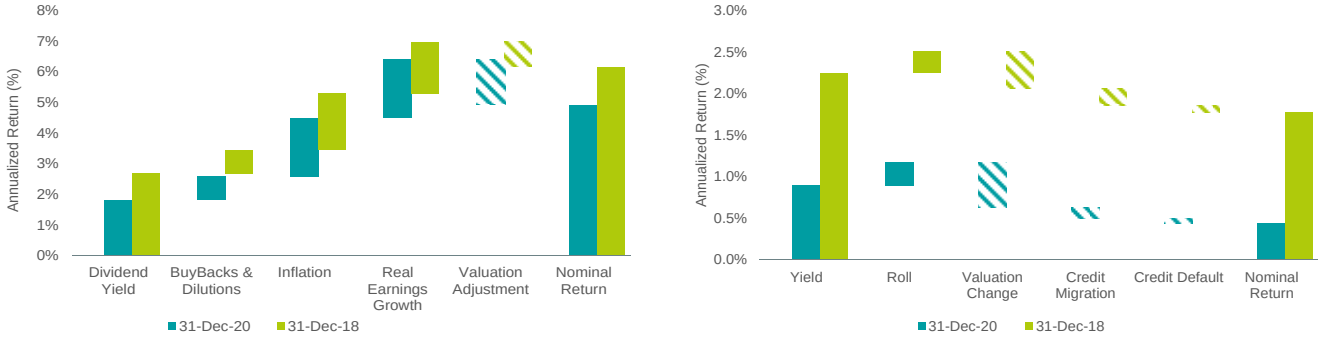
Source DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

Comparing our return forecasts to those in the first edition of this report two years ago illustrates the trend lower in forecasted returns across both global equities and global bond markets (see Figure 20). In equities, compression across components of the income pillar and a more challenging valuation landscape have lowered the outlook for nominal returns.

Across fixed income markets, lower starting risk-free yield levels reflect the significant monetary stimulus provided by global central banks in response to the COVID-19 crisis. Credit spreads, while offering some yield pickup over sovereign bonds, also face continued fundamental weakness at least in the immediate term. Notably, the gap between forecasted returns for fixed income and equity are not obviously driven by inflation expectations which remain fairly muted thus far (see Table 5 on page 26). In a scenario where inflationary pressures do build up over the longer term, these nominal assets would face further challenges relative to equities and alternative asset classes.

[11] 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 20: 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



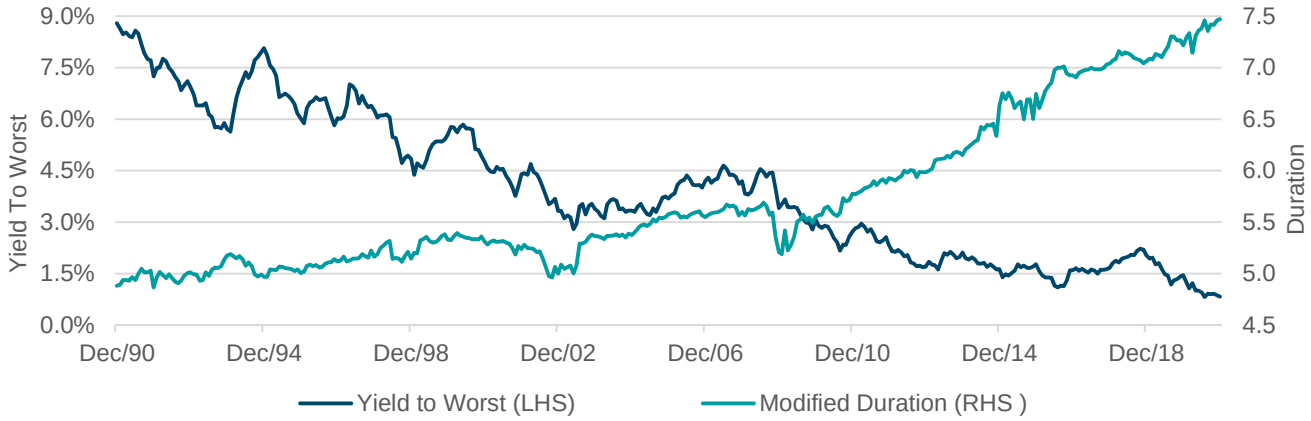
Source DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

This decline in the return prospects for many (especially income-yielding) asset classes is arguably a structural phenomenon which goes beyond the effects of the pandemic or the longer-term consequences of central bank policy: an ageing population in many parts of the world not only affects long-term economic growth prospects (see page 27), but also increases savings requirements and therefore demand for fixed income assets.

Declining yields in fixed income and reduced dividend yields in equities explain much of the decline in our return forecasts, together with more adverse valuation effects that reflect the continued demand for financial assets. Of course, Figure 20 illustrates changes over a comparatively short period of two years, but Figure 21 shows that this is a well-established trend: global bond yields have been declining for decades, even while investors have had to accept steadily rising interest-rate duration risk.

Meanwhile, over the past several months, many corporations have been taking this opportunity to raise more debt while temporarily reducing their buybacks and dividend payouts to shareholders. It remains to be seen to what extent this increased debt burden will compromise their future ability to return income to shareholders even after the immediate economic impacts of the pandemic have subsided.

Figure 21: Global Aggregate Bond Index, Yield to Worst (left-hand side) and modified duration (right-hand side), 12/31/1990 – 12/31/2020



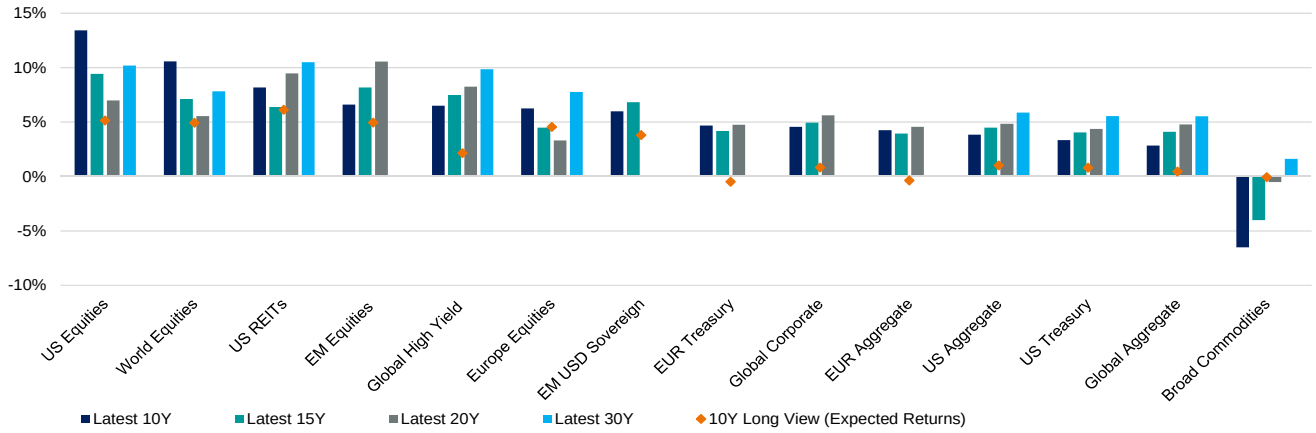
Source DWS Investments UK Limited. Data as of 12/31/20.

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.

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 22. 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 asset classes, however, our forecasts are well below historical returns.

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



Source Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

In a world of lower returns, was higher risk compensated?

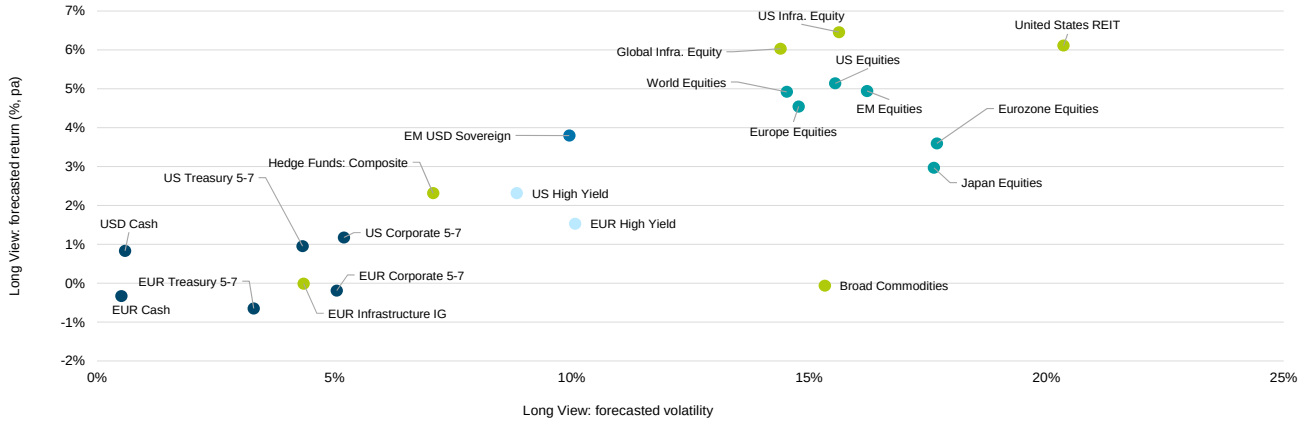
Financial theory tells us riskier asset classes are likely to compensate the investors via higher forecasted returns. This well-known trade-off between risk and return is the main conclusion from Figure 23.[12] We observe that the usual relationship is presented over our 10-year horizon, with a compensated risk premium for most asset classes.

Using the same data, we can calculate and compare forecasted Sharpe ratios (Figure 24), 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, EM USD Sovereigns offer higher or comparable Sharpe ratios.
- We forecast corporate bonds to realize significantly lower Sharpe ratios than equities: even accounting for the different level of risk, return expectations are low in IG and HY corporates.
- EM USD Sovereign bonds stand out as the only fixed income asset class with comparable forecasted Sharpe ratio to equities.
- 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 23 and Figure 24 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 (see page 27)

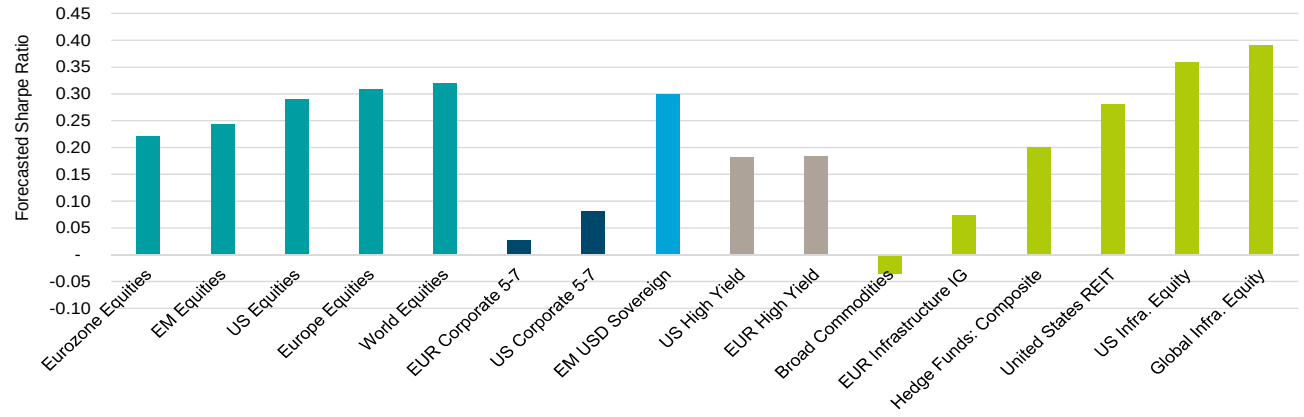
[12] This chart utilises our approach, a macro-level forecasting method, for calculating the forecasted returns and the approach we developed for forecasted volatilities and correlations, presented from page 78.
Past performance, [actual or simulated], is not a reliable indication of future performance.
Forecasts are not a reliable indicator of future returns. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Figure 23: 10-year forecasted return and risk by asset class, annualised (local currency) (2021–2030)



Source DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

Figure 24: 10-year forecasted Sharpe ratio by asset class in euro (EUR), annualised (2021–2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

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.

Strategic allocation

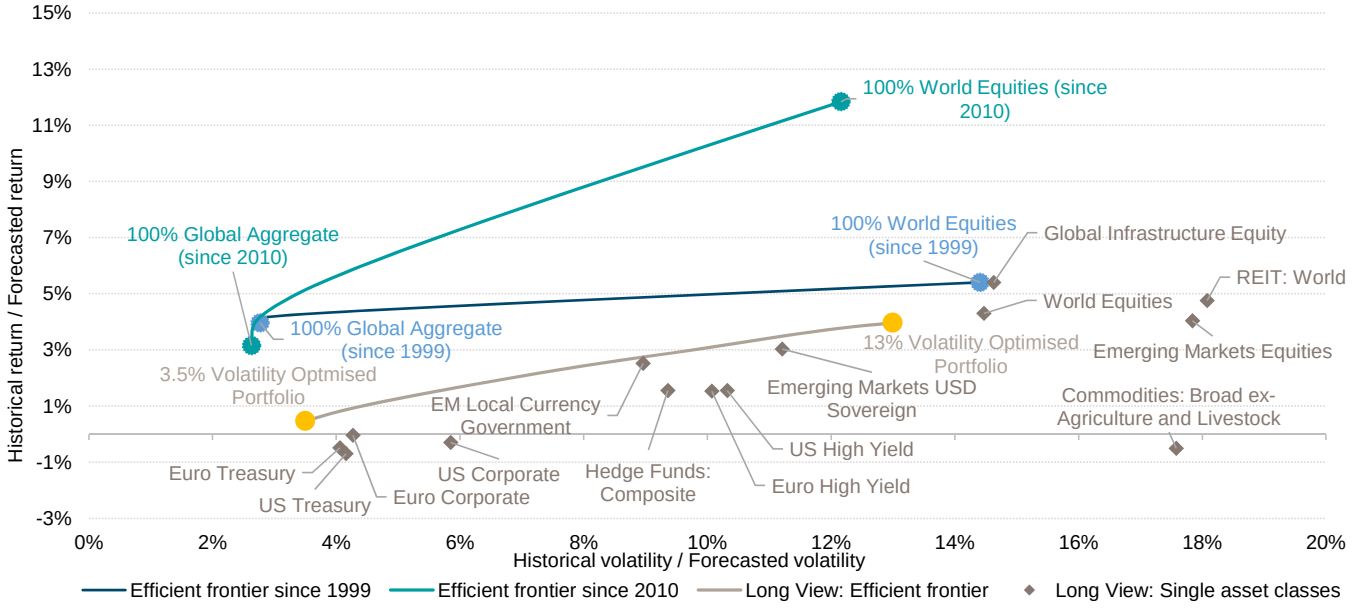
Connecting our Long View with portfolios in practice

Over the past 20 years, asset returns – in particular fixed income and equities – have been particularly volatile. This is in part due to the unprecedented decline in interest rates, with investors now being hardly rewarded for taking additional risk (Figure 25).

In addition, the rebound in equities since the financial crisis was extreme.

Using our Long View forecasts to construct a hypothetical efficient frontier, forecasted multi-asset returns over the next ten years are uninspiring.[13] 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 25: 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 12/31/20. 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 12/31/20. See appendix for the representative index corresponding to each asset class.

[13] 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. 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 indication of future performance.

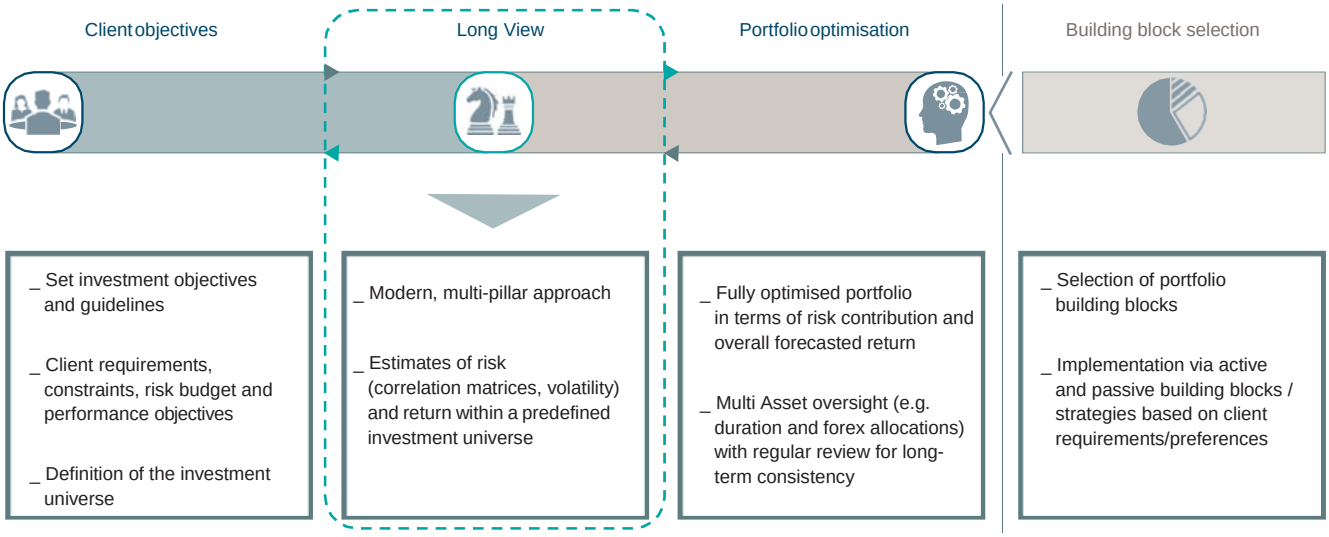
In this section we reiterate our strong belief in strategic asset allocation (SAA). This process endeavours to examine investment strategies in an ongoing effort to assist investors in pursuit of their investment objectives.

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 26. We believe this multi-pillar approach provides additional insights versus other forecasted return-based approaches and aims to provide stability across parameter changes.

Figure 26: Decomposition of the Strategic Asset Allocation process



Source: DWS Investments UK Limited. As of 12/31/20.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.

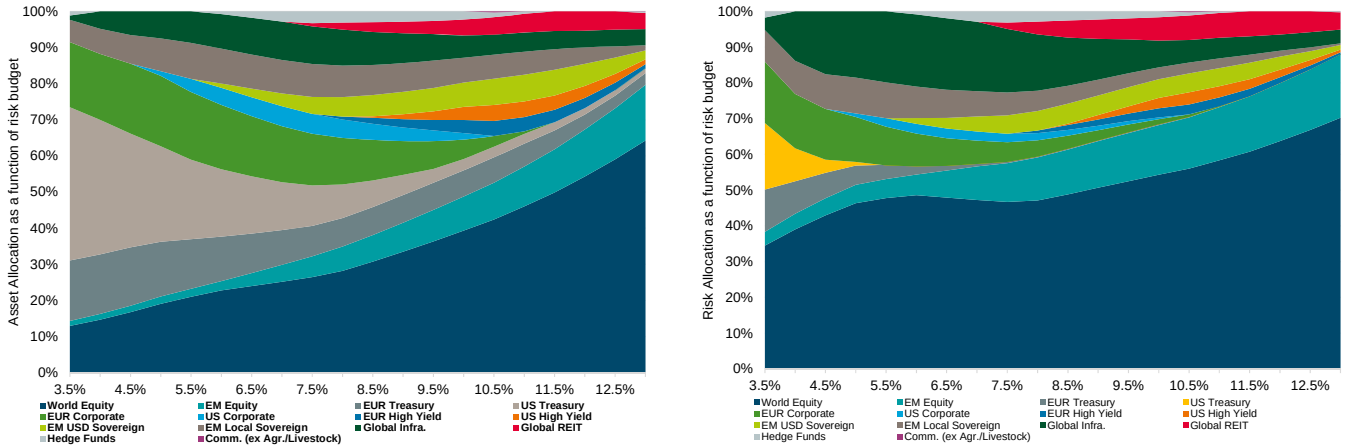
Combining the Long View with our portfolio construction approach

Relying on the GRIP (Group Risk in Portfolios) approach developed by DWS, in Figure 27, 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 analysis[14] 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 27: Asset allocation and risk allocation as a function of the target volatility



Source: DWS Investments UK Limited. Data as of 12/31/20. For illustrative purposes only. See appendix for the representative index corresponding to each asset class.

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

Economic assumptions

"Invest in Inflation. It's the only thing going up."
Will Rogers[15]

Inflation and GDP-growth assumptions

Long term inflation expectations are pivotal to our Long View framework as they are core input when developing forecasts for most asset classes.

As per Table 5, our output and inflation forecasts are relatively similar across developed countries, with the exception of Japan.

We note that real output growth for emerging countries is forecasted to exceed that of developed countries by about 1 percent on average over the next 10 years. This is a key factor that will among others significantly impact return forecasts for developed and emerging markets equities.

Table 5: Economic forecasts for select countries/regions (2021–2030)

Country / region	Inflation	GDP growth
World	2.0%	3.3%
United States	2.1%	2.1%
Eurozone	1.5%	1.6%
United Kingdom	1.9%	2.0%
Japan	0.7%	0.8%
China	2.7%	5.1%

Source: DWS Investments UK Limited. Data as of 12/31/20. Inflation for World is based on a weighted composite of national inflation forecasts using MSCI ACWI weights.

[15] http://www.investmenttools.com/thestate/cpi__consumer_price_index.htm
Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Outlining the global macroeconomic outlook

The COVID-19 Pandemic has sent the world into its deepest global recession for more than 70 years. According to estimates of the International Monetary Fund ("IMF"), global GDP shrank by 3.5% in 2020. In 2009, during the Global Financial Crisis, global GDP only stagnated. However, there is another major difference between these two recessions. The Global Financial Crisis lasted several years and growth was very weak in aftermath as companies, household, and—in particular in Europe—also states had to deleverage. Increased savings led to less consumption and less investments.

However, this time is different. The pandemic was an external shock that brought the world economy in spring 2020 to a nearly complete standstill. Consumers did not consume and enterprises did not invest, not because they did not want to, but because they were not allowed to. Now, with vaccination programmes underway, there are good reasons to assume that life will slowly—even though not fully—normalize over the quarters to come. That should lead to relatively high GDP growth figures across the globe for this and next year at least. One could even imagine that a sort of "roaring twenties-feeling" to take shape over the next two years.

However, this should be a short-lived experience of high growth rates mainly due to catch-up effects: Pent-up demand and investments will boost the economy only for a few quarters. Starting from the low GDP level makes the growth rates look even more impressive. A few years later, however, when the impact of COVID abates, growth rates should normalize to substantially lower levels.

Economists distinguish between (short term) business cycles and (long term) growth. The key concept, growth, refers to the growth of potential output, often also called potential growth. The business cycle merely represents the fluctuations of the actual economic activity along the long-term growth path. This growth path is mainly driven by two factors: demographics and productivity. Unfortunately, the outlook for neither of the two factors is currently very optimistic. Regarding demographics, what has been a tailwind for decades across the globe will turn into a substantial headwind in the coming decade—at least for the developed markets and most Asian economies. Productivity growth has been disappointingly low over the last twenty to thirty years, and there are few indications that this is likely to change substantially over the next decade.

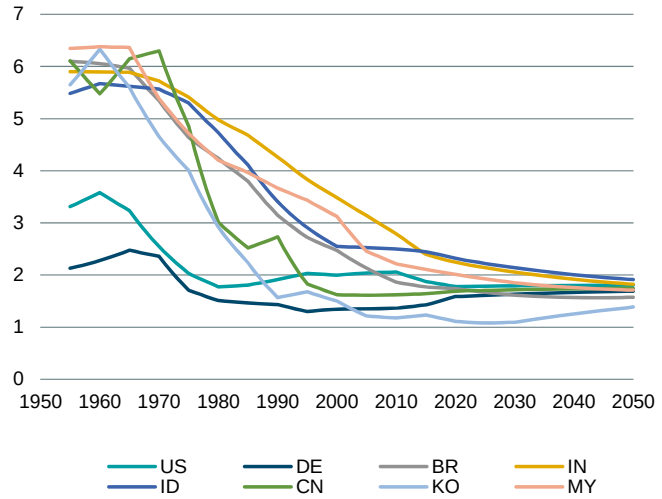
Demographics

Starting with demographics, the component that significantly shapes potential growth is population growth, or more precisely the growth of the working-age population. We are currently experiencing a demographic tidal shift, or" the great reversal", as Goodhart and Pradhan (2020) termed it. Labor force growth, as experienced by the West and China in past decades, is over. Most Western societies are no longer growing as they did in the past, but are already shrinking or will do so very soon. This often underestimated development will shape future development. It is also the main reason why our growth forecasts lag significantly behind historical growth rates.

There are two major drivers of demographical trends. One is the decreasing number is babies born per woman, the other is the huge increase in life expectancy.

Today, the worldwide fertility rate is only 2.5 children per woman. On average, industrialized countries' birth rates are around 1.7 and developing countries are around 2.6. This trend toward lower birthrates is often completely underestimated. For example, women in India now have, on average, only 2.2 children, in Bangladesh the figure is as low as 2.1; in Brazil it is 1.7. In almost all industrialized countries and in most emerging economies, the rate is now below the replacement level of just over two children per woman (see Figure 28).

Figure 28: Birth rate per woman across countries



Source: United Nations, Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21.

Life expectancy is increasing significantly worldwide. In the period from 1950 to the present, the average person on earth has gained almost 25 years of life. To a large extent, this significantly higher life expectancy is due to lower infant

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.

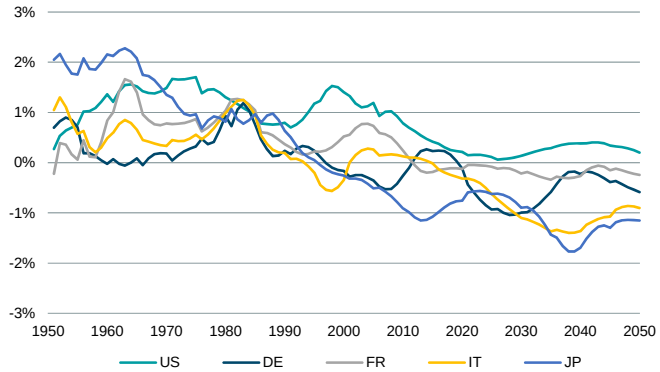
mortality – but better medical care is also driving up life expectancy. In particular, the greater availability of antibiotics has ensured that many people can reach older age in good health.

Fewer babies born and more years to live have two effects on the working-age population. First, more and more people will celebrate their 65th birthday in the coming years and thus retire from working life in most countries. Second, a consistently much smaller group will celebrate their 18th birthday.

This means that the demographic tailwind that has been the main driver of economic development in the West in recent decades will turn into a growth hurdle, first in the form of a demographic standstill, which will then turn into a quite powerful headwind. While the U.S. had working-age population growth of just under 1.5 percent per year in the 1960s, the figure is now down to only 0.25 percent. According to the United Nations forecasts, growth will effectively come to a complete halt by the end of this decade. In Germany, thanks to baby boomers and immigration, the working-age population grew by as much as 0.7 percent per year in the 1980s; but current growth is only 0.25 percent – and over the next decade, the working-age population will shrink by about 0.75 percent per year. All else being equal, the economy will therefore grow by almost 1.5 percent less per year in the foreseeable future than it did 40 years ago (see Figure 29).

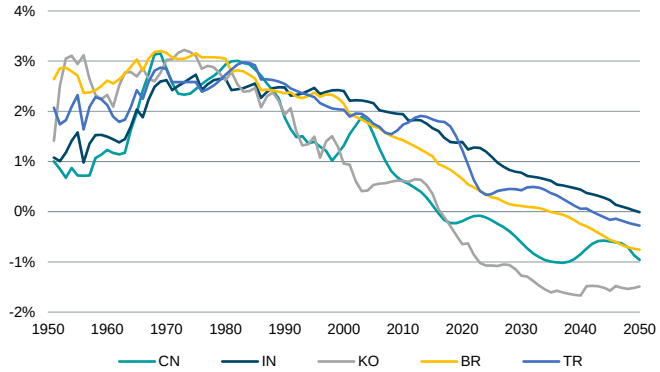
The demographic turnaround in China is even more dramatic. After 2.8 percent growth in the 1980s, growth is falling continuously from 2 percent in 2003 and will reach its low point in the mid-2030s with a decline of one percent per year. From demographic reasons alone, economic growth in China will be around 3 ½ percentage points lower than in the 1980s. In other emerging countries, the development in the coming years looks strikingly similar. In Brazil or India, the demographic tailwind is three and two percentage points lower, respectively, than in the 1980s (see Figure 30).

Figure 29: Change in working age population in developed countries, annual



Source: United Nations, Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21. Working age is defined as 15-65 years.

Figure 30: Change in working age population in emerging countries, annual



Source: United Nations, Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21. Working age is defined as 15-65 years.

Productivity growth

This raises the question of whether significantly higher productivity might compensate for the decline, or rather the declining growth, in the labor force. Unfortunately, this does not appear to be the case.

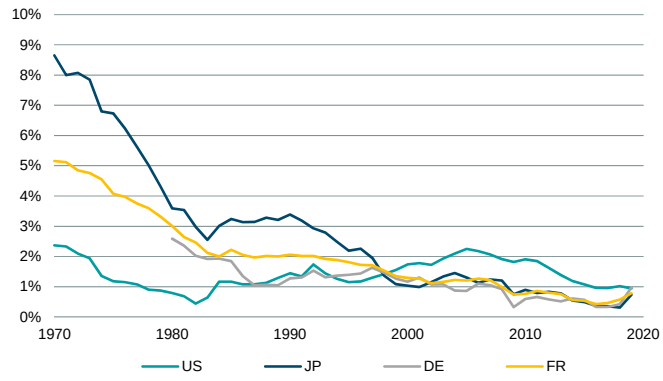
Productivity growth is measured here as the growth in productivity of all employees. Since, in downturns, production usually falls faster than companies are able to reduce staff, (hourly) productivity usually falls as well. Conversely, in upswings, companies do not rehire staff as quickly as demand for staff grows. All the more so because, during a recession, companies first cut from the less productive segments of the workforce. Companies therefore start into the next upswing with a "fitter" team. As a result, observed productivity

fluctuates considerably more during a business cycle than actual "productivity potential" does. To eliminate this effect, smoothed values have been presented in Figure 31 and Figure 32.

It is striking that productivity growth has been declining for years. It is beyond the scope of this publication to discuss the numerous reasons for the decades-long decline in productivity in the advanced economies. Demographics are one factor here as well, although not the only one. Aging societies often show lower productivity dynamics. Older workers are less likely to look for new jobs or move to cities where they can be more productive.

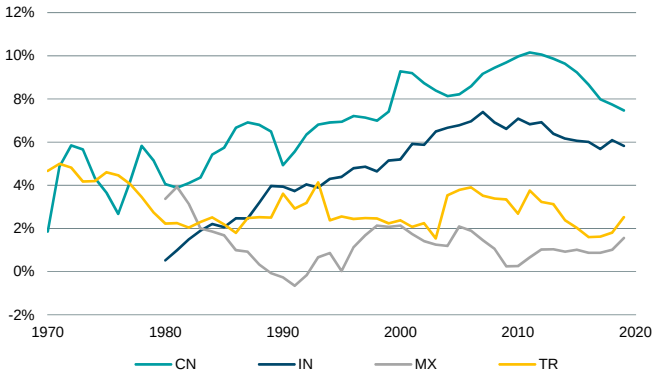
Unlike advanced economies, many emerging markets still have higher growth in front of them. First, they can still reap the low-hanging fruit. As China has climbed up the value chain, so has productivity. Some Asian countries still have this road ahead of them. Second, many emerging economies still have quite favorable demographics. Countries with a low dependency ratio often show higher growth rates per capita because proportionately more are in their most productive years. However, even this "demographic dividend" will soon be used up in many emerging countries.

Figure 31: Productivity growth in developed countries, annual



Source: OECD, Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21.

Figure 32: Productivity growth in emerging countries, annual

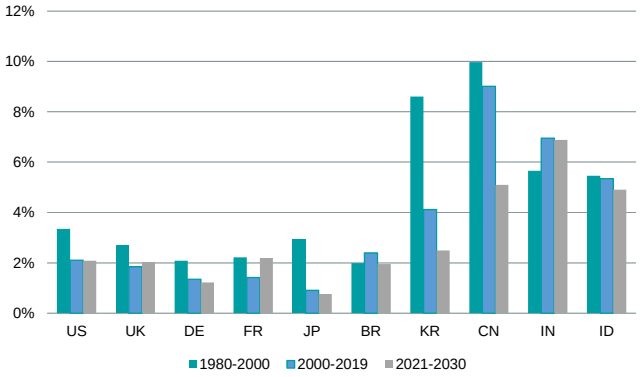


Source: OECD, Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21.

Results

Our analysis shows that the growth outlook for the next ten years will fall far short of the growth seen in previous years. This is due to low productivity growth and slowing of growth or even a shrinking of working-age population in industrialized countries but also in China.

Figure 33: Real GDP growth rates across countries, annual: forecasts for the next decade versus historical growth rates



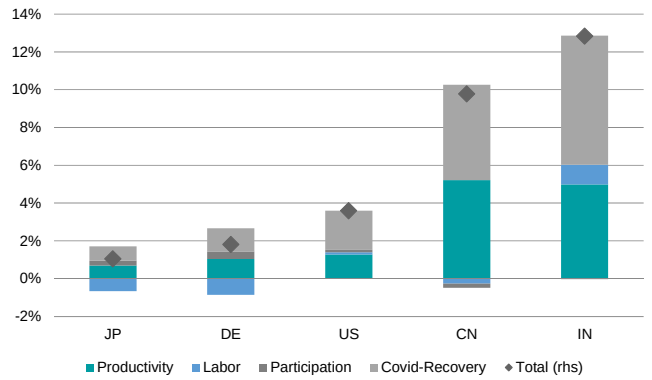
Source: Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21. Arithmetic mean of annual growth rates.

Our model shows that most industrialized countries will face rather modest growth. While the US still profits from some working age population growth and higher productivity growth, other countries like Germany, Italy or Japan face severe headwinds from a shrinking working age population combined with only modest productivity gains. At first sight, the expected growth does not seem much different from the past 20 years. However, this is mainly due to the very high growth rates in the first few years, which are well above average simply because of the catch-up effects and the base effect in the

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.

wake of the pandemic (see Figure 34). It is sort of a perverse effect: the deeper the economy has fallen as a consequence of the COVID-19 pandemic, the brighter the (short-term) growth outlook. Looking at the growth paths gives a more realistic picture of the long term outlook for industrialized countries. While the industrialized countries (and China) have already largely reaped their demographic dividends, some emerging markets are still awaiting them (see Figure 34).

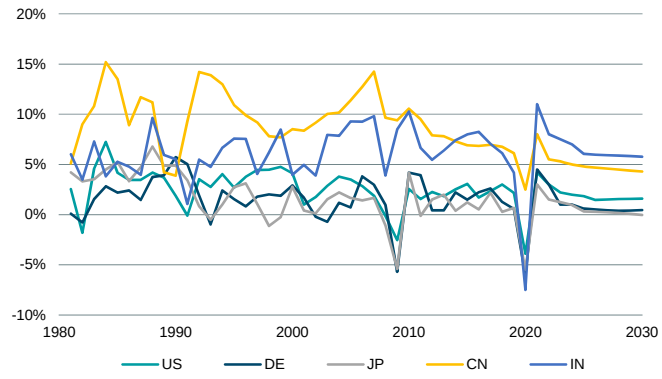
Figure 34: Contribution to forecasted real GDP growth across countries, annual for the next decade



Source: Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21. Arithmetic mean of annual growth rates, 2021-2030.

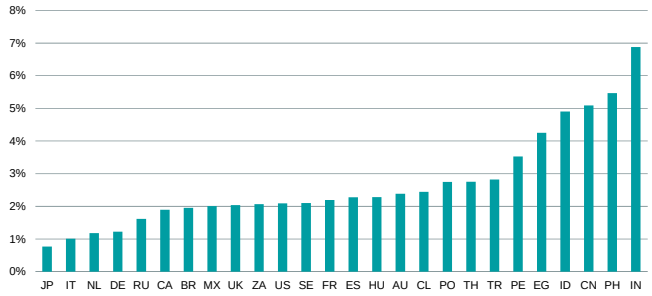
As a result, potential growth in all industrialized countries is likely to be (significantly) lower than in the past, while some emerging countries, notably those in Asia, will continue to experience strong growth in the future (see Figure 35). In the future, investors will find growth primarily in Asia (see Figure 36).

Figure 35: Real GDP growth rate across countries, annual: realized growth until 2020, forecasts from 2021



Source: Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21.

Figure 36: Real GDP growth forecasts across countries for the next decade, annual



Source: Haver Analytics Inc., DWS Investments UK Limited. Data as of 1/15/21. Arithmetic mean of annual growth rates, 2021-2030. Forecasts are not a reliable indicator of future returns. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

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.

Currency estimates

Translating local currency return forecasts

Long-term currency forecasting can be challenging. As such, we apply a blended approach of well-documented theories and methodologies. To build our 10-year forecasted returns and volatility we start by forming the corresponding forecasts in a local-currency context for specific asset classes. From there, we overlay our relative currency forecasts.

Each forecasted return is first expressed in its currency of denomination, that is, in local currency (at the individual security level).

We develop currency assumptions for two main purposes:

- When building composite assets: to assemble risk and return forecasts related to components denoted in multiple currencies (for example, the MSCI Europe Index).
- To provide risk and return forecasts in different base currencies.

Foreign exchange volatility can introduce a significant risk factor, especially for lower risk assets such as cash and fixed income. Over five years, Figure 37 shows the meaningful difference between foreign asset returns in local currency compared with in euros (EUR). In order to manage/mitigate taking on this currency risk it may make sense to consider currency hedged investments[16]. We use two complementary approaches: hedged and unhedged strategies. Each relies on well-established academic consensus.

Our hedged framework uses observable market data to estimate the long-term costs when hedging the financial risk of an asset denominated in a foreign currency versus the investor's base currency. We consider the difference in future yield curves between the base currency and the asset's currency of denomination to be a telling indicator of forex performance.

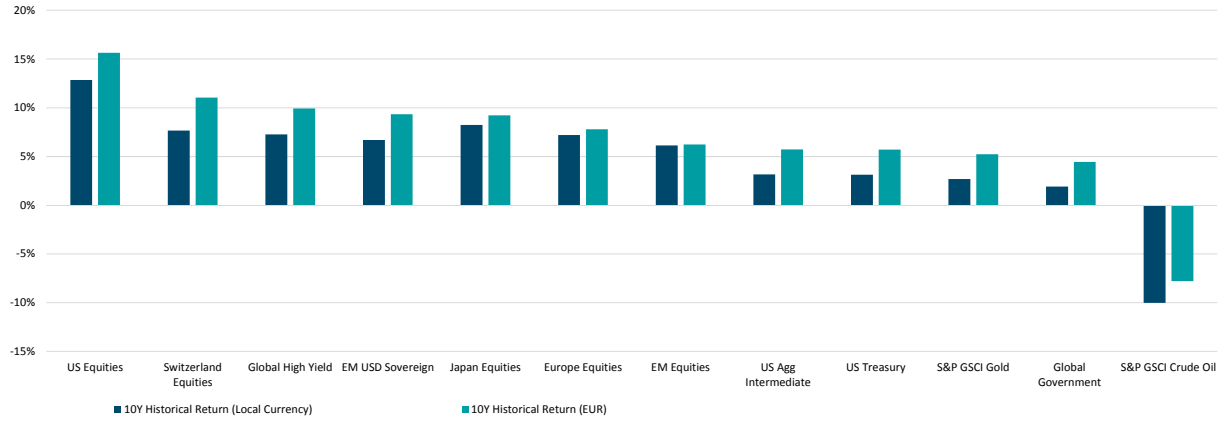
This is based on the theory known as covered interest rate parity that assumes the absence of arbitrage opportunities[17]. It is worth mentioning at this point, that this assumption has been consistently violated among G10 currencies since the financial crisis. Much has been written around the topic over the last few years, pointing to the limits to arbitrage (such as regulations, cost of borrowing and so on) as the driver of this imbalance[18]. Figure 38 shows the impact of forex hedging on the forecasted returns in euros and dollars.

Our unhedged framework aims to determine long-term equilibrium assumptions for currencies. To build these assumptions, we rely on multiple theories[19] and methodologies, each well documented in the literature:

- Relative purchasing-power parity: in brief this theory stipulates that a basket of goods should ultimately be worth the same price everywhere. The equilibrium exchange rate between two countries is therefore defined as a differential of inflation[20].
- International Fisher effect[21]: where risk free nominal interest rates are used as the basis for the equilibrium exchange rate. This theory is based on Fisher's assumption that real interest rates are not affected by changes in inflation.

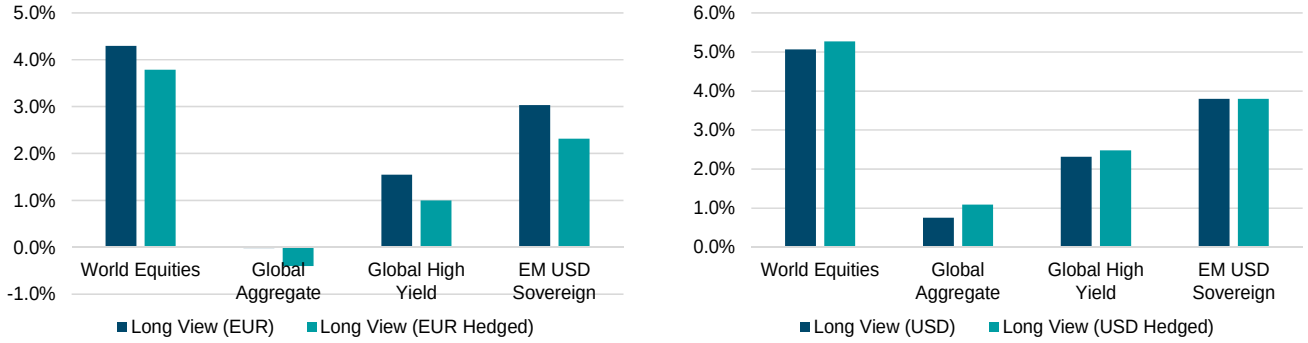
[16] See (Denoiseux and Debru 2015) for an in depth analysis of the impact of FX in the risk and returns of asset classes.
[17] See (Obstfeld and Rogoff 1996) and (Bekaert, Min et Yuhang 2007) for a good introduction on this approach and its long term significance.
[18] See (Du, Tepper and Verdelhan 2017).
[19] We remind the reader that each approach forms a long-term equilibrium view on currency pairs, and might significantly differ from short-term moves.
[20] See (Taylor and Taylor 2004).
[21] According to the International Fisher Effect, changes in differences in countries' relative interest rates can be used to predict changes in the currency pair. Changes in nominal interest rates correspond to changes in inflation, which help indicate potential appreciation or depreciation of the currency. Therefore, according to Fisher, differences in nominal interest rates can be used to imply the future spot rate.
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.

Figure 37: Implication of currency fluctuations on asset-class returns, annualised (10-year period ending 12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class

Figure 38: Illustration of the impact of currency hedging on our 10-year forecasted returns, annualised (YE 2021–2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

Our framework is augmented by following the approach developed in Balassa (1964) and Choudhri et Khan (2004), which takes into account the role of productivity differentials. In practice we use the growth of output per capita as a proxy for productivity to further adjust our forex framework.

We note that the introduction of this productivity gap factor has a limited impact on the long term forecasts (5 or more years) for G10 currencies but does influence emerging currencies.

Table 6: Current (Dec 2020) and forecasted (YE 2030) currency levels vs. USD

Currency	Current	YE 2030 Forecast
EUR	0.82	0.76
Japanese yen (JPY)	103.25	100.14
British pound (GBP)	0.73	0.69
Swiss franc (CHF)	0.89	0.87

Source: DWS Investments UK Limited. Data as of 12/31/20.

Table 7: Current (Dec 2020) and forecasted (YE 2030) currency levels vs. EUR

Currency	Current	YE 2030 Forecast
USD	1.22	1.32
JPY	126.2	132.2
GBP	0.89	0.91
CHF	1.08	1.15

Source: DWS Investments UK Limited. Data as of 12/31/20.

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.

Traditional asset classes

"Success is more a function of consistent common sense than it is of genius."
An Wang[22]

A comprehensive approach

Forecasting returns can be approached from a number of different angles. Some investors apply different methodologies depending on asset class, others employ a top-down investment strategy or focus exclusively on macro risk drivers[23].

Thanks to improved market sophistication, datasets and technology, investors increasingly understand the importance of considering true risk drivers. These include so-called factors, for example, momentum, carry, or value strategies. That said, especially in the context of a strategic asset allocation framework, most investors still contemplate portfolio construction through an asset-class lens.

That is why our Long View assumptions focus on asset classes too, both for traditional and alternative investments. However, unlike many peers, we also use a consistent framework irrespective of asset class. This not only helps us apply rigor to our process, but we hope it aids our clients in better understanding the constituent sources of returns on a comparative basis.

The DWS Long View forecast is constructed of three pillars, which can be expressed as follows:

Asset class total return = income + growth + valuation

The decomposition of each pillar, for the main traditional asset classes reviewed below, is shown in Figure 39.

We recognise that when dealing with each specific asset class, there is some discretion in the association of each component with a particular pillar. But overall, this framework provides a high level of consistency and transparency across our forecasts.

Mostly, our reference case is a long-term investment in a particular asset class, more precisely in what we will refer to as a representative index. But as we describe below, there may be opportunities to adapt certain sub-asset classes. This modularity is another useful feature of our framework.

For example, consider a portfolio tracking a fixed-income index, which aims to maintain a certain level of duration risk. Even theoretically, to pursue constant duration, over time, an investor may wish to sell its shortest dated bonds and buy longer-dated securities. Our forecast methodology addresses this rebalancing effect; however, this approach may not address investment objectives of certain long- term investors, such as pension funds or insurance companies, who may rely on a buy and hold approach, and hence do not follow a rebalancing process. As such, the profits and losses generated by portfolio rebalancing might not be relevant.

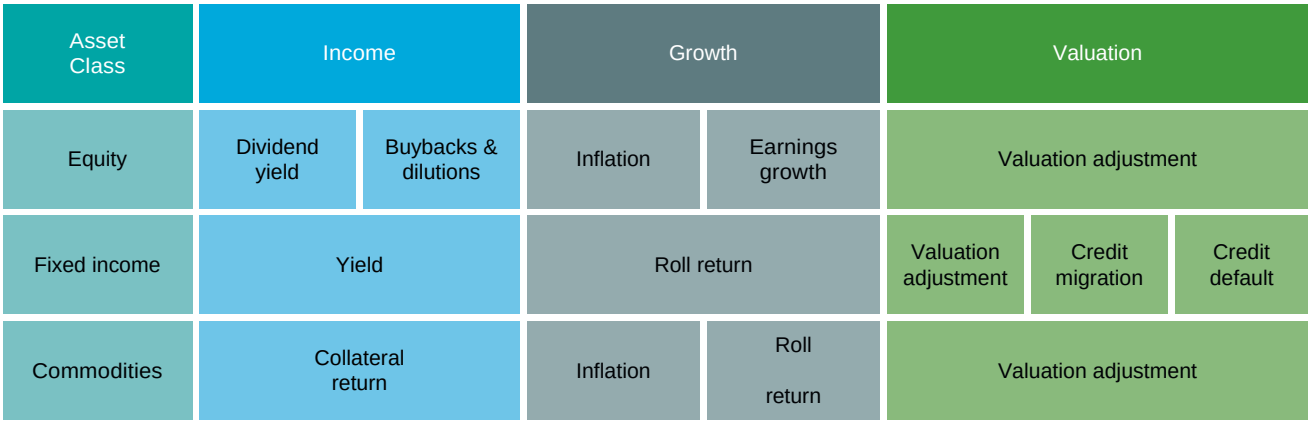
Our building block approach is designed to remove the rebalancing component from our income pillar, whilst pursuing consistency within the overall framework's assumptions.

Similarly, for commodities, we forecast long-term returns for the relevant futures, and the total return of such an investment will always include components related to both the collateral as well as the roll of the futures – these building blocks can be removed for long-term investors interested in the underlying physical commodities (whose prices are more driven by inflation and valuation), but instead a new component related to storage costs should be considered.

For equities on the other hand, an index is usually a straightforward diversified basket of stocks. The main changes are related to corporate actions and from time to time new security additions or deletions. These index-related operations are fairly consensual.

[22] https://libquotes.com/an-wang/quote/lbn2d3q
[23] See (Ilmanen 2012) for a deep dive on this topic.

Figure 39: Long View for traditional asset classes: Pillar decomposition



Source: DWS Investments UK Limited. As of 12/31/20

Forecasts and data: a balancing act

Our framework relies on a broad and diverse pool of data. This has been selected on the basis of various criteria including: precision, source, frequency of observation, and the availability of estimates vs. realised numbers.

Datasets are divided into four main categories:

- Market-based, historical: index values, interest rates, breakeven inflation, dividend yield, duration;
- Market-based, implied: implied volatility, implied earnings yield;
- Economic: we use realised published/interim economic data (such as realised GDP and inflation) as well as forward looking estimates from different providers;
- Fundamental: corporate earnings, aggregated at the index level, in the form of past realised earnings, or forward-looking, analyst-based forecasts.

When building our framework, we try to reconcile two specific (and sometimes conflicting) objectives:

- Maximise the value we extract from each dataset; more technically, we aim to maximise the incremental predictive value that each data point might bring to the forecast.
- Prevent the risk of over-fitting data or relying too much on a particular data point to construct the forecast.

We explain our methodology in more detail by asset class in the following section.

Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Equities

Forecasted returns for the next decade

This section is divided into two parts. The first presents the main Long View forecasts and insights from our equity model while the second presents the methodology.

We forecast world equities (as proxied by the MSCI World Index) to deliver a 4.9 percent annualised total return, which is far from what investors have grown used to over the past ten years, as can be seen in Figure 40.

In fact, we forecast roughly a similar total return for equities for most developed countries, with a similar gap between historical and forecasted returns. The exception is emerging markets, also with a 4.9 percent annualised total return forecast in local currency, which is at par with its returns over the past decade.

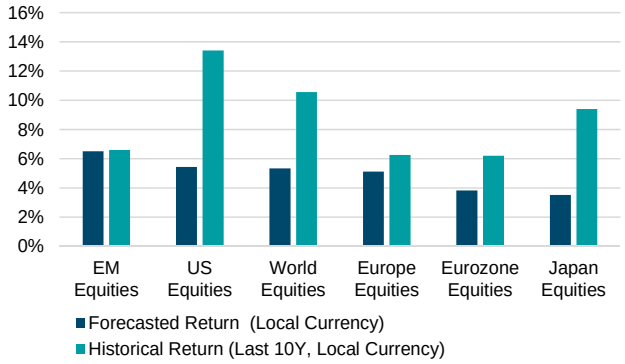
Meanwhile, on average, we estimate a meaningful premium for small-cap stocks, which is also broadly similar across regions (Figure 41).

Fundamentals may support relatively attractive equity returns

It may be useful to remind ourselves here that equities still look reasonably supported from a long term historical trend perspective.

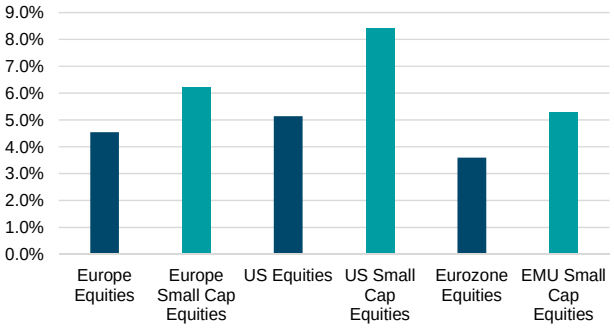
For example, in Figure 42, we observe earnings-per-share (EPS) growth across regions over the past three decades. We note that 2008 was tough everywhere, with equities suffering from a sharp drop in their EPS. However, EPS growth rebounded toward the longer-term trend afterwards, particularly in Japan and the United States. Following another dip during the 2020 pandemic, EPS growth is now currently running below this long-term trend.

Figure 40: 10-year forecasted returns across regions, annualised (YE 2020 – YE 2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative Index corresponding to each asset class.

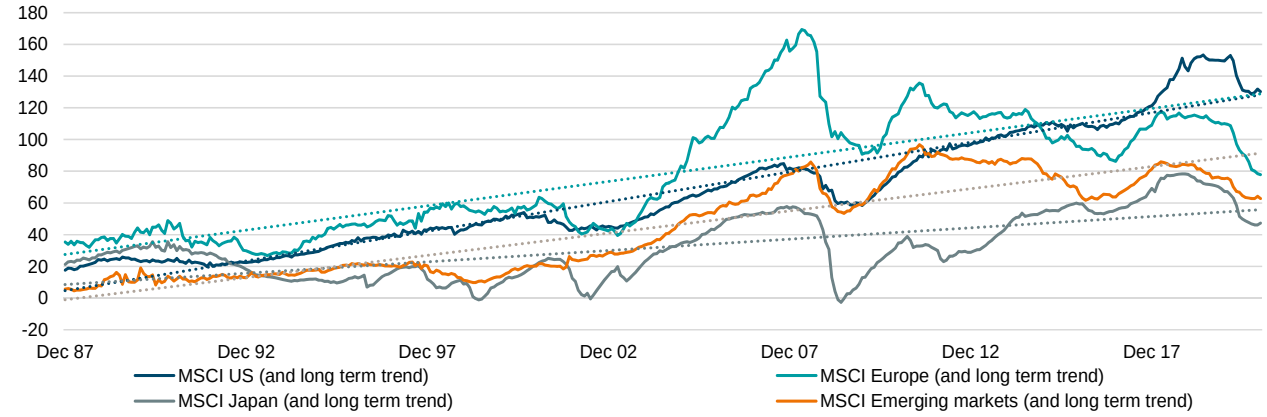
Figure 41: 10-year forecasted returns for large-cap and small-cap equities, annualised (YE 2020 – YE 2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. 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.

Figure 42: Equities have delivered solid long-term EPS growth despite a big dip in 2008

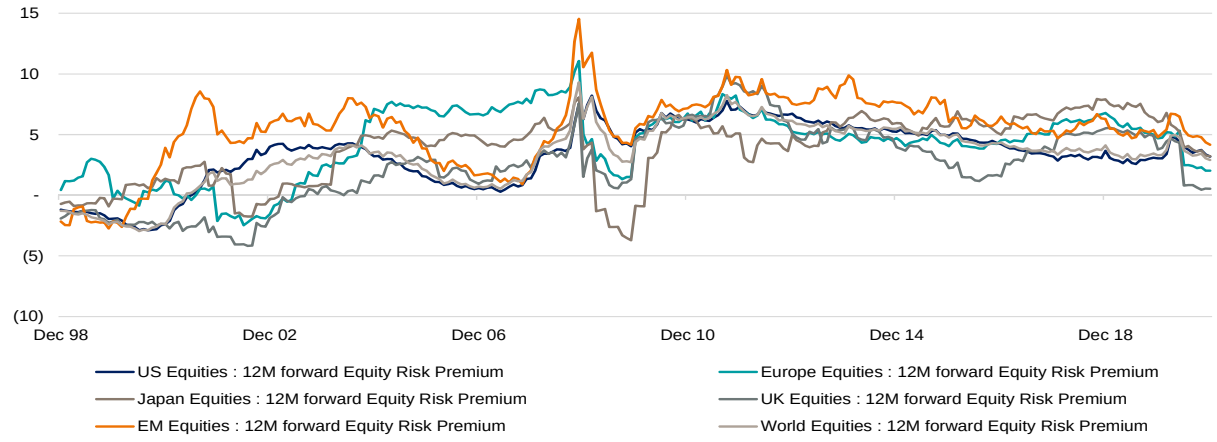


Source: Refinitiv Datastream, DWS Investments UK Limited, data from 12/31/87 to 12/31/20.

The translation of EPS growth into investment forecasts can be performed via different approaches. In Figure 43, we calculate the equity risk premium across regions, which we approximate very roughly here as the spread between the earnings yield (the inverse of the trailing price-to-earnings ratio) and the corresponding risk-free rate. A high ERP would indicate that, with respect to current market valuations, the earnings delivered by companies provide a relatively high expected reward to equity investors vs. the prevailing risk-free rate.

Over the last year, we can see that the ERP has declined, as has the risk-free rate. As a result, expected nominal returns have also declined. While useful as an investment signal, the ERP defined here is not precise enough to provide us with a meaningful contribution to total-return estimates, especially with a long-term investment objective in mind.

Figure 43: Equity risk premiums (as measured by the earnings yields)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20.

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.

Constructing our equity Long View forecast

In line with other asset classes, we build our long-term forecast for equities on the basis of three fundamental pillars: income, growth, and valuation.

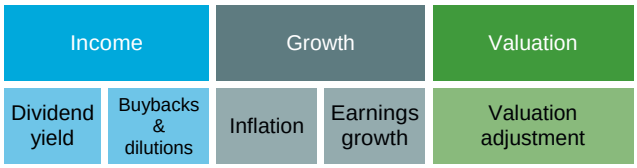
Each pillar relies on one or several fundamental components. These are set out in Figure 44, and we consider them below in turn.

A long-term perspective

In order to understand the relative importance of each pillar, let us begin with a long-term return decomposition of U.S. equities, for which there is the longest and most reliable data.

Using historic numbers compiled by Robert Shiller[24], we decomposed the U.S. equity performance into our three pillars: income (dividends[25]), growth (inflation and real earnings growth) and valuation.

Figure 44: Pillar decomposition: Equities



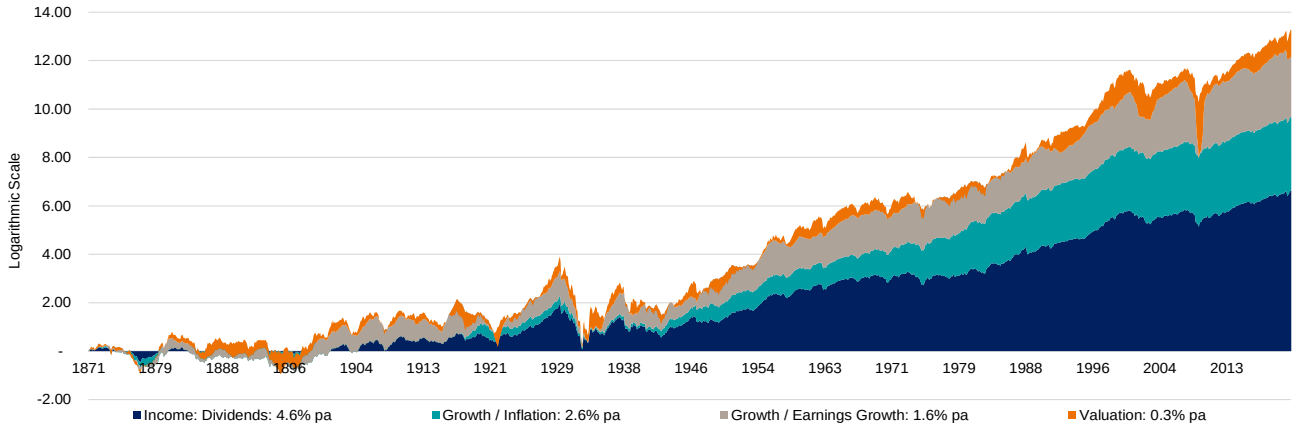
Source: DWS Investments UK Limited. As of 12/31/20

From Figure 45 we can draw a few conclusions:

– Dividends do not drive value, but play a major role in how value is transferred to investors in the form of returns – and their return contribution in the long term has been almost thrice that of real earnings. Across time, dividends have been relatively stable, which gives us comfort when estimating them.

- The impact of the valuation pillar is much smaller but comes with higher volatility. This makes forecasting more difficult.

Figure 45: Return decomposition of U.S. equities (1871–2020)



Source: Robert J. Shiller, DWS Investments UK Limited. Data as of 12/31/20.

[24] See (Shiller, Online Data Robert Shiller 2020)
[25] As we will show hereafter, buybacks and dilutions have a significant impact. In this simple return breakdown over a long historical period, we assume them to be included in the dividend component.
Past performance, [actual or simulated], is not a reliable indication of future performance.

Equipped with these orders of magnitude, let us now analyse each of the three equity model pillars in more detail.

Income: dividends and buybacks

If we exclude the minimal value of holding cash on the balance sheet, there are two ways a company can pass on earnings to its shareholders: by distributing them via dividends and share buybacks or re-investing them into the business.

Distributions are covered in our income pillar whilst reinvestment is accounted for in the growth pillar.

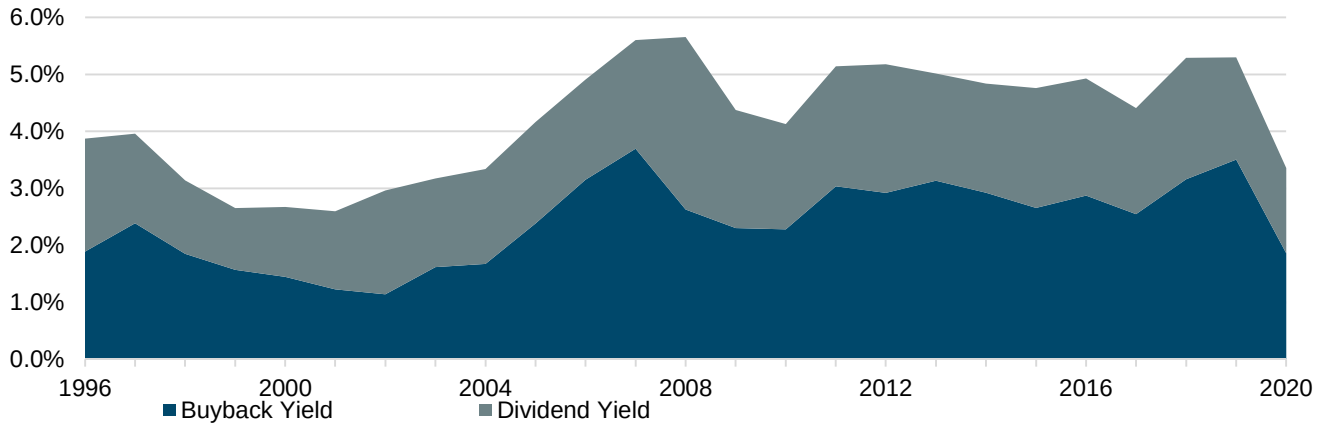
Mentioned above, dividends have long represented the lion's share of U.S. equity total returns, although there has been a decline in the pay-out ratio (dividends divided by earnings) over the past few decades, shown clearly in Figure 50. In order to estimate the dividend-yield component of our income pillar, we take the trailing dividend yield of a representative index, in accordance with the academic literature.

Buybacks are another way for companies to re-distribute earnings via the purchase of their own shares. Apart from potential tax impacts, the effect of a share buyback is similar to that of a dividend payment. As with dividends, they do not affect what a company is worth, but in terms of their contribution to total returns, their impact may be significant because when companies buy back shares, they reduce the amount of shares outstanding. Assuming earnings remain constant, EPS then increases.

Unlike dividends, however, estimating the buyback yield is a data-intensive operation as we need to analyse financial statements for every historical index member. Figure 46 shows the results of this operation and compares dividend yields and buyback yields. As can be seen, buybacks have represented, on average, more than half of distributions to shareholders since 1996.

We calculate and incorporate the buyback yield net of dilutions (see below) in our income pillar. However, creating a reliable forecast for net buyback yields is difficult given available data, so we use a long term historical average as our estimate.

Figure 46: Buybacks have represented a significant part of MSCI USA Index total yield (1996 through 2020)



Source Bloomberg Finance L.P., DWS Investments UK Limited, data from 12/31/1996 to 12/31/2020. Buyback Yield for 2020 is estimated based on data available until 4-Feb-21.

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.

Growth: Earnings are a function of GDP

Even though distributions make up the majority of shareholder returns, ultimately, value is driven by earnings. That said, equity investors have the lowest priority claim on these earnings, being paid after all creditors, either in the form of distributions – captured by our income pillar – or via a higher share price. As the last claimants, investor pay-outs are akin to a call option on earnings, hence the added importance of estimating the earnings-growth component correctly.

Also remember that earnings are not the same as earnings per share. Returns to investors are hugely diluted by the issuance of shares, as we explain below. In the end, long term data show that while earnings can be volatile, they have provided an investor with an annual average growth of about 1.6 percent in real terms (over the time frame between 1871 and 2019 in Figure 47).

To forecast any potential earnings, we consider three main approaches:

- **Survey-based estimates:** These typically compile broker or buy side earnings forecasts. However, history is clear these estimates have often been overly optimistic.[26]
- **Long-term regressions of EPS trends:** Whilst robust when looking at long term historical trends, regression based approaches are limited when analysing countries or indices that do not have decades of earnings data. This approach also suffers when forward estimates are not aligned with past trends.[27]
- **EPS forecasts based on output growth:** The relationship between EPS growth and GDP growth seems to be quite strong and benefits from academic research. As noted earlier, the degree of this translation may vary across regions, which we reflect by having adjusted the real earnings growth by a factor of 0.5x for India, Brazil, and China (only MSCI China – the newly added China A shares market has actually seen earnings growth keep pace more closely with GDP, so here we work with a 0.75x translation of output growth to earnings).

Of these three approaches, we believe that forecasting long run earnings based on economic growth is the most reliable – and this forms the basis of our Long View equity forecasts.

The relationship is well illustrated in Figure 47, which represents a long term regression of GDP growth, GDP-per-capita growth, dividends-per-share growth, and earnings-per-share growth. As can be seen, not all economic growth (which averaged at 3.4 percent per annum) translates into earnings growth (which grew by less than half the rate).

The main reason for this gap is companies issuing new shares over time. In doing so, as companies expand their shares outstanding, assuming constant overall earnings, earnings per share are lower. Such dilution has had a significant impact, and we estimate it has accounted for 1.3 percent per annum over the past two decades for U.S. stocks. We forecast dilutions in the same way as we do buybacks – that is, we calculate the annual level of dilution for every company and aggregate the amount for each index.

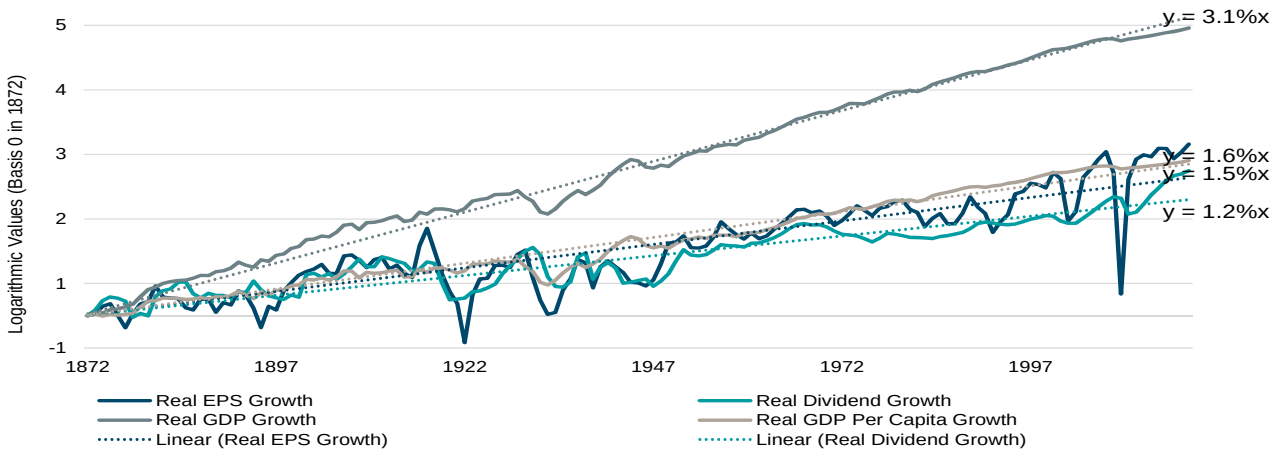
Once dilution has been accounted for, we are comfortable using real GDP growth as a proxy for earnings growth, following the same rationale as developed by Grinold, Kroner and Siegel (2011). They conclude that in the long run, dividend and earnings growth of large cap equity indices and GDP growth of their related countries should converge. (One caveat to this is that the relationship has been less strong in some key emerging markets – see page 44).

The stability of two other relationships serve as a useful sanity check as we forecast potential earnings growth. First, the recent stability of the pay-out ratio, as seen in Figure 50, allows us to gain comfort with the relationship between growth and dividend-per-share growth. The pay-out ratio has stabilised at around 40 percent since the 1990s, following a sharp decrease in preceding decades.

Second, we also note that corporate profits have represented a relatively constant share of GDP over the long run, as can be seen in Figure 51. If we can be more or less confident with our economic-growth projections, our Long View earnings estimates are not likely to distort our return forecasts too much.

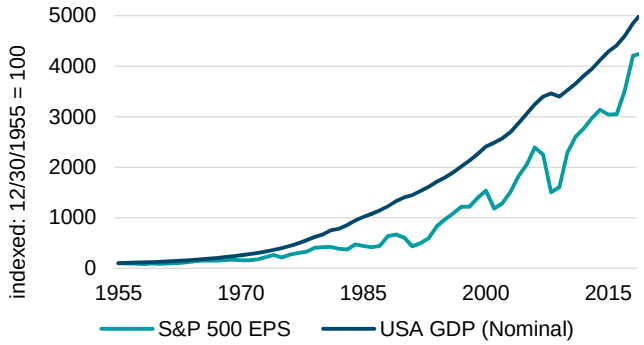
[26] See (Goedhart, Raj and Saxena 2010)
[27] Backward looking approaches might overlook technological changes or recent changes in monetary policies which would usually be reflected in forward looking estimates like GDP or EPS growth.

Figure 47: Real earnings and dividends for U.S. equities, real GDP and GDP per capita (1872–2018)



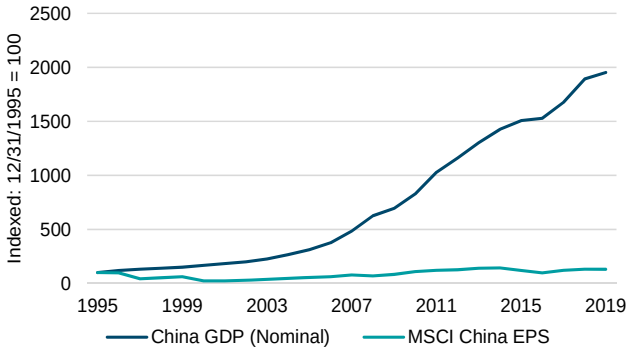
Source: Robert J. Shiller, Maddison Project Database, DWS Investments UK Limited. Data from 1872 to 2018.

Figure 48: USA GDP vs. EPS of S&P 500 Index



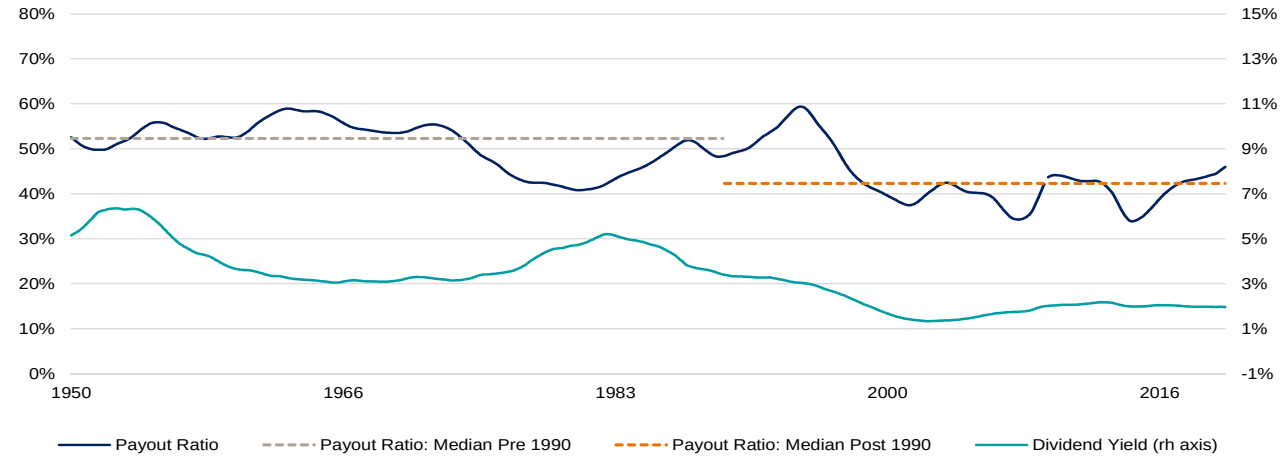
Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20.

Figure 49: China GDP vs. EPS of MSCI China Index



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/19.

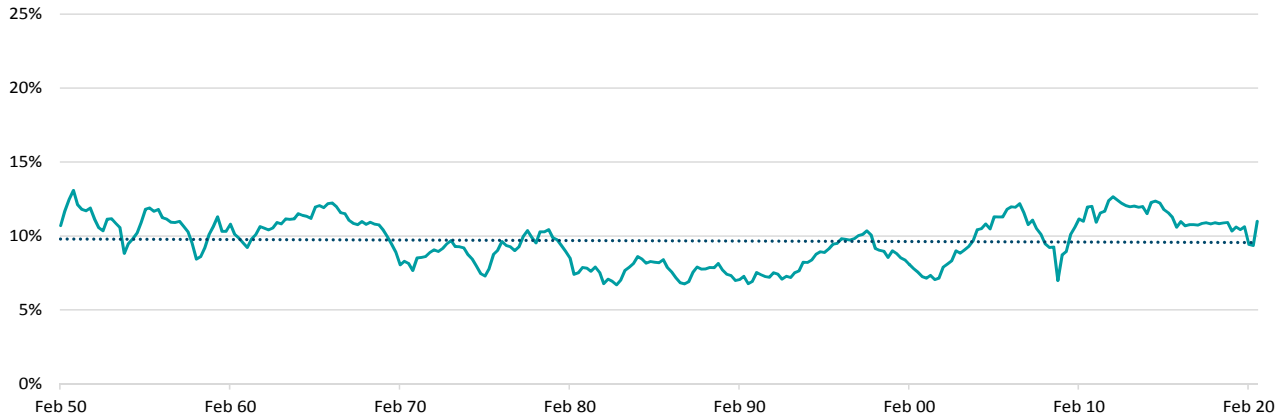
Figure 50: Pay-out ratio of U.S. equities (1950–2020)



Pay-out ratio based on the S&P 500 Index. Source: Robert J Shiller, DWS Investments UK Limited, Data as of 9/30/20.

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

Figure 51: U.S. corporate profits as percentage of GDP (2/50–8/20)



Source: Refinitiv Datastream, DWS Investments UK Limited. Data from 1950 to August 2020.

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

Valuation

We now turn to the last of our three equity pillars, valuation. As seen in Figure 45, prices moving out of line with valuation fundamentals is one of the most volatile components in our equity forecast. Estimating this pillar is therefore challenging.

Hence we revert again to the literature. The likes of Robert Shiller and Andrew Smithers[28] remind us that long run equity valuations have historically exhibited mean-reverting behaviour. While metrics such as the cyclically adjusted price-to-earnings ratio have little predictive power in the short-term, their longer-term mean reverting behaviour makes them ideal for our Long View methodology.

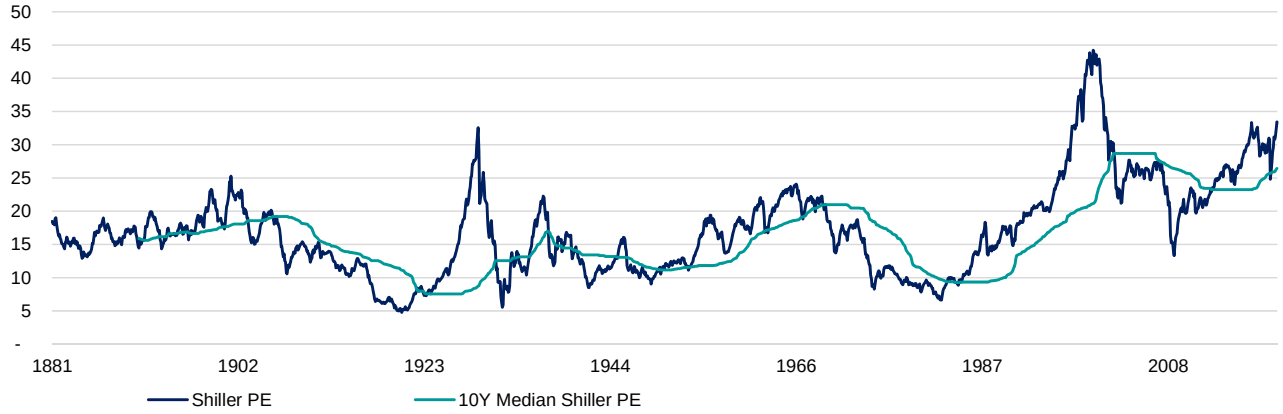
Properly capturing mean reversion in forecasting is not simple. It requires first the selection of a suitable long-term valuation metric. Second, we must define the relevant time horizon over which to set an average level. And, finally it must be agreed how long to wait for any mean reversion to occur.

We have chosen to use the most commonly used indicator, the Shiller price-to-earnings (PE) ratio, based on real cyclically adjusted earnings. With regards to the duration of the expected mean reversion, again we follow the literature (R. Arnott 2014) and rely on a 20-year re-pricing period.

While the behaviour of the Shiller PE is relatively straightforward, due to this very long assumed re-pricing period, we are aware that the mean-reversion may happen faster or slower than our implicit assumption of a smooth process. In consequence, because of this uncertainty over timing, the contribution of our valuation pillar to the overall forecasted return could potentially be wrong for years. However, even though this pillar may be too late or too early much of the time, Figure 53 (showing a strong relationship between the Shiller PE and subsequent ten year returns) indicates that the case for using this ratio is compelling.

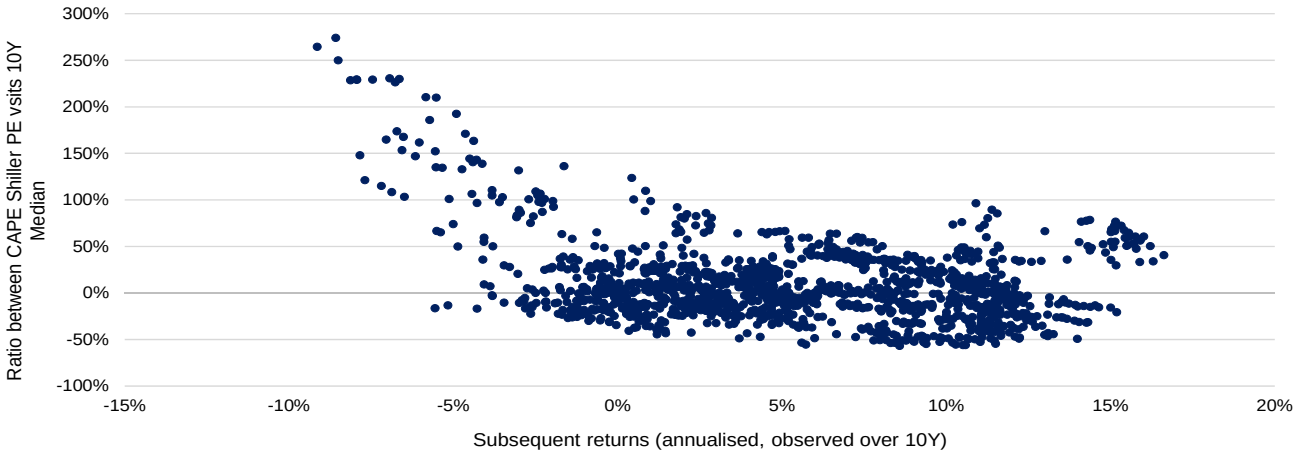
[28] Andrew Smithers is an economist and investor, having published extensively on equity market valuations.

Figure 52: The Shiller PE of U.S. equities has demonstrated mean-reverting behaviour (1881–2020)



Source: Robert J. Shiller, DWS Investments UK Limited. Data as 12/31/20.

Figure 53: The Shiller PE of U.S equities and subsequent 10 year returns (1881–2020)



Source: Robert J. Shiller, DWS Investments UK Limited. Data as of 12/31/20.

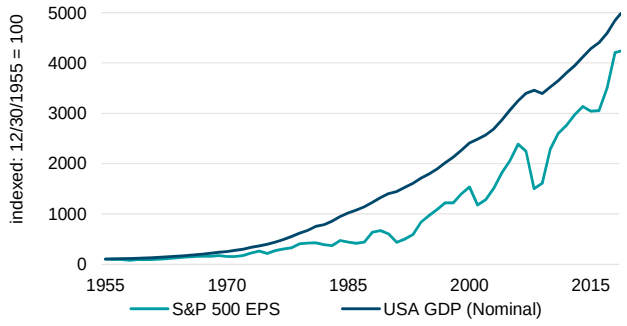
Past performance, [actual or simulated], is not a reliable indication of future performance.

Link between EPS growth and GDP growth is weaker in some emerging markets

In a low-growth environment, getting the growth rate right is crucial for establishing return forecasts and our research suggests that a lower growth rate for at least some EM equities is more appropriate.

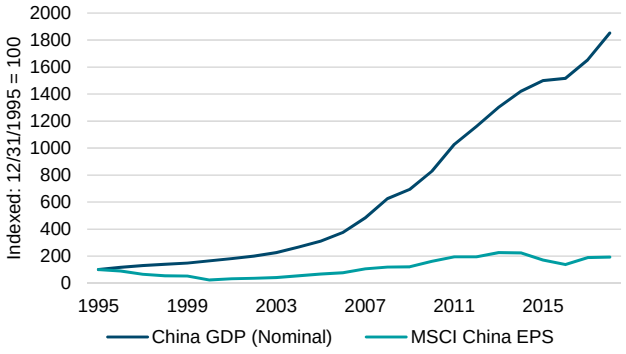
Theory suggests that earnings should grow in line with gross domestic product (GDP). Although this has been the case for the United States (see Figure 54) and most other markets, a number of important emerging markets have exhibited a different behaviour. Earnings have remained largely unchanged in Brazil and for the broader Chinese equity market (MSCI China) over the past decade despite their continued economic growth. In India, the relationship appears to have broken down. While we may argue about the precise factors that may have contributed to their slower earnings growth (excessive capital invested diluting returns, shifts in the distribution of wealth between capital and labour, weaker corporate governance, including the key role still played by state-owned enterprises which often double up as investment vehicles for macro-economic initiatives), this lower earnings growth rate has contributed to the low EM equity returns over the past decade. We reflect these considerations by estimating real earnings growth at only 0.5x real GDP growth for India, Brazil, and the broader Chinese equity market.

Figure 54: U.S. GDP vs. EPS of S&P 500 Index



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20.

Figure 55: China GDP vs. EPS of MSCI China Index



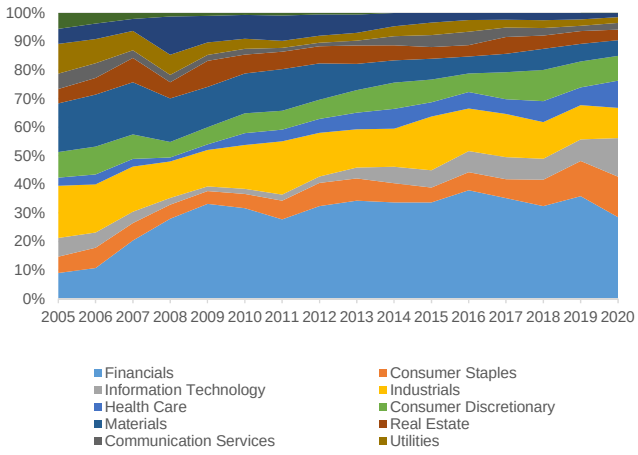
Source: Refinitiv Datastream, DWS Investments UK Limited. Data as of 12/31/20.

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.

Introducing China A-shares

For China A-shares specifically, growth in real EPS seems to align better with China's real GDP growth. Since 2005, earnings per share for the CSI 300 Index and China's real GDP rose at a similar cadence, while earnings per share for the MSCI China Index did not keep up. One possible reason for this could be that broad China equities, represented by MSCI China for example, have historically been dominated by capital intensive stocks such as energy, capital goods, shipping and telecom stocks, whereas China mainland equities, represented by the CSI 300, tend to have a higher share in Consumer Staples, Health Care and Technology Sectors. One may also consider the sector evolution of the CSI 300 from 2005 to 2020.

Figure 56: CSI 300 sector evolution (2005-2020)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20.

Considering that A-share EPS appears to have tracked GDP growth more closely than MSCI China EPS has, but also acknowledging the rationale behind applying a 0.5x factor to GDP growth when forecasting EPS growth for the broader Chinese equity market, we assume a factor of 0.75x Chinese real GDP growth translation into real earnings growth for the CSI 300.

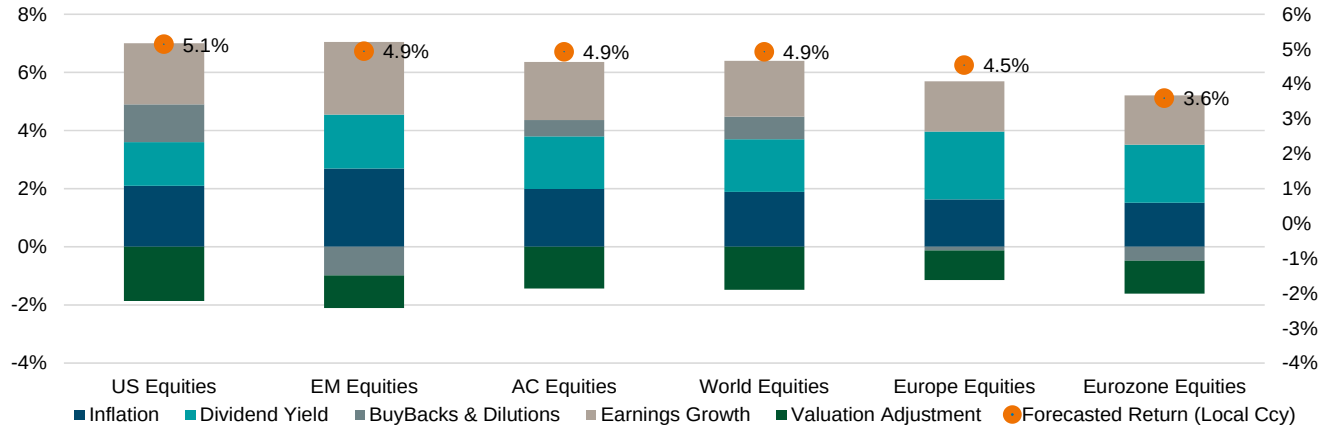
Applying our Long View equity forecast method globally

We apply our equity forecasted returns framework to different countries and regions as follows. For each country we determine a Long View estimate for a benchmark large-capitalisation equity index. Then for each region, we combine the relevant country return forecasts. These have been converted into a single base currency where appropriate.

Meanwhile, small cap equities forecasted returns are derived from respective large cap returns and by applying a small-cap risk premium. The small-cap risk premium is calculated as the median of the long-term excess returns of each small-cap index vs. its corresponding large-cap index.

Figure 57 summarises the pillar decomposition of the forecasted annual returns for the main countries and regions we cover.

Figure 57: Pillar decomposition of our Long View (10-year) return forecasts for equities, annualised (local currency, for YE 2020- YE2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

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.

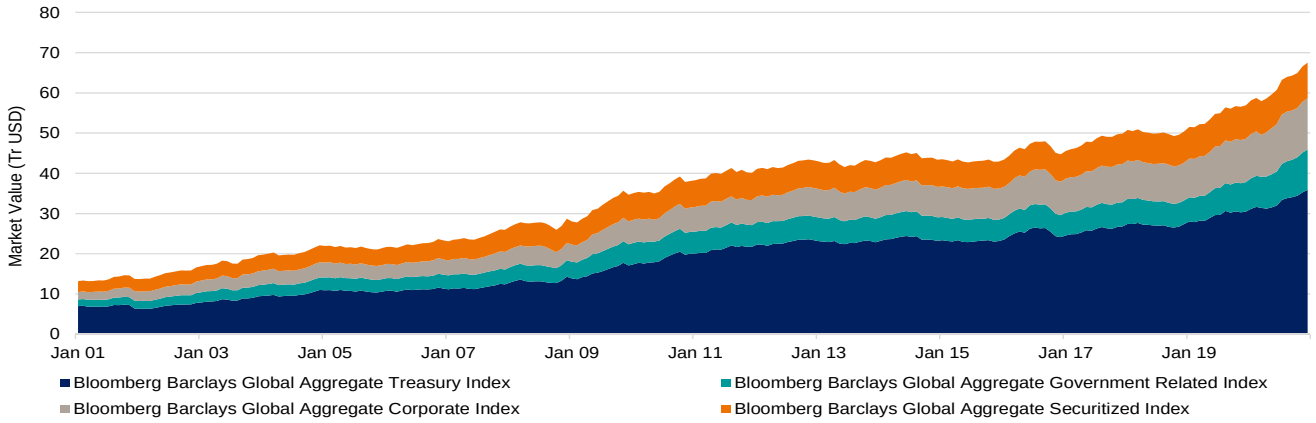
Fixed income

As previously for equities, the first section presents the main forecast results and insights from our fixed income methodology, while the second outlines our methodology in detail.

Forecasted returns for the next decade

To put our fixed income Long View in context, it is worth remembering that over the past two decades, global debt markets have grown rapidly in size. The more liquid segments alone have quadrupled in value, as can be seen in Figure 58.

Figure 58: The fixed income markets have seen nearly 20 years of continuous expansion (12/31/00–12/31/20)



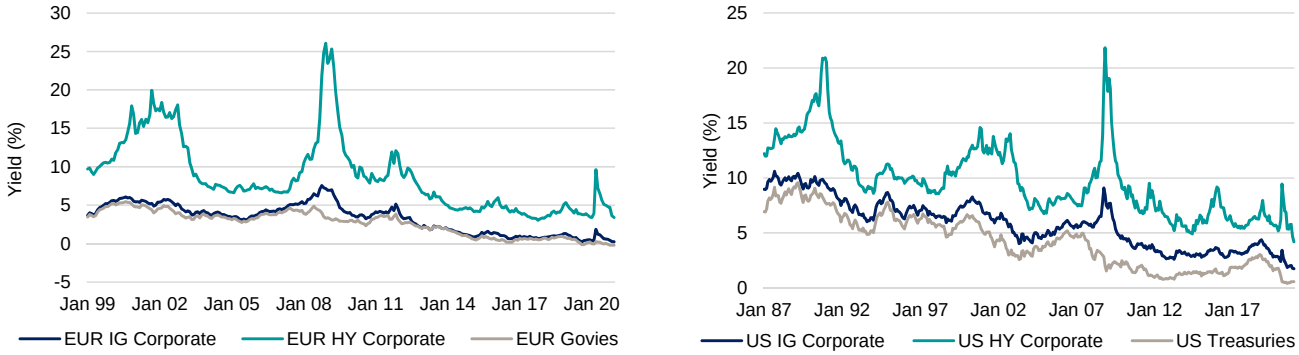
Source: Bloomberg Finance L.P., DWS Investments UK Limited, data as of 12/31/20.

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

In line with other asset classes, yields for fixed-income securities have been declining for most of the past few decades, owing to the fall in interest rates in developed countries (Figure 59).

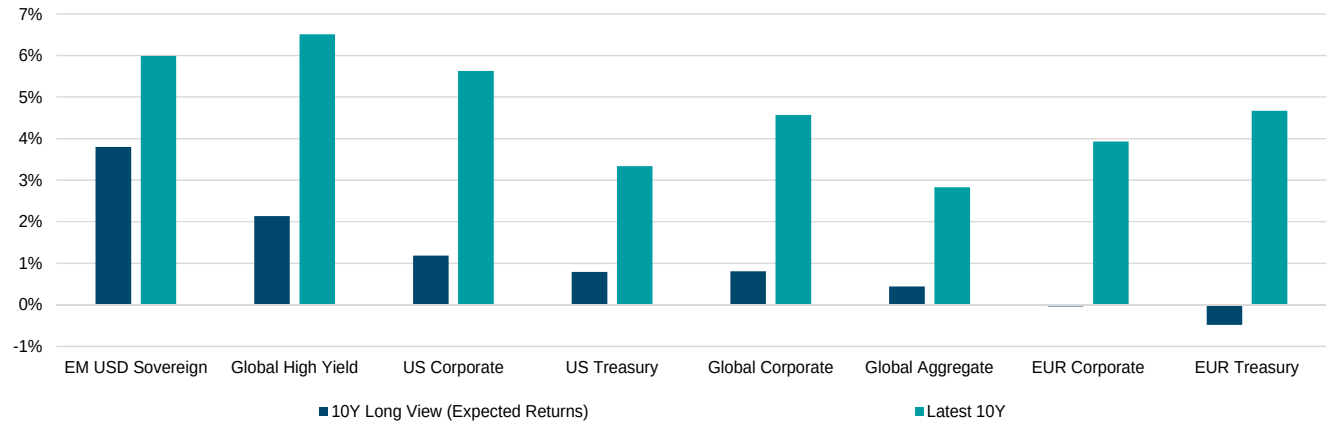
Over the long term (10-year period YE 2020- YE 2030), we forecast euro government bonds to deliver -0.48 percent per annum and corporates -0.04 percent. This is of course disappointing compared with (especially recent) history (Figure 60). Looking at different market segments, it is possible to find higher yielding assets – but this requires investors moving further up the risk curve and into segments they might not have considered until recently. Even for High Yield, our forecasts would amount to historically low 10-year returns, leaving EM fixed income as the only main segment where forecasted returns are roughly two-thirds of their realized return over the past decade – everywhere else, the forecasts are well below half the returns of the last decade.

Figure 59: Fixed income yields have been trending down for the last 20 years (12/31/98–12/31/20 and 12/31/86–12/31/20 respectively)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class (forecasted return for multi-currency indices is calculated as the average of each currency constituent).

Figure 60: Fixed income forecasted returns vs. realised returns over 10 years, annualised (local currency)



Forecasted returns for multi-currency indices are calculated as the average of each currency constituent. Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class (forecasted return for multi-currency indices is calculated as the average of each currency constituent).

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.

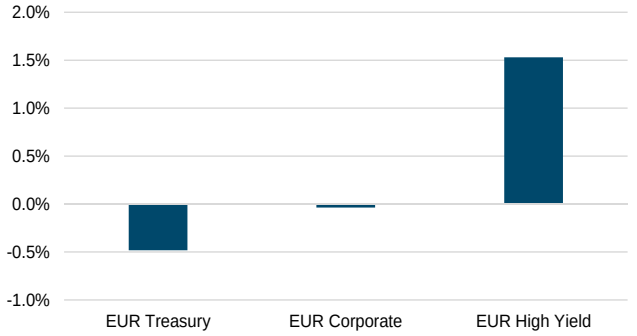
Figure 61 shows the current credit premium in euro-denominated fixed income, while Figure 62 illustrates the term premium in euro government bonds. Investors might still expect a credit premium, although it is lower than it has been in the past. But due to the ECB's Quantitative Easing (QE) programs, the term premium is available only at the long end of the term structure.

Looking at forecasted returns, the bright spots are in higher-risk fixed income segments, and even here really only in emerging market debt – whereas US and Euro high-yield forecasted returns are historically low, almost matching the returns realized in the decade to the financial crisis – reflecting significant recovery in spreads since Q1 2020 while the defaults resulting from the pandemic recession are largely yet to materialize.

This leaves emerging markets debt segments which may still generate between 3 and 4 percent per annum over our 10-year forecast. These returns also seem low relative to history; however, even on a risk-adjusted basis they appear to offer higher potential than most developed market debt segments, certainly compared to euro assets (Figure 62).

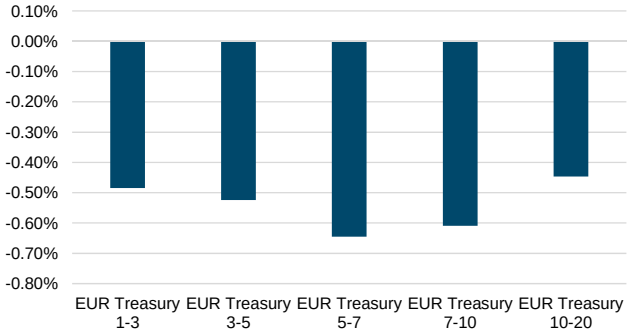
Note that the forecasted Sharpe ratio for emerging market bonds for the next ten years is comparable to the ratio for emerging-market equities, as can be seen in Figure 24

Figure 61: Credit premium observed on euro fixed income



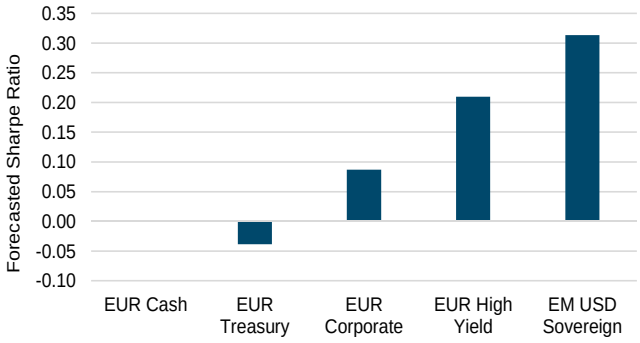
Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

Figure 62: Term premium observed on euro fixed income



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

Figure 63: Forecasted Sharpe ratio (YE 2021-2030) for fixed-income assets in euros



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. 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.

Constructing our fixed-income Long View

Various types of fixed income instruments may feature different levels of return, and this drives our methodology. Whereas the equity method presented earlier makes use of both financial and economic data, our approach to fixed-income assets focuses on calculating and discounting potential cash flows. In particular we mimic the development over time for the forecasted cash flows of a dynamically rebalanced portfolio of debt securities.

Our starting point is the average current yield of the portfolio. Comparing the historical yield of a government bond index and its subsequent total return gives us an interesting perspective, as shown in Figure 64[29]. The yield appears to be a credible first-order approximation for forecasted fixed-income total returns.

However, we will show below that the reality is more complicated. Other components demonstrate a significant role in forecasting fixed-income returns. This is already apparent when looking at corporate bonds (Figure 65) which can be riskier than government bonds (Figure 64). On this graph, yield and future performance vary more over time, and, on some occasions, the difference has been material.

A few necessary assumptions

As discussed previously, our fixed-income approach is designed to forecast an investment in a respective fixed-income index and not in a single bond. Therefore, an important assumption in our methodology is the expectation of some stability of the main characteristics of the index, such as duration or ratings split. Figure 66 is reassuring in this respect as it shows that, whilst duration does evolve over time, the duration of the U.S. Treasury Index stays close to the historical average.

Figure 64: Historical yield to maturity and subsequent five year total-return performance of 5-Year U.S. Treasury bonds, annualised (1/31/73-12/31/20)

Source: Bloomberg Finance L.P., DWS Investments UK Limited, data from 1/31/73 to 12/31/20. See appendix for the representative index corresponding to each asset class.

[29] See (R. Arnott 2015) for further reference.
Past performance, [actual or simulated], is not a reliable indication of future performance.

Figure 65: Historical yield to worst and subsequent five year return performance of 5-year U.S. corporate bonds, annualised (1/31/73-12/31/20)

Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data from 1/31/73 to 12/31/20. See appendix for the representative index corresponding to each asset class.

Figure 66: Duration of the Barclays U.S. Treasury Index (1/31/89–12/31/20)

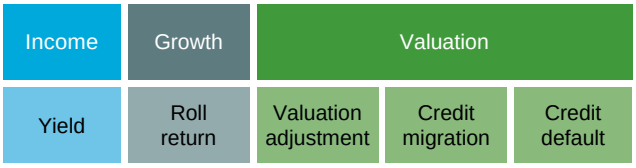
Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data from 1/31/89 to 12/31/20.

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

Our three-pillar approach to fixed income

As with other asset classes in this publication[30], we split the forecasting of fixed income returns into three fundamental pillars: income, growth and valuation. Each is then decomposed into one or several components, as shown in Figure 67.

Figure 67: Pillar decomposition: Fixed income



Source: DWS Investments UK Limited. As of 12/31/20

Fixed-income investors receive coupons for each bond in the index, which represents the income pillar of the return. The second pillar is roll return, which represents the mark-to-market changes due to passage of time.

Finally, our valuation pillar is made of three components: the valuation adjustment, accounting for the mark-to-market of the bonds due to expected changes in the yield curve, and credit migration and credit default[33], with the latter two representing the impacts on the expected return due to changes in bond ratings and in some case defaults. These events impact the ratings mix of a bond index, which usually impacts its valuation. We now look at each of these pillars in more detail.

Forecasting the average yield

The yield component represents the income pillar of the return. Historically, this has been the largest contributor to fixed-income total returns. In practice, it accounts for the sum of the coupons an investors expects to receive over the investment period.

Bonds provide an investor with a reasonable likelihood[31] of receiving the coupons and principal at maturity. Considering a broad index, potential cash flows are summarised by an average yield we refer to as the initial average yield, as observed at the time of purchase.

This holds until the first bond expiry in the index. See Figure 68 for a breakdown of a bond's expected change in value over time.

Over a ten year period, some bonds will expire and or may be replaced with others. Each new bond will bring a different yield, more precisely, the yield at the bond's investment date. It is important to keep in mind, as mentioned above, that we are modelling fixed income indices (that is, representing dynamic portfolios of bonds) and not static portfolios of securities.

Over the time horizon of our forecast period of ten years, an investor will be exposed to a changing portfolio – both in relation to the securities mix and time to maturity of each security. From a yield perspective, an investor will receive a combination of the initial yield and an expected yield, which represents an estimate of the index yield at the end of the ten-year forecast period.

For example, a U.S. Treasury Index is composed of a full range of bonds, from short (under 3 years) to long maturities (over 20 years). Looking at Figure 69, more than 80 percent of the bonds in this index will have expired before the end of our observation window. During this time, they will be replaced by new bonds at a presently unknown yield.

Whereas the initial yield of a bond at the time of its issuance is straightforward and observable, estimating its potential yield is more challenging and requires several assumptions. To forecast the expected yield, we rely on the traditional decomposition of any bond yield as the sum of two parts:

- The corresponding government yield – that is, the yield of a government bond of the relevant country with a similar duration
- The corporate spread[32] related to the credit quality[33] of the corporate bonds compared to risk-free securities.

The starting government yield is the yield currently observed on the relevant Treasury curve at the duration point that best matches the index considered. The forecasted government yield is derived from this starting yield by incorporating our estimates of the forward government yield curve. The overall forecasted yield is an average of these two yields.

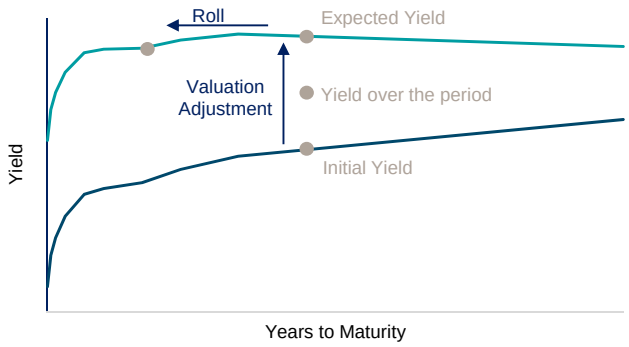
[30] See page 33 for our overall framework.
[31] Certainty, in the absence of default.
[32] For government bonds, we assume this credit spread to be equal to 0.
[33] Credit quality represents the lower rating of either Moody's Investors Services, Inc. or Standard & Poor's Corporation and is their opinions as to the quality of the securities they rate. Credit quality does not remove market risk and is subject to change.
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.

Similarly, for corporate spreads, the current spread (often referred to as the option-adjusted spread or OAS) is easily observable for a given index. Complexity resides in estimating the long-term forecast for the OAS.

Figure 70 highlights the variability of the OAS's long-term behaviour, across different credit qualities.

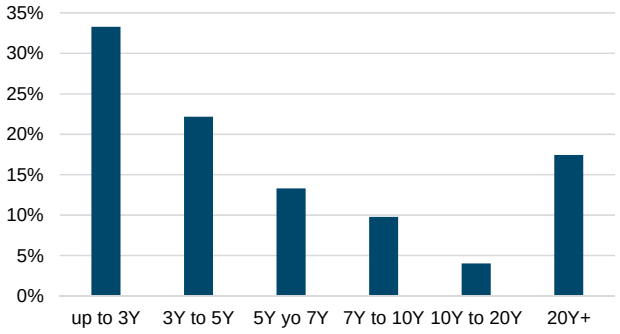
As acknowledged widely in the literature[34], the spread's behaviour tends to be mean-reverting and we rely on this property to develop a reasonable long-term equilibrium estimate.

Figure 68: Components of bond returns



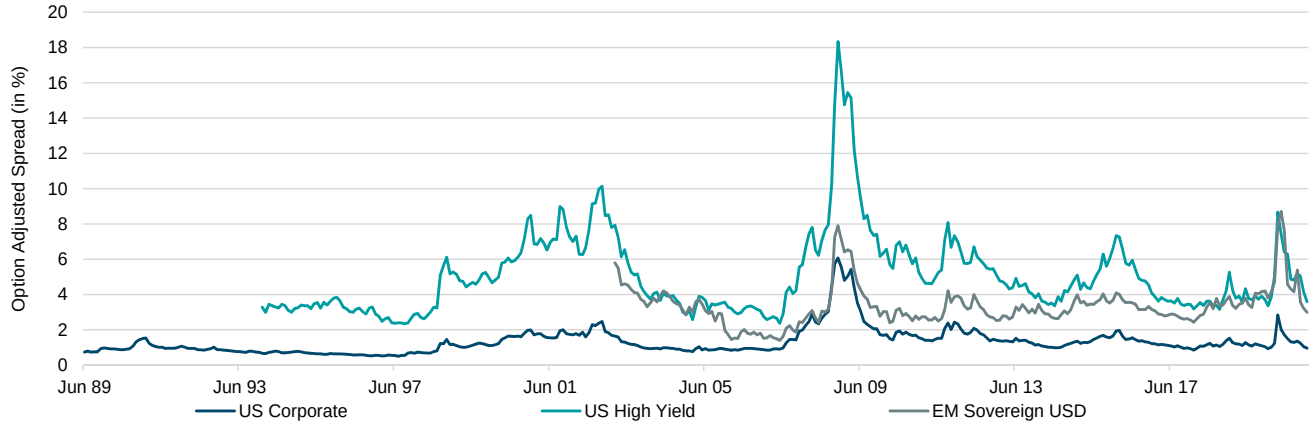
Breakdown of a bond's expected change in value.
Source: DWS Investments UK Limited. For illustration purposes only.

Figure 69: Proportion of the U.S. Treasury index by maturity



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 1/31/20.

Figure 70: Historical values for different options-adjusted spreads (5/31/89–12/31/20)



Source: Bloomberg Finance L.P. Data of 12/31/20. See appendix for the representative index corresponding to each asset class.

[34] See (R. Arnott 2015) and (Ilmanen 2012)
Past performance, [actual or simulated], is not a reliable indication of future performance.

Roll return

Buying a bond with a fixed maturity, investors face the economic impact of its reducing time to maturity. This is commonly referred to as the roll return, and it represents the mark-to-market impact of the bond moving along the yield curve (Figure 71).

Valuation adjustment: reflecting the impact on potential changes in interest rates

The valuation pillar reflects the mark-to-market impact of a change in yields over time, the result of changes in interest rates and corporate spreads. Both changes affect a bond's valuation proportional to the duration of the index, as can be derived from a pure cash flow analysis. Utilising the forward curve and the expected long-term change in OAS, we directly calculate the hypothetical mark-to-market impact.

Credit migration

Credit migration refers to a change in the bond rating, which is usually reflected in valuations.[35] This can have a dramatic impact, in particular for investors in high-yield bonds.

Over a long period of time, a company's outlook can change. Hence, the ratings of bonds issued can also change, and, in turn, the valuation of such bonds can be affected by market perception, taking into account the probability of default. This is what we aim to capture with our credit-migration component of the fixed-income forecasts.

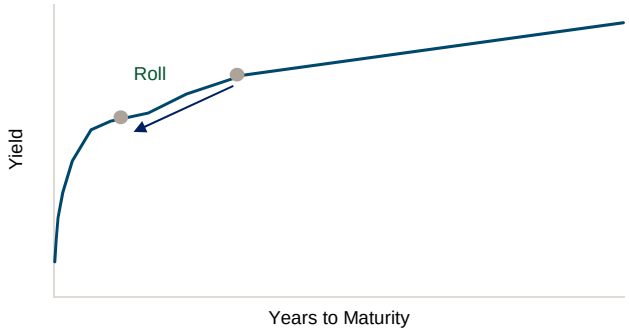
For a particular index, we can examine its composition by credit quality or rating. See Figure 72 for the credit rating mix of the Bloomberg Barclays U.S. Aggregate Corporate Index. This so-called credit mix is shifting over time, following any upgrades and downgrades by rating agencies. Changes in rating for a given bond impact its spread. As illustrated in Figure 73, all else equal, the worse the rating, the higher the corporate spread.

At the index level, this means the corporate spread of a benchmark index will move over time because of the change in the ratings split. Moves in the spread will translate into mark-to-market changes in the index as a result of this credit migration.

The impact of credit migration impacts tend to be negative in most cases, since, in aggregate, bonds are more likely to be downgraded than upgraded. At the extreme, for example, AAA bonds cannot be upgraded. This is different for high-yield bonds, where the likelihood of an upgrade is greater and the possibility of downgrades is somewhat floored, as bonds would have to default (see next section).

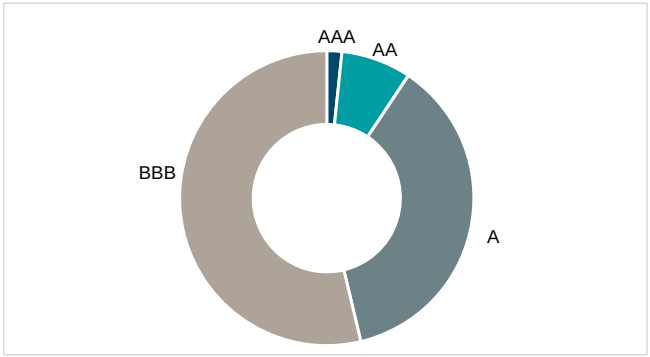
It is interesting to note here that sovereign bonds and corporate bonds have different behaviours when it comes to downgrades or upgrades. To be more accurate, ratings agencies do not treat both type of bonds in the same way. This translates into transition matrices and recovery rates varying significantly between corporate and government bonds.

Figure 71: The roll yield refers to the impact on yield and price during the bond's retention



Source: DWS Investments UK Limited. For illustrative purposes only.

Figure 72: Proportion of U.S. corporate bonds[1] outstanding by credit rating



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/23/20.
[1] Bloomberg Barclays U.S. Aggregate Corporate Index.

[35] Credit quality represents the lower rating of either Moody's Investors Services, Inc. or Standard & Poor's Corporation and is their opinions as to the quality of the securities they rate. Credit quality does not remove market risk and is subject to change.

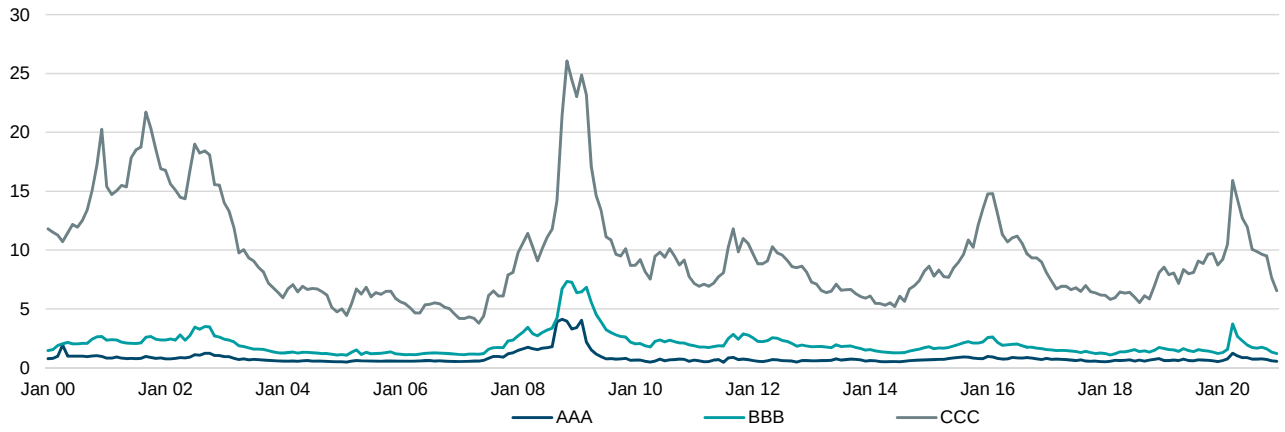
Credit default

Here we cover the most extreme case of credit migration, that is the risk of a bond defaulting.[36] Should this happen, its impact would take the form of a partial or full loss of the bond principal, rather than a change in the yield. For any given bond, depending on its rating, it carries a probability of default and an average recovery amount in the case of default. By multiplying the two, bond by bond, we can calculate the impact at the index level. Figure 74 shows the importance of credit defaults for U.S. high-yield returns.

Update to Transition Matrices

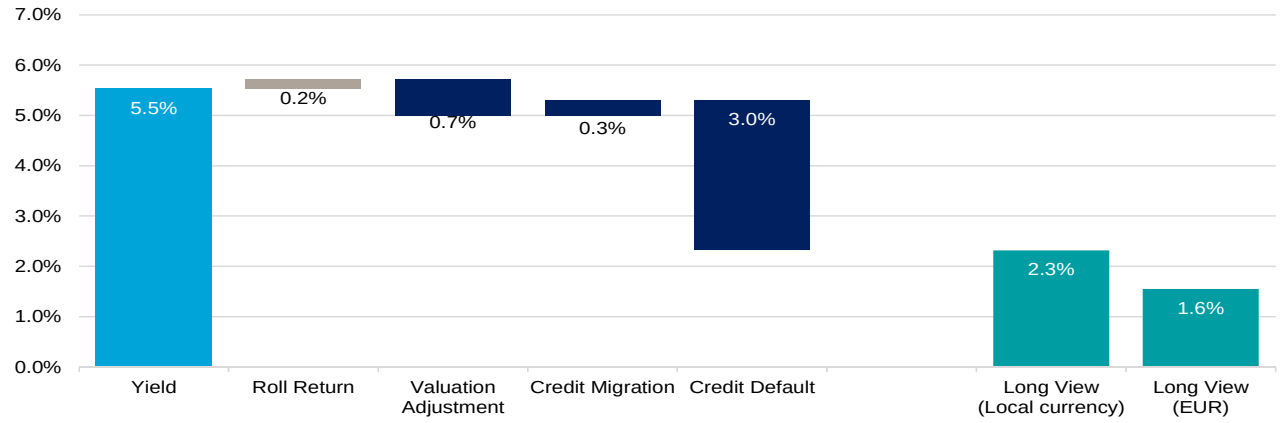
Generally, our credit migration and credit default pillars are based on historical long-term, 1-year average transition matrices as published in annual default studies by S&P and Moody's (with data from 1979 until the latest available year). While these transition matrices are typically very stable and only evolve slowly from year to year, this was not an assumption that could be taken for granted in a recession of the magnitude we witnessed in 2020. With the onset of this recession triggered by the Covid-19 pandemic, these long-term transition matrices were likely underestimate the risk and the severity of credit defaults at least over the next few years, so in Q2 2020 we moved to using the transition matrices from the period 1979-2009 (i.e. with a higher weight given to the default environment after the GFC). We are closely monitoring the ongoing recovery from the Covid-19 crisis and will revert to base transition matrices over time when appropriate.

Figure 73: U.S. Corporate spread reversion to the mean (12/31/99–12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data from 12/31/99 to 12/31/20. See appendix for the representative index corresponding to each asset class.

Figure 74: Components of U.S. high yield bond 10-year forecast, annualised (in local currency, YE 2021-2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

[36] Credit quality represents the lower rating of either Moody's Investors Services, Inc. or Standard & Poor's Corporation and is their opinions as to the quality of the securities they rate. Credit quality does not remove market risk and is subject to change.
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.

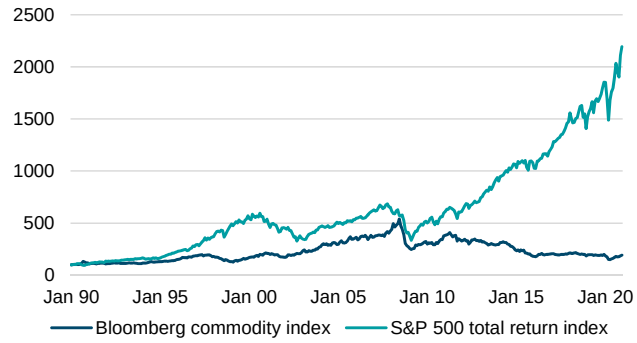
Commodities

Forecasted returns for the next decade

When contemplating an investment in commodities, we first must admit that recent performance (Figure 75) is hardly a strong endorsement. What is more, our total return forecasts are lacklustre (Figure 76). However, commodities can offer diversification benefits.

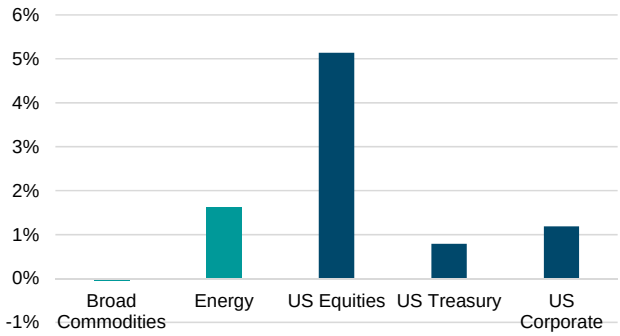
Commodities, particularly gold and oil, are often thought of as diversifiers in portfolios to asset classes such as equities or fixed income. Indeed, many investors in Commodities may consider their returns as more of a bonus. Figure 77 and Figure 78 demonstrate the low correlation and hence good diversification benefits which oil and gold may provide.

Figure 75: Commodity Index vs. S&P 500



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data from 12/31/89 to 12/31/20.

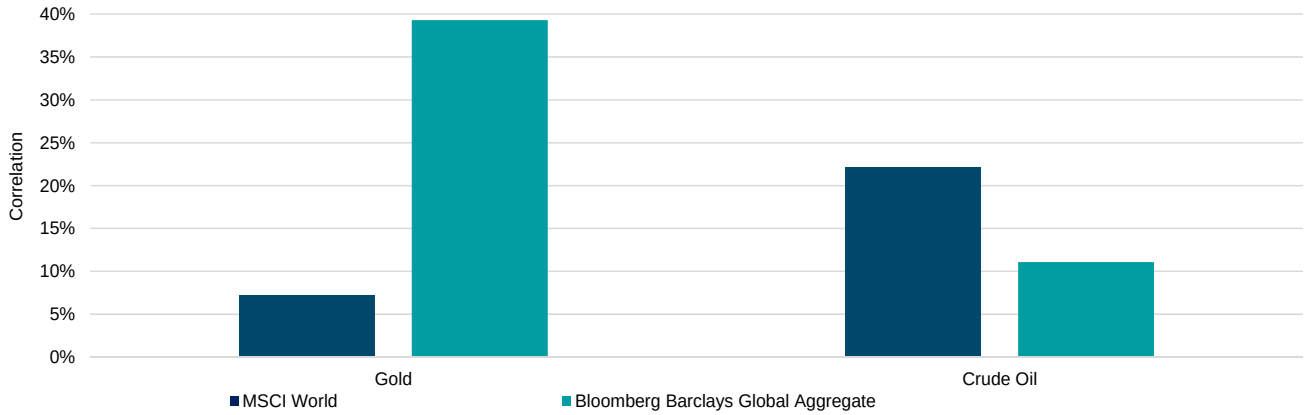
Figure 76: 10-year commodity forecasts vs. equities and bonds, annualised (YE 2021–2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

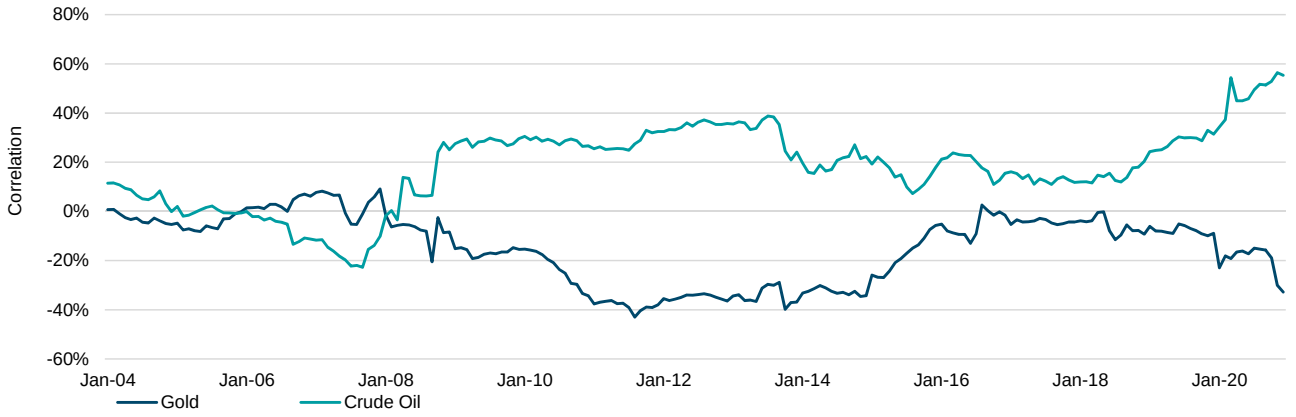
Past performance, [actual or simulated], is not a reliable indication of future performance. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Figure 77: Correlation of global equities and bonds with gold and crude oil (12/31/89–12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data from 12/31/89 to 12/31/20. See appendix for the representative index corresponding to each asset class. Overlapping monthly returns are used for calculations. Calculations in dollars.

Figure 78: Five-year rolling correlation of Euro Stoxx 50 with gold and crude oil (12/31/03–12/31/20)



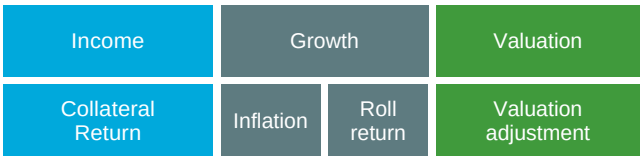
Source Bloomberg Finance L.P., DWS Investments UK Limited. In EUR. 12/31/03 to 12/31/20 (Overlapping monthly returns are used for calculations. Calculations in EUR). See appendix for the representative index corresponding to each asset class.

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

Constructing our commodities Long View

To present forecasted returns for commodities, we apply the same broad framework as introduced earlier for equity and fixed income as shown in Figure 79.

Figure 79: Pillar decomposition: Commodities



Source: DWS Investments UK Limited. As of 12/31/20.

Financial exposure to commodities is achieved via futures contracts. As these are accessed by providing margin[37], futures come with embedded leverage. To properly compare the Long View of commodities with other asset classes, such as equity or fixed income, we analyse the contracts by providing full cash collateralisation[38] for the notional exposure[39] of the futures contracts.

Another important characteristic of a futures instrument is its term-structure and the multiplicity of contracts.

Inflationary pressure leads to an increase in commodity prices and also plays a role in long-run prices of a commodity, while the roll return depends on the shape of the futures term structure and how this curve behaves when rolling to the next contract. Valuation adjustments occur when commodity prices revert to their long-term average.

As each commodity is different, aspects such as roll return and valuation adjustment are estimated separately. Other building blocks such as the forecasted return on the collateral or inflation expectations are a function of the economy and are generally applicable to all types of commodities futures contracts.

Once long-run forecasts for single commodities are estimated, they are used to calculate forecasts for composite commodities indices.

Collateral return

Because fully collateralised futures are used for our long run forecasts, the collateral return is the performance of the fixed-income instrument (usually short-dated government bills) in dollars.

For the estimation to forecast fixed-income returns, please refer to the fixed-income section of this paper.

Roll return

Most investors take exposure to near-dated contracts in order to maintain a long-term exposure to a commodity. Close to a contract's expiration these investors sell the near-dated future and buy a further-dated future. Any profit or loss generated from this transaction is known as the roll return. While most commodities index-providers roll to the nearest available contract, for our estimation of the roll yield, we use the average value across all of the investable futures contracts for the given commodity at that point in time[40].

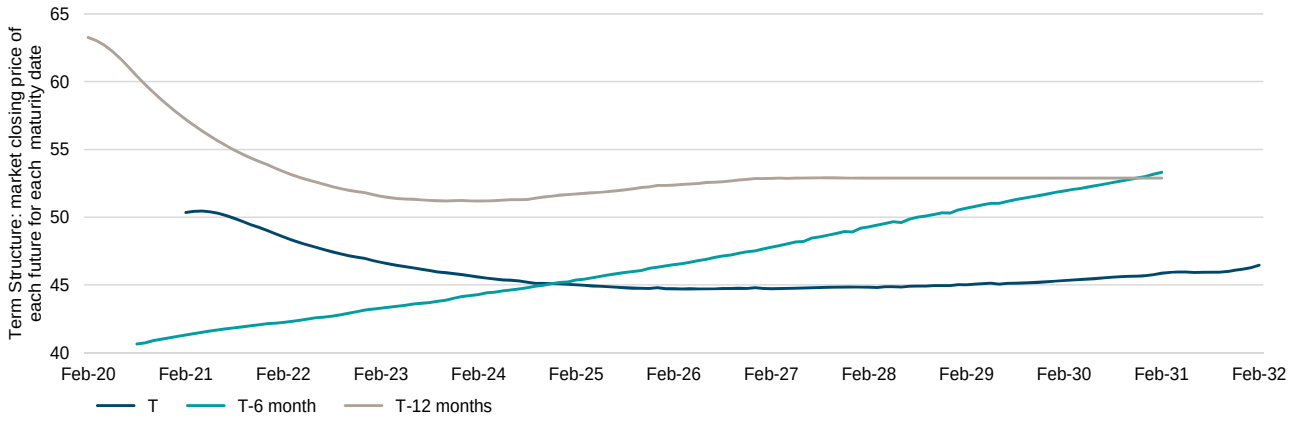
Gleaning information across term structure and over time

Depending upon the interplay of current financing costs, storage costs and convenience yield, a commodity curve is either in backwardation or contango[41]. Hence to estimate the average roll yield over our 10-year horizon we use the average of the roll yield over an expanding window. Figure 80 shows the variation in term-structure of West Texas Intermediate (WTI) crude oil[42] over time. In this example, the crude-oil term structure has changed from a backwardation structure a year ago to a strong contango curve about six months ago. As of 1/6/21, it is in a mild backwardated structure again. Given such changes in term structure and contracts, we consider it best to use an average view.

Once the roll return has been estimated for a particular point in time, our Long View roll return is forecasted by taking an exponentially weighted average over an expanding window.

[37] Funds deposited to initiate and maintain futures contract
[38] Futures collateralisation refers to, while entering into a futures position, simultaneously investing the notional value of the futures in Treasury Bills or other short-term fixed-income instrument
[39] Notional exposure of a futures contract represents the total amount of the security underlying the future at its spot price
[40] When commodities futures contracts expire, investors must re-invest the cash received at expiry in order to maintain exposure to the commodity. For re-investment or "roll", commodities indices typically re-invest into the shortest maturity contract available for the given commodity.
[41] Backwardation: Condition of the term structure in forward/futures market when the price of spot/near-dated contract is higher than far-dated contract. In Contango, the conditions are opposite to backwardation.
[42] West Texas Intermediate (WTI) crude oil serves as a benchmark in oil pricing on the New York Mercantile Exchange

Figure 80: Changes in the crude oil (WTI) futures curve over the past 12 months (1/6/20-1/6/21)

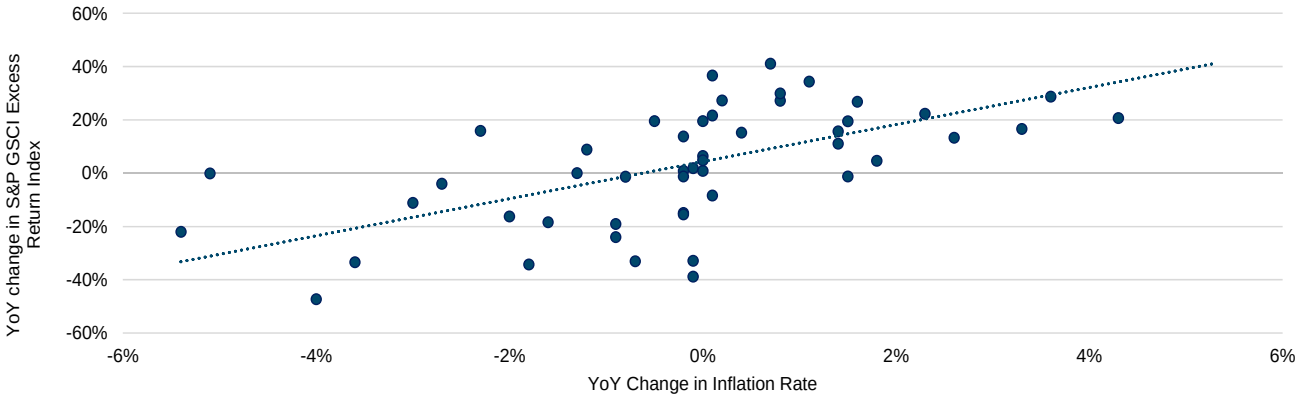


Source: Bloomberg Finance L.P., DWS Investments UK Limited, data as of 1/6/21.

Inflation

The inflation component raises commodity prices, as can be seen in Figure 81, whereas inflation adjusted prices exhibit a tendency to mean-revert (see Figure 82 and Figure 83). Certain commodities may also act as hedges against unexpected inflation[43].

Figure 81: Commodity prices positively correlated to changes in inflation (12/31/71 – 12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data from of 12/31//71 to 12/31/20.

[43] If we consider unexpected inflation to be equal to year-on-year changes in inflation, we can see a long term positive relationship between commodity excess returns and changes in inflation. Figure 81 shows the relationship between excess returns of the GSCI and year-over-year change in inflation from 1970 through 2020. Since 1970 contemporaneous changes in the annual rate of inflation have seemingly explained about 40 percent of the time-series variation in the GSCI's annual excess returns.
Past performance, [actual or simulated], is not a reliable indication of future performance.

Valuation

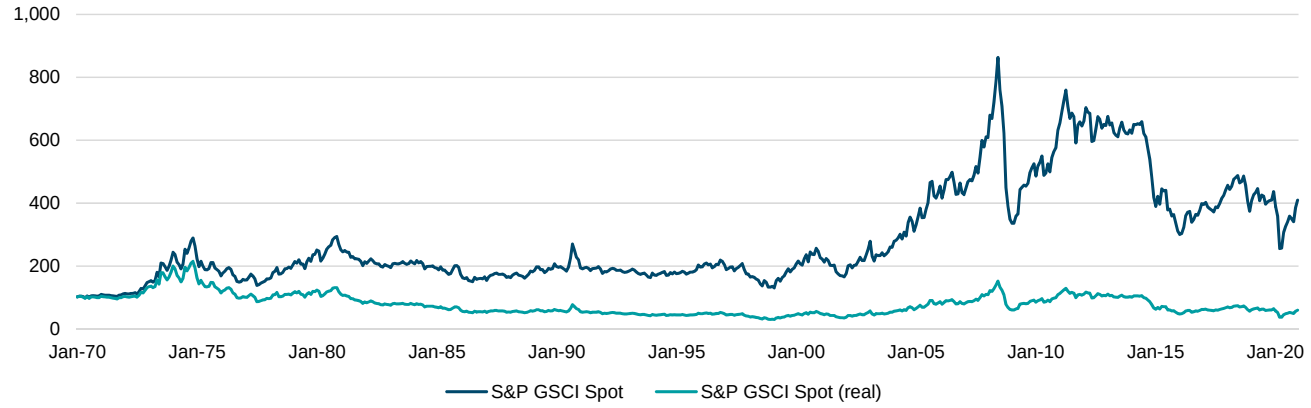
To illustrate, the nominal price of a commodity can be decomposed into real price and inflation. If we look at the long-term trend of the real S&P GSCI Spot index, as shown in Figure 82, we see prices mean-revert.

Furthermore, as we forecast single commodities and then aggregate them into indices, we also need to understand the mean-reversion tendencies of single commodity real spot prices. Four examples are shown in Figure 84.

These figures show that commodities have exhibited mean reverting characteristics over time, that is they show negative (or lower) subsequent returns following higher prices and positive (or higher) subsequent returns following lower prices. This occurs for different reasons: changes in the supply-and-demand dynamics of a commodity, modifications to the production process, discovery of new deposits, the invention or price reduction of a substitute, to name but a few.

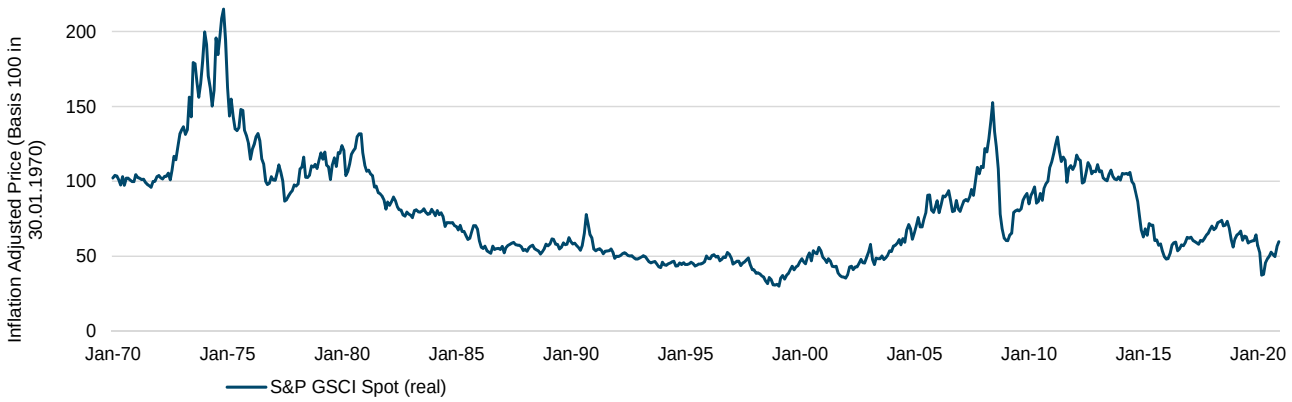
We incorporate mean reversion into our valuation pillar, where current real spot prices may revert to the historical real average prices over the last 10 years.

Figure 82: Nominal and real commodity prices: real prices revert to the mean over time (12/31/69-12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data from 12/31/69 to 12/31/20.

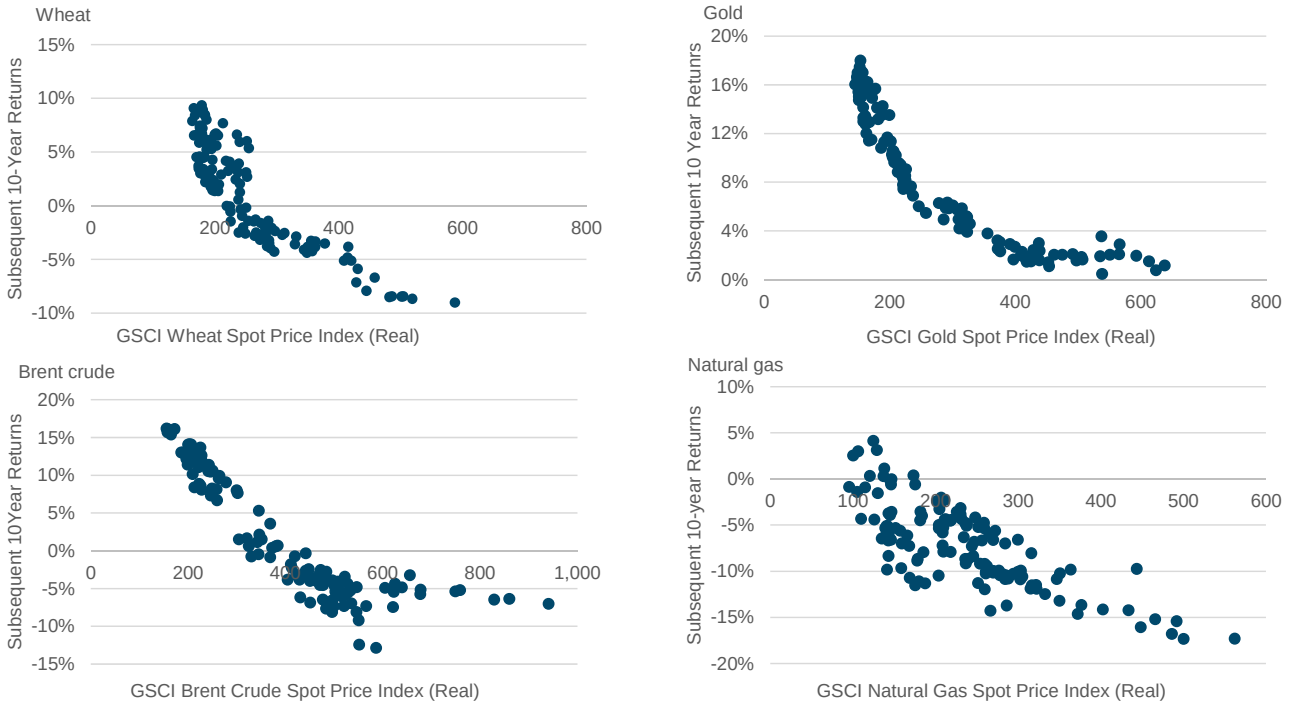
Figure 83: Once adjusted for inflation, the S&P GSCI Index exhibits mean-reverting behaviour



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data from 12/31/69 to 12/31/20.

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

Figure 84: Single commodities exhibit strong mean-reverting behaviour (12/31/99-12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data from 12/31/99 to 12/31/20.

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

Alternative assets

"I don't read, much less follow, the valuations or predictions. I study the numbers."

John Neff[44]

Alternatives Long View framework

The analytical framework we rely on for alternative asset classes is similar to that of traditional asset classes presented in the previous chapter, as shown in Figure 85.

More precisely, we forecast most alternative asset classes' returns with the same approach as their corresponding traditional asset classes, sometimes with an added premium to account for specific features, for example liquidity. Hedge funds are the exception, as we forecast returns through a regression of their historical performances.

Figure 85: Long View for alternative asset classes: pillar decomposition

Asset Class	Income	Growth		Valuation			Premium
Hedge funds		Hedge funds' full exposure to each pillar is 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	Earnings growth	Valuation adjustment			
Private real estate equity	Dividend yield	Inflation	Earnings growth	Valuation adjustment			
Private real estate debt (in development)	Yield	Roll Return		Valuation change	Credit migration	Credit default	Liquidity premium
Listed infrastructure	Dividend yield	Inflation	Earnings growth	Valuation adjustment			
Private infra-structure debt	Yield	Roll Return		Valuation change	Credit migration	Credit default	Liquidity premium

Source: DWS Investments UK Limited. As of 12/31/20.

[44] https://www.investors.com/how-to-invest/investors-corner/shaich-lynch-buffett-words-of-wisdom/

Hedge funds

Forecasted returns for the next decade

As can be seen in Table 8, our 10-year forecasts are differentiated depending on hedge-fund category. The return forecasts are somewhat lower than history, which reflects among other reasons our conservative approach due to biases in hedge-fund performance reporting.

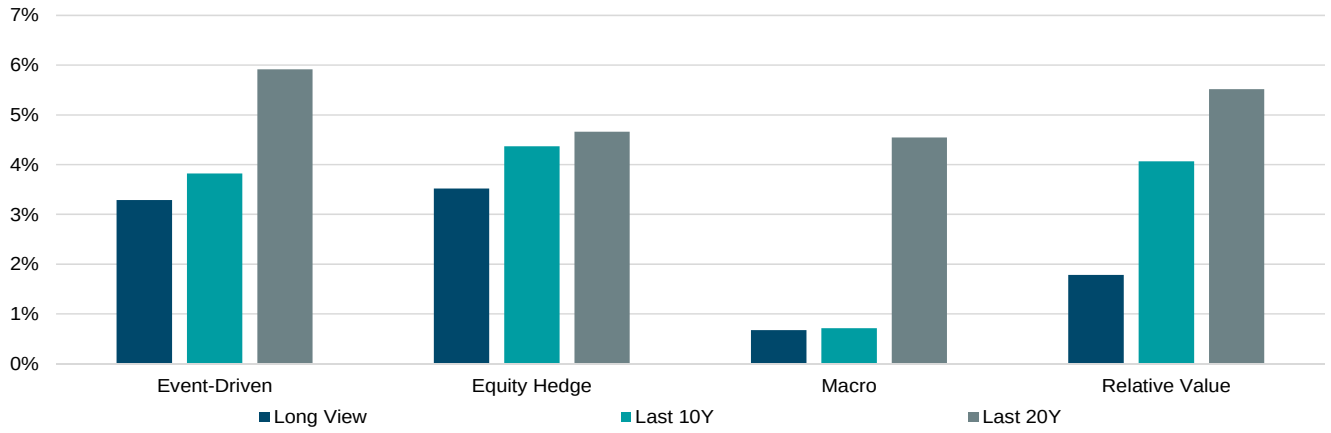
Compared with past performance, Figure 86 highlights that forecasted returns for hedge funds reflect a declining trend for industry returns over two decades.

Table 8: Forecasted returns (YE 2020 – YE 2030) for hedge funds, annualised

Hedge-fund strategy	Return forecast (local currency)
Event-driven	3.3%
Macro	0.7%
Relative value	1.8%
Composite	2.3%

Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

Figure 86: Hedge funds' annualised 10-year forecasted (YE 2021- YE 2030) and realised returns (in USD) (10-year and 20-year as of 10/31/20)

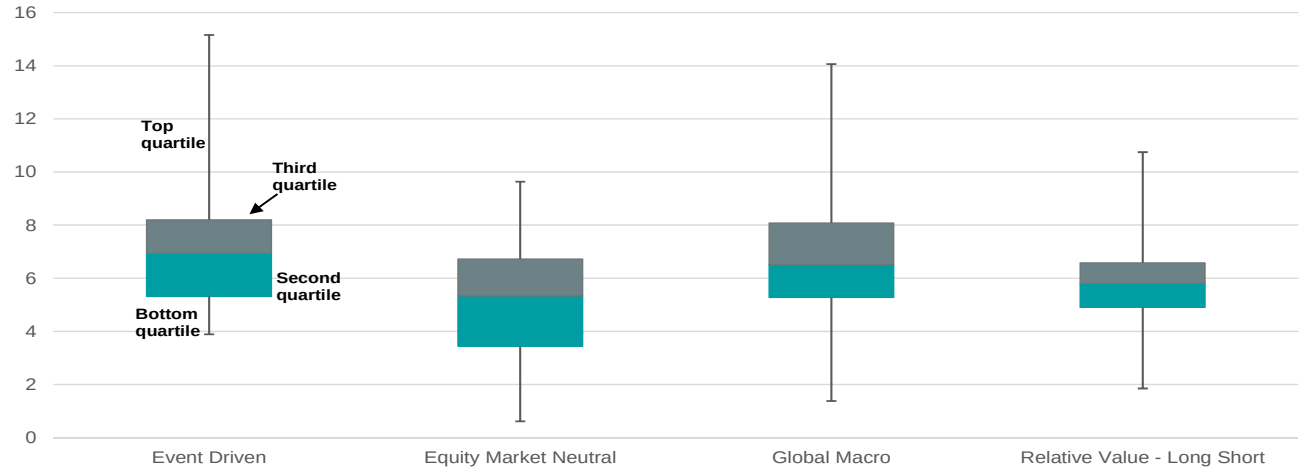


Source: DWS Investments UK Limited. Performance data as of 10/31/20. See appendix for the representative index corresponding to each asset class.

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.

It is worth remembering that forecasted returns are only average values across all funds and the performance dispersion between funds has been and is forecasted to be high. Historical dispersion for a few representative Morningstar categories can be seen in Figure 87.

Figure 87: Hedge-fund performance dispersion over the last 5 years by quartile, annualised



Source: Morningstar, DWS Investments UK Limited. Data as of 1/6/21.

Constructing our hedge-fund Long View

We build our 10-year forecasts for hedge funds on two main pillars. The first is beta, which represents their exposure to liquid market instruments, such as equities and bonds. The second is alpha. This can be thought of as a hedge-fund premium that may be delivered by hedge funds over time.

Main challenges when forecasting hedge-fund returns

Unlike most of our other Long View forecasts, potential hedge-fund returns are developed using a regression of historical performance. Therefore, the choice of the universe considered for any regression is important. Our aim is to be as comprehensive as possible and so we have included the HFRI universe[45], among others, due to its broad coverage of managers and equal-weighted methodology, which allows for more diverse representations of all managers.

We also had to address two of the most studied issues in historical data for hedge funds: so-called survivorship bias and backfill bias. These are described below.

– Survivorship bias arises when closed funds stop reporting into the index making it representative only of successful funds. Using the findings of various academic studies we have modified the historical returns to correct for that bias.[46]
– Backfill or instant-history bias arises when new funds come onto the database with instant histories (back filled returns since the incubation period). The impact is less documented but has been taken into account in our analysis.

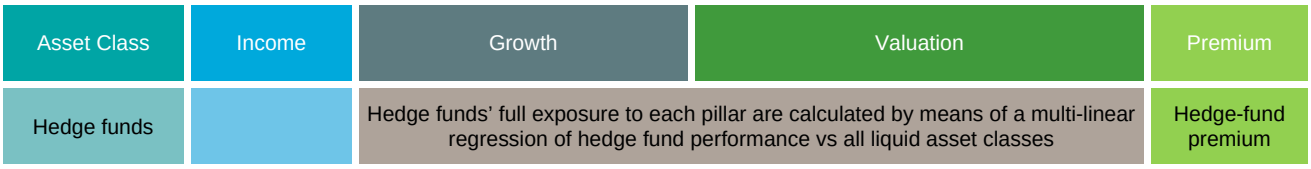
For each segment, we perform a long-term regression of historical returns versus a set of liquid instruments across global equities, global fixed income and commodities. This accounts for the beta part of the hedge-fund performance. Depending on the segment, beta may represent a different share of the total return. As an example, hedge funds belonging to the equity hedge category[47] historically tend to possess a higher beta than merger-arbitrage funds.

The alpha part is defined more subjectively by considering the historical returns in light of the performance of the liquid factors and the leverage typically used in the strategy.

Overall, our Long View for hedge funds is derived by adding the alpha to the combination of the beta coefficients with our forecast of their respective underlying liquid investments.

Figure 88: Pillar decomposition: Hedge funds

Beta and alpha



Source: DWS Investments UK Limited. As of 12/31/20.

[45] Source: Hedge Fund Research, Inc.
[46] See (Ibbotson, Chen und Zhu 2010) (Fung and Hsieh 2000)
[47] We rely on the HFRI classification, available at (HFR 2018)
Past performance, [actual or simulated], is not a reliable indication of future performance.

Private infrastructure debt

Forecasted returns for the next decade

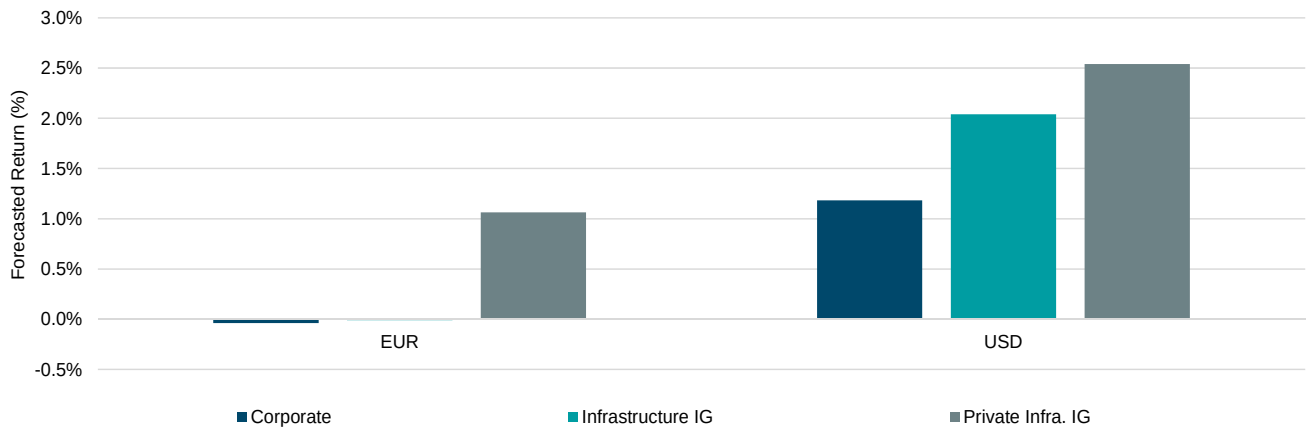
Historically, private infrastructure debt has offered a spread premium over listed infrastructure debt with a comparable credit rating and duration. This spread premium, also known as complexity premium, is driven by several factors, including the relative illiquidity of private debt, but also by differences in credit profile, security and covenant packages.

It is difficult to exactly quantify this complexity premium. However, by comparing spreads across private-infrastructure-debt transactions with spreads for listed infrastructure debt, historically, we have observed a spread premium of about 108 basis points for euro-investment-grade private infrastructure debt with seven years duration, and 50 basis points for dollar-investment-grade private infrastructure debt with the same duration.[48]

Meanwhile, for dollar-high-yield private infrastructure debt, historically, we have observed a complexity premium of 69 basis points for durations of four years.

Although the complexity premium offered by private infrastructure debt is generally greater at origination, data for secondary market transactions indicate that it tends to remain constant thereafter, with the private-infrastructure-debt spread moving, on average, broadly in line with the listed-infrastructure-debt benchmark.

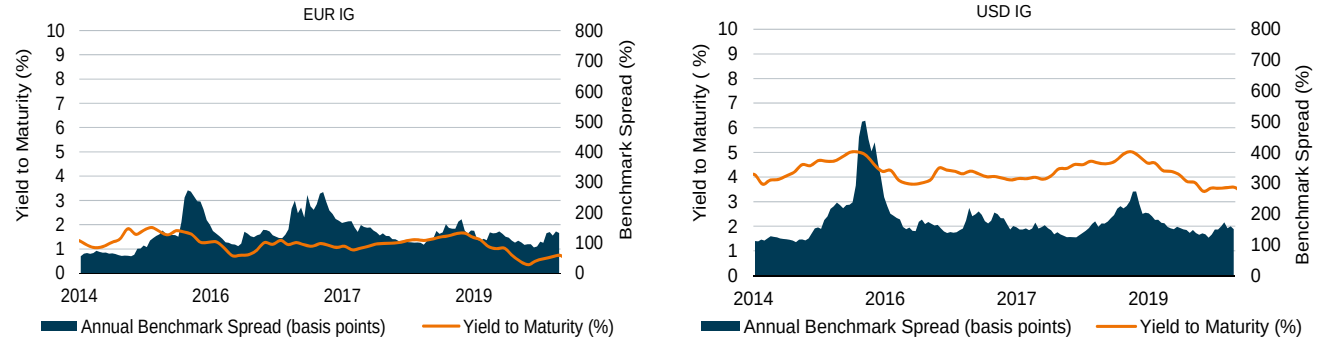
Figure 89: 10-year forecasted returns for private infrastructure debt, compared to listed infrastructure debt and broader corporate debt, annualised (YE 2020 – YE 2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. Proprietary database of private infrastructure debt transactions.

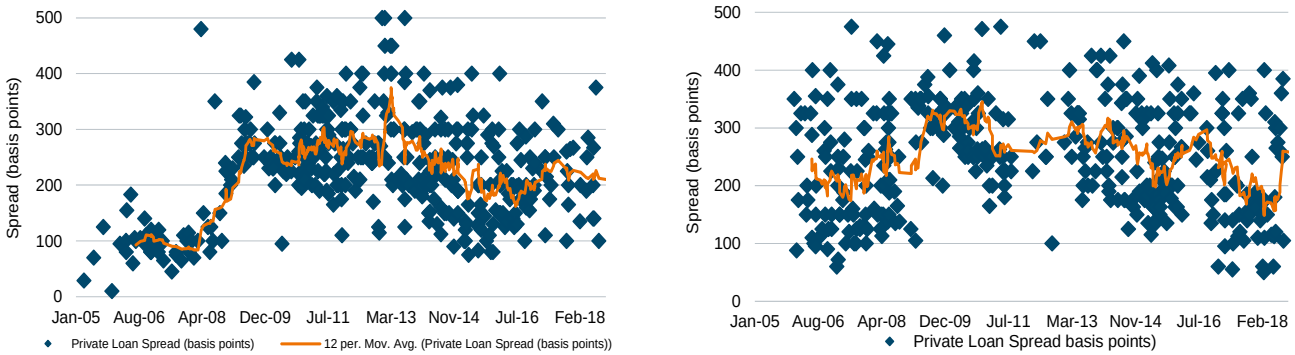
[48] Estimate based on a comparison of DWS proprietary database of private infrastructure debt transactions and IHS Markit iBoxx Infrastructure Debt Indices
Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.
Past performance, [actual or simulated], is not a reliable indication of future performance.

Figure 90: Historical returns for listed infrastructure debt, annualised (YE 2014 – YE 2020)



Source: DWS Investments UK Limited. Data from 12/31/14 to 12/31/20. Markit iBoxx USD and EUR Infrastructure IG.

Figure 91: Infrastructure private-loan-debt spreads for Europe (left) and North America (right) (YE 2005 – 2020)



Source: DWS Investments UK Limited. Data as of 12/31/20. Private-loan-debt spreads based on DWS proprietary transaction database of market transactions with publicly available information. Private-infrastructure-debt annual spread maximum and minimum include transactions across both investment-grade and high-yield rating categories.

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

Constructing our private-infrastructure-debt Long View

Contemplating an investment methodology similar to our reference case for fixed income[49], private-infrastructure-debt return assumptions can be forecasted using a modified version of our fixed-income approach.

The main modification comes from the yield assumption, where, as discussed previously, we add a constant illiquidity premium to the yield of listed infrastructure debt as observed in markets.

Moreover, credit migration and credit default are modified to reflect the credit profile of private infrastructure debt. Default studies demonstrate that infrastructure-debt credit ratings migrate less compared with non-financial corporate-fixed-income securities, with infrastructure assets supported by business profiles that tend to be resilient, driven by the essential nature of the service provided, and regulation.

Default studies show that infrastructure debt has consistently generated default rates lower than equally rated non-financial corporate bonds. For example, the average ten-year cumulative default rate for BBB-rated infrastructure debt is about two percent, compared with 3.1 percent for equally rated non-financial corporate bonds. [50]

Our survey of studies and academic sources suggests that infrastructure debt has shown higher average recovery rates compared with non-financial corporates, for both senior-secured and unsecured debt. Senior-secured infrastructure debt demonstrated a recovery rate of 72 percent, compared with 54 percent for equivalent non-financial corporate debt.[50]

We believe that a stronger credit profile, supported by lower default rates and higher recovery rates, can translate into a lower loss-given-default, and into a further default-adjusted spread premium for private infrastructure debt compared with listed non-financial corporate debt.

Figure 92: Pillar decomposition: Private infrastructure debt

Source: DWS Investments UK Limited. As of 12/31/20.

[49] In particular, we assume the portfolio manager keeps the main portfolio characteristics (among others, duration) broadly constant over time. This encompasses a rebalancing process as described above.
[50] Moody's Investors Service, "Infrastructure default and recovery rates, 1983–2017", September 27, 2017
Forecasts are based on assumptions, estimates, views, and hypothetical models of analyses, which might prove inaccurate or inccorect.
Credit quality is a measure of a bond issuer's ability to repay interest and principal in a timely manner. Rating agencies assign letter designations such as AAA, AA, and so forth. The lower the rating, the higher the probability of default. Credit quality does not remove market risk and is subject to change.

Private Real-Estate Debt

Similar to private infrastructure debt, we find that private real-estate debt behaves in line with the listed part of the market, with some variations. The performance of listed, senior real-estate bonds denominated in euros, pounds and dollars therefore represents a useful tool for analysing return attributes that are valid for both public and private debt, as part of a multi-asset or fixed-income portfolio.

Proposed Methodology (under development)

We intend to develop a methodology for forecasting long-term returns of non-listed real estate debt. Our starting point is the fixed income-methodology. Similar to private infrastructure debt, returns should reflect a yield plus a spread due to illiquidity.

Private debt may offer an illiquidity premium over listed debt, particularly at origination. Factors including differences in credit profile, transaction structure (for example, security or covenant packages) and the relative illiquidity of private real-estate debt, may translate into a spread premium over listed real-estate debt.

Figure 93: Pillar decomposition: Private real-estate debt

Source: DWS Investments UK Limited. As of 12/31/20.

Our analysis, comparing listed real estate debt indices with our own estimates of the private debt market based on a proprietary market transactions database, gives a broad indication of the asset-swap premium which may be achievable for private-real-estate debt across euro and pound-sterling markets.

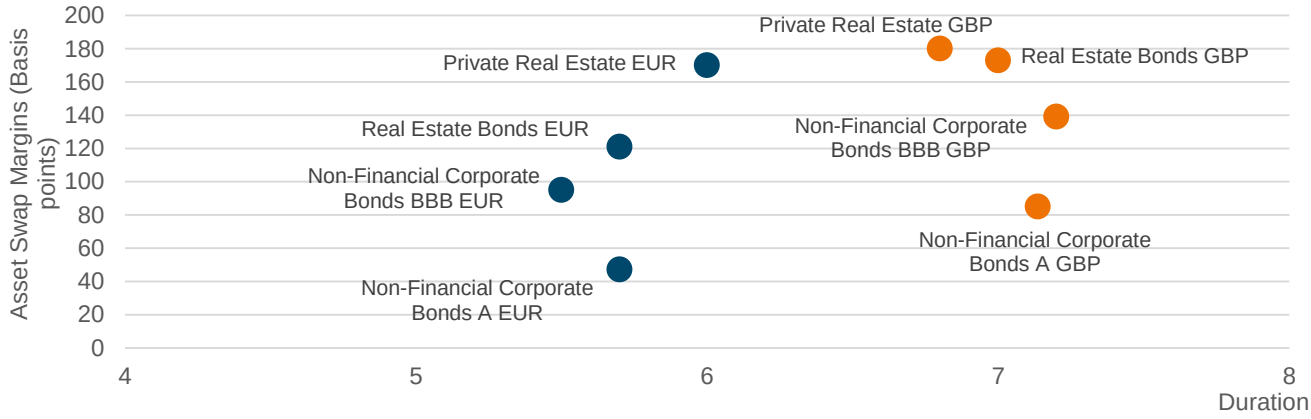
As can be seen in Figure 94, we estimate that between October 2020 and December 2020 this premium was 7 basis points for pound sterling and 49 basis points for euros[51].

Private-real-estate debt also exhibits different credit migration and default behaviour and this needs to be translated into our forecast. Historically, average default rates for real-estate debt have been lower than for non-financial corporate bonds. Data for the period between 1983 and 2020 show that annual default rates for real estate bonds were just 0.9 percent, compared with 1.7 percent for non-financial corporate bonds.

In addition, during the same period, the cumulative ten-year default rate for real estate debt has been 3.6 percent historically, versus 15.5 percent for non-financial corporates[52].

Debt secured by real assets also tends to benefit from higher recovery rates than corporate debt, due to the value retained in the tangible underlying assets. Investors in real-estate debt have therefore tended to recover a significant proportion of their investment in the event of default. For example, analysis of defaulted loans from U.S. real-estate transactions between 2009 and 2017 showed that the average recovery rate for real estate has been 71 percent, rising to 75 percent during the first three quarters of 2017[53].

Figure 94: Private-real-estate debt spread premium over listed debt (average of October 2020 – December 2020)



Sources: IHS Markit, DWS Investments UK Limited, Jan 2021. Private Real Estate Bonds: iBoxx Real Estate Debt Indices; Non- Financial Corporates: iBoxx Non-Financial Corporates Indices.
Note: Index durations may not always match exactly.

[51] IHS Markit, DWS Investments UK Limited, January 2021
[52] Moody's, January 2021
[53] Real Capital Analytics, November 2017
Past performance, [actual or simulated], is not a reliable indication of future performance.

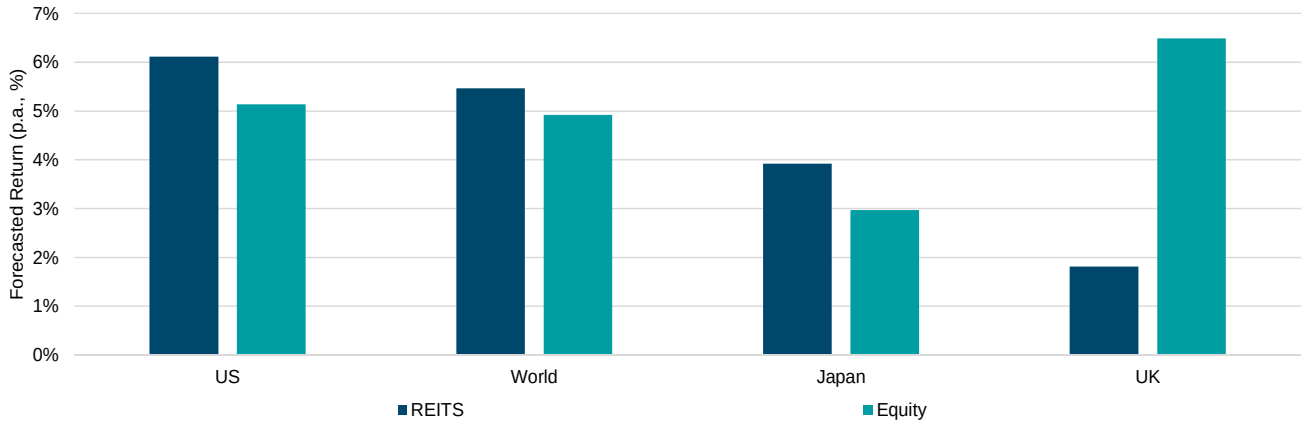
Listed real-estate equity

Forecasted returns for the next decade

Real estate investment trusts (REITs) represent a growing segment of global markets. Focusing on equity REITs, that is, listed shares of companies that own physical real-estate assets, the significance of such vehicles has increased both in the U.S. and internationally.

Our forecasted returns for REITs indicate a possible premium for investors compared to traditional broader equity markets (with the clear exception of the UK), driven by valuation but also the strong income component of REITs. However, even for REITs, our current forecasts are on the lower end of their historical returns.

Figure 95: 10-year forecasted returns for listed real-estate equity, annualised (local currency, YE 2020 – YE 2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Constructing our listed-real-estate-equity Long View

The pillars of our listed-real-estate Long View follow the same principles as the equity methodology but REITs have unique characteristics, such as a higher relative share of income in the total return. Our approach is presented in Figure 96.

Income

Due to their higher relative share of income in the total return, income investors typically take REITs into consideration. Historically, most real-estate companies received reliable streams of income from long and stable tenant leases, and, by construction, REITs must distribute at least 90 percent of their taxable income to shareholders as dividends. This high dividend-pay-out requirement results in a larger share of REITs returns coming from dividends as compared to the broader equity market.

Growth

REITs are different to stocks because they do not retain the majority of their earnings, and hence we do not account for earnings growth in our model. This leaves inflation as the main remaining component of the growth pillar.

Figure 97 displays the development of three components of the U.S. REIT Index return: dividend yield, inflation and valuation adjustment.

Valuation

Figure 98 shows U.S. REIT dividend yields versus TIPS yields. REIT dividend yields have largely kept a constant elevated spread over the TIPS yield, however, this does fluctuate. Over the long term, however, the spread reverts to the mean. This relationship appears to hold across geographic regions globally.

Our view is that, when the spread fluctuates to well above its historical norm, it is a sign that REITs are potentially undervalued. Spreads peaked during the brief 2002 recession and then later during the 2008 financial crisis, suggesting that REITs were under-priced. On the contrary, when REITs spreads are well below its historical norm (e.g. negative) this suggests that REITs are over-priced as investors are banking on capital appreciation and robust growth – instead of current and measurable income – to drive returns. And since earnings represent a good indicator of future revenue, and so help to define real-estate prices over the long term, this inflated price should correct.

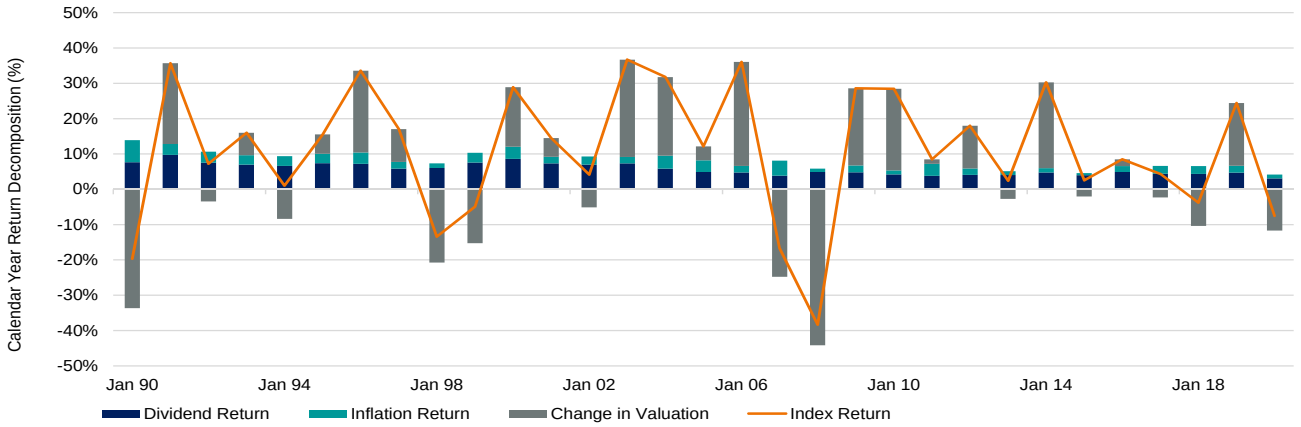
If we look at historic REITs-to-TIPS spreads and subsequent ten-year realised returns, we can see this relationship empirically across a number of major markets, as shown in Figure 99.

Figure 96: Pillar decomposition: Listed real-estate equity

Source: DWS Investments UK Limited. As of 12/31/20.

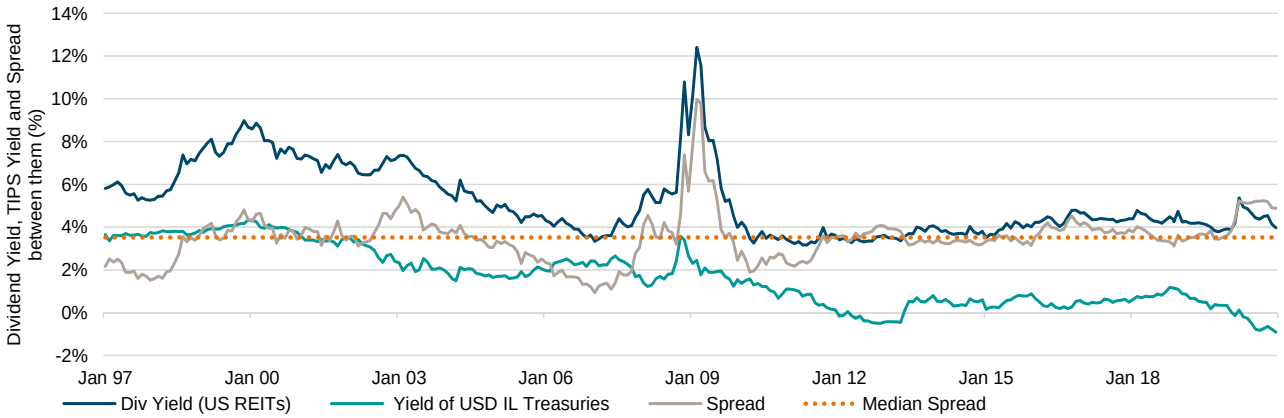
Past performance, [actual or simulated], is not a reliable indication of future performance.

Figure 97: Return decomposition of S&P U.S. REIT Index (12/31/89–12/31/20)



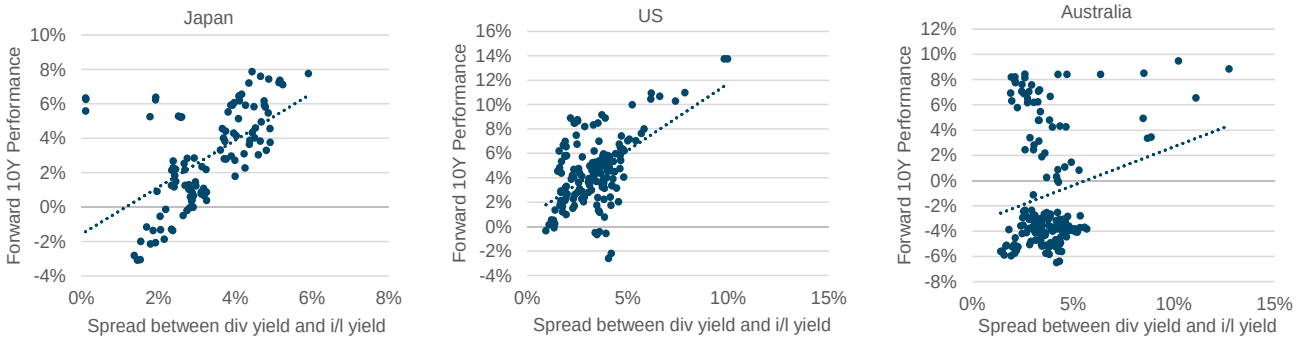
Source: Source: S&P, Bloomberg Finance L.P. LLP, DWS Calculation, data from 12/31/89 to 12/31/20. See appendix for the representative index corresponding to each asset class.

Figure 98: U.S. REITs yields and TIPS yields over the long term (12/31/96–12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited, data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

Figure 99: The REITs spread has historically been a good predictor of subsequent 10-year REITs performance (7/31/89-12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited, data from 7/31/89 to 12/31/20. 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.

Private real-estate equity

Forecasted returns for the next decade

For the time period 2001–2019, private global real estate has produced an annual total return of 7.3 percent[54]. The majority of this has been the result of a consistent income return, which has averaged 5.6 percent annually, while capital growth has been averaging close to inflation at 1.7 percent.

Over the same period, as interest rates have declined for the most part, so too have income yields on property, leading to a general increase in capital values and a corresponding decline in the level of annual income return. As can be seen in Figure 100, global income yields declined from roughly seven percent annually in the early part of the 2000s, to 4.2 percent by the end of 2019.

Similar trends occurred across Europe. Since 2004[55], for example, the MSCI Pan-European property funds index (PEPFI) had returns averaging 6.8 percent annually, of which 5.8 percent came from income, while the UK Association of Real Estate Funds index returned 4.6 percent over the same period. The low return in the UK predominantly reflects the adverse impact of the Global Financial Crisis (GFC) on the sector. While the returns realized during the Covid-19 crisis were negative, they were not as severe as during the GFC. Over a longer 20-year view, UK returns have averaged 5.5 percent per annum.

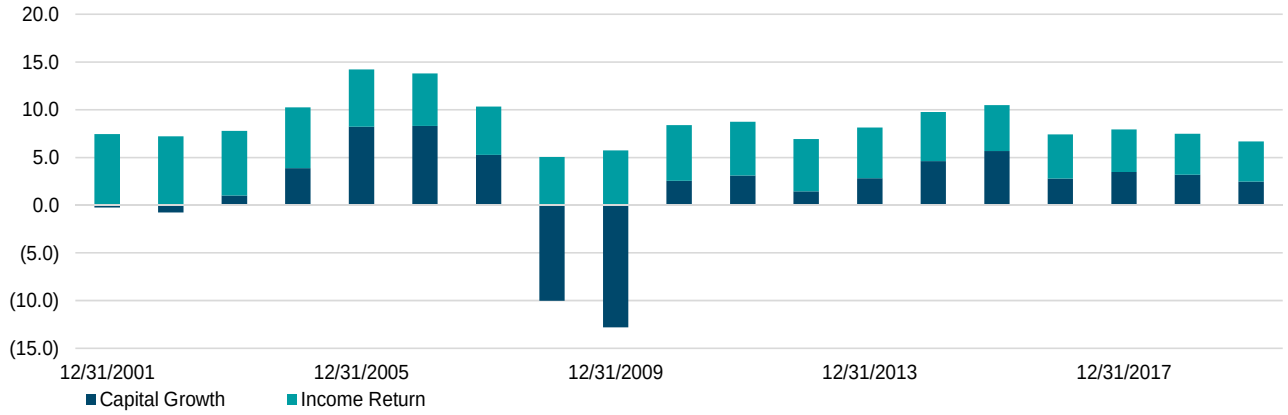
Likewise, the income return has been trending lower across Europe. Using the MSCI Pan-European property funds index again, we see that since 2004 the annual income return has averaged around 5.8 percent, compared with 4.8 percent in the past five years.

In the U.S., returns based on the NCREIF Open-End Diversified Core Equity Fund Index (NFI-ODCE) averaged 8.1 percent annually since 1998.[56] Income returns averaged 5.9 percent during the time period. Similar to the UK and Europe, income returns have also been trending down in America to about 4.3 percent in the past five years. Note that the NFI-ODCE index only includes funds with core properties, therefore income yields tend to be lower. Looking ahead, we forecast the long-term (YE 2020 – YE 2030) returns for U.S. non-listed real estate to be 7.4 percent per annum, based on inflation of 2.1 percent and a current income return of 4.0 percent.

Across regions our forecasts are in Figure 101. When compared with traditional equities, they show similar to better return forecasts despite the relatively low leverage of the assets considered here.

[54] According to MSCI Global Annual Property Index
[55] For all Private Real Estate Indices, unless stated otherwise, the historical returns till 30-Sep-2020.
[56] According to the NCREIF Open-End Diversified Core Equity Fund Index
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.

Figure 100: Decomposition of the MSCI Global Annual Property Index



Source: MSCI, DWS Investments UK Limited, as of 12/31/20.

Figure 101: 10-year forecasted private-real-estate-equity returns, annualised (local currency, YE 2021-2030)

Source DWS Investments UK Limited. Data as of 12/31/20. See appendix or 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.

Constructing our private-real-estate-equity Long View

The non-listed real-estate forecasted return methodology is derived from the equity approach. It relies on three pillars: income, growth and valuation, as shown in Figure 102.

The historical performance shown in the previous section is in line with the theory, which says that historically, the bulk of non-listed real-estate returns may be attributed to an income return plus inflation-based capital-value growth. The earnings-growth components play a secondary role here.

From one year to the next, capital growth may be driven by a combination of yield change and net income growth – a function broadly of changes in rents and occupancy.

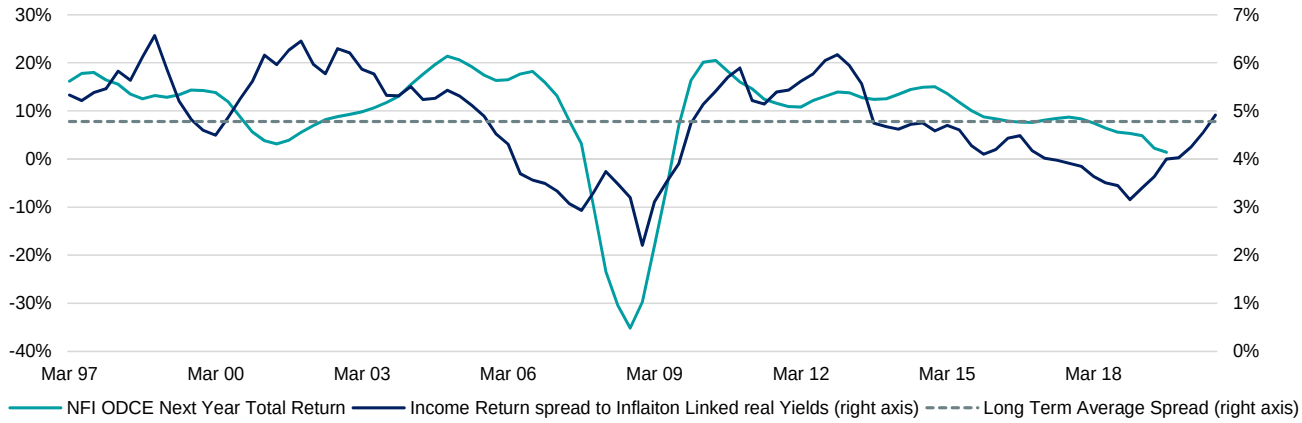
Over long-term periods of 10 to 20 years, therefore, capital growth may be inflationary, with the yield and occupancy trending around a mean, and rents growing in line with inflation. While certainly not a perfect market, with land constraints in some cases supportive of outsized rental growth, on the whole, supply is reactive to demand, which leads to our assumption that over rolling 10-year periods, rents may be aligned with global price growth.

Around this broad trend of income return and inflation expectations, there is a change-in-valuation factor to consider. Total yield is the latest income return (income yield or cap rate) from the relevant market[57]. The valuation adjustment refers to the income return spread over the relevant TIPS real yield. Similar to REITs, we believe there has been a meaningful correlation between total returns and the income return spread over the ten-year government bond yield on a lagged basis (see Figure 103).

Figure 102: Pillar decomposition: Private real estate

Source: DWS Investments UK Limited. As of 12/31/20.

Figure 103: NCREIF ODCE Index total return vs. income-return spread over 10-year inflation-linked government bond yield



Source: NCREIF, DWS Investments UK Limited. Data from 3/31/97 to 9/30/20.

[57] Income yield, income return and cap rate are equivalent and used interchangeably

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

Listed infrastructure equity

Forecasted returns for the next decade

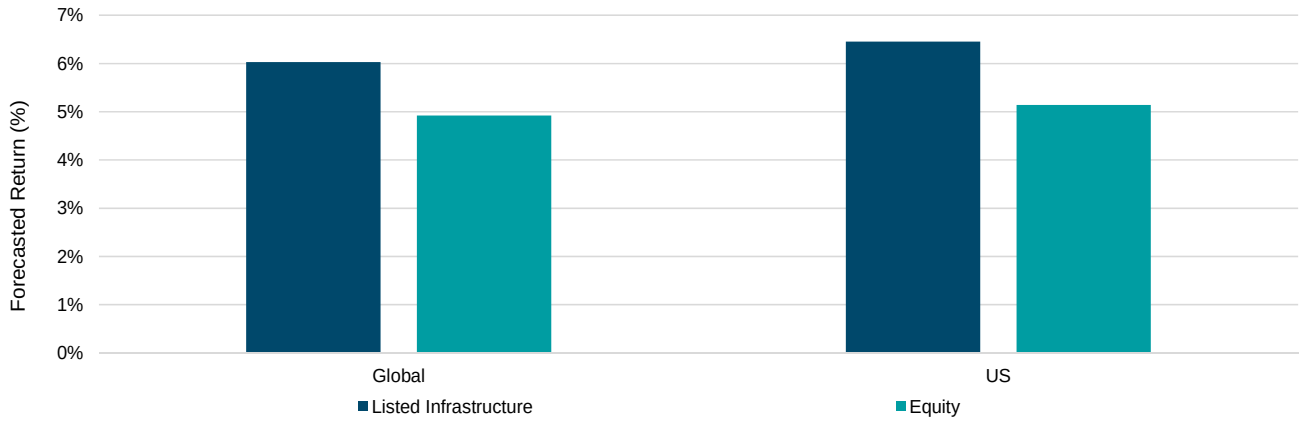
Infrastructure is a broad asset class, encompassing various sectors, with diverse underlying business models, such as utilities, regulated power networks, airports, toll roads, rail roads, ports, energy pipelines and mobile towers. The Dow Jones Brookfield infrastructure indices endeavour to measure the performance of pure-play listed infrastructure equities on a global basis.

Infrastructure companies provide essential services, have monopolistic business models with high barriers to entry, and can be regulated or contracted in the long term. As a result, infrastructure has the potential to offer investors a steady dividend yield that can generally be higher than broader listed equities. Infrastructure is a good inflation hedge as essential services face a low elasticity of demand and inflation can be often passed over to the end customers.

Moreover, some infrastructure companies are backed by specific contractual or regulatory arrangements allowing for an explicit link of tariffs to inflation.

Some infrastructure sectors, such as regulated networks, have business characteristics that can be resilient to the economic cycle, thus leading to lower performance volatility, but also lower long-term earnings-growth potential compared with broader equities. Other sectors, such as airports or toll roads, although regulated, may be more exposed to the macroeconomic environment, thus leading to potentially higher performance volatility, but also offering stronger earnings-growth potential over the long term.

Figure 104: 10-year forecasted returns listed infrastructure equity, annualised (local currency, YE 2020 – YE 2030)



Source: DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Constructing our listed-infrastructure-equity Long View

Our listed-infrastructure forecasted return methodology is based on the listed-equities approach, with some ad-hoc adjustments, factoring in the defensive nature of the asset class.

Inflation

Inflation used in the forecast is weighted by respective country, using index market weights. Compared with listed equities, listed infrastructure has a stronger relationship to inflation, and price inflation can often be passed on to the end consumer. Most regulatory frameworks allow regulated assets to use inflation-indexed user tariffs, often associated with electricity transmission and distribution or gas distribution. Inflation-indexed toll increases can be common features of concessions for some types of surface transport, such as roads, bridges and tunnels. For unregulated assets, full hedging may not always be possible.

Growth

For the earnings-growth forecast, in an attempt to forecast the performance of listed infrastructure equity more accurately, based on historical performance evidence, we have decided to separate the asset class into two main categories, including (i) companies in sectors with mature, regulated business profiles supporting long-term dividend predictability but also limiting capital-growth potential, and (ii) companies in sectors with higher cyclicality but also more solid long-term capital-growth potential.

Valuation

Valuations for listed-infrastructure companies in group (i) have shown the potential to be relatively resilient over a period of 10 to 15 years, underpinned by the distinctive characteristics of the underlying assets and by regulatory frameworks providing protection to long-term income returns. For this reason we assume that investors would think about valuing such companies in terms of the spread between their dividend yield and a risk-free investment, and in our methodology for this group (i), we use an approach in line with listed real-estate equity. For assets in group (ii), on the other hand, where potential capital growth needs to be taken into account, we use an approach in line with broader listed equities.

Figure 105: Pillar decomposition: Listed infrastructure equity

Source: DWS Investments UK Limited. As of 12/31/20. For illustrative purposes only.

Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Volatility and correlation

Forecast volatility and correlation for the next decade

The relatively benign macroeconomic conditions that prevailed over the past few years prior to the Covid-2019 pandemic also saw volatility decrease steadily. Figure 106 shows the annualised volatility for major asset classes in our universe, which, as can be seen, are increased again from near historic lows prior to the recession, but still remain at or below long-term median levels.

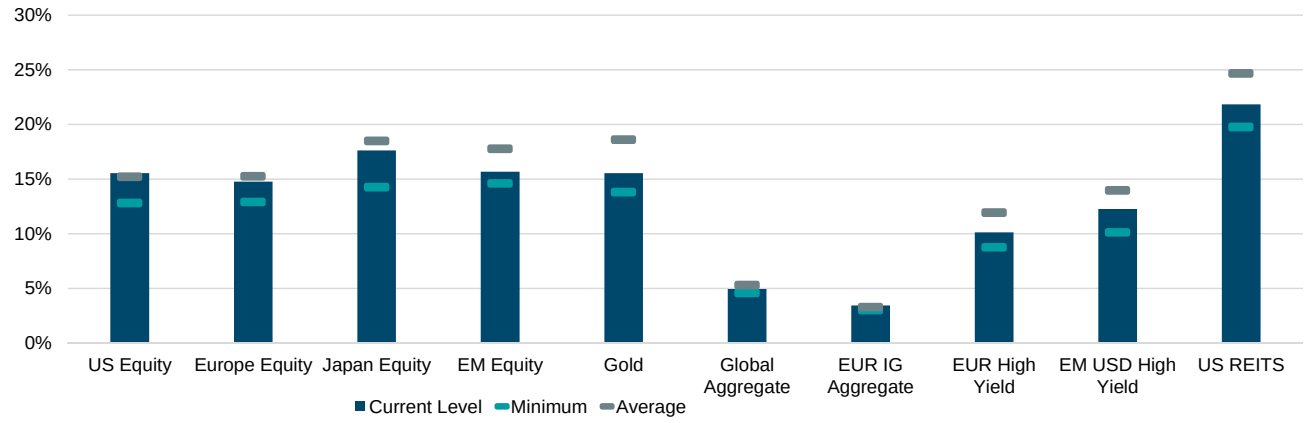
This can also be observed for correlations. Figure 107 shows that rolling six-month average correlations between major asset classes stayed below the historical average for most of 2015-19. This trend was interrupted by a sharp increase in correlations to highest levels in recent history during onset of Covid-19 in Mar 2020, but they reverted to around long term averages by the end of 2020.

The usual problem with correlation analysis is the large number of data points to consider. In Figure 108, we show two levels of information: the correlation matrix and the corresponding hierarchy of relationships between asset classes.

It can be seen that EUR IG aggregate, gold, and global aggregate asset classes have the lowest correlation with other asset classes (as depicted with the green and light colour cells) whereas emerging markets and Asia Pacific ex Japan exhibit the highest correlation (as depicted with red cells).

The hierarchical-tree diagram in the same chart clusters assets together based on their correlation values – for example, global aggregate and euro IG aggregate are shown as one tight cluster, as are emerging markets and Asia Pacific ex Japan equities. Less closely correlated assets are further apart in the cluster representation.

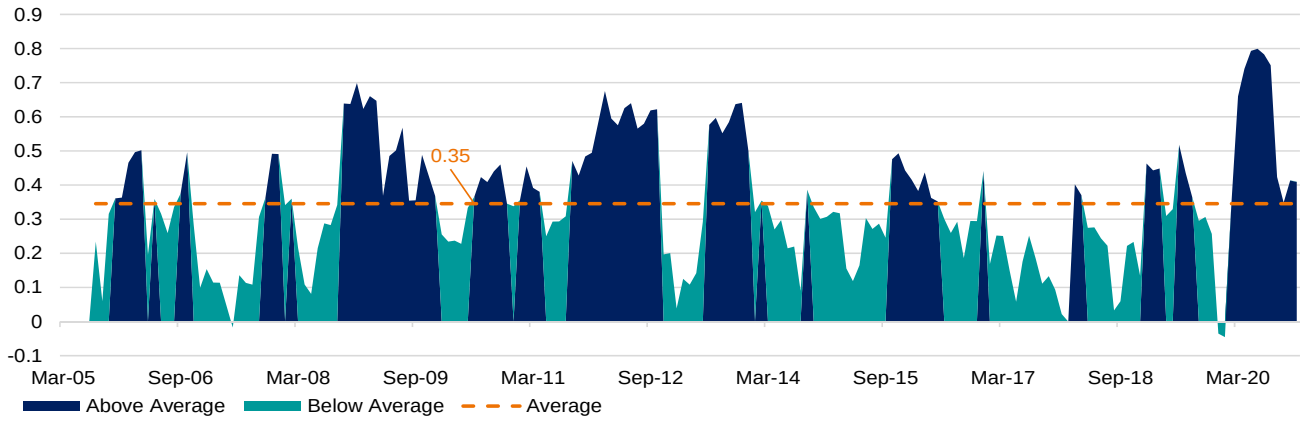
Figure 106: Historical and current level of annualised asset-class volatility (1/29/71-12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

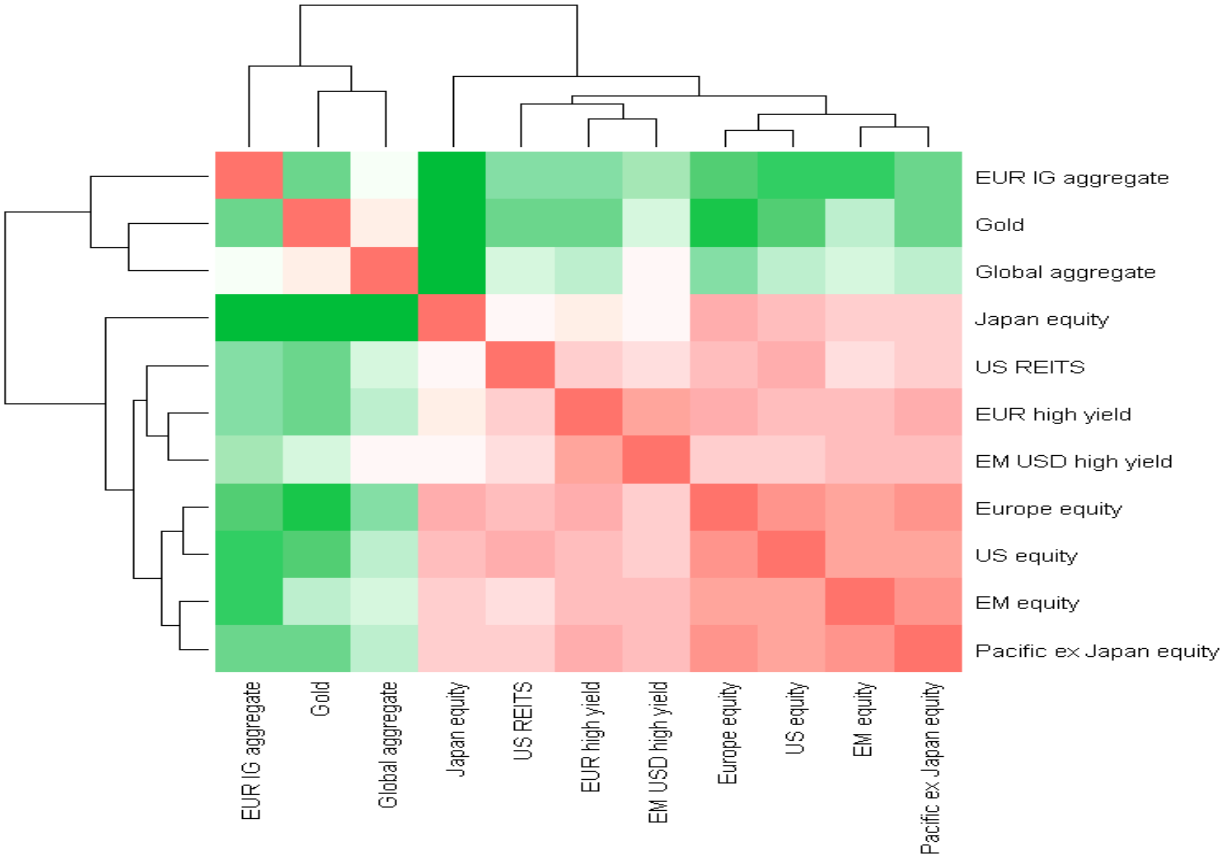
Past performance, [actual or simulated], is not a reliable indication of future performance.

Figure 107: Historical average of the correlation among major asset classes (3/31/05-12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. Data shows average pairwise correlation for the asset classes listed in Figure 100. See appendix for the representative index corresponding to each asset class.

Figure 108: Correlation and hierarchical relationship between asset classes



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results. For illustrative purposes only.

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

Constructing our volatility and correlation view

Our Long View on volatilities and correlation are grounded in historical observations. However, a balance has to be found between recent history and distant events. We consider that observations in the distant past have less bearing on the current environment than near-term observations but still carry some information, hence we use a so-called exponentially weighted moving average (EWMA) to underweight historical returns for the long term.

What is more, in volatility/covariance matrix observations we often face time series with unequal lengths, as illustrated below. Therefore, only the common period history is used for the computation of a covariance matrix.

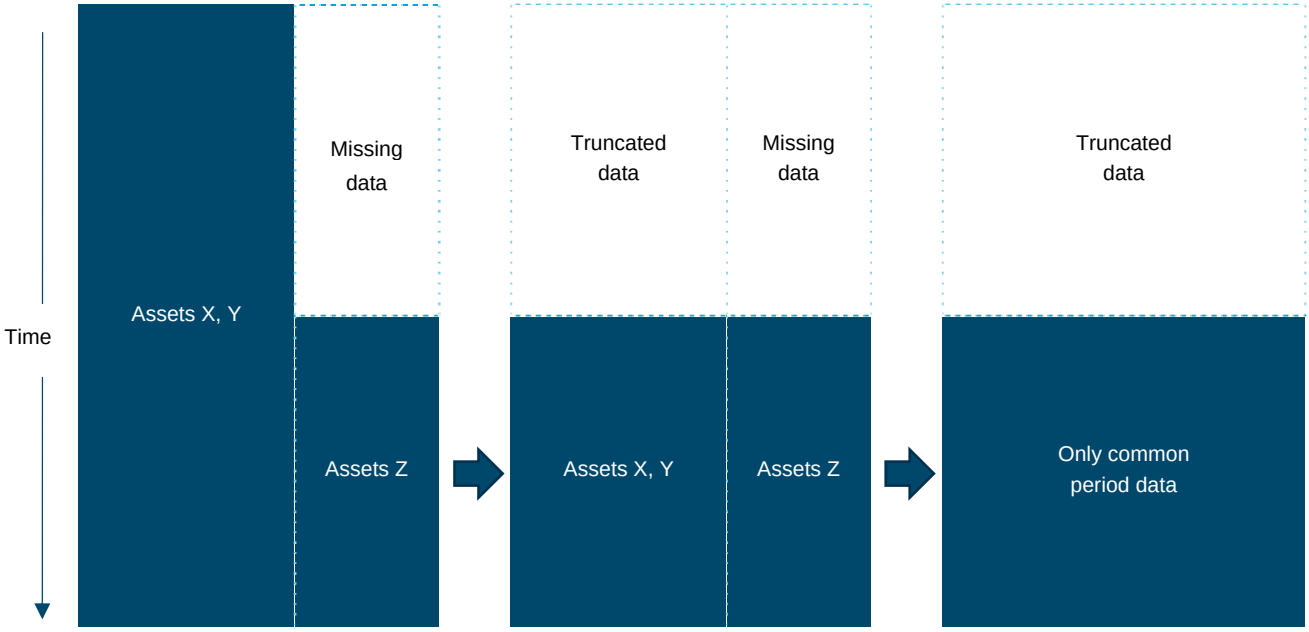
As shown in Figure 109 such truncation could result in the loss of valuable information. Therefore, we employ an alternative approach (Stambaugh 1997) that utilises the complete history of the sample to estimate a covariance matrix.

In simple words, we extrapolate the missing historical data by performing a multi-linear regression of the existing available time series. By doing so, we obtain a time-consistent set of time series, and hence more consistent estimates for volatilities and correlations.

This is necessary because, by way of example, many REITs indices available today have only been launched after the financial crisis. Without the addition of the missing historical data, price volatility would be underestimated because these funds have only experienced a long bull market. We do know, however, that real-estate assets carry liquidity risks in times of crises.

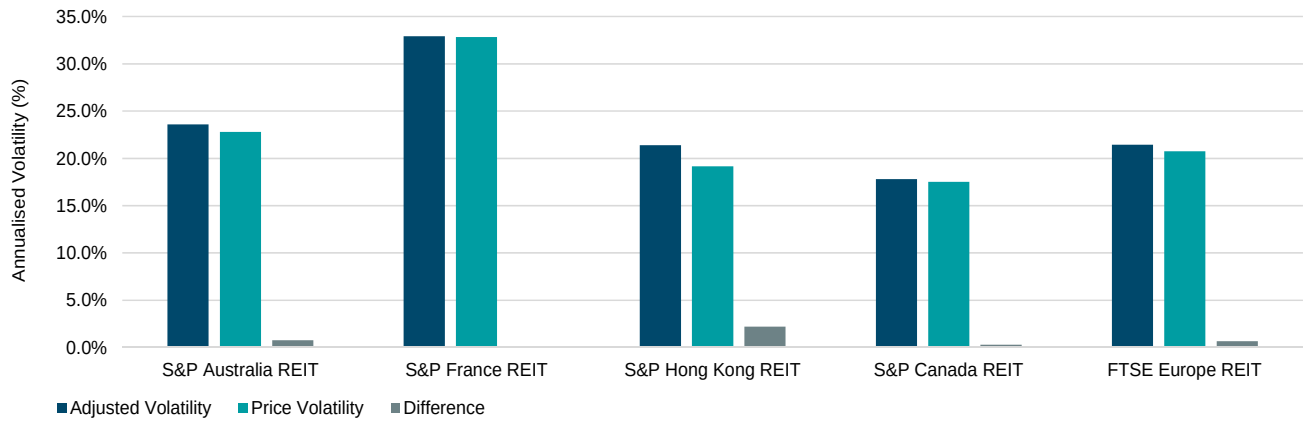
Using our methodology as described above, we see below that REIT funds launched post 2008 have systematically higher adjusted volatility.

Figure 109: Building the correlation Long View



Source: DWS Investments UK Limited. As of 12/31/20.

Figure 110: REITs volatility – price volatility underestimates latent risk-adjusted volatility using long-term time series (1/29/71-12/31/20)



Source: Bloomberg Finance L.P., DWS Investments UK Limited. Data as of 12/31/20. See appendix for the representative index corresponding to each asset class.

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

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	2020	2019	2018	2017	2016
Fixed Income	EM USD High Yield	Bbg Barclays EM USD Aggregate High Yield	4.25%	11.48%	-4.73%	9.54%	15.89%
Fixed Income	EM USD Sovereign	Bbg Barclays Emerging Markets USD Sovereign	5.17%	13.35%	-4.20%	9.29%	9.34%
Fixed Income	EUR Aggregate	Bbg Barclays Euro Aggregate	4.05%	5.98%	0.41%	0.68%	3.32%
Fixed Income	EUR Cash	EUR 3M Libor TR	-0.43%	-0.36%	-0.33%	-0.33%	-0.27%
Fixed Income	EUR Corporate	Bbg Barclays Euro Aggregate Corporate	2.77%	6.24%	-1.26%	2.41%	4.73%
Fixed Income	EUR Corporate 1-3	Bbg Barclays Euro Aggregate Corporate 1-3 Years	0.69%	1.34%	-0.23%	0.52%	1.57%
Fixed Income	EUR Corporate 3-5	Bbg Barclays Euro Aggregate Corporate 3-5 Years	1.56%	4.00%	-0.65%	1.64%	3.55%
Fixed Income	EUR Corporate 5-7	Bbg Barclays Euro Aggregate Corporate 5-7 Years	2.97%	7.52%	-1.42%	2.87%	5.53%
Fixed Income	EUR Corporate 5-7	Bbg Barclays Euro Aggregate Corporate 5-7 Years	2.97%	7.52%	-1.42%	2.87%	5.53%
Fixed Income	EUR Corporate 7-10	Bbg Barclays Euro Aggregate Corporate 7-10 Years	4.38%	10.92%	-2.36%	4.19%	7.03%
Fixed Income	EUR High Yield	Bbg Barclays Pan-European High Yield (Euro)	2.29%	11.33%	-3.82%	6.90%	9.13%
Fixed Income	EUR Treasury	Bbg Barclays Euro Treasury	4.99%	6.77%	0.98%	0.17%	3.23%
Fixed Income	EUR Treasury 1-3	Bbg Barclays Euro Aggregate -Treasury 1-3 Years	0.02%	0.28%	-0.09%	-0.34%	0.38%
Fixed Income	EUR Treasury 3-5	Bbg Barclays Euro Aggregate - Treasury 3-5 Years	1.29%	1.88%	0.09%	0.03%	1.55%
Fixed Income	EUR Treasury 5-7	Bbg Barclays Euro Aggregate Treasury 5-7 Years	2.83%	4.23%	0.17%	0.50%	2.26%
Fixed Income	EUR Treasury 7-10	Bbg Barclays Euro Aggregate Treasury 7-10 Years	4.52%	6.74%	1.37%	1.20%	3.78%
Fixed Income	Global Aggregate	Bbg Barclays Global Aggregate	9.20%	6.84%	-1.20%	7.40%	2.09%
Fixed Income	Global Corporate	Bbg Barclays Global Aggregate Corporate	10.37%	11.51%	-3.57%	9.09%	4.27%
Fixed Income	Global Government	Bbg Barclays Global Aggregate Treasuries	9.50%	5.59%	-0.38%	7.29%	1.65%
Fixed Income	Global High Yield	Bbg Barclays Global High Yield	7.03%	12.56%	-4.06%	10.43%	14.27%
Fixed Income	US Agg Intermediate	Bbg Barclays US Aggregate Intermediate	5.60%	6.67%	0.92%	2.27%	1.97%
Fixed Income	US Aggregate	Bbg Barclays US Aggregate	7.51%	8.72%	0.01%	3.54%	2.65%
Fixed Income	US Corporate	Bbg Barclays US Corporate	9.89%	14.54%	-2.51%	6.42%	6.11%
Fixed Income	US Corporate 5-7	Bbg Barclays US Corporate 5-7 Years	9.45%	12.68%	-0.74%	4.92%	5.41%
Fixed Income	US High Yield	Bbg Barclays US High Yield	7.11%	14.32%	-2.08%	7.50%	17.13%
Fixed Income	US Treasury	Bbg Barclays US Treasury	8.00%	6.86%	0.86%	2.31%	1.04%
Fixed Income	US Treasury 5-7	Bbg Barclays US Treasury: 5-7 Years	8.48%	6.79%	1.44%	1.87%	1.30%
Fixed Income	USD Cash	USD 3M Libor TR	0.67%	2.39%	2.38%	1.28%	0.75%
Fixed Income	USD IL Treasuries	Bbg Barclays US Govt Inflation Linked Bonds	11.55%	8.75%	-1.48%	3.30%	4.85%
Equities	AC Equities	MSCI ACWI	14.21%	26.24%	-7.69%	19.77%	9.04%
Equities	EM Equities	MSCI EM	19.12%	18.05%	-10.07%	30.55%	9.69%
Equities	EMU Small Cap Equities	MSCI EMU Small Cap	-1.02%	25.47%	-12.70%	12.49%	4.37%

*Realised Returns referenced in this table represent the last five years 2016-2020. 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 12/31/20. 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	2020	2019	2018	2017	2016
Equities	Europe Equities	MSCI Europe	-2.21%	23.75%	-10.59%	13.06%	7.23%
Equities	Europe Small Cap Equities	MSCI Europe Small Cap	5.88%	29.01%	-15.56%	22.05%	6.02%
Equities	Eurozone Equities	MSCI EMU	-1.00%	25.44%	-12.75%	12.63%	4.33%
Equities	Japan Equities	MSCI Japan	9.17%	18.94%	-14.85%	20.14%	-0.40%
Equities	Switzerland	MSCI Switzerland	1.91%	29.98%	-8.03%	17.47%	-3.42%
Equities	US Equities	MSCI USA	20.73%	30.88%	-5.04%	21.19%	10.89%
Equities	US Small Cap Equities	MSCI USA Small Cap	18.32%	26.74%	-10.40%	16.75%	19.15%
Equities	World Equities	MSCI World	13.48%	27.34%	-7.38%	18.48%	9.00%
Alternative	Australia REIT	S&P AUSTR REIT	-3.88%	18.14%	4.52%	4.87%	11.89%
Alternative	Broad Commodities	Bbg Commodity	-3.12%	7.69%	-11.25%	1.71%	11.77%
Alternative	Crude Oil	Bbg Composite Crude Oil	-41.92%	34.88%	-17.64%	9.87%	16.32%
Alternative	Energy	Bbg Energy	-42.71%	11.76%	-12.69%	-4.32%	16.27%
Alternative	EUR Infrastructure IG	Markit iBoxx EUR Infrastructure Index	3.15%	6.91%	-1.24%	2.30%	4.89%
Alternative	EUR Infrastructure IG	Markit iBoxx EUR Infrastructure Index	3.15%	6.91%	-1.24%	2.30%	4.89%
Alternative	Global Infra. Equity	DJ Brookfield Global	-6.97%	28.69%	-7.87%	15.79%	12.52%
Alternative	Gold	Gold Futures	20.95%	18.03%	-2.81%	12.79%	7.75%
Alternative	Hedge Funds: Composite	Hedge Funds	11.61%	10.45%	-4.75%	8.59%	5.44%
Alternative	HF - Equity Hedge	HFRI Equity Hedge	17.41%	13.71%	-7.14%	13.29%	5.47%
Alternative	HF - Equity Market Neutral	HFRI EH: Equity Market Neutral	-0.32%	2.33%	-0.98%	4.88%	2.23%
Alternative	HF - Event-Driven	HFRI Event-Driven	8.84%	7.49%	-2.13%	7.59%	10.57%
Alternative	HF - FoF Composite	HFRI Fund of Funds Composite	10.34%	8.39%	-4.02%	7.77%	0.51%
Alternative	HF - Macro	HFRI Macro	5.31%	6.50%	-4.08%	2.20%	1.03%
Alternative	HF - Macro: Systematic	HFRI Macro: Systematic Diversified	2.65%	7.08%	-6.62%	2.12%	-1.37%
Alternative	HF - Merger Arbitrage	HFRI ED: Merger Arbitrage	5.92%	6.81%	3.29%	4.31%	3.63%
Alternative	HF - Relative Value	HFRI Relative Value (Total)	3.66%	7.42%	-0.43%	5.14%	7.67%
Alternative	Japan REIT	S&P Japan	-13.66%	24.74%	10.29%	-7.40%	9.52%
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	-7.52%	24.45%	-3.79%	4.33%	8.49%
Alternative	US Infra. Equity	DJ Brookfield US	-12.30%	27.86%	-10.53%	7.39%	22.24%
Alternative	USD Infrastructure IG	Markit iBoxx USD Infrastructure Index	10.30%	15.25%	-3.33%	7.59%	10.30%

*Realised Returns referenced in this table represent the last five years 2016-2020. 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 12/31/20. Past performance, actual or simulated, is not a reliable indicator of future results.

Appendix 2

Table of figures

Appendix 3

Bibliography

Alexander, Carol O. 1997. “On the Covariance Matrices used in Value-At-Risk Models.” Ang, Andrew. 2012. “Real Assets.“

Arnott, Robert D. 2015. “Collateralized commodity futures – Methodology Overview.” Arnott, Robert D. 2014. “Equities – Methodology Overview.”

Arnott, Robert D. 2015. “Fixed Income – Methodology Overview.” Arnott, Robert D. 2002. “What Risk Premium Is ‘Normal’?”

Arnott, Robert D., and Ronald J. Ryan. 2001. “The death of the risk premium.”

Balassa, Bela. 1964. “The Purchasing Power Parity Doctrine: A Reappraisal.” Journal of Political Economy, 584–596.

Bekaert, Geert, Wei Min, and Xing Yuhang. 2007. “Uncovered interest rate parity and the term structure.”

Bhardwaj, Geetesh, Gary B. Gorton, and K. Geert Rouwenhorst. 2015. “Facts and Fantasies about Commodity Futures Ten Years Later.“

Bolt, Jutta, Robert Inklaar, Herman de Jong, and Jan Luiten van Zanden. 2018. “Rebasing ‘Maddison’: new income comparisons and the shape of long-run economic development.”

Boudry, Walter I. 2011. “An examination of REIT dividend payout policy.”

Brightman, Christopher J. 2002. “Expected Return.”

Brinson, Gary P., Brian D. Singer, and Gilbert L. Beebower. 1991. “Determinants of Portfolio Performance II: An Update.”

Byrne, Joseph, Shuo Cao, and Dimitri Korobilis. 2017. “Forecasting the term structure of government bond yields in unstable environments.”

Campbell, John Y., Peter A. Diamond, and John B. Shovel. 2001. “Estimating the Real Rate of Return on Stocks over the Long Term.”

Cheng, Pen, and Roger G. Ibbotson. 2001. “The Supply of Stock Market Returns.”

Choudhri, Ehsan, and Mohsin Khan. 2004. “Real Exchange Rates.”

Clayton, Jim, Michael Giliberto, Jacques N. Gordon, Susan Hudson-Wilson, Frank J Fabozzi, and Youguo Liang. n.d. “Real Estate‘s Evolution as an Asset Class.”

Denoiseux, Vincent, and Pierre Debru. 2015. “Over the Currency Hedge”. DWS Investments UK Limited.

Denoiseux, Vincent, and Pierre Debru. 2015. “Small Caps: a large Investment Opportunity.”

Denoiseux, Vincent, and Pierre Debru. 2015. “The Income Challenge – Balancing Income and Risk in an Income Focused Portfolio.”

Denoiseux, Vincent, Verity Worsfold, and Pierre Debru. 2017. “Defensive Assets: creating robust portfolios for changing markets.”

Denoiseux, Vincent, Verity Worsfold, and Pierre Debru. 2016. “Risk profiled portfolios: why focusing on risk can enhance returns.”

Diermeier, Jeffrey J., Roger G. Ibbotson, and Laurence B. Siegel. 1984. “The Supply for Capital Market Returns.”

Dobbs, Richard, and Werner Rehm. 2005. “The Value of share buybacks.”

Du, Wenxin, Alexander Tepper, and Adrien Verdelhan. 2017. Deviations from Covered Interest Rate Parity. NBER WORKING PAPER SERIES, NATIONAL BUREAU OF ECONOMIC RESEARCH.

Erb, Claude. 2014. “Commodity “CAPE Ratios”.

Erb, Claude B., and Harvey, Campbell R. 2006, “The Strategic and Tactical Value of Commodity Futures”

Erb, Claude B., and Harvey, Campbell R. 2016, “Conquering Misperceptions about Commodity Futures Investing”

Erb, Claude B., and Harvey, Campbell R. 2013, “The Golden Dilemma”

Gorton, Gary, and Rouwenhorst, Geert K. 2004. “Facts and Fantasies about Commodity Futures”

Fama, Eugene, and Kenneth French. 1999. “The Corporate Cost of Capital and the Return on Corporate Investment.”

Feng, Zhilan, and Price McKay. 2011. “An Overview of Equity Real Estate Investment Trusts (REITs): 1993–2009.”

Fung, William, and David A Hsieh. 2000. “Performance Characteristics of Hedge Funds and Commodity Funds: Natural vs. Spurious Biases.” The Journal of Financial and Quantitative Analysis, 09: Vol. 35, No. 3 pp. 291–307.

Goedhart, Marc, Rishi Raj, and Abhishek Saxena. 2010. Equity analysts: Still too bullish. McKinsey.

Gordon, Myron J., and Eli Shapiro. 1956. “Capital Equipment Analysis: the required rate of profit.”

Grinold, Richard C, and Kenneth F. Kroner. 2002. “The Equity Risk Premium: Analyzing the Long-Run Prospects for the Stock Market.”

Grinold, Richard C., Kenneth F. Kroner, and Laurence B. Siegel. 2011. “A Supply model of the Equity Premium.”

Groen, Jan, and Menno Middeldorp . 2009. “Creating a History of U.S. Inflation Expectations.” https://libertystreeteconomics.newyorkfed.org/2013/08/creating-a-history-of-us-inflation-expectations.html.

Hardin, William G. III, and Mathew D. Hill. 2008. “REIT Dividend Determinants: Excess Dividends and Capital Markets.” HFR. 2018. “HFRI Indices.” https://www.hedgefundresearch.com.

Hille, Christian, Warken, Peter, and Kirk, Stuart. 2018. “Don’t be fooled by low volatility.”

Ibbotson, Roger G, Peng Chen, and Kevin X Zhu. 2010. “The ABCs of Hedge Funds: Alphas, Betas, & Costs.”

Ibbotson, Roger G., and Peng Chen. 2001. “The Supply of Stock Market Returns.”

Ibbotson, Roger G., and Rex A. Sinquefield. 1976. “Stocks, Bonds, Bills, and Inflation: Year-by-Year Historical Returns (1926–1974).”

Ilmanen, Antti. 2012. “Expected Returns on Major Asset Classes.”

Ilmanen, Antti. 2011. “Expected Returns: An Investor’s Guide to Harvesting Market Rewards.”

Ilmanen, Antti, and Raymond Iwanowski. 1996. “The Dynamics of the Shape of the Yield Curve: Empirical Evidence, Economic Interpretations and Theoretical Foundations.”

Kravis, and Lipsey. 1983. “Toward an Explanation of National Price Levels." Princeton Studies in International Finance. Maddison, Angus. 2018. “Maddison Historical Statistics.” https://www.rug.nl/ggdc/historicaldevelopment/maddison/.

Martin, T. 2012. “U.S. Equities’ Long-Term Real Returns.” 19 12. Accessed 2018. https://www.pragcap.com/u-s-equities-long-term-real-returns/. Mehra, Rajnish, and Edward C. Prescott. 1985. “The Equity Premium: a puzzle.”

Obstfeld, M, and K Rogoff. 1996. Foundations of international macroeconomics. MIT Press. Ronig, Roland. 2011. “Real Estate Investment Trusts – REITs.”

S. Khan, Mohsin, and Ehsan U. Choudhri. 2004. “Real Exchange Rates In Developing Countries: Are Balassa-Samuelson Effects Present?”

Samuelson, Paul A. 1964. “Theoretical Notes on Trade Problems.” Review of Economics and Statistics, 145–54.

Shiller, Robert J. 2000. “Irrational Exuberance.” 2018. “Online Data Robert Shiller.” http://www.econ.yale.edu/~shiller/data.htm.

Siegel, Jeremy J. 1999. “The Shrinking Equity Premium.”

Silva, Ricardo. 2009. “On estimating covariances between many assets with histories of highly variable length.”

Stambaugh, Robert F. 1997. “Analysing Investments Whose Histories Differ in Length.”

Taylor, Alan M, and Mark P Taylor. 2004. “The Purchasing Power Parity Debate.” Journal of Economic Perspectives, August: 312–320.

Willenbrock, Scott. 2011. “Diversification return, portfolio rebalancing, and the commodity return puzzle.”

Young, Michael S., Jeffrey D. Fischer, and Joseph D‘Allessandro. 2016. “New NCREIF Value Index and Operations Measures.”

Zietz, Emily, G. Stacy Sirmans, and H. Swint Friday. 2014. “The environment and performance of Real Estate Investment Trusts.”

Important Information (US)

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. DWS 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 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.

081172_1 (02/2021)

Important Information (EMEA/APAC/LATAM)

This marketing communication is intended for professional clients only.

DWS is the brand name of DWS Group GmbH & Co. KGaA and its subsidiaries under which they operate their business activities. The respective legal entities offering products or services under the DWS brand are specified in the respective contracts, sales materials and other product information documents. 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 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 Group, 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 constitute an offer, recommendation or solicitation to conclude a transaction and should not be treated as giving investment advice.

The document was not produced, reviewed or edited by any research department within DWS and is not investment research. Therefore, laws and regulations relating to investment research do not apply to it. Any opinions expressed herein may differ from the opinions expressed by other legal entities of DWS or their departments including research departments.

The information contained in this document does not constitute a financial analysis but qualifies as marketing communication. This marketing communication is neither subject to all legal provisions ensuring the impartiality of financial analysis nor to any prohibition on trading prior to the publication of financial analyses.

This document 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 document. 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 in this document. Past performance is not guarantee of future results.

We have gathered the information contained in this document from sources we believe to be reliable; but we do not guarantee the accuracy, completeness or fairness of such information. All third party data are 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, including market fluctuations, regulatory change, possible delays in repayment and loss of income and principal invested. The value of investments can fall as well as rise and you might not get back the amount originally invested at any point in time. Furthermore, substantial fluctuations of the value of any investment are possible even over short periods of time. The terms of any investment will 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 any transaction.

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 or persons associated with it may (i) maintain a long or short position in securities referred to herein, or in related futures or options, and (ii) purchase or sell, make a market in, or engage in any other transaction involving such securities, and earn brokerage or other compensation.

DWS does not give taxation or legal advice. Prospective investors should seek advice from their own taxation agents and lawyers regarding the tax consequences on the purchase, ownership, disposal, redemption or transfer of the investments and strategies suggested by DWS. The relevant tax laws or regulations of the tax authorities may change at any time. DWS is not responsible for and has no obligation with respect to any tax implications on the investment suggested.

This document may not be reproduced or circulated without DWS written authority. The manner of circulation and distribution of this document may be restricted by law or regulation in certain countries, including the United States.

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.

DWS Investment GmbH. As of February 2021

Issued in the UK by DWS Investments UK Limited which is authorised and regulated by the Financial Conduct Authority (Reference number 429806).

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

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

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

081172_1 (02/2021)

DWS ESG signals that DWS uses in its investment management are sourced or derived from data that DWS receives pursuant to licenses with third-party commercial ESG data providers. Sources: ISS ESG, Sustainalytics, S&P Trucost Limited, MSCI ESG Research Inc. and Morningstar, Inc., Arabesque S-RAY as well as information publicly available.
These signals do not constitute investment advice or recommendations by such Licensors. All rights in the data and reports provided by third-party licensors vest in such licensors and/or their content providers licensors. None of such licensors or their affiliates, or their licensors content providers, accept any liability for any errors, omissions or interruptions in such data/reports and none warrants their data as to completeness, accuracy or timeliness. No copying or further distribution of such data/reports is permitted