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DWS MULTI-ASSET LONG VIEW

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Christian Hille
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Foreword

"But this long run is a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is long past the ocean is flat again."[1]

These famous words of John Maynard Keynes[1] come to mind as we publish our Long View for market returns. In light of the storms over the past 12 months, one might be forgiven for thinking that now is not the time to focus on the horizon. We beg to differ. Having a solid set of properly derived long term capital market assumptions is as essential in turbulent periods as it is in calmer ones.

Asset allocation dominates performance. As a result, it is essential to get a strategic base portfolio right. In some ways the task is easier than for short and medium run forecasting. Prices are a better reflection of fundamentals over a full cycle; near term they react to behavioural patterns. Long run modelling has actually proven to be quite reliable, as we explain on page 19.

That said, markets have clearly begun a new tempestuous phase. The so-called goldilocks years are behind us and this cycle is closer to the end than beginning. Asset prices are likely to be more volatile, dominated by central bank actions, notably the shift from quantitative easing to tightening. Even if this causes severe reactions, we view it as a healthy process, where investing reverts to more normal times with the old rules of finance and economics applying once again.

For example, high profit margins may come under pressure. Already we are seeing the tech super cycle beginning to fade. Investors need to appreciate they had an exceptional eight years in financial markets, with a Sharpe ratio above one at every point along the efficient frontier. This was never likely to last.

Our Long View framework builds on research and insights developed by the Multi-Asset & Solutions Group. It also leverages the respective asset class experts across DWS. Combining well-established macro-economic models and empirical insights, we provide high-level perspectives as well as granularity within each asset class.

The good news is that investors are likely to be rewarded in the years ahead for taking risk as the efficient frontier steepens. This requires discipline – looking beyond any near term storms and instead focusing on the long run. Soon enough, the ocean will be calm again. We trust the following pages will help steer your portfolios.

January 2019

[1] Keynes, J.M. (1923) A Tract on Monetary looks fairly steep Reform, Ch. 3 (Original italics)

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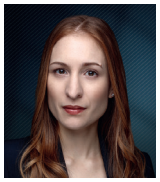

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Executive summary

Investing is about patience, diversification and expected returns. This has been somewhat forgotten since the financial crisis as global asset prices surged. In future, however, we believe the recent market wobbles are a harbinger of a more normalised environment. Higher volatility means investors have to diversify and focus on the long run. Meanwhile, expected returns will be lower, as they always are towards the end of bull market.

Nowhere can this better be seen than looking at the shift in the efficient frontier, which represents the trade-off investors have to make between risk and returns. The chart below shows a relatively steep frontier post-crisis compared with the past two decades. In other words, whereas you used to have to take much more risk to generate higher returns, over in the last ten years investors got used to a much better performance from risky assets.

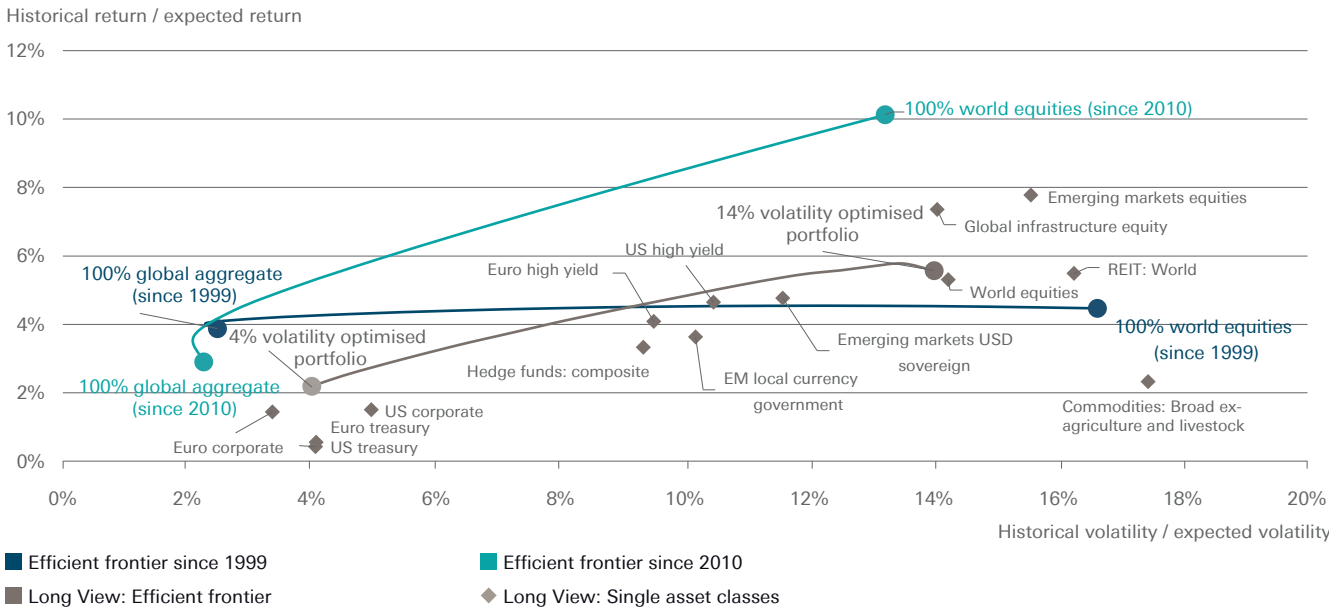
Over the next ten years, based on the forecast returns in this publication, the efficient frontier not only flattens slightly again, it drops well below the post-crisis frontier. For the same four per cent volatility, your expected return halves. The reality is that investors who wish to generate their usual five per cent return must take a level of risk they may be uncomfortable with.

In this environment, strategic asset allocation becomes all the more important, as does taking a sophisticated approach to portfolio construction. We use tools such as dynamic overlays to help keep risk levels manageable and our proprietary risk-based allocation models are superior to traditional techniques when it comes to building resilient and stable multi-asset portfolios that still reward clients with attractive returns (Figure 1).

All asset allocation models have long run asset price forecasts as an input. This publication contains the long term capital market assumptions that underpin our multi-asset portfolios. They are the responsibility of DWS's Multi-Asset and Solutions Group. Estimates are based on ten year models and should not be compared with the twelve month forecasts published in the CIO View.

Central to this document is our belief that clients should always take a long term perspective when it comes to achieving portfolio objectives. Extending the investment horizon

FIGURE 1: HISTORICAL AND EXPECTED EFFICIENT FRONTIERS



Historical efficient frontiers are calculated using historical returns and volatilities since 1999 and since 2010 as represented, and each represents the risk-return profile of the portfolios that could have been invested into world equities (in EUR, unhedged) and global aggregate (EUR hedged). The Multi-Asset long view efficient frontier represents the expected return profile of the optimal portfolios (EUR) that can be constructed using the GRIP optimisation-techniques presented in page 26, and investing in the various asset classes here represented. Source DWS. Data as of 12/31/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

produces smoother returns, as shown in Figure 3. This makes entry points less relevant and models more stable.

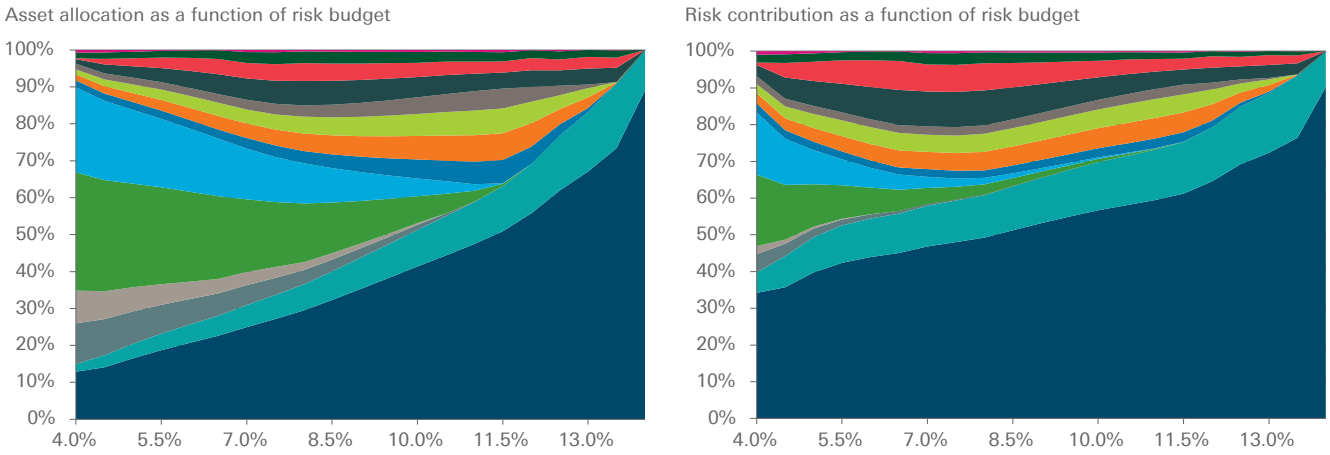
For example, we currently believe that many asset class valuations are high relative to history. But as we show on page 16, the difference between buying exactly at the peak of the dot.com boom in April 2000 versus a year later only amounts to one per cent annually over 15 years. Over five years the hit to returns was six per cent per annum.

Likewise, volatility moved to a higher regime towards the end of last year. But again this matters less to a long run investors.

A two standard deviation drop in US equities over one year has been a 27 per cent price fall on average; over a decade the average two sigma decline was less than one per cent. The long run is simply a calmer place in which to invest.

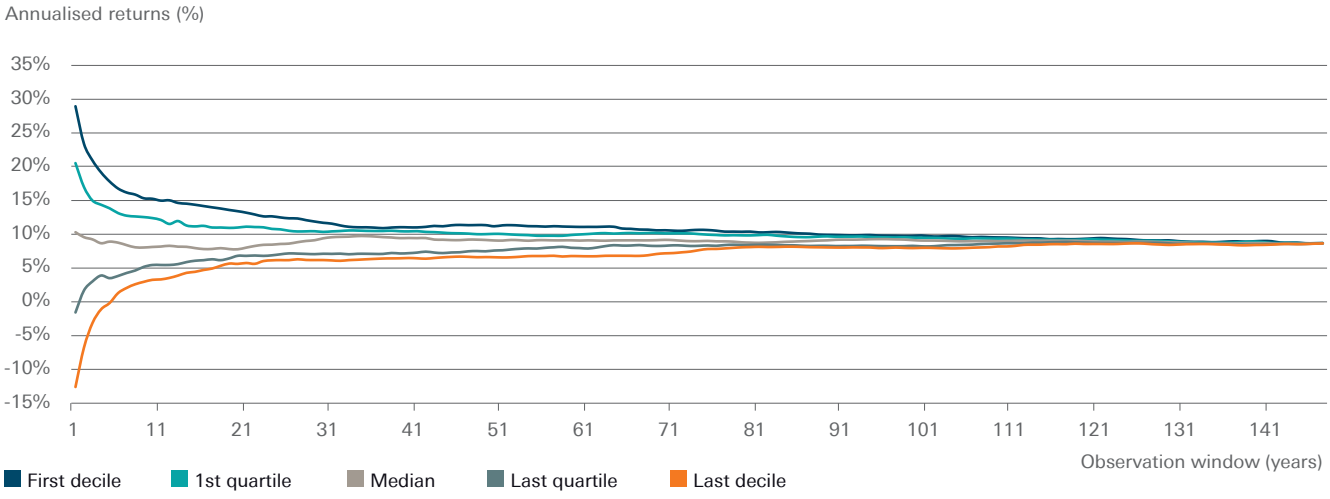
Hence sceptics may be surprised just how stable long range forecasting can be, although the usual disclaimers apply. When we backtested our equity model, for example, ten year expected returns were within one standard deviation of subsequent realised returns 85 per cent of the time. Almost two thirds of the observations were within half a standard deviation.

FIGURE 2: ASSET ALLOCATION AND RISK ALLOCATION BY TARGET VOLATILITY



Source: DWS. Data as of 12/31/18. For illustrative purposes only. See page 26 for details.

FIGURE 3: DISTRIBUTION OF US EQUITIES – HISTORICAL RETURNS OVER DIFFERENT TIME PERIODS



Source: Robert J. Shiller, DWS calculations. Data from 1871 to 2018. Past performance, actual or simulated, is not a reliable indicator of future results.

Framework

We use the same building block approach to modelling expected returns irrespective of asset class. This brings consistency and transparency to our analysis and helps clients better understand the constituent sources of returns.

The Long View framework breaks down returns into: income + growth + valuation, each with their own sub-components.

The pillars and components for the traditional asset classes under our coverage (equities, fixed income, commodities and REITs) can be seen below.

Likewise Figure 5 shows that alternative asset classes under our coverage (listed real estate, private real estate, private real estate debt, listed infrastructure and private infrastructure debt) are modelled using exactly the same approach, sometimes with an added premium to account for specific features, such as liquidity.

FIGURE 4: 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. As of 12/31/18.

FIGURE 5: LONG VIEW FOR ALTERNATIVE ASSET CLASSES – PILLAR DECOMPOSITION

Asset Class	Income	Growth		Valuation			Premium
Hedge funds	Hedge funds' 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	Inflation	Earnings growth	Valuation change	Credit migration	Credit default	Liquidity premium
Listed infrastructure	Dividend yield	Inflation	Earnings growth	Valuation adjustment			
Private infra-structure debt	Yield	Inflation	Earnings growth	Valuation change	Credit migration	Credit default	Liquidity premium

Source: DWS. As of 12/31/18.

Results

Our Long View forecasts can be seen for all asset classes on bar chart below and Sharpe ratios are shown in Figure 26.

In summary, we would make five observations from the results:

_ Emerging market equities and bonds have the highest expected returns within traditional assets.

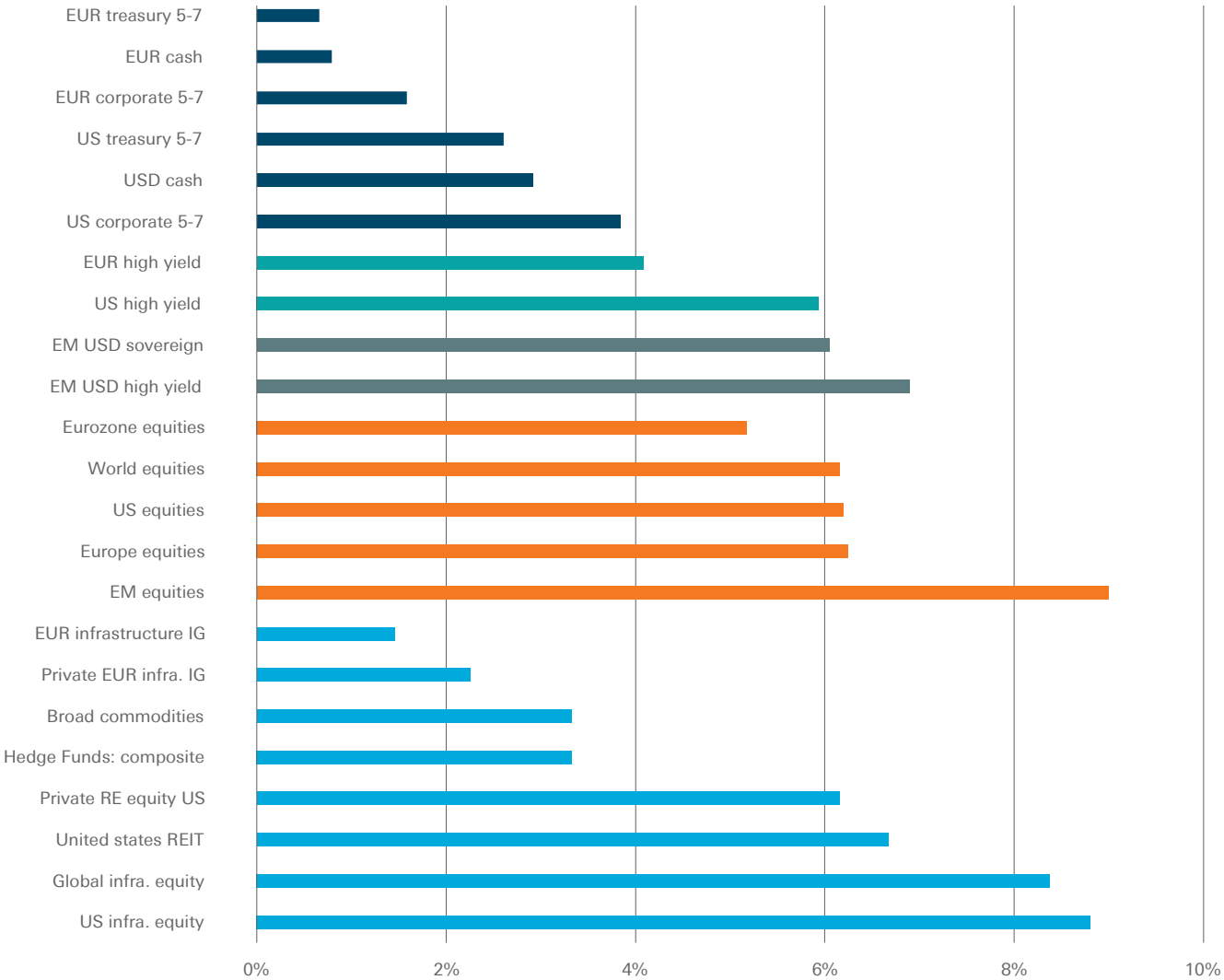
_ Superior returns can be found in private and listed real estate and infrastructure.

_ Stocks are more attractive than bonds generally, with selective opportunities in credit.

_ While providing useful diversification benefits, the outlook for commodities is poor.

_ Lower returns overall means forex presents a significant risk – which depending on their risk appetite, investors might want to consider hedging.

FIGURE 6: LONG TERM EXPECTED RETURNS FOR MAJOR ASSET CLASSES (LOCAL CURRENCIES)



Source: DWS. As of 12/31/18. See page 80 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.

The Long View

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

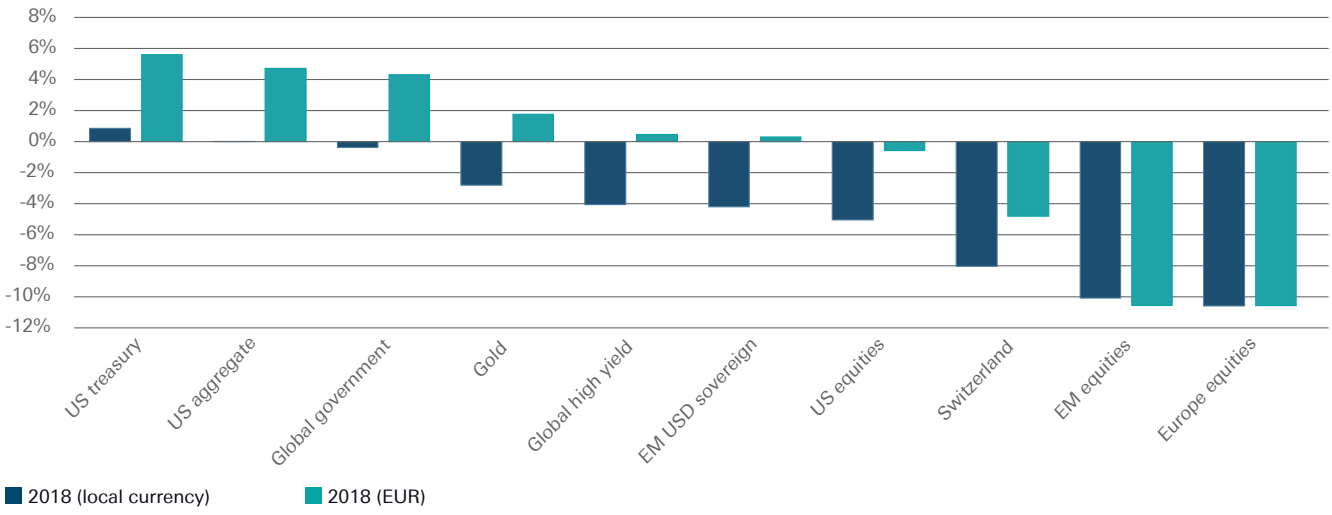
Investing is about patience, diversification and expected returns

2018: A year to forget?

Last year was miserable for financial markets and a challenge for asset allocators. As shown in Figure 7, most asset classes posted negative returns[2].

During the course of 2018, the most frequently asked questions we received from investors focused on three main issues: the diversification benefits between equity and fixed income securities (or lack thereof); the rich valuations in most asset classes, in particular equities; and the change in volatility regime and what it means from a strategic asset allocation perspective. Our view on each of these issues follows below.

FIGURE 7: PERFORMANCE OF MAJOR ASSET CLASSES IN 2018[2] (LOCAL CURRENCIES AND EUROS)



Source: Bloomberg, DWS calculations. Data from 31/12/17 to 12/31/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

[2] Source Bloomberg, DWS calculations and data as of 31/12/2018.

Equity-bond correlations should return to normal

One of the most striking characteristics of last year was that bonds did not always help in protecting equity portfolios, as they usually do (Figure 8). This was in part due to a normalisation of monetary policy around the world. Correlations between bonds and equities did revert to normal towards the end of the year however, and we do not see any reason why there should be a permanent breakdown in this long run relationship. We explained why in a publication in 2017[3], and our reasoning is backed up by long run data, as can been seen in Figure 9.

For example, out of the ten worst months experienced by equity investors since 1992, US government bonds delivered positive returns seven times, with an average 2.1 per cent monthly return.

Lower valuations are a matter of Long term perspective

Although this publication is concerned with the long term picture, we recognise that investors face a challenging investment environment today. How should they think about current market levels? We recommend keeping valuations in perspective.

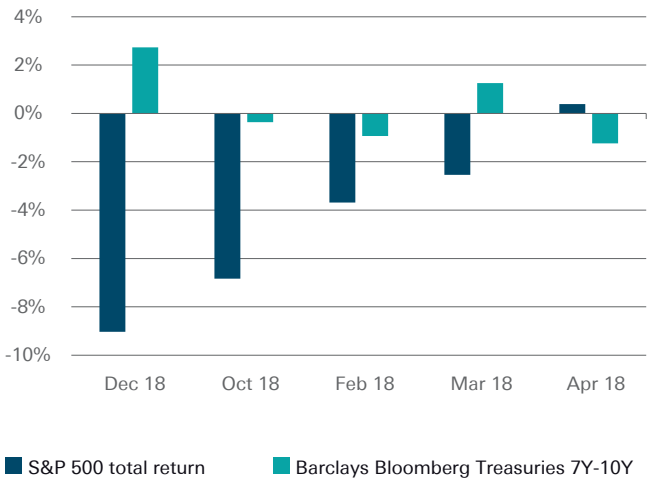
For example, if we look at markets in the medium term, say over five years, valuations for US equities, euro swaps and corporate bonds are already back to their average or below, as can be seen in Figure 10. This might be interpreted as reasonable entry point.

But when we consider a much longer view – back to the start of the millennium, say – the extraordinarily unusual investment backdrop continues to dominate asset prices. In particular, we are still facing the consequences of inflated central bank balance sheets (Figure 11). These have propelled valuations to historically high levels, compared with long term averages, as shown in Figure 12.

Therefore equities and bonds still look relatively expensive compared with history, even following the declines in markets last year. In Figure 12, it can be seen that the Shiller PE ratio is around 30 times, corporate bonds option adjusted spreads are only starting to revert to their average, and interest rates remain depressed versus the past two decades.

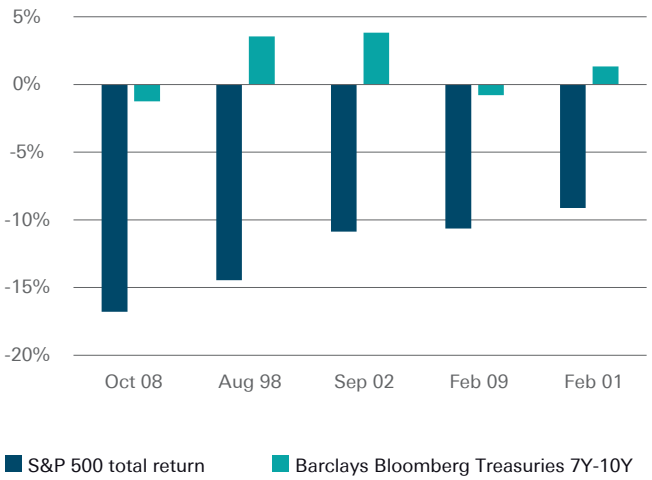
Our message here is straightforward: defining a time horizon is paramount in assessing valuations.

FIGURE 8: PERFORMANCE OF US EQUITIES AND US TREASURIES OVER THE 5 WORST MONTHS FOR US EQUITIES IN 2018



Source Bloomberg, DWS calculations. Data from 31/12/17 to 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results.

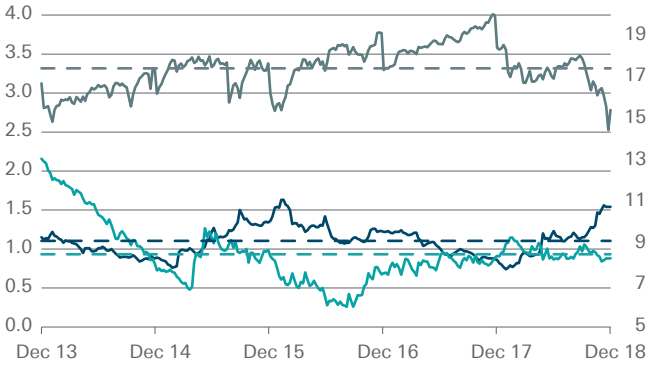
FIGURE 9: PERFORMANCE OF US EQUITIES AND US TREASURIES 7-10Y OVER THE 5 WORST EQUITIES MONTHS FROM 1992 TO 2018



Source Bloomberg, DWS calculations. Data from 31/12/17 to 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results.

[3] See (Denoiseux, Worsfold et Debru 2017)

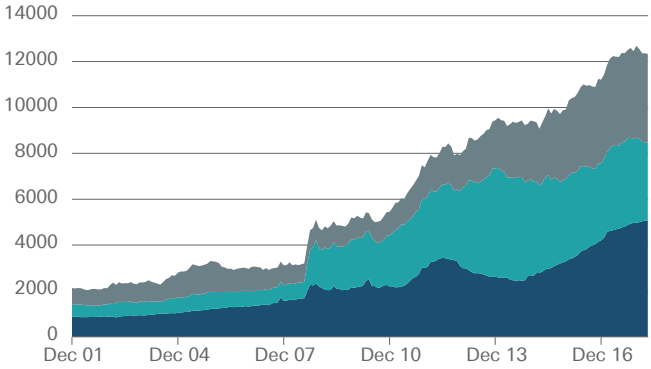
FIGURE 10: LOW OR AVERAGE VALUATIONS COMPARED WITH LONG 5Y AVERAGES



Bloomberg Barclays Euro Corporate OAS (and 5Y average, LHS axis)
EUR swap 10Y (and 5Y average, LHS axis)
S&P 500 12M forward PE (and 5Y average, RHS axis)

Source Bloomberg, DWS calculations. As of 31/10/18. Past performance, actual or simulated, is not a reliable indicator of future results.

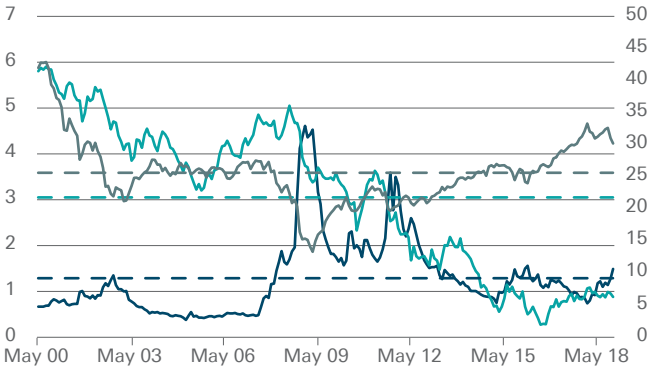
FIGURE 11: THE MAIN CENTRAL BANKS HAVE CONSIDERABLY INCREASED THEIR BALANCE SHEETS



Eurozone Central Bank total gross assets (IMF)
US Central Bank total gross assets (IMF)
IMF Japan Central Bank total gross assets (IMF)

Source: Bloomberg, DWS calculations. As of 31/10/18. May not be indicative of future results.

FIGURE 12: ELEVATED VALUATIONS COMPARED WITH LONG TERM VALUES



Bloomberg Barclays Euro Corporate OAS (and average, LHS axis)
EUR swap 10Y (and average, LHS axis)
S&P 500 forward PE (and average, RHS axis)

Source Bloomberg, DWS calculations. As of 31/10/18. Past performance, actual or simulated, is not a reliable indicator of future results.

Volatility has shifted and is not always what it seems

Volatility is a crucial parameter when allocating between asset classes. And the increased level of market stresses last year made volatility one of the key areas of investor concern.

We wrote a lot about volatility in 2018 and made two main points. That volatility tends to move in phases and alternative ways of measuring risk can reveal important insights. Regarding the former, Figure 13 shows that implied volatilities (that is, market expectations for future short term volatility) have experienced three broad phases over the past few years:

_ A steady decrease from 2015 to early 2018;
_ Several sudden spikes through 2018;
_ A significantly increased average level across the second half of 2018.

While implied volatility is a useful indicator, investors should not be too distracted by recent shocks. As we published last year[4], volatility is only one measure of market risk. For example, during periods of quiet and low volatility earlier last year, we identified a very high level of kurtosis in some asset classes, and warned that this was a potentially dangerous sign of market breakdown.

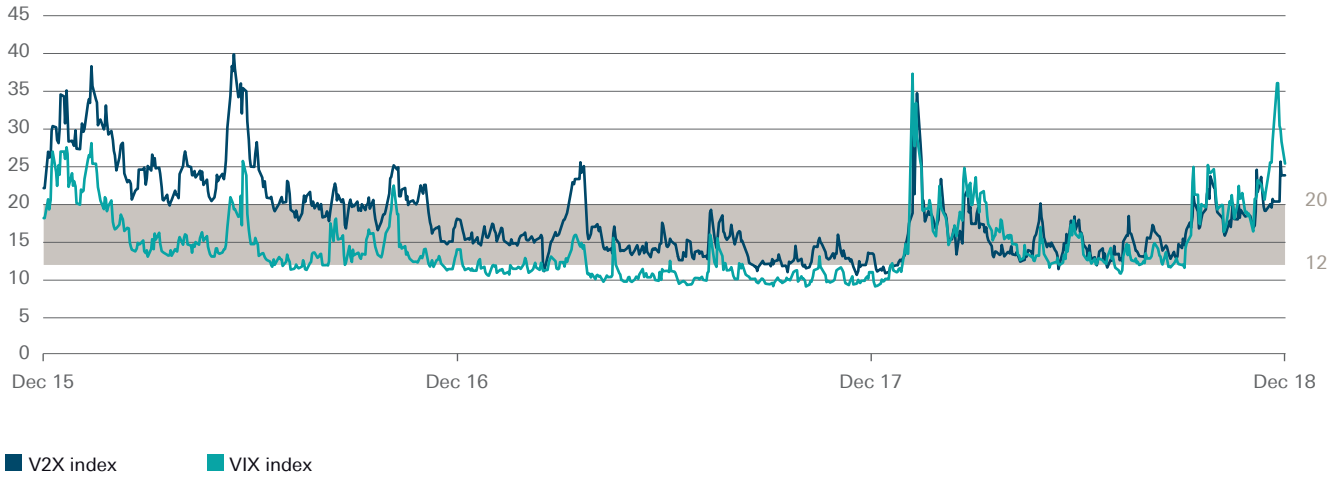
So how best to think about increased levels of volatility? Yes it is important to follow, but the reality is that a spike does not necessarily mean sell everything just as a fall in volatility is not a buy signal. When constructing risk profiled portfolios, we advise investors to avoid hasty conclusions and keep an eye on the fundamentals.

Remember that most asset allocation processes use risk profiling to try to keep risk in portfolios constant over time. Such an approach can be discretionary or systematic, and in an environment of higher volatility, typically exposure to risky asset classes is reduced. But while risk profiling has delivered excess returns over time, its usefulness is sometimes limited, as we have also written about in the past (Denoiseux, Worsfold et Debru 2016). For example, rather than a spike in volatility being a precursor to a sell-off, Figure 14 shows that markets can over-react and such moments can in fact be attractive buying points.

To conclude this section, we have provided a quick take on the abrupt market shifts observed in 2018 with regard to the big issues on investors' minds, in particular the equity versus bond relationship, asset valuations and volatility. Now we must address – before summarising our expected returns – what exactly we mean by a long view, how it alters portfolio construction, and why we believe we are even capable of making long range forecasts.

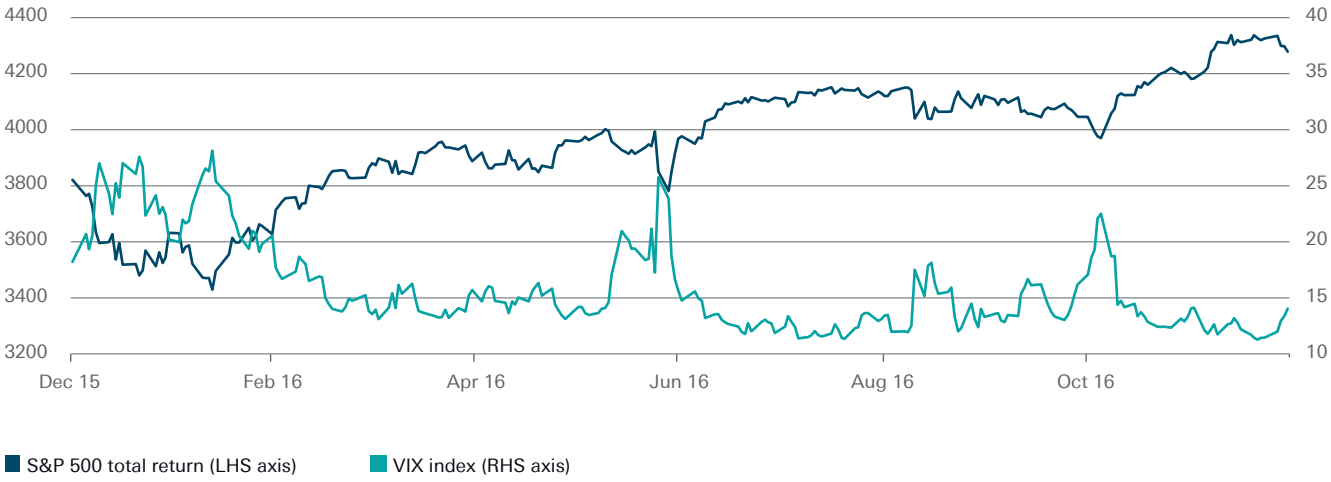
[4] See (Hille, Warken et Kirk 2018)

FIGURE 13: IMPLIED VOLATILITIES IN BOTH EUROPEAN AND US EQUITY MARKETS HAVE INCREASED IN 2018



Source Bloomberg, DWS calculations. Data from 12/31/17 to 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 14: RISING IMPLIED VOLATILITY CAN SOMETIMES PINPOINT AN ATTRACTIVE ENTRY POINT



Source: Bloomberg, DWS calculations. Data from 12/31/15 to 12/31/16. Past performance, actual or simulated, is not a reliable indicator of future results.

Long term investors enjoy smoother returns

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 capture the full risk premium[5] available for each asset class at the time of purchase.

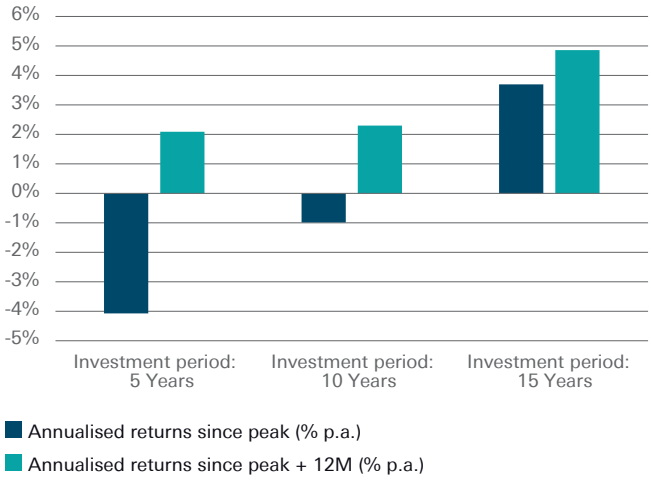
To illustrate this, Figure 15 compares the annual return for an investor buying US stocks at different times around April 2000. This was one of the most expensive valuation points for most equity indices until late 2007, and as such, it represented a challenging period for investors. Surely this was a terrible time to buy the market?

Indeed it was. If we look at returns over the subsequent five years, performance was significantly impacted by market timing. Equipped with a crystal ball, an investor would have been much better waiting for lower valuations and buying 12 months after the peak. If they had done so, subsequent annual returns would have been boosted by five per cent, turning negative four per cent into a more comfortable 2.1 per cent annual return.

However, if we take the same example over a 15 year investment horizon, Figure 15 shows that an investor's total return would have been much less sensitive to market timing. What is more, it is well noted that about 90 per cent of portfolio returns come from asset allocation[6]. In other words, taking a long view means portfolio allocation decisions are usually far more critical than trying to pick the highs and lows.

The fact is, the longer the investment horizon the better. However we recognise the real world is rarely so patient. Hence our Long View forecasts are based over ten years, which we believe is near term enough to be relevant, while still a reasonable time-frame for a full market cycle to occur. Of course, depending on specific client needs, we can also provide estimates based on different time horizons.

FIGURE 15: LONG TERM INVESTORS IN US EQUITIES SHOULD NOT BE EXCESSIVELY WORRIED ABOUT THEIR ENTRY POINT



Source Bloomberg, DWS calculations. Data from 4/28/00 to 4/28/15. Past performance, actual or simulated, is not a reliable indicator of future results.

[5] 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.

[6] See, among others, (Brinson, Singer and Beebower 1991) for an in-depth analysis of the relative impact of Strategic Asset Allocation in portfolios' performance.

Long run investments are more stable

Not only does having a long term view make investing less sensitive to market timing, it also means returns are more stable. Consider the performance of US equities since 1871 based on Robert Shiller[7] data.

US equities delivered a 9.2 per cent nominal return, which translates into 6.9 real return – outperforming real output growth in the US by 3.7 per cent.

Figure 16 makes clear that in the long run, equities have historically produced steady above-inflation returns, despite some nasty short-term losses.

To quantify long run stability versus short term risk, Figure 17 shows the full distribution of US equities total returns across different time horizons. It illustrates that with a longer investment view investors have historically received much smoother compounded returns.

With a ten year timeframe, the downside risk of US equities is significantly reduced

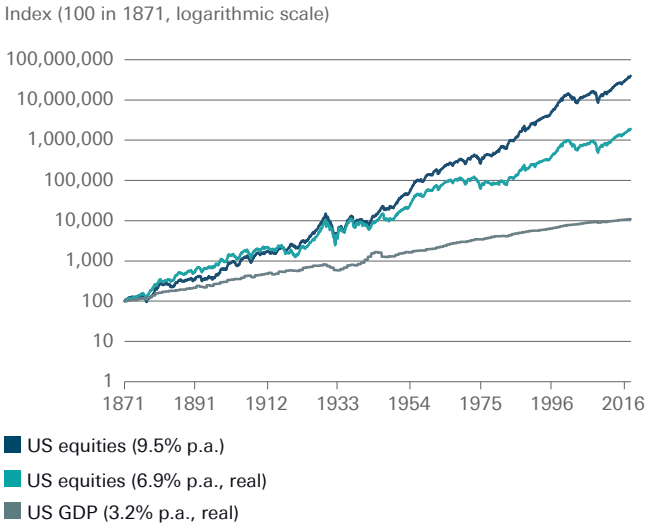
How does the Long View's ten year time frame look in terms of return stability? Table 1 provides average and various standard deviation moves across different time periods for US equity investors. As can be seen, both the upside and downside of a two standard deviation event, for example, has been much more muted over a decade than even five years.

TABLE 1: AVERAGE AND STANDARD DEVIATION OF REALISED RETURNS OVER DIFFERENT TIME PERIODS

Maturity (year)	1	5	10
Average (IRR) - 2 StDev	-27.4%	-6.1%	-0.5%
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%	13.2%
Average (IRR) + 2 StDev	44.7%	23.4%	17.8%

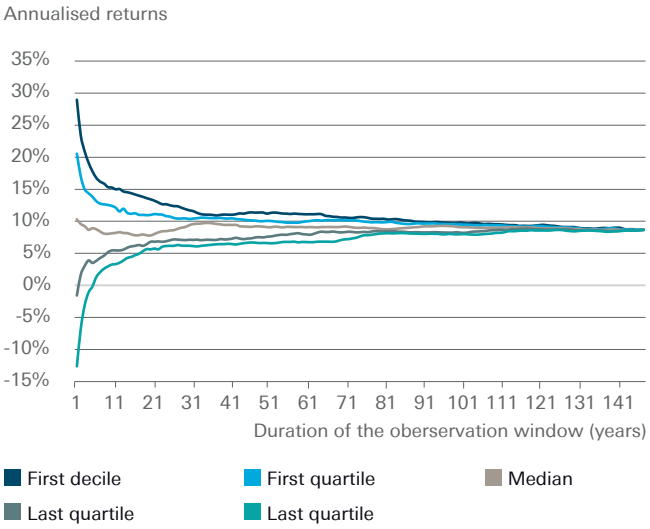
Source Robert J. Shiller, DWS calculations. Data as of December 2018.

FIGURE 16: US EQUITY RETURNS AND US GDP GROWTH



Source Robert J. Shiller, Madison Historical Statistics, DWS calculations. Data from 1871 to 2018. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 17: THE LONGER THE HOLDING PERIOD, THE SMOOTHER THE AVERAGE RETURN OF US EQUITIES



Source Robert J. Shiller, DWS calculations. Data from January 1871 to December 2018. Past performance, actual or simulated, is not a reliable indicator of future results.

[7] Long term US equities data is available at (Shiller, Online Data Robert Shiller 2018) and long term macro-economic data is sourced from (Maddison 2018).

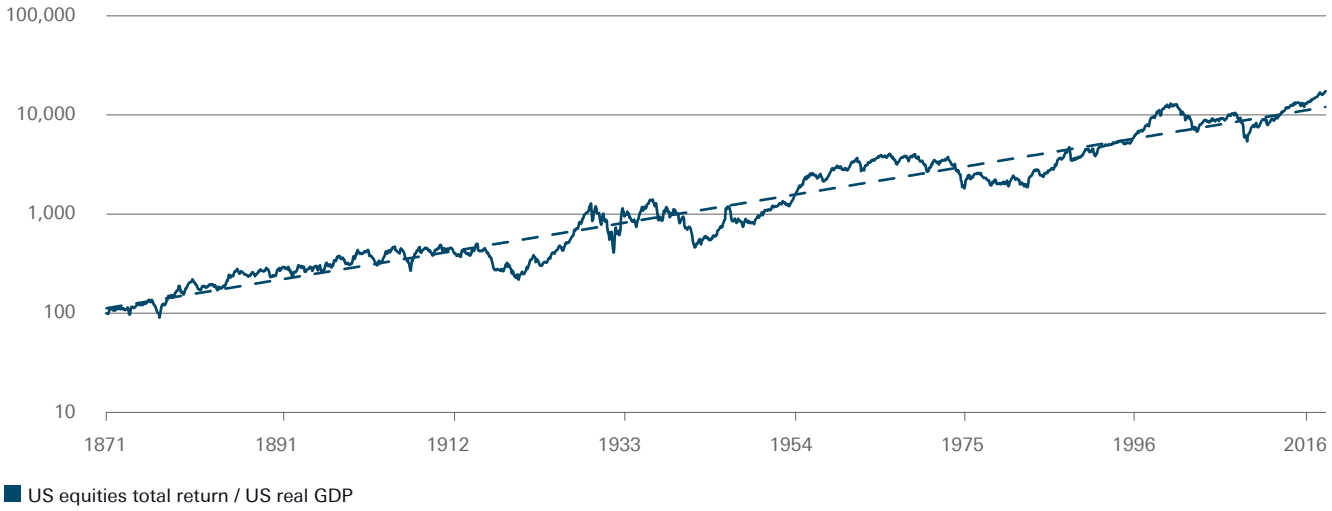
Over ten years equity returns can be more consistently forecasted

Equity returns as a function of economic growth

Many people believe that trying to forecast market returns is a fool's errand, but over extended time horizons the exercise becomes easier because long term relationships can be identified. Take the ratio between real total returns for US stocks and real output.

Figure 18 suggests that stocks outperform economic growth over the long run by 3.6 per cent per annum. This relationship does not guarantee a future one, but it should be enough to add some comfort to investors that over time equities and their behaviour can be reasonably modelled.

FIGURE 18: THE RATIO BETWEEN THE REAL TOTAL RETURN OF US EQUITIES AND US REAL GDP HAS GROWN AT 3.5% PA

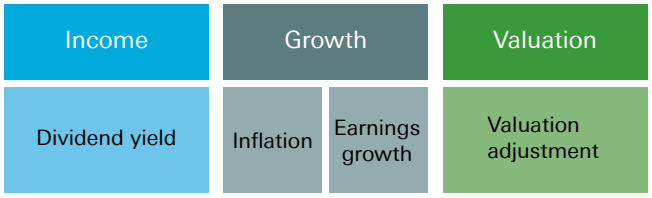


Source Robert J. Shiller, Angus Maddison Project, Thomson Reuters Datastream, DWS calculations. Data from 1871 to 2018. Past performance, actual or simulated, is not a reliable indicator of future results.

A simplified equity model

To prove the validity of the claim above, we analysed our own Long View equity model to test its predictive power over the long run. We inputted long term return and fundamental data (Shiller, Online Data Robert Shiller 2018) into the model as described in Figure 19.

FIGURE 19: PILLAR DECOMPOSITION OF OUR SIMPLIFIED EQUITY MODEL



Source Bloomberg, DWS calculations. Data as of 10/31/18

For this exercise, we made two adjustments, 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 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 simulation period.

Subject to these adjustments, we have the necessary data to provide expected return backcasts from 1971. This is long enough to cover a few market cycles.

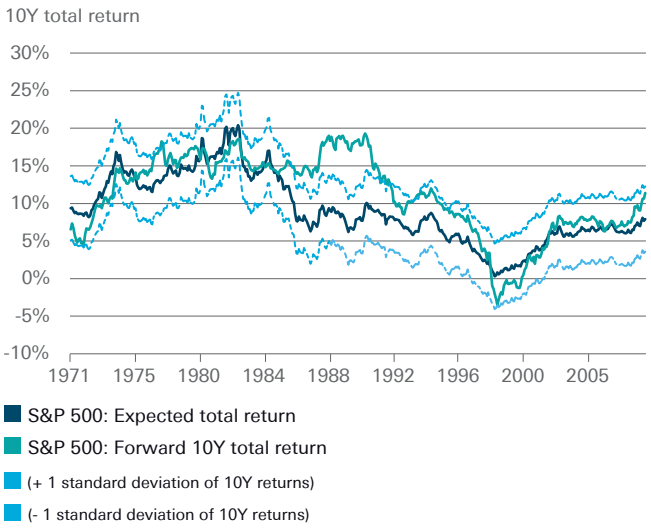
Long term forecasts from our equity model

The results suggest the predictive power of our Long View equity model is more than satisfactory – and it will improve further as we make improvements. Figure 20 shows the expected returns versus realised returns. While there are periods where divergence exceeds one standard deviation, we would highlight two statistics in support of the model.

The first is that in 85 per cent of the observations the expected return has been within one standard deviation of the subsequent ten year realised return.

Second, the gap between the expected returns and subsequent realised return has been less than half of one standard deviation 60 per cent of the time.

FIGURE 20: OUR MODEL WOULD HAVE PROVIDED ESTIMATES FOR US EQUITIES RETURNS WITHIN ONE STANDARD DEVIATION



Source: DWS, Robert J. Shiller and Federal Reserve. Data from September 1971 to December 2018. 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.

Expected returns and long term insights

Our expected returns for 2019 – 2029

In this section we summarise our Long View forecasts. Figure 21 shows the total return expectations that our models have produced for each asset class[8] [9].

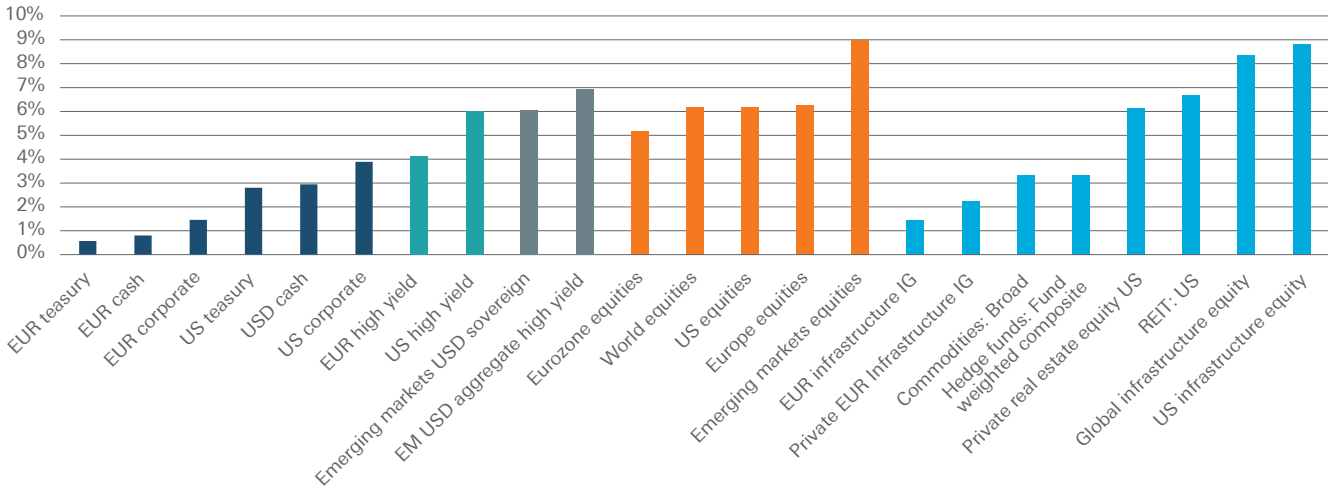
What are the takeaways? For starters, fixed income returns look disappointing from an absolute perspective, with most segments expected to deliver less than two per cent per annum. In comparison, equities seem healthy, returning five to six per cent in developed regions and up to eight per cent per annum in emerging markets. Very attractive returns can also be found in alternatives.

The other message that jumps out is that in order to expect a five per cent return or greater, investors need to contemplate riskier asset classes. These are the only investments that satisfy an elevated expected return, based on our forecasts.

Looking at fixed income in more detail, investors usually look at two particular metrics. The term premium helps to quantify how much incremental return an investor might expect by committing to a higher duration (and hence bearing an increased duration risk). The credit premium relates to higher return that is expected by investors as a compensation for their investment in increasingly riskier bond (that is, bonds of lower credit rating). Figure 22 shows that investors can still have reasonable term and credit premia, albeit smaller than historical averages. In practice, this should reflect the value that an investor can extract from a move into longer dated and/or riskier fixed income assets.

The expected return from developed market equities is superior to fixed income, but below the double digit returns since the crisis, although the outlook for emerging markets is brighter. Most regions still offer at least a five per cent total return over the long term. Of course, the recent sell-off has increased the dividend yield and lowered valuation, which mechanically boosts expected returns.

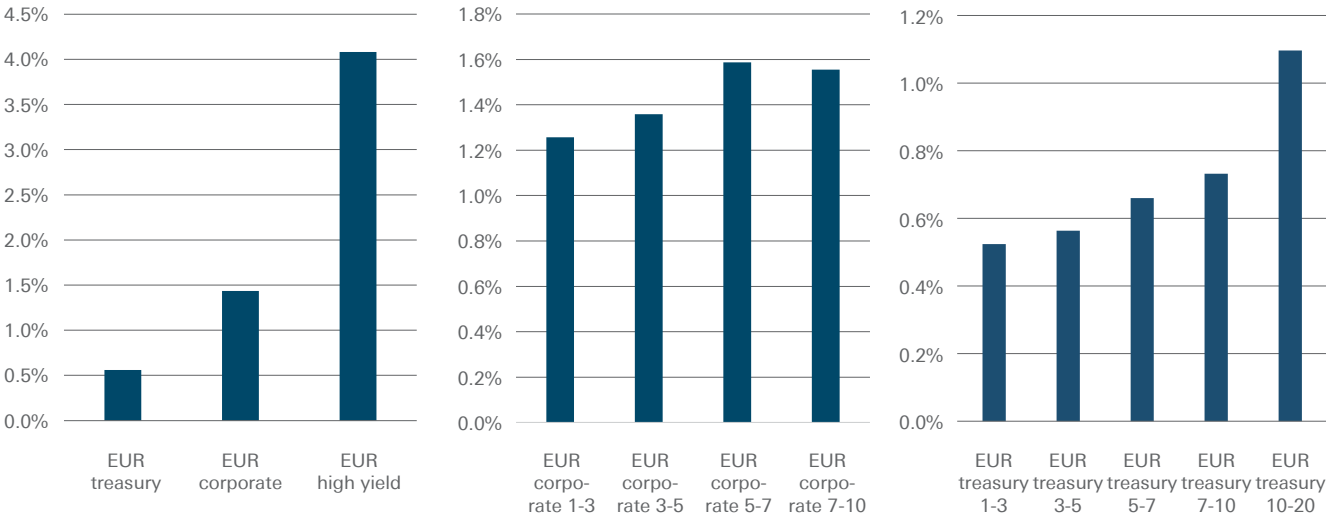
FIGURE 21: LONG TERM EXPECTED RETURNS FOR MAJOR ASSET CLASSES (IN LOCAL CURRENCIES)



Source DWS. Data as of 12/31/18. See page 80 for the representative index corresponding to each asset class. Within alternatives, listed infrastructure as well as public and private US real estate are all forecasts to make above six per cent returns per annum. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

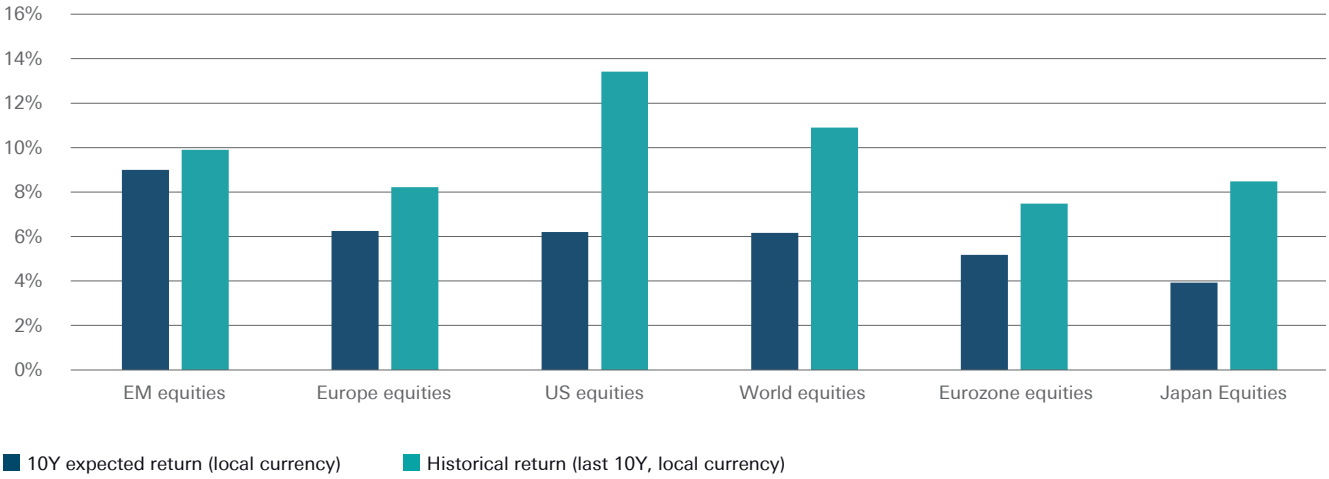
[8] Data as of 31 Oct. 2018, Source DWS Calculations.
[9] Please see from page 32 for an exhaustive explanation on how we have formed these long term return estimates.

FIGURE 22: TERM AND CREDIT PREMIUMS EXPECTED IN EUR FIXED INCOME



Source: DWS. Data as of 12/31/18. See page 80 Index corresponding to each asset class. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

FIGURE 23: EXPECTED AND HISTORIC RETURN FOR LARGE CAP EQUITIES ACROSS REGIONS

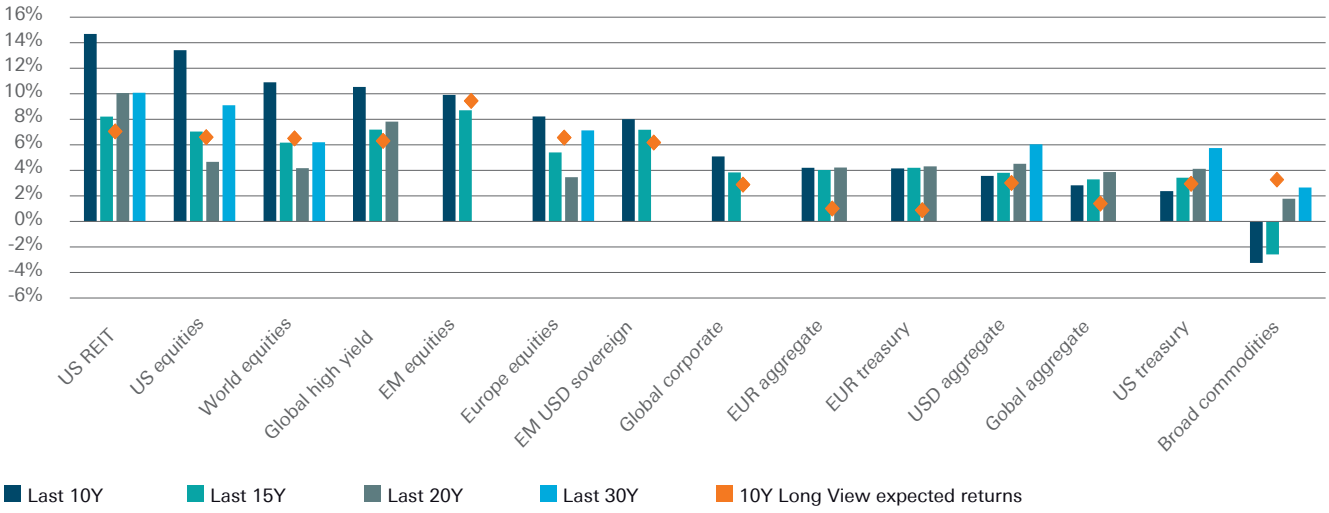


Source: DWS. Data as of 12/31/18. See page 80 for the representative index corresponding to each asset class. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect. Past performance, actual or simulated, is not a reliable indicator of future results.

Expected returns versus the past

It is always useful to compare the expected returns of our main asset classes with their realised performance, which is shown in Figure 24. Again it can be seen that the past ten 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. Emerging markets (both equities and fixed income) are a notable exception, with an expected return nearly as strong as seen over the previous decade.

FIGURE 24: EXPECTED RETURNS COMPARED WITH HISTORY



Source Bloomberg, DWS calculations. Data as of 12/31/18. See page 80 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.

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

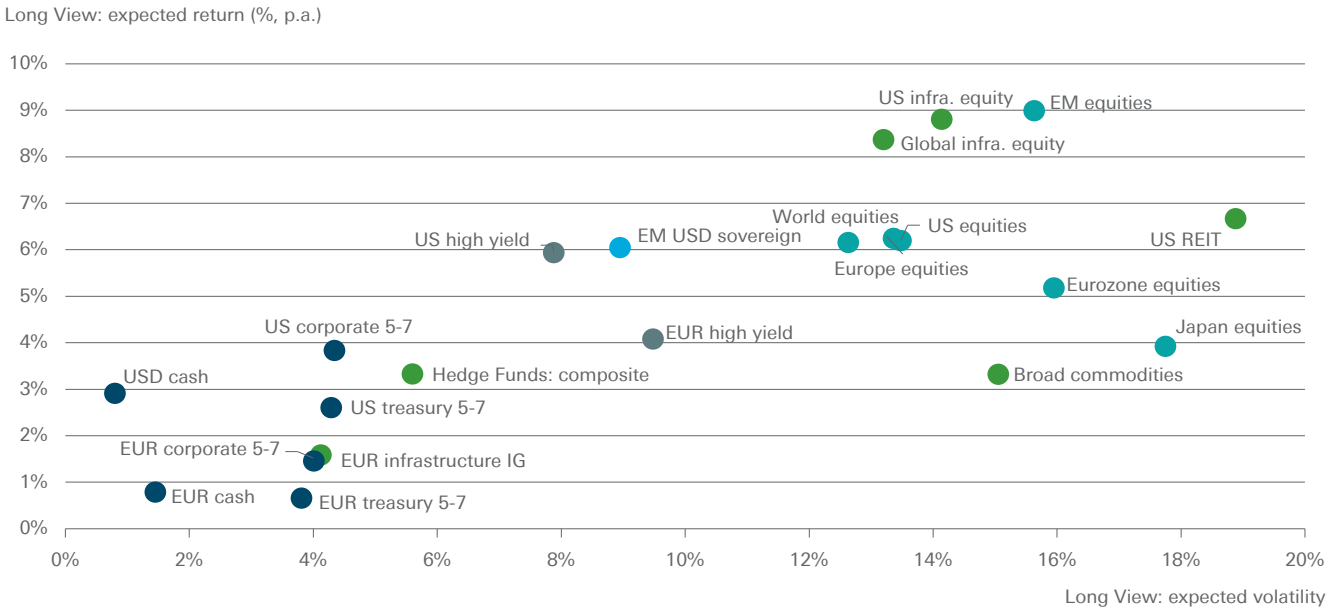
Financial theory tells us riskier asset classes should compensate the investors via higher expected returns. This well-known trade-off between risk and return is the main conclusion from Figure 25[10]. We observe that the usual relationship is preserved over our 10 year horizon, with a compensated risk premium for most asset classes. The exception is commodities.

Using the same data, we can calculate and compare expected Sharpe ratios (Figure 26), taking into account our expectations for money market instruments. Regarding both of these charts we would make the following comments:

_ Expected risk in equities should be compensated: Most equity asset classes demonstrate the highest expected returns and some of the highest Sharpe ratios.
_ Long term opportunities exist for corporate bonds: Despite a limited absolute level of expected return, investment grade corporate bonds still demonstrate a positive Sharpe ratio.
_ The risk in lower grade fixed income instruments should be compensated: High Yield and Emerging Market Debt are topping the Fixed Income asset class from a Sharpe ratio perspective.
_ Emerging markets look compelling for both equities and bonds.

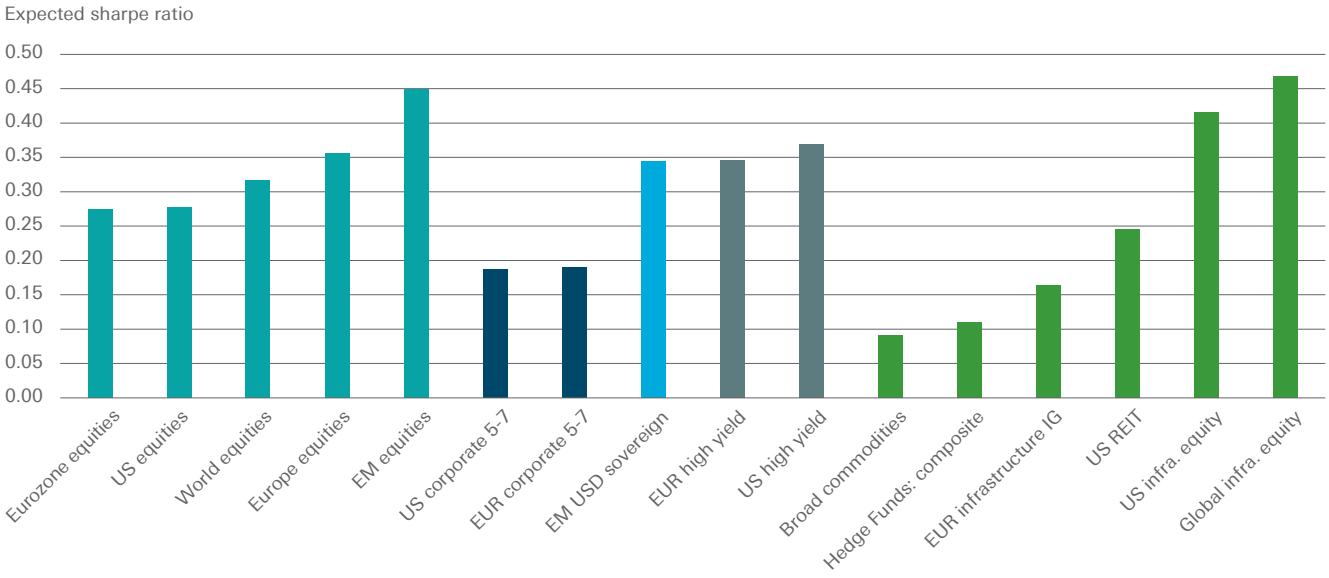
[10] This chart utilises both the methodology for calculating the expected returns and the approach we developed for expected volatilities and correlations, presented from page 72.

FIGURE 25: RISK-RETURN PROFILES OF MAJOR ASSET CLASSES (LOCAL CURRENCY)



Source DWS. Data as of 12/31/18. See page 80 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.

FIGURE 26: LONG VIEW – FORECAST SHARPE RATIOS (EUR)



Source: DWS. Data as of 12/31/18. See page 80 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.

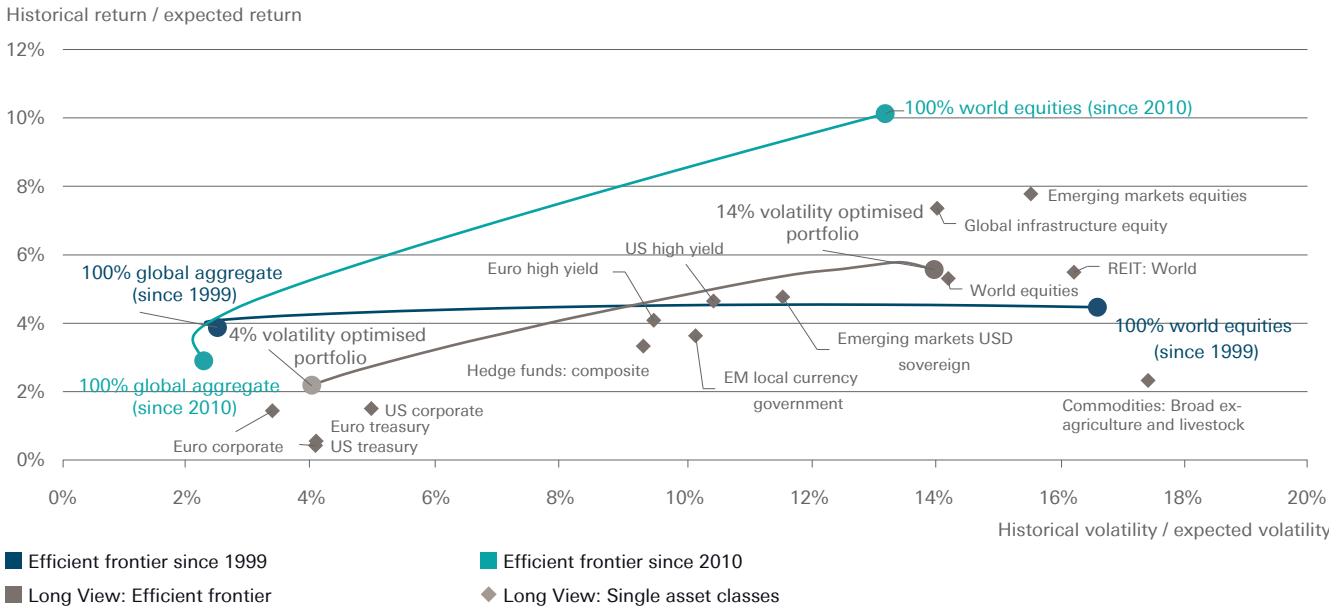
Strategic allocation

Connecting our Long View into portfolios

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 not rewarded for taking risk to the extent expected (Figure 27). In addition, the rebound in equities post-financial crisis was extreme.

Using our Long View forecasts to project an efficient frontier, forecast multi-asset returns over the next ten years are uninspiring. For investors wanting to achieve better returns, the higher risk required may be concerning. Therefore in order to keep risk at reasonable levels, dynamic overlay approaches can be useful.

FIGURE 27: HISTORICAL AND EXPECTED EFFICIENT FRONTIERS



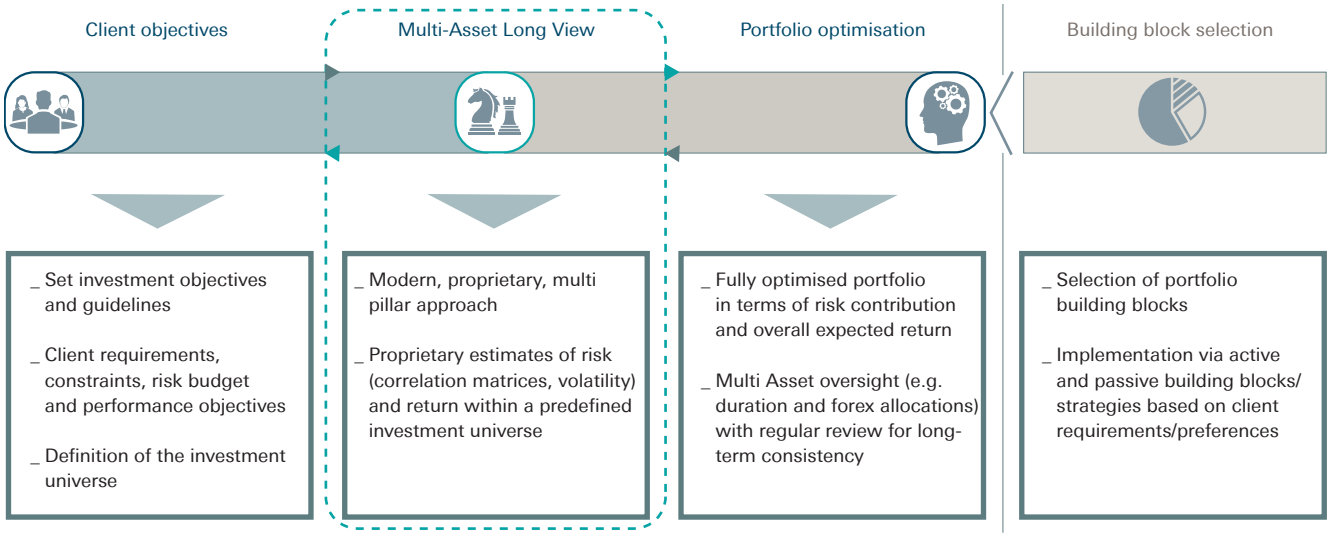
Historical efficient frontiers are calculated using historical returns and volatilities since 1999 and since 2010 as represented, and each represents the risk-return profile of the portfolios that could have been invested into world equities (in EUR, unhedged) and global aggregate (hedged in EUR). The Multi-Asset Long View efficient frontier represents the expected return profile of the optimal portfolios that can be constructed using the GRIP optimisation techniques presented in page 24, and investing in the various asset classes here represented.
Source: DWS. Data as of 12/31/18. See page 80 or the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

In this section we reiterate our strong belief in strategic asset allocation (SAA). This is a process that determines the optimal portfolio to deliver on an investor's risk-return expectations.

A SAA framework is based on:
_ The risk and return objectives of the investor;
_ The expected risk and return profiles of available asset classes;
_ The allocation process

Using proprietary models, we use a risk-based investment approach[11] for strategic asset allocation. We believe this is superior to relying on expected return-based approaches when building resilient portfolios, due to enhanced stability across parameter changes.

FIGURE 28: DECOMPOSITION OF THE STRATEGIC ASSET ALLOCATION PROCESS



Source: DWS. As of 12/31/18.

[11] We build our SAA portfolio using the proprietary model called GRIP, see (Hille and Warken 2018) for a deep-dive in our asset allocation approach

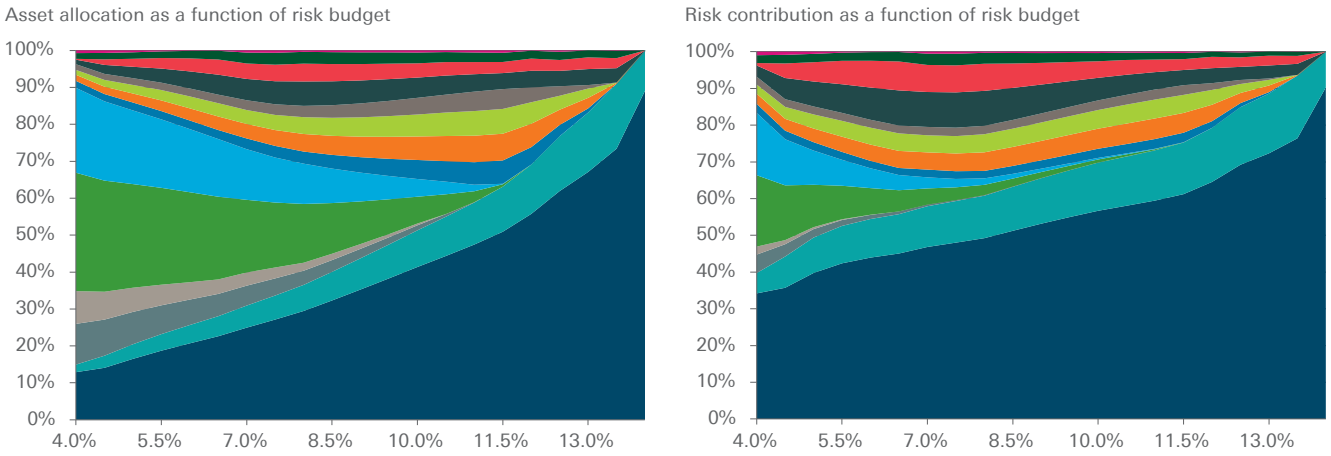
Getting a GRIP on asset allocation: Combining the Long View and our proprietary portfolio construction approach

Relying on our GRIP model (group risk in portfolios), we show in Figure 29 two concrete examples of portfolio construction exercises, based on investor risk considerations.

Each strategic asset allocation is modified on the basis of a different risk profile. The chart on the left shows an asset allocation by risk profile, and on the right a risk allocation by risk profile. Further analysis[12] shows that by moving beyond the usual risk parity framework it is possible to construct allocations that are diversified from a capital allocation as well as 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. In the case of the two strategic asset allocations, below, GRIP was calibrated to only hold long-only positions and ensure that the overall portfolio volatility equalled a given target. But it is possible to add further rules or constraints based on the risk profile, investment, or practical needs of an investor.

FIGURE 29: ASSET ALLOCATION AND RISK ALLOCATION AS A FUNCTION OF THE TARGET VOLATILITY



Source: DWS. Data as of 12/31/18. For illustrative purposes only.

[12] See (Hille and Warken, Time to get a GRIP on Asset Allocation 2018).

Economic assumptions

"Invest in Inflation. It´s the only thing going up."
Jim Rogers

Inflation and GDP growth assumptions

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

As per Table 2, our output and inflation expectations are relatively similar across developed countries, with the exception of Japan.

We note that real output growth for emerging countries is expected to exceed that of developed countries by two per cent on average over the long term. This is a key factor that will among others significantly impact the differences in expected returns for developed and emerging markets equities.

TABLE 2: ACROSS DM COUNTRIES, GDP AND INFLATION LONG VIEWS ARE RELATIVELY CONSISTENT

Country / region	Inflation	GDP growth
World	1.8%	1.7%
Emerging markets	3.1%	3.7%
Europe	1.7%	1,6%
Japan	0.8%	0.8%
United Kingdom	2.0%	1.8%
United States	2.0%	1.8%

Source: DWS. Data as of 12/31/18. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Currency estimates

To build our long term expectations for returns and volatility we start by forming the corresponding expectations on single currency based asset classes.

Each expected return is first expressed in its currency of denomination, that is, in local currency.

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, MSCI Europe).
_ To provide risk and return forecasts in different base currencies.

Forex moves are a significant risk factor, especially for lower risk assets such as cash and fixed income. Over five years, Figure 30 shows the meaningful difference between foreign asset returns in local currency compared with in euros. In order to avoid taking on this currency risk it may be desirable to consider currency hedged investments[13]. We use two complementary approaches: hedged and unhedged. Each relies on well-established academic consensus.

Our hedged framework is market based, and aims 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 the main performance driver of forex performance.

This is based on a simple no arbitrage assumption. The theory is known as the covered interest rate parity theory[14]. It is worth mentioning at this point, that this theory has been consistently violated among G10 currencies since the financial crisis. Much has been written around the topic over the last few years, pointing the limits to arbitrage (regulations, cost of borrowing and so on) as the driver of this imbalance[15]. Figure 31 shows the impact on forex hedging on the expected returns in euros and dollars.

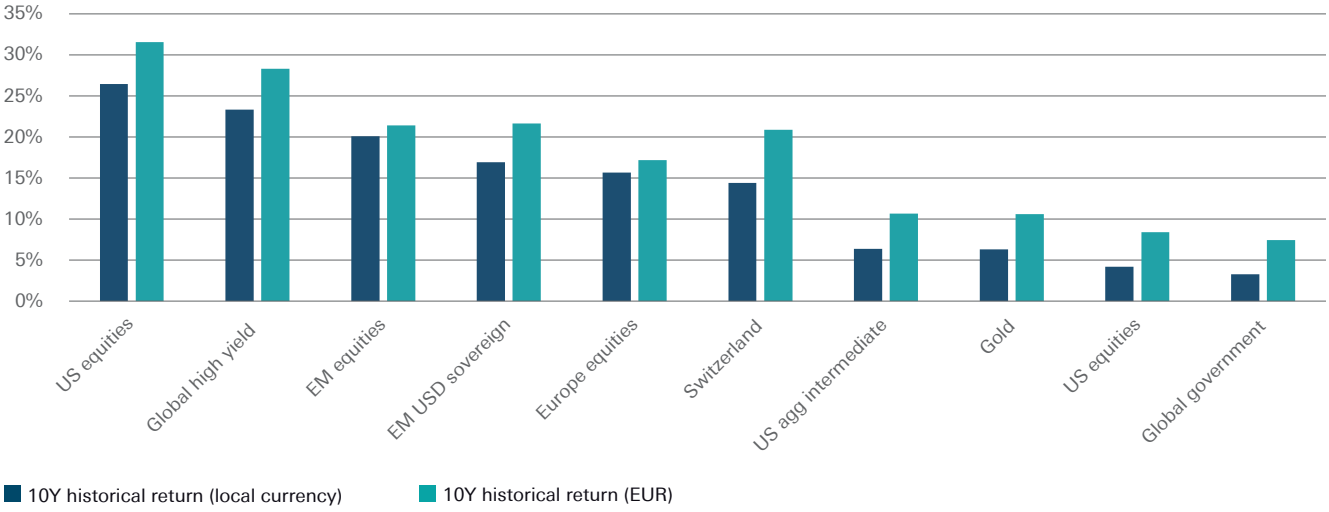
Our unhedged framework aims to determine long term equilibrium assumptions for currencies. To build these assumptions, we rely on multiple theories and methodologies, each well documented in the literature. Mainly, we base our approach on:

_ 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[16].

_ International Fisher effect[17]: 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.

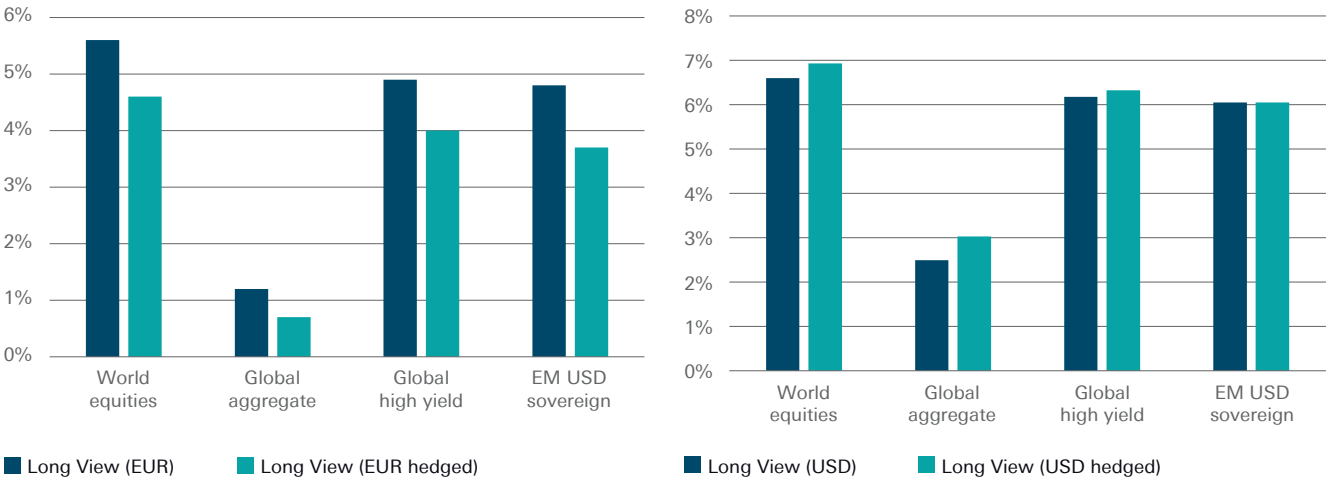
[13] See (Denoiseux and Debru 2015) for an in depth analysis of the impact of FX in the risk and returns of asset classes.
[14] See (Obstfeld and Rogoff 1996) and (Bekaert, Min et Yuhang 2007) for a good introduction on this approach and its long term significance.
[15] See (Du, Tepper and Verdelhan 2017).
[16] See (Taylor and Taylor 2004).
[17] We remind the reader that each approach forms a long term equilibrium view on currency pairs, and might significantly differ from short term moves.

FIGURE 30: FOREX HAS HAD A SIGNIFICANT IMPACT ON PERFORMANCE ACROSS ASSET CLASSES



Source: Bloomberg, DWS calculations. Data as of 12/31/18. See page 80 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.

FIGURE 31: THE IMPACT OF EURO HEDGING ON OUR LONG VIEW IS SIGNIFICANT



Source: DWS. Data as of 12/31/18. See page 80 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.

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 expectations for G10 currencies but does influence emerging currencies.

TABLE 3: MAIN FOREX ASSUMPTIONS VERSUS DOLLAR

Currency	Current	10Y forecast
EUR	0.87	0.76
JPY	110.0	93.0
GBP	0.78	0.71
CHF	0.98	0.86

Source: DWS. Data as of 12/31/18. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

TABLE 4: MAIN FOREX ASSUMPTIONS VERSUS EURO

Currency	Current	10Y forecast
EUR	1.15	1.30
JPY	125.0	122.0
GBP	0.9	0.92
CHF	1.13	1.13

Source: DWS. Data as of 12/31/18. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Traditional asset classes

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

A consistent approach

Modelling and 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[18].

Thanks to improved market sophistication, datasets and technology, investors increasingly understand the importance of modelling 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[19].

That is why our Long View assumptions focus on asset classes too, both for traditional and alternative investments. However unlike many peers, we 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 better understand the constituent sources of returns.

The Long View return model 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 32.
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.

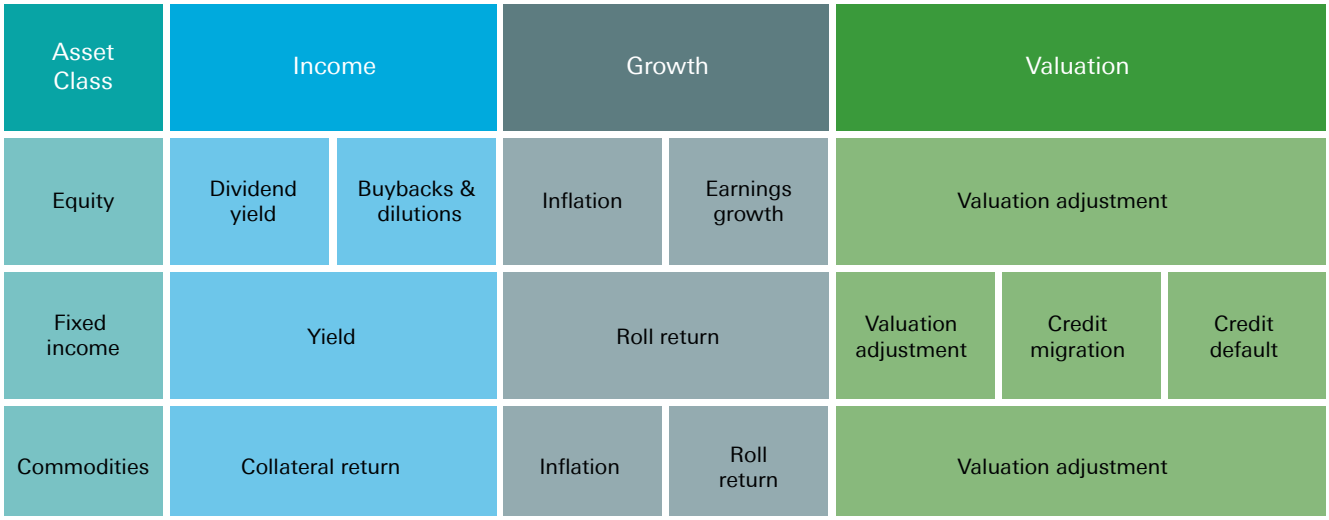
Mostly our reference case is a long term investment in an asset class, more precisely what we will refer to as a representative index. But as we describe below, there may be opportunities to adapt certain asset class pillars or components to meet specific investor needs. This modularity is another useful feature of our framework.
Take a fixed income index, which aims to maintain stability of duration. To do this it regularly needs to sell its shortest dated bonds and buy longer dated securities. Our models fully account for this rebalancing effect, however this might not match the approach taken by certain long-term investors, such as pension funds or insurance companies, which 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 enables such clients to remove this component from our yield pillar, whilst staying entirely consistent within the overall framework's assumptions.

For equities on the other hand, an index is a straightforward diversified basket of stocks, requiring only a limited amount of maintenance. For example, the main changes are in regard to corporate actions and from time to time new security additions or deletions. These index related operations are fairly consensual and should hence align with most investors.

[18] See (Illmanen 2012) for a deep dive on this topic.
[19] We use style premium and equity factor strategies quite extensively within our portfolio construction process, and will describe our process extensively in an upcoming publication

FIGURE 32: DECOMPOSITION OF THE LONG VIEW FOR EACH ASSET CLASS



Source: DWS. As of 12/31/18.

Models and data: A balancing act

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

Datasets are in 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 (for example, 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 model.
_ Prevent the model from over-fitting data or relying too much on a particular data point.

Investors must appreciate that achieving these two objectives requires a delicate balancing act and our Long View framework and models will inevitably be improved. But even today we are excited to introduce our current model, which we believe already produces powerful results and solutions for clients. We explain our methodology in more detail by asset class in the following section.

Equities

Expected returns for 2019 – 2029

We expect world equities to deliver a 6.2 per cent total return per annum, which is far from what investors have been used to over the past ten years, as can be seen in Figure 33.

Indeed, we expect roughly a similar total return for equities for most developed countries, with the same contrast between past and expected returns. The exception is emerging markets.

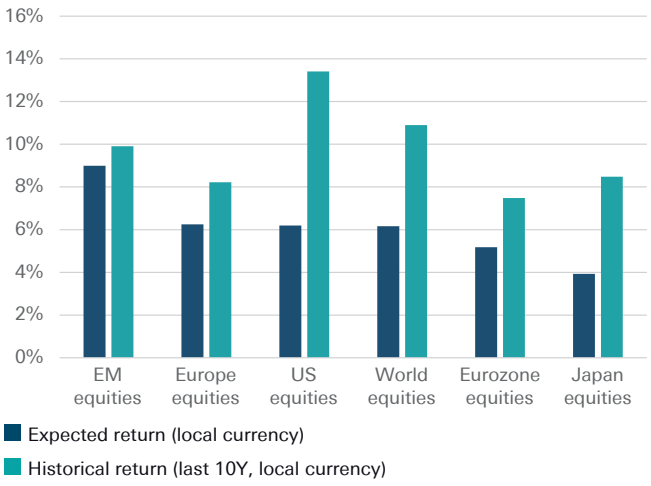
Meanwhile, on average, we estimate a significant premium for small cap stocks, which is also broadly similar across regions (Figure 34).

Fundamentals still support attractive equity returns

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

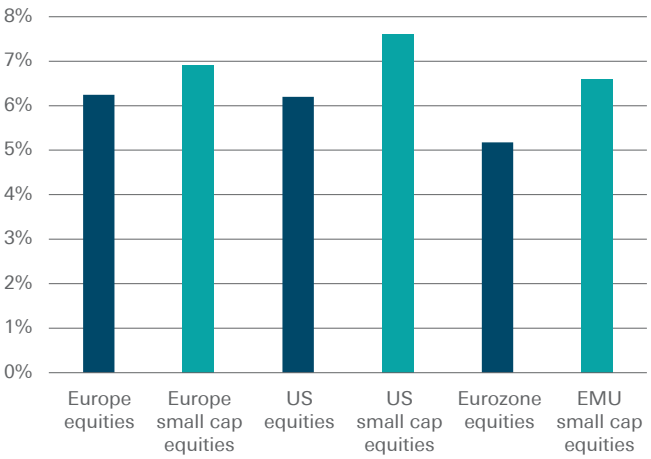
For example, in Figure 35 we observe solid historical earnings per share growth across regions over the past three decades. We note that 2008 was tough everywhere, with equities suffering from a sharp drop in their earnings per share (EPS). However the subsequent recovery has been strong, particularly in Japan and US.

FIGURE 33: EXPECTED AND HISTORIC RETURNS FOR LARGE CAP EQUITIES ACROSS REGIONS



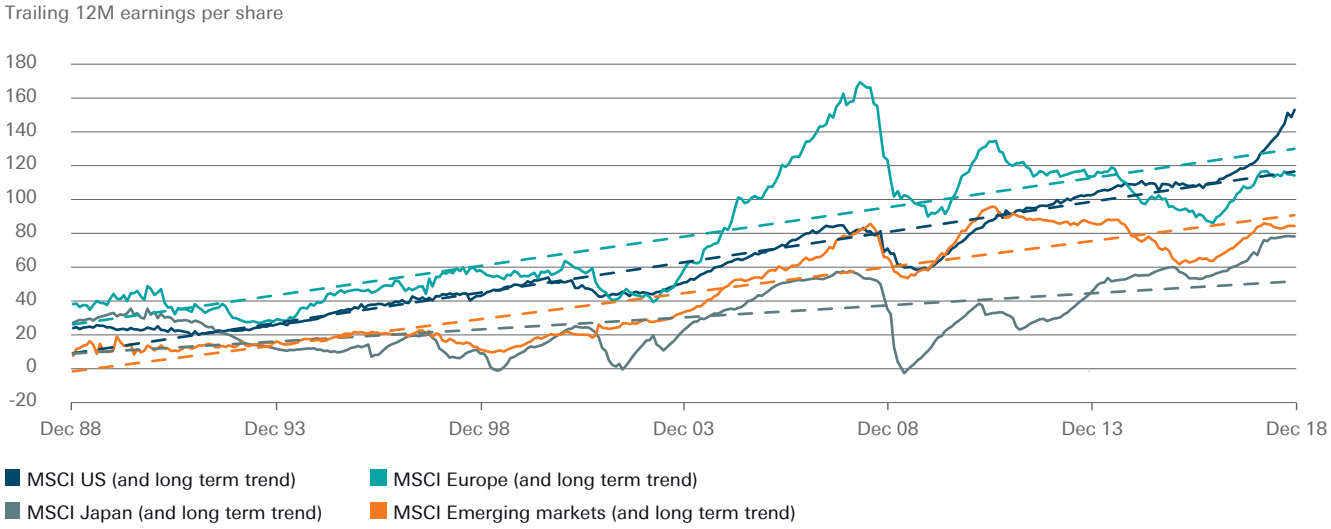
Source: DWS. Data as of 12/31/18. See page 80 for the representative Index corresponding to each asset class. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

FIGURE 34: EXPECTED RETURN FOR LARGE CAP AND SMALL CAP EQUITIES



Source: DWS. Data as of 12/31/18. See page 80 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.

FIGURE 35: EQUITIES HAVE DELIVERED SOLID LONG TERM EPS GROWTH DESPITE A BIG DIP IN 2008

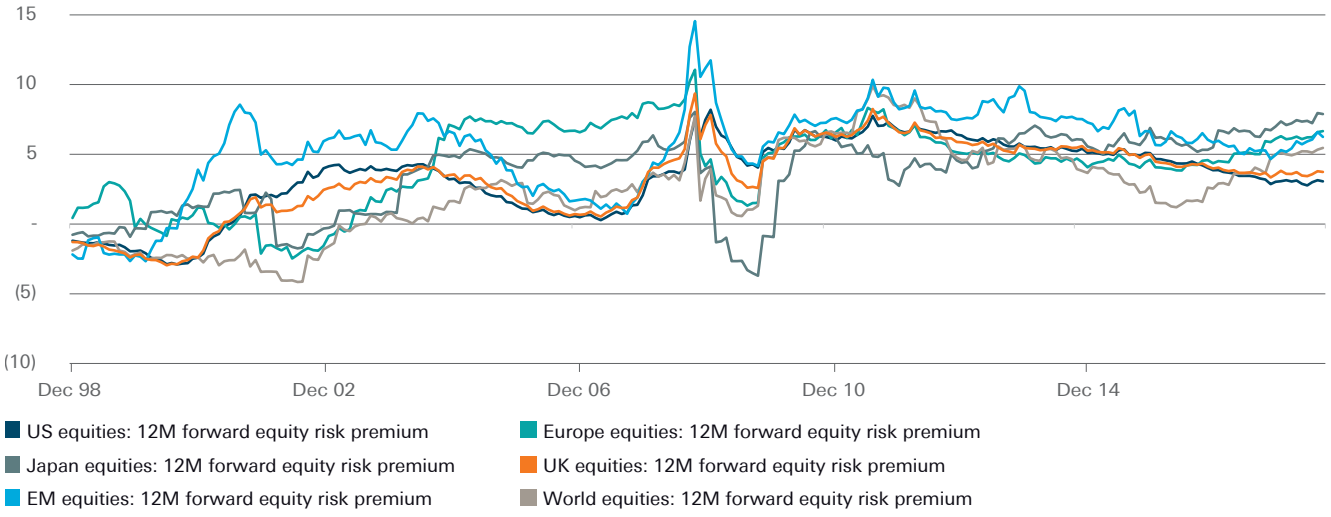


Source: Bloomberg, DWS calculations. Data from 31/01/95 to 30/11/18. Past performance, actual or simulated, is not a reliable indicator of future results.

The translation of EPS growth into investment forecasts can be performed via different approaches. In Figure 36, we calculate the equity risk premium (ERP) across regions, which we define here as the spread between the earnings yield (the inverse of the trailing price/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 reward to equity investors versus the prevailing risk free rate.

We can see that the ERP is currently elevated in most regions and is near or above average levels for the past 20 years. This provides us with our constructive outlook. We also note that the recent increase in market volatility has been observed without much degradation of forecasted earnings, which mechanically propels the ERP further. While useful as an investment signal, the ERP defined here is not precise enough to provide us with a total return estimate, especially with a long term investment objective in mind.

FIGURE 36: EQUITY RISK PREMIUMS (AS MEASURED BY THE EARNING YIELDS) LOOK RELATIVELY ELEVATED ACROSS REGIONS



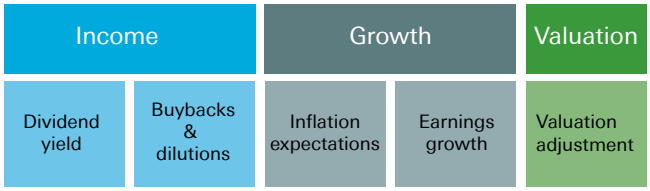
Source: Bloomberg, DWS calculations. Data as of 11/30/18. Past performance, actual or simulated, is not a reliable indicator of future results.

Constructing our equity long view

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 37 and we consider them below in turn.

FIGURE 37: LONG VIEW EQUITY MODEL: DECOMPOSITION OF PILLARS



Source:: DWS. As of 12/31/18.

A long term perspective

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

Using historic numbers compiled by Robert Shiller[20], we decomposed the performance of the US equities into our three pillars: income (dividends[21]), growth (inflation and real earnings growth) and valuation.

From Figure 38 we can draw a few conclusions:

_ Dividends do not drive value, but play major role in how value is transferred to investors in the form of returns – more than twice that of real earnings. Across time dividends have been relatively stable, which give us comfort when estimating them.

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

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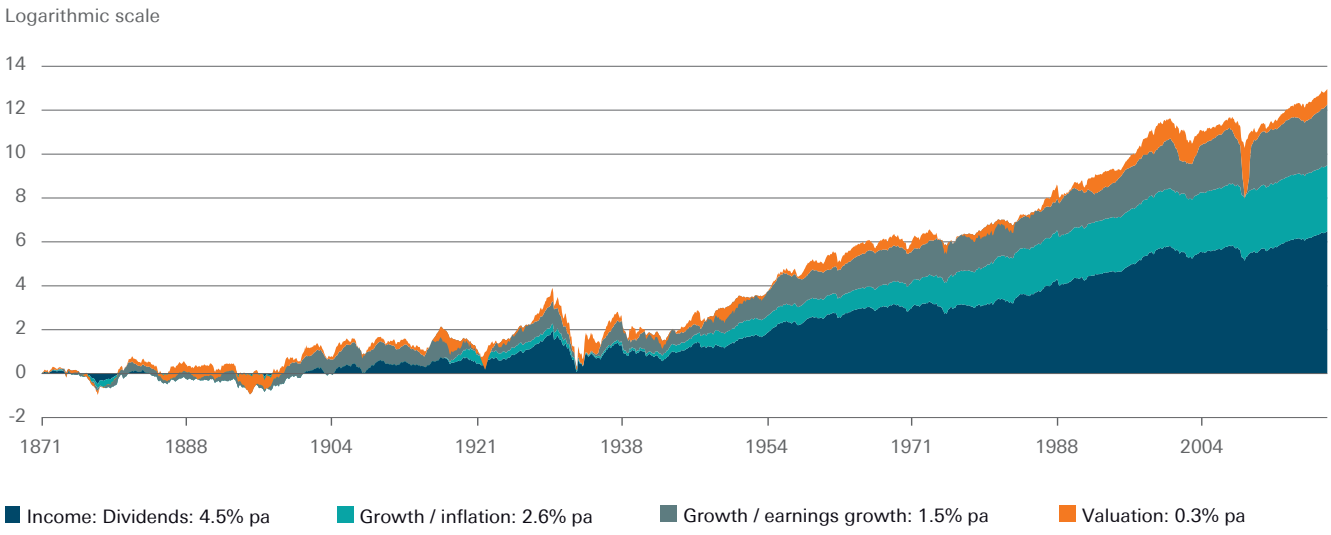
FIGURE 38: RETURN DECOMPOSITION OF US EQUITIES



Source:: Robert J. Shiller, DWS. Data from 1871 to 2018. Past performance, actual or simulated, is not a reliable indicator of future results.

[20] See (Shiller, Online Data Robert Shiller 2018)
[21] As we will show hereafter, buybacks and dilutions have a significant impact. In this return breakdown, we assume them to be included in the dividend pillar.

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 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 re-investment is accounted for in the growth pillar.

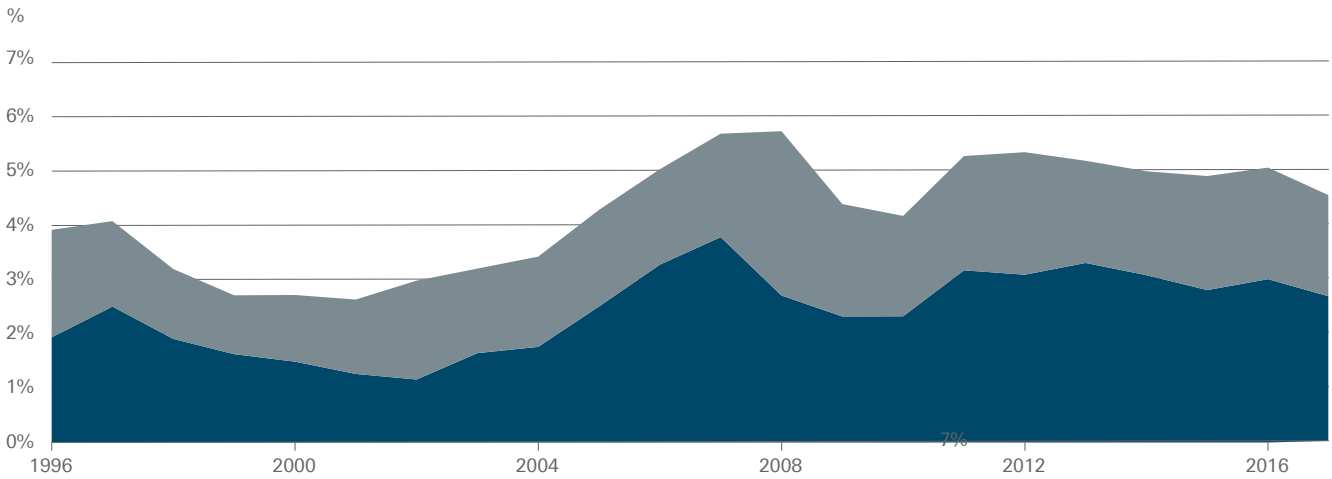
Mentioned above, dividends have long represented the lion's share of US equity total returns, although there has been a decline in the pay-out ratio (dividends divided by earnings) over the past few decades, shown clearly in Figure 41. In order to estimate the dividend yield component of our income pillar, we take the trailing dividend yield of an 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 is now significant.

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 39 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.

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

FIGURE 39: BUYBACKS HAVE REPRESENTED A SIGNIFICANT PART OF MSCI US TOTAL YIELD



Source: Bloomberg, DWS. Data from 12/31/95 to 12/31/17. Past performance, actual or simulated, is not a reliable indicator of future results.

Growth: Earnings are a function of output

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 pillar 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 been volatile, they have provided an investor with an annual average growth of about 1.5 per cent in real terms (Figure 38).

To forecast 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[22].

_ 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[23].

_ EPS forecasts based on output growth: The relationship between EPS growth and GDP growth seems to be quite strong and is back up by academic research.

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 models.

The relationship is well illustrated in Figure 40, which represents a long term regression of output, output per capital, dividends per share, and earnings per share. As can be seen, not all economic growth (which averaged at 3.4 per cent 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. Dilution had a significant impact and accounted for 1.1 per cent per annum over the past two decades for US stocks. We model 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.

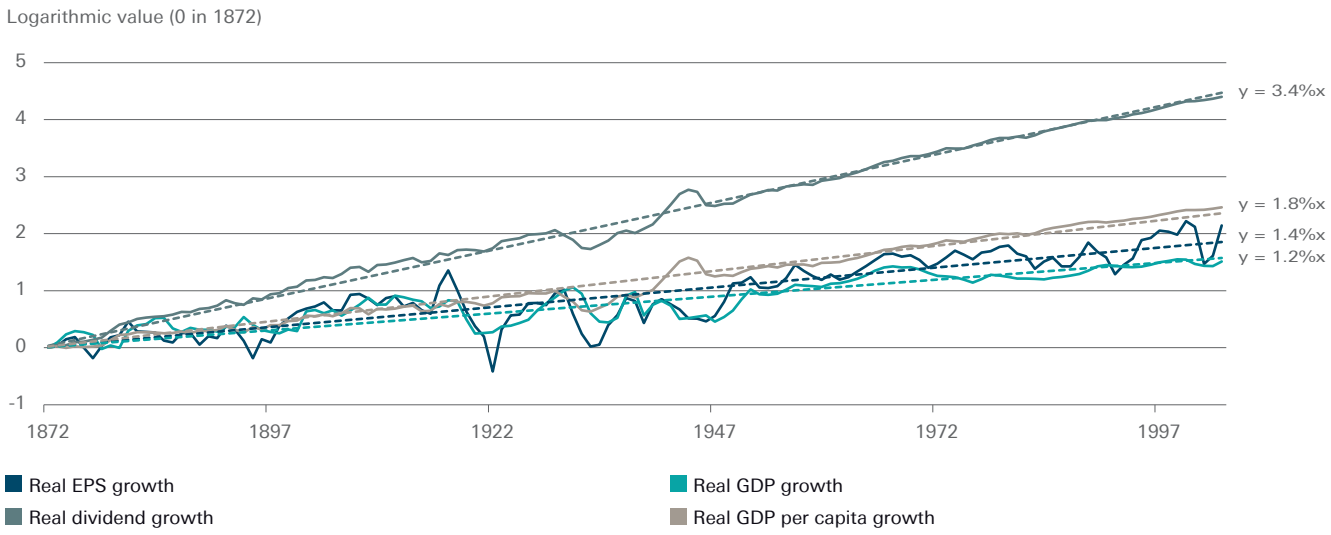
Once dilution has been accounted for, we are comfortable using real output growth as proxy for earnings growth, following the same rationale as developed by Grinold, Kroner and Siegel (2011). They conclude that in the long run, dividend and earnings growth of large cap equity indices and output growth of their related country should converge.

The stability of two other relationships serve as a useful sanity check as we model earnings growth. First, the recent stability of the pay-out ratio, as seen in Figure 41, allows us to feel comfortable that the link between earnings growth and dividend per share growth will not break any time soon. The pay-out ratio has stabilised at around 30 per cent since the 1990s, following a sharp decrease in preceding decades.

Second, we also note that corporate profits have represented a relatively constant share of output over the long run, as can be seen in Figure 42. If we can be more or less happy with our economic growth projections, our Long View earnings estimates cannot distort our return assumptions too much.

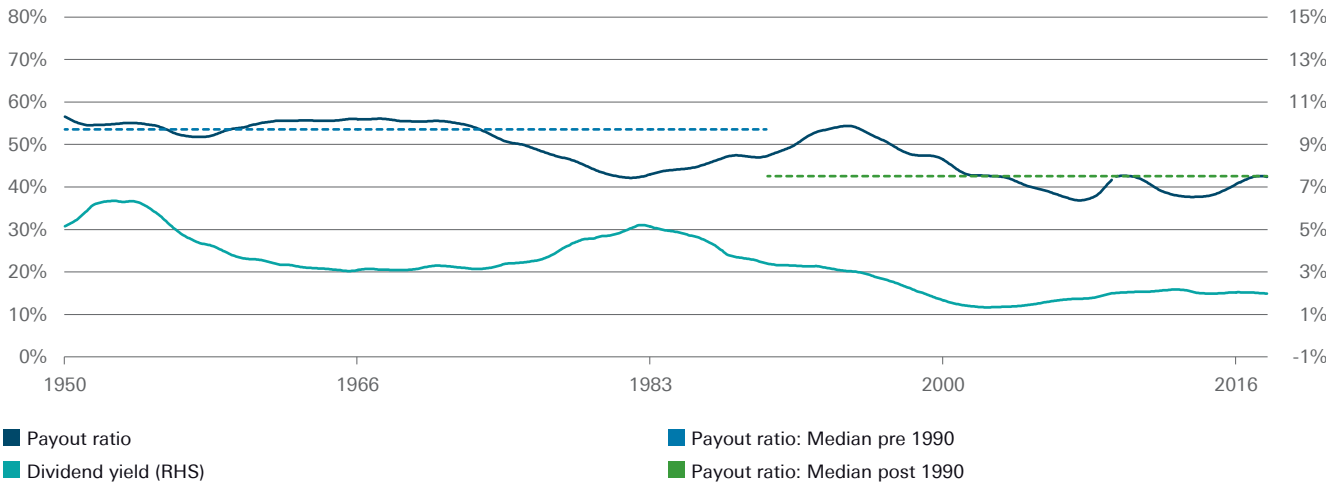
[22] See (Goedhart, Raj and Saxena 2010)
[23] Backward looking approaches might overlook technological changes or recent changes in monetary policies which would usually be reflected in forward looking estimates like GDP or EPS growth.

FIGURE 40: REAL EARNINGS AND DIVIDENDS FOR US EQUITIES, REAL GDP AND GDP PER CAPITA



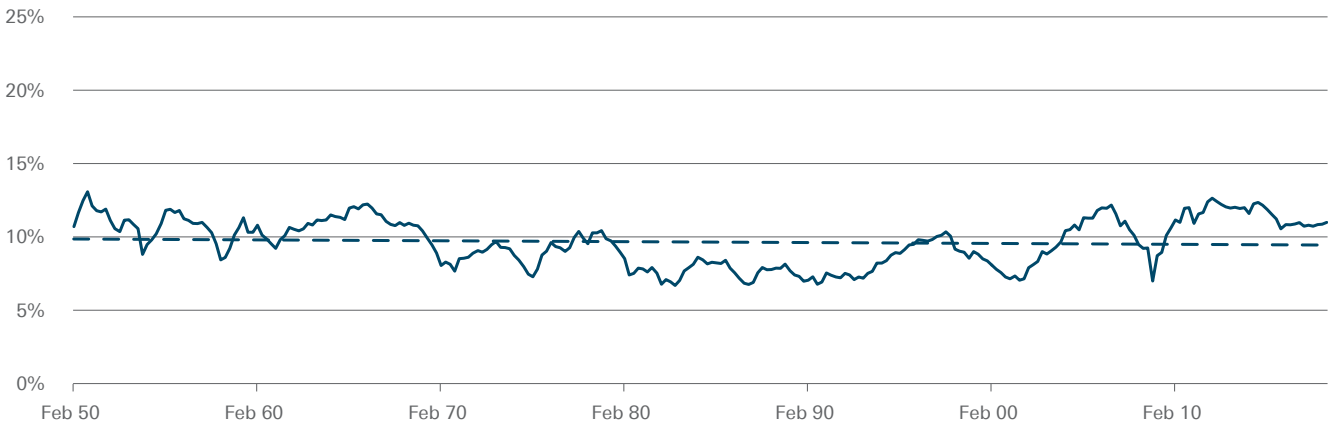
Source: Robert J. Shiller, Maddison Project Database, DWS. Data from 1871 to 2018. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 41: PAY-OUT RATIO OF US EQUITIES



Source: Robert J. Shiller, DWS calculations. Data from 1950 to 2018.

FIGURE 42: US CORPORATE PROFITS AS PERCENTAGE OF GDP



Source: Thomson Reuters Datastream, DWS. Data from 1950 to 2018.

Valuation

We turn now to the last of our three equity model pillars, valuation. As seen in Figure 38, prices moving out of line with valuation fundamentals is one of the most volatile terms in our equity model. Estimating this pillar is therefore challenging, as anyone who ran equity portfolios during the dot.com boom and bust knows.

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

Properly capturing mean reversion in models 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.

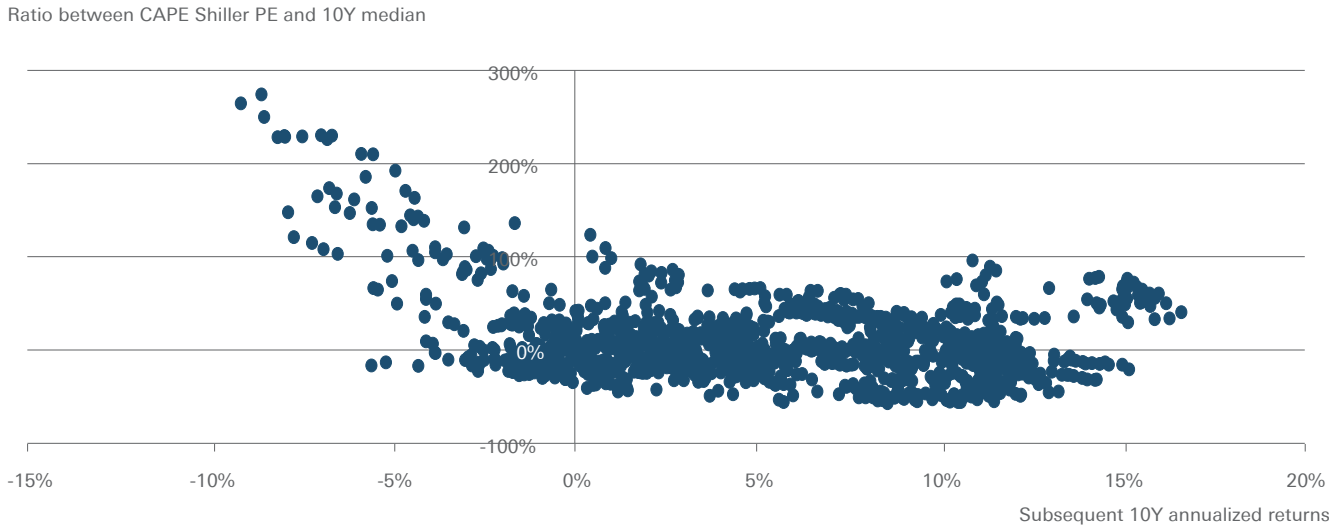
We have chosen to use the most commonly used indicator, the Shiller PE, based on real cyclically adjusted earnings. With regards to the duration of the expected mean reversion, again we follow the literature (R. Arnott 2014) and rely on a 20 years re-pricing period.

While the behaviour of the Shiller PE is relatively straightforward, we are aware that mean-reversion may take some time to occur, and hence our valuation pillar could be wrong potentially for years. Even though this pillar may be too late or early much of the time, Figure 44 – showing a strong relationship between the Shiller PE and subsequent ten year returns – comforts us that the case for using this ratio is compelling.

FIGURE 43: THE SHILLER PE OF THE US EQUITIES AGAIN REVERTS

Source: Robert J. Shiller, DWS calculations. Data as from 1871 to 2018.

FIGURE 44: US EQUITIES SHILLER PE AND SUBSEQUENT 10 YEAR RETURNS



Source: Robert J. Shiller, DWS calculations. Data as from 1871 to 2018. Past performance, actual or simulated, is not a reliable indicator of future results.

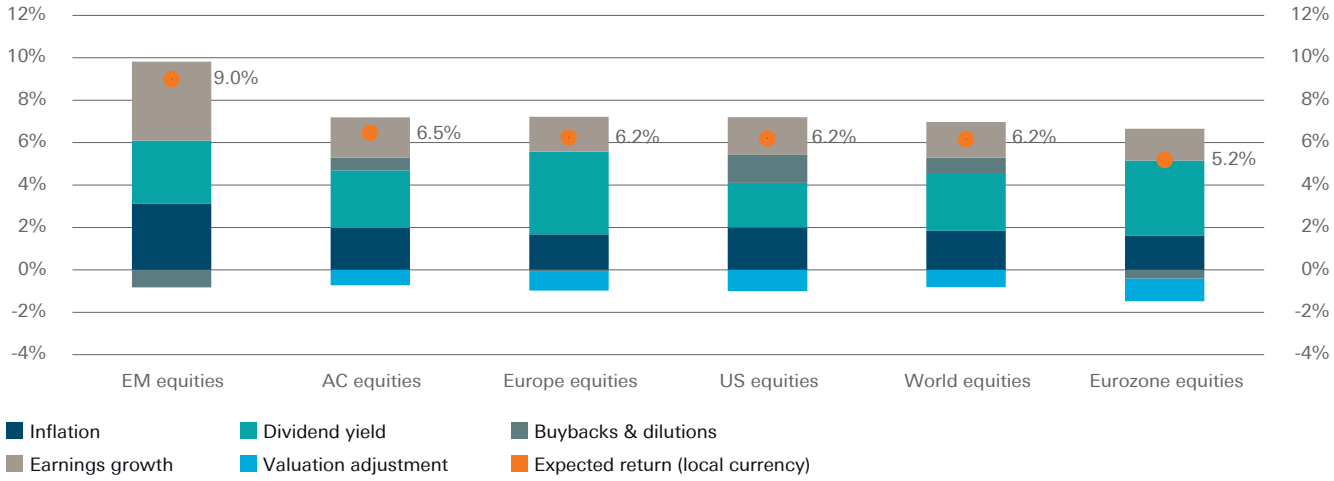
Applying our Long View equity model globally

We apply our equity expected 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 each relevant country return expectation. This is converted into a single base currency where appropriate.

Meanwhile, small cap equities expected returns are derived from respective large cap returns and applying a small cap premium. This is calculated as the median of the long term excess return of each small cap index versus its corresponding large cap index.

Figure 45 summaries the pillar decomposition of the expected returns for the main countries and regions we cover.

FIGURE 45: PILLAR DECOMPOSITION OUR LONG TERM EXPECTED RETURNS FOR EQUITIES (LOCAL CURRENCIES)



Source: DWS. Data as of 12/31/18. See page 80 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.

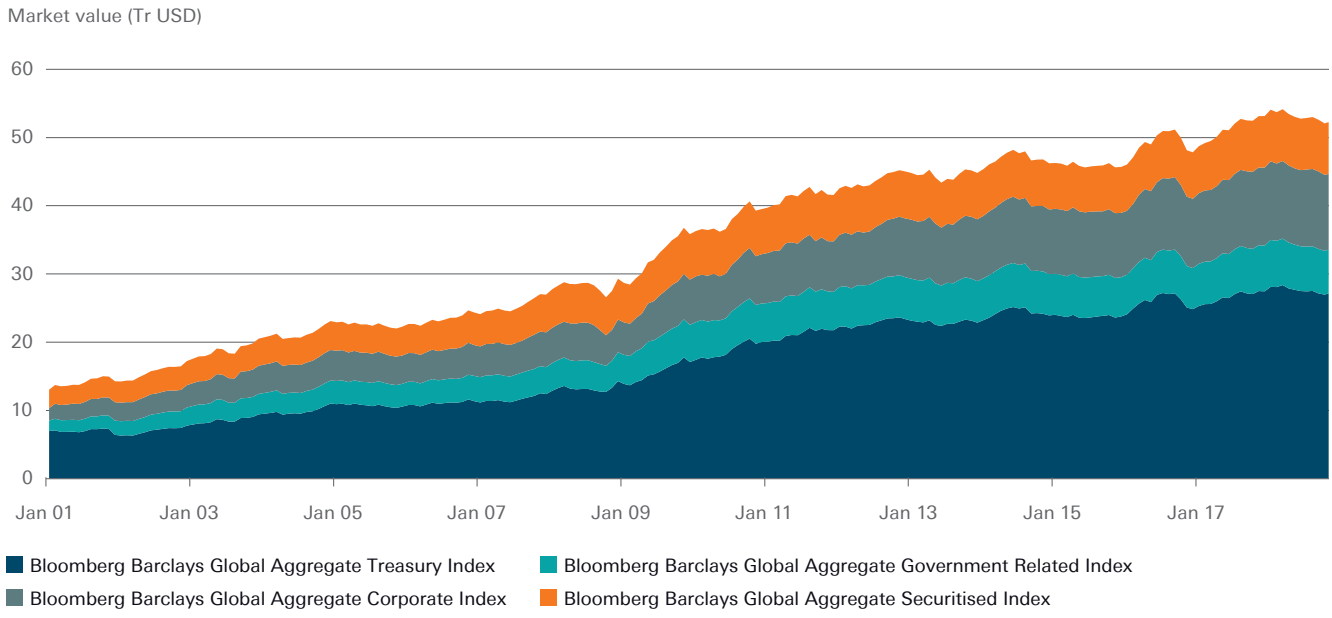
Fixed income

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

Expected returns for 2019 – 2029

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 almost quadrupled in value, as can be seen in Figure 46.

FIGURE 46: THE FIXED INCOME MARKETS HAVE SEEN 20 YEARS OF CONTINUOUS EXPANSION

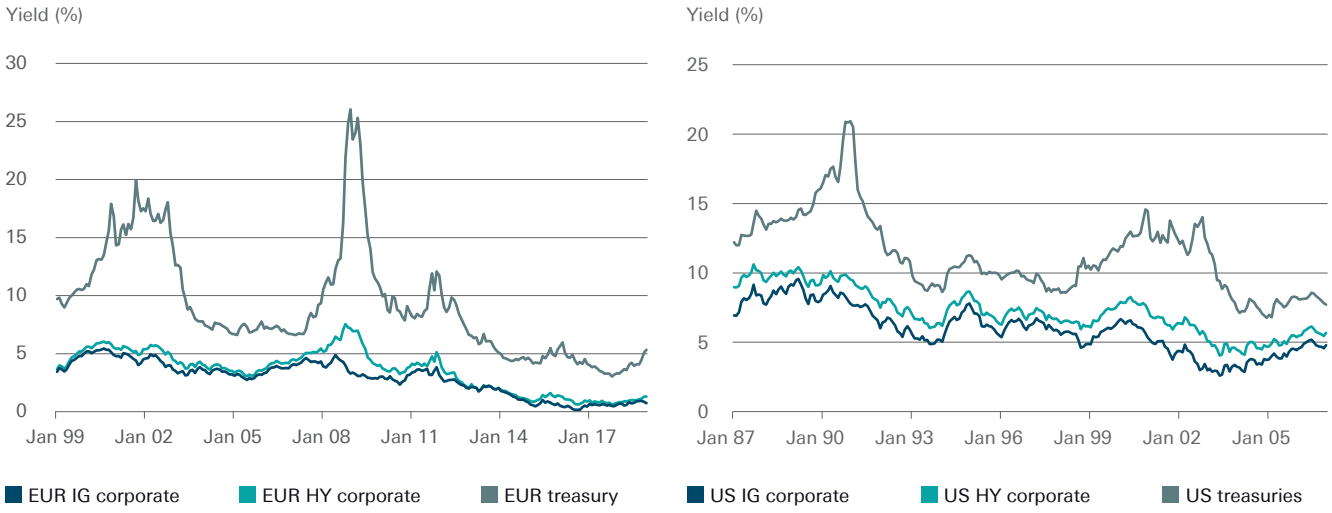


Source: Bloomberg, DWS. Data from 1/31/01 to 11/30/18. Past performance, actual or simulated, is not a reliable indicator of future results.

In line with other asset classes, long term expected returns for fixed income securities have been declining for most of the past few decades, reflecting the fall in interest rates in developed countries (Figure 47 and 48).

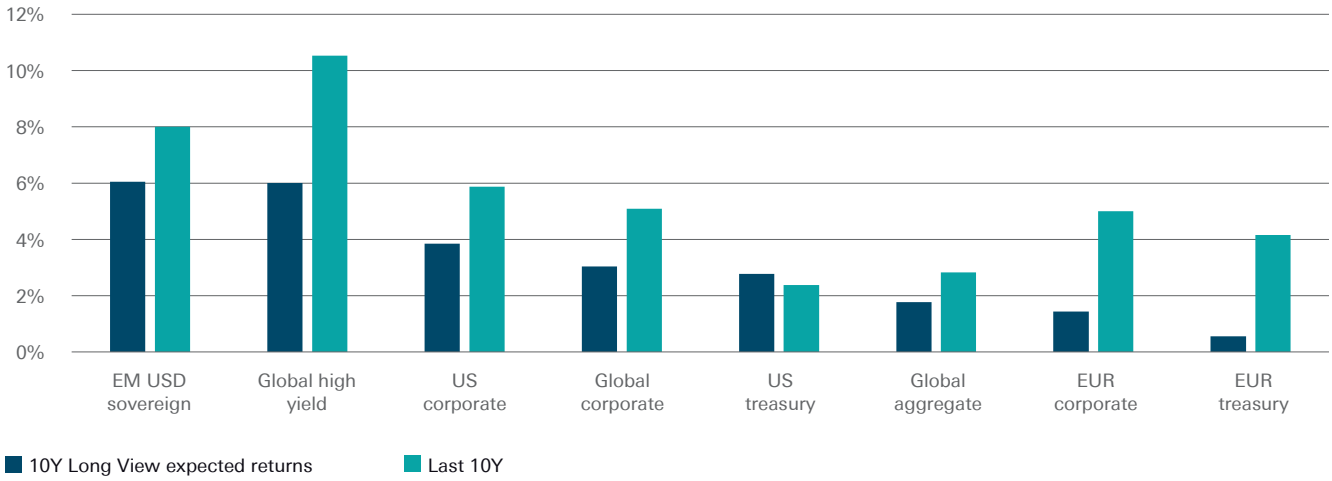
Over the long term, we expect euro government bonds to deliver 0.8 per cent per annum and corporates 1.4 per cent. This is of course disappointing compared with recent history (Figure 49). Looking at different market segments, it is possible to find higher yielding assets.

FIGURE 47 AND FIGURE 48: FIXED INCOME YIELDS HAVE BEEN DRIFTING DOWN FOR THE LAST 20 YEARS



Source: Bloomberg, DWS Calculations. Data from1/31/87 to 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results. See page 80 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.

FIGURE 49: FIXED INCOME EXPECTED RETURN VERSUS REALISED PERFORMANCES OVER 10 YEARS IN LOCAL CURRENCIES



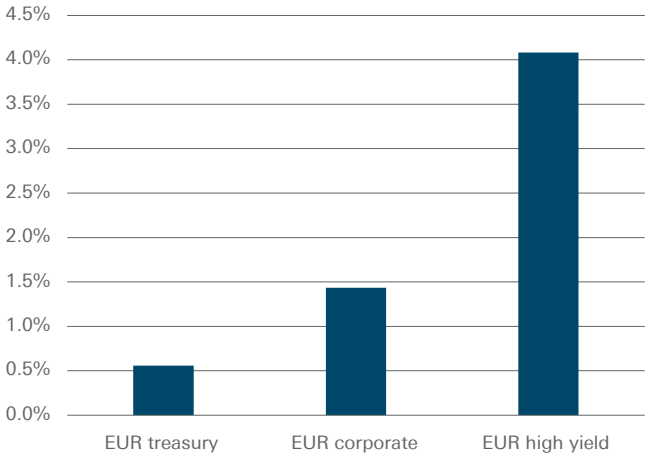
Source: DWS. Data as of 12/31/18. See page 80 for the representative index corresponding to each asset class (expected return for multi-currency indices is calculated as the average of each currency constituent). Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

Figure 50 shows the credit premium in fixed income and Figure 51 illustrates the term premium in euro government bonds. Both premia are still available to investors for the purpose of asset allocation but from a lower starting point.

Looking at returns, the bright spots are in higher risk fixed income segments such as emerging markets and high yield where expectations can still match equities around five to six per cent per annum. These returns also seem low relative to history, however they are attractive versus low risk assets such treasuries on a risk-adjusted basis.

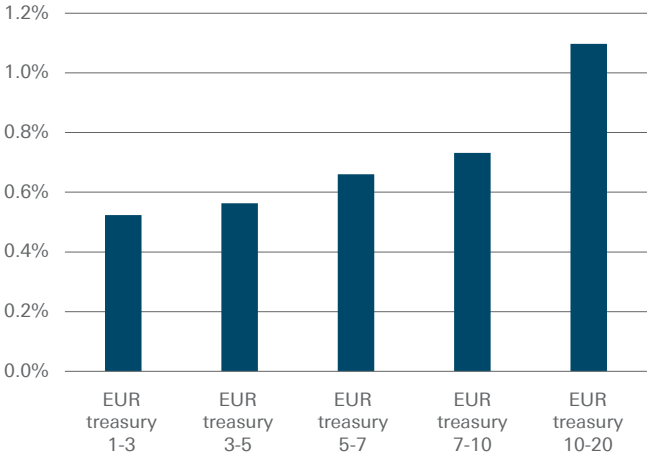
Note that the expected Sharpe ratio for emerging market bonds for the next 10 years is almost identical to the ratio for emerging market equities, as can be seen in Figure 52.

FIGURE 50: SWAP OBSERVED ON EURO FIXED INCOME



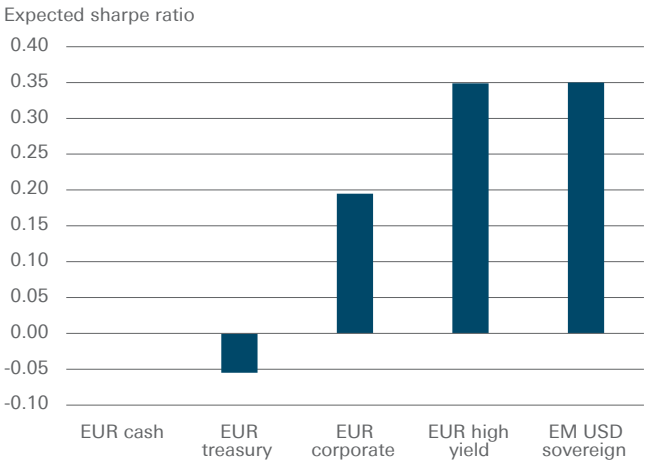
Source: DWS. Data as of 12/31/18 See page 80 for the representative index corresponding to each asset class.

FIGURE 51: TERM PREMIUM OBSERVED ON EURO FIXED INCOME



Source: DWS. Data as of 12/31/18. See page 80 for the representative index corresponding to each asset class.

FIGURE 52: EXPECTED SHARPE RATIO FOR FIXED INCOME ASSETS IN EUROS



Source: DWS. Data as of 12/31/18. See page 80 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 fixed income long view

Bonds deliver a pre-defined pay-out, and this drives how we model them. Whereas the equity model presented earlier makes use of both fundamental and economic data, our approach to fixed income assets focuses on calculating and discounting expected cash-flows. In particular we mimic the development over time for the expected cash flows of a dynamically rebalanced portfolio of debt securities.

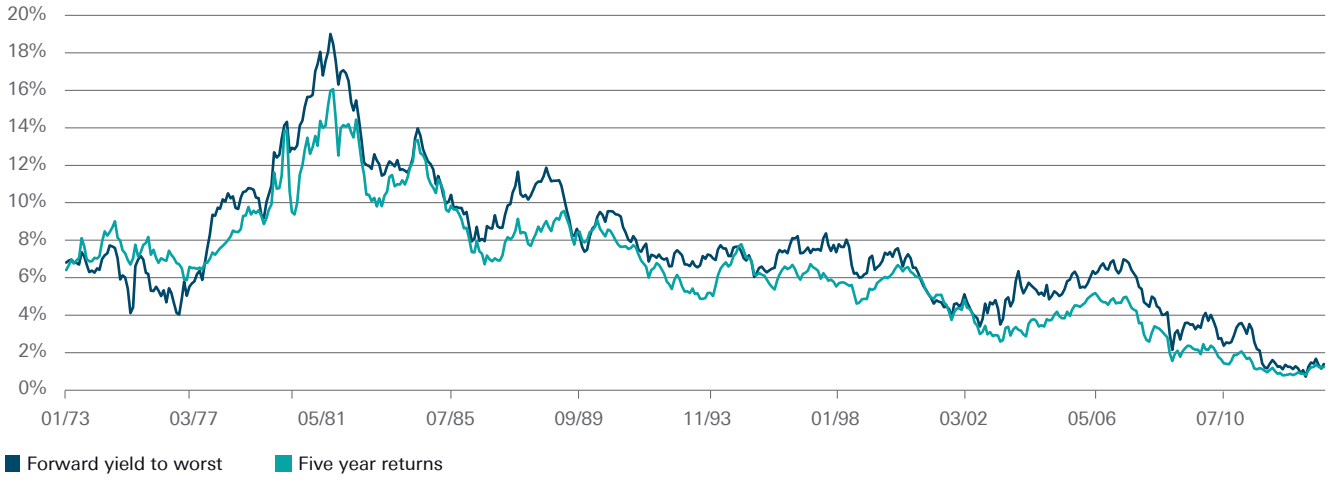
Our starting point is the average current yield of the portfolio. Comparing the historical yield of a government bond index and its subsequent total return gives us an interesting perspective, as shown in Figure 53[25]. The yield appears to be a credible first approximation for fixed income expected total returns.

However, we will show below that reality is more complicated. Other pillars and components demonstrate a significant role in determining fixed income expected returns. This is already apparent when looking at (riskier) corporate bonds. In Figure 54, 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 model an investment in a fixed income index not in a single bond. In order to maintain stability in some of their characteristics such indices need to sell their shortest dated bond holdings and to buy longer dated ones. Therefore, an important assumption in our model is the expectation of some stability of the main characteristics of the index, such as duration or rating split. For example, Figure 55 is reassuring as it shows that whilst duration does evolve over time, the duration of the US Treasury index does not meaningfully change much in the long run.

FIGURE 53: HISTORICAL YIELD TO MATURITY AND SUBSEQUENT FIVE YEAR TOTAL RETURN PERFORMANCE OF 5-YEAR US TREASURY BONDS



Source: Bloomberg, DWS. Data from 1/31/78 to 11/30/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

[25] See (R. Arnott 2015) for further reference

FIGURE 54: HISTORICAL YIELD TO WORST AND SUBSEQUENT FIVE YEAR RETURN PERFORMANCE OF 5-YEAR US CORPORATE BONDS

Source: Bloomberg, DWS. Data as from 1/31/73 to 11/30/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

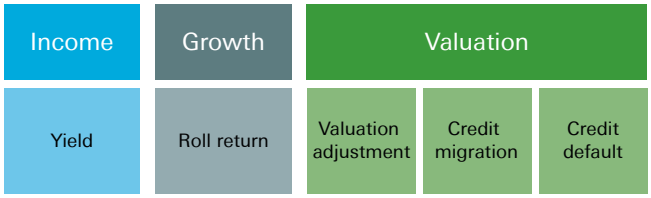
FIGURE 55: DURATION OF THE BARCLAYS US TREASURY INDEX

Source: Bloomberg, DWS calculations. Data from 1/31/89 to 11/30/18. Past performance, actual or simulated, is not a reliable indicator of future results.

Our three pillar approach to fixed income

As with other asset classes in this publication[26], we split the modelling of fixed income expected returns into three fundamental pillars: income, growth and valuation. Each is then decomposed into one or several components, as shown in Figure 56.

FIGURE 56: FIXED INCOME LONG VIEW: DECOMPOSITION OF PILLARS



Source: DWS. As of 12/31/18.

Fixed income investors receive coupons for each bond in the index, and benefit or lose from the increased or decreased valuation of the principal. This depends on yield curve changes and the changing maturity of each single bond. The next pillar is roll return, which represents the mark to market changes due to time passing.

Finally, our valuation pillar is made of three components: valuation adjustment, accounting for the mark to market of the bonds due to expected change in the yield curve, and credit migration default, which represent the impacts on the expected return due to changes in bond ratings and in some case defaults. These impact the rating mix of bond index and therefore its value. We now look at each of these pillars in more detail.

Calculating the average yield

The yield component represents the income pillar of the model. On average this is the largest contributor to the fixed income asset class. In practice, it accounts for the sum of the coupons an investor expects to receive over the investment period.

Bonds provide an investor with a reasonably high likelihood[27] of receiving the coupons and principal at maturity. Considering a broad index, expected 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 57 for a breakdown of a bond's expected change in value over time.

Over a ten year period, it is likely to see some bonds expiring and/or being 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 whole period, therefore, an investor will be exposed to a changing portfolio – both in relation to the securities mix and purchase date of each security. From a yield perspective, an investor will receive a combination of 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 US treasury index is composed of a full range of bonds, from very short to very long maturities. Looking at Figure 58, more than 80 per cent of the bonds in the 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 is straightforward and observed, estimating the expected yield is more challenging and requires several assumptions. To model the expected yield, we rely on the traditional decomposition of any bond yield as the sum of two terms:

- The corresponding government yield – that is, the yield of a government bond of the relevant country with a similar duration
- The corporate spread[28] related to the credit quality 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 matches best the index considered. The expected government yield is derived from this starting yield by

[26] See page 33 for our overall framework.
[27] Certainty, in the absence of default.

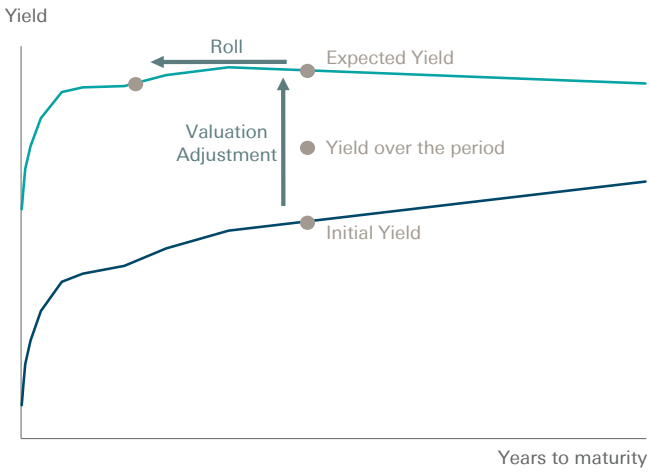
incorporating our views of the future Treasury curve. The overall expected yield is an average of these two yields.

Meanwhile 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 expectation for the OAS.

Figure 59 highlights the variability of the OAS's long term behaviour, across different credit qualities.

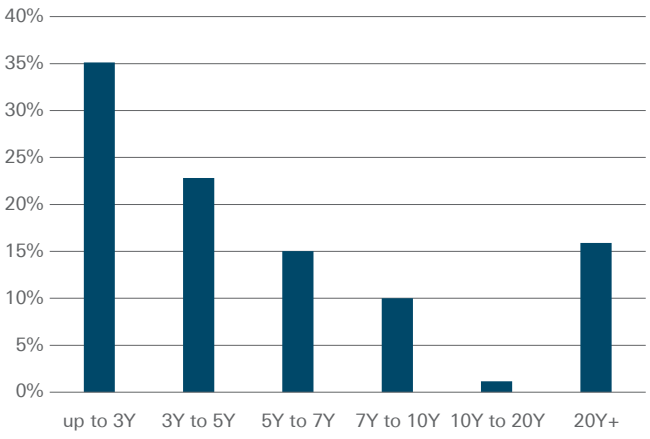
As acknowledged widely in the literature[29], the spread's behaviour tends to be mean reverting and we rely on this property to develop a reasonable long term equilibrium estimate.

FIGURE 57: BREAKDOWN OF A BOND'S EXPECTED CHANGES OF VALUE



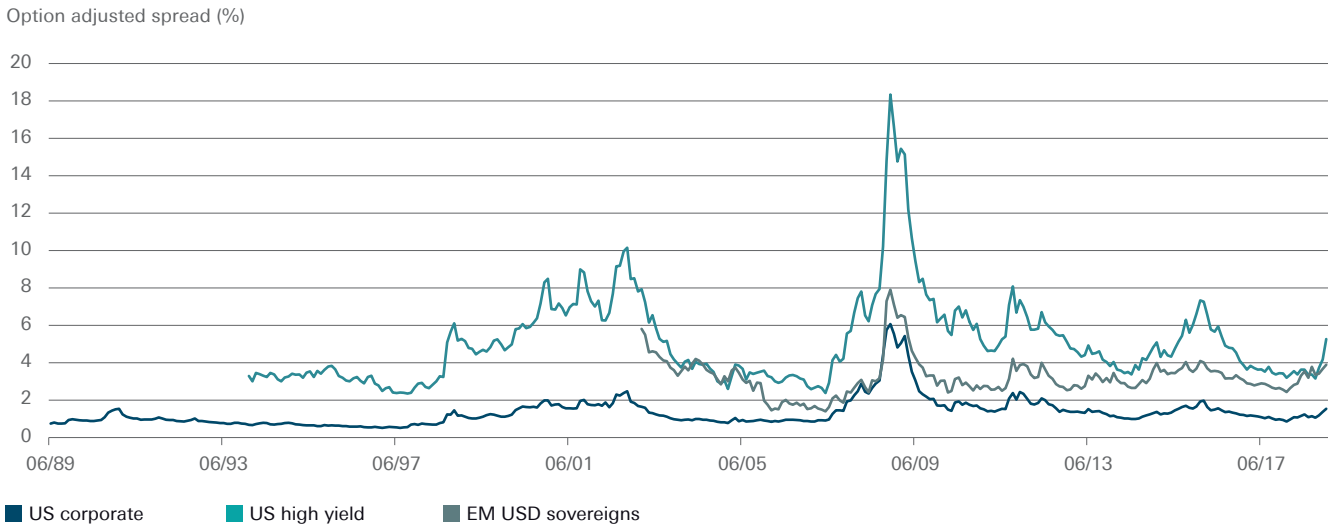
Source: DWS. For illustration purposes only.

FIGURE 58: US TREASURY INDEX IS COMPOSED OF BONDS COVERING A WHOLE RANGE OF MATURITIES



Source: Bloomberg, DWS. Data as of 1/7/19. May not be indicative of future results.

FIGURE 59: HISTORICAL VALUES FOR DIFFERENT OPTIONS ADJUSTED SPREADS



Source: Bloomberg. Data from of 6/30/89 to 12/31/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

[28] For government bonds, we assume this credit spread to be equal to 0.
[29] See (R. Arnott 2015) and (Illmanen 2012)

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 on the yield curve (Figure 60)

Valuation adjustment: reflecting the impact on expected 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 government yields and corporate spreads. Both changes affect a bond 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 likely mark-to-market impact.

Credit migration

Credit migration refers to a change in bond rating, which is usually reflected in valuations. This can have dramatic impact, in particular for investors in high yield.
Over a long period of time, company fortunes ebb and wane. Hence the ratings of bonds issued will also change, and, in turn, the valuation of such bonds will 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 model.

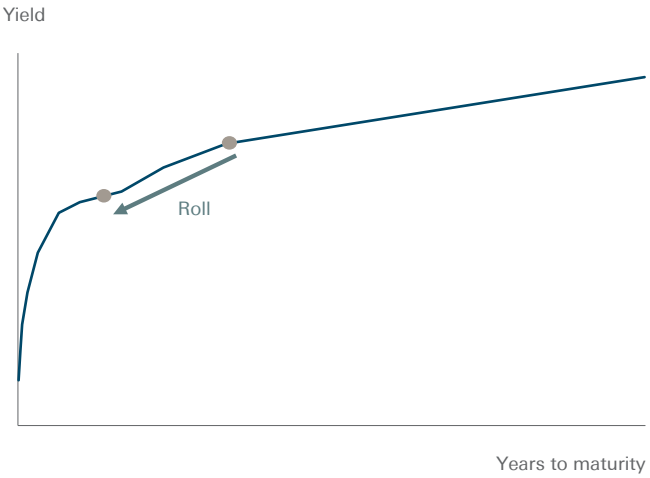
Contemplating a particular index, we can represent its allocation by credit quality. This so-called credit mix is expected to shift over time, following any upgrades and downgrades by rating agencies. A current breakdown in ratings can be seen in Figure 61. Changes in rating for a given bond impacts its spread. As illustrated in Figure 62, the worse the rating, the higher the corporate spread.

At an index level this means the corporate spread of a benchmark will move over time because of the change in the rating split. Moves in the spread will translate into mark-to-market changes in the index that we call credit migration.

Credit migration impacts tend to be negative in most cases, since bonds are more likely downgraded than upgraded. At the extreme, for example, AAA bonds cannot be upgraded. This is less true for high yield bonds, where the likelihood of upgrade is greater and the possibility of downgrades is somewhat floored, as bonds would have to default (see below).

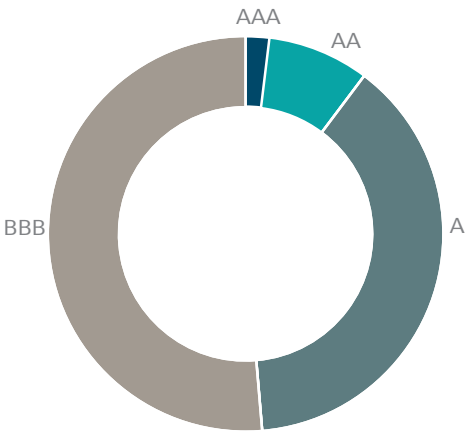
It is interesting to note here that sovereign bonds and corporate bonds have different behaviours when it comes to downgrades or upgrades. To be more accurate, rating agencies do not treat both type of bonds in the same way. This translates into transition matrices and recovery rates varying significantly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

FIGURE 60: THE ROLL YIELD REFERS TO THE IMPACT ON YIELD AND PRICE DURING THE BOND'S RETENTION



Source: DWS. For illustrative purposes only.

FIGURE 61: BLOOMBERG BARCLAYS US AGGREGATE CORPORATE INDEX RATING SPLIT

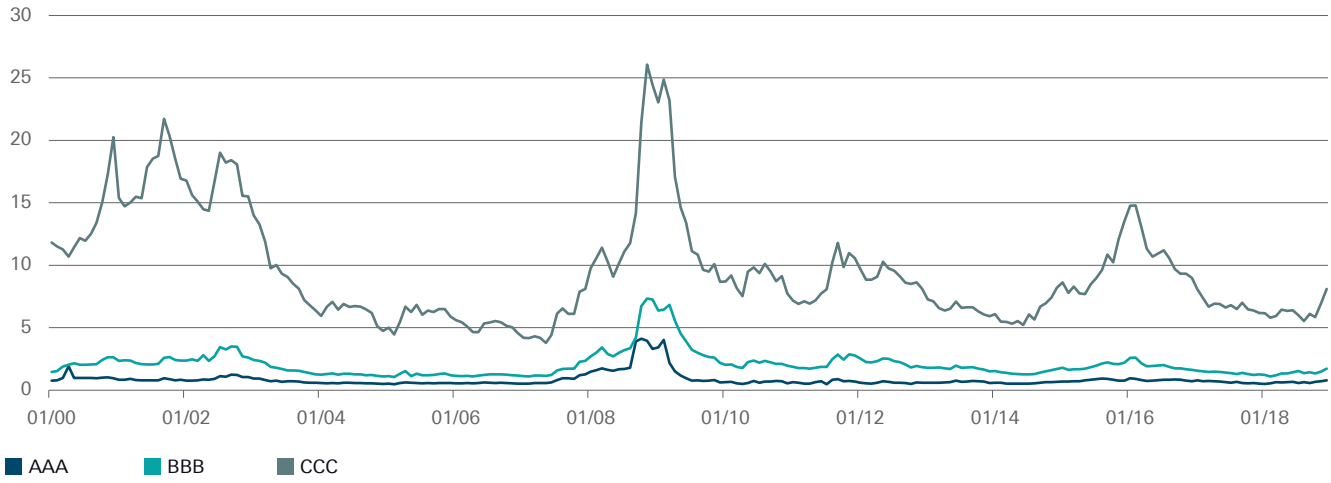


Source: Bloomberg, DWS. Data as of January 2019.

Credit default

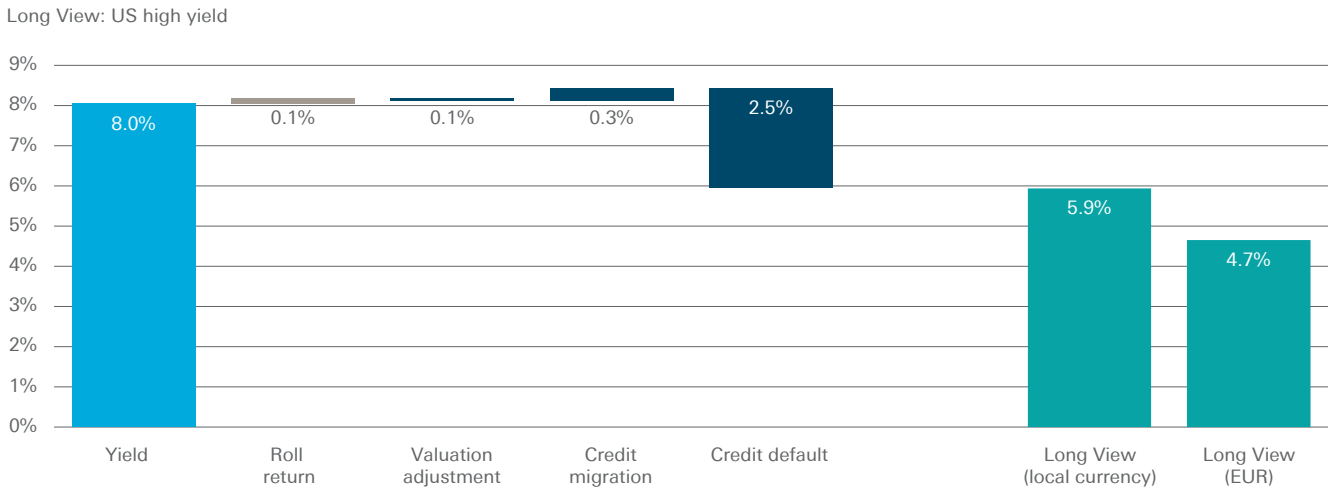
Here we cover for the most extreme case of credit migration, that is the risk of a bond defaulting. Should this happen, its impact would take the form of a partial or full loss of the bond notional, rather than a change in the corporate spread. For any given bond, depending on its rating, it carries a probability of default and an average recovery amount in case of default. By summing the two, bond by bond, we can calculate the impact at the index level. Figure 63 shows the importance of credit default to US high yield returns.

FIGURE 62: CORPORATE SPREADS EXHIBIT STRONG MEAN REVERSION, ACROSS CREDIT RATINGS



Source: Bloomberg, DWS calculations. Data from 6/30/89 to 12/31/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 63: DECOMPOSITION OF US HIGH YIELD EXPECTED RETURNS (IN LOCAL CURRENCY AND EUR)



Source: DWS. Data as of 12/31/18. See page 80 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.

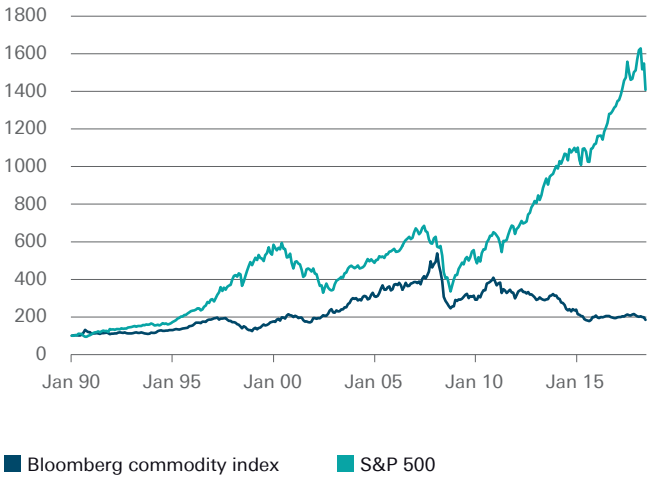
Commodities

Expected returns for 2019 – 2029

When contemplating an investment in commodities, we first must admit that recent performance is hardly a strong endorsement. What is more, our total return expectations are lacklustre. Hence we need to consider diversification benefits of commodities too.

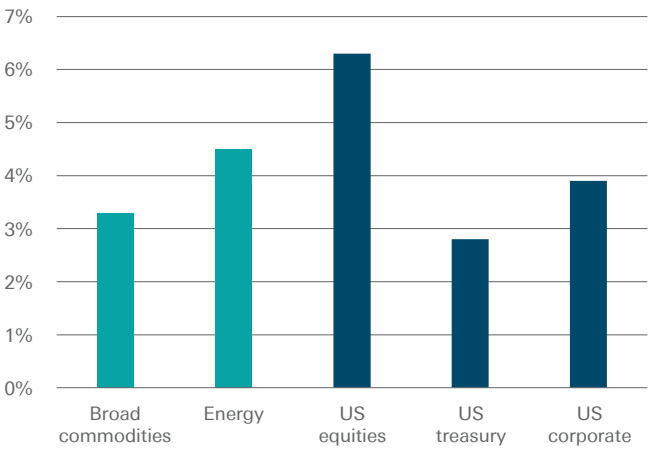
Commodities are often thought of as strong diversifiers in portfolios, particularly gold and oil versus traditional asset classes. Indeed many investors consider returns as more of a bonus. Figure 66 and Figure 67 demonstrate this clearly.

FIGURE 64: TOTAL RETURN OF COMMODITIES AND US EQUITIES



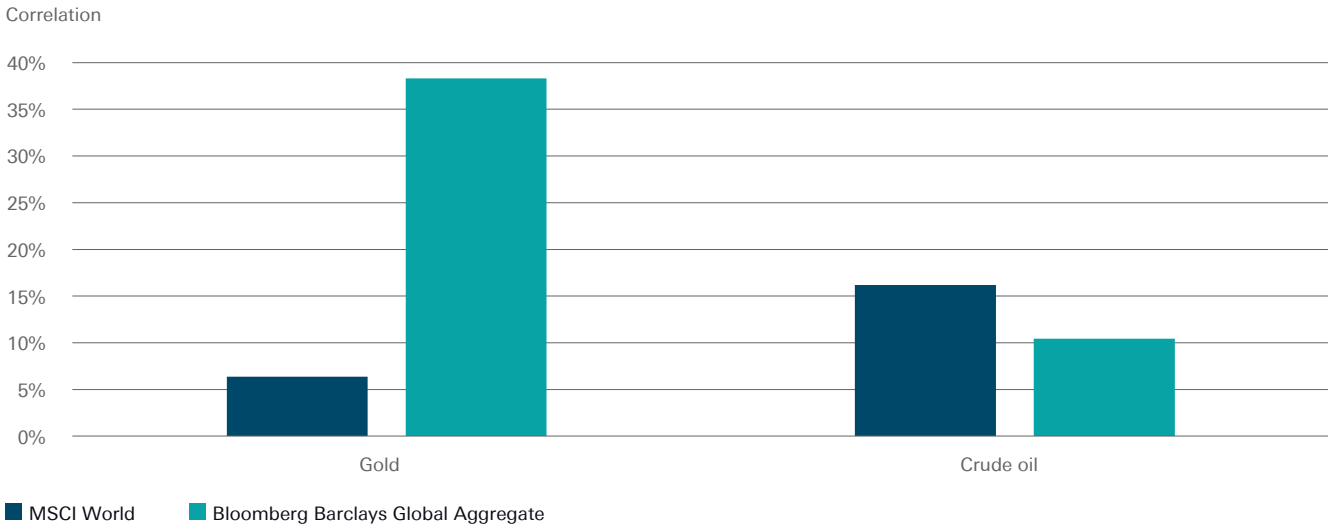
Source: Bloomberg, DWS calculations. Data from 1/31/90 to 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 65: OUR LONG VIEW EXPECTED RETURNS FOR COMMODITIES AND EQUITIES



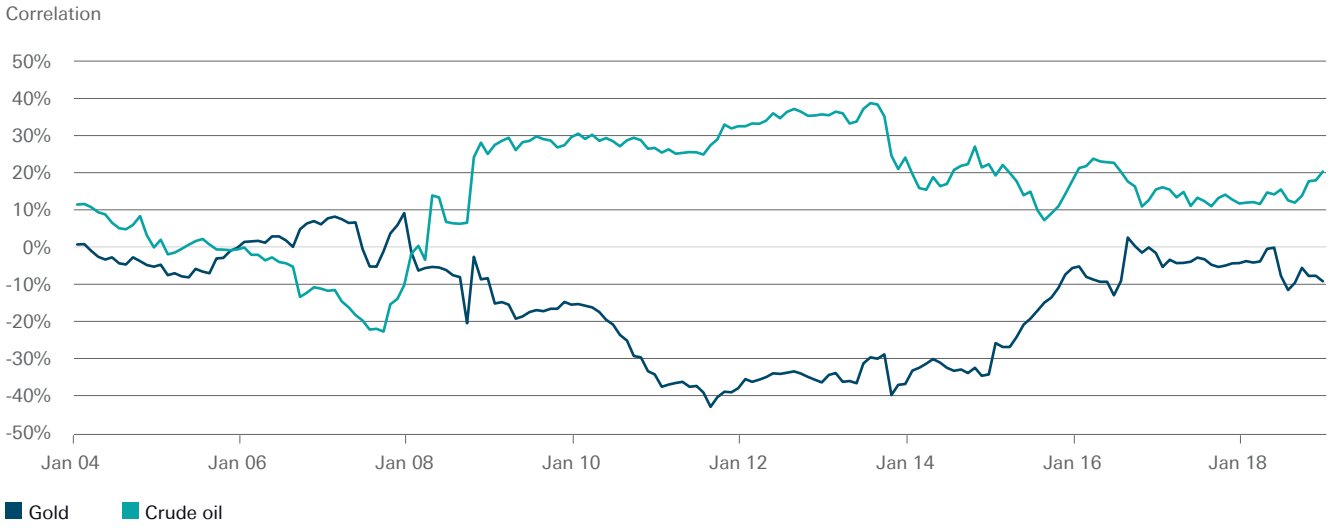
Source: DWS. Data as of 12/31/18. See page 80 for the representative index corresponding to each asset class. Forecasts are based on assumptions, estimates, views and hypothetical models or analyses, which might prove inaccurate or incorrect.

FIGURE 66: CORRELATION OF GLOBAL EQUITIES AND BONDS WITH GOLD AND CRUDE OIL



Source: Bloomberg, DWS. Data from January 1990 until October 2018. See page 80 for the representative index corresponding to each asset class. Overlapping monthly returns are used for calculations. Calculations in dollars. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 67: FIVE-YEAR ROLLING CORRELATION OF EURO STOXX 50 WITH GOLD AND CRUDE OIL

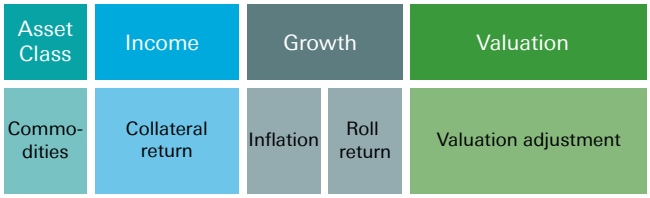


Source: Bloomberg, DWS calculations. Data from 2/29/04 to 12/31/18 (Overlapping monthly returns are used for calculations. Calculations in EUR). See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

Constructing our commodities Long View

To estimate expected returns for commodities, we apply the same broad framework as introduced earlier for equity and fixed income as shown in Figure 68.

FIGURE 68: OUR MODEL FOR A LONG VIEW ON COMMODITIES



Source: DWS. As of 12/31/18.

Financial exposure to commodities is achieved via futures contracts. As these are accessed by providing margin[30] 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 collateralisation for the notional exposure.

Another important characteristic of a futures instrument is its term-structure and the multiplicity of contracts. Roll return depends on the shape of the futures term structure and how this curve behaves when rolling to the next contract. Inflationary pressure leads to an increase in commodity prices and also plays a role in long run prices of a commodity. Valuation adjustments occur when a 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 expected return from cash or inflation are a function of the economy and are applicable to all commodities.

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

The estimation to forecast cash returns, is explained in the fixed income section of this paper.

Roll return

Most investors will typically take exposure to near-dated contracts in order to maintain a long-term exposure to a commodity. Close to a contract's expiration they will sell the near-dated future and buy a further-dated future. Any profit or loss generated is known as the roll return. While most of the index-providers roll to the nearest available contract, for our estimation of the roll yield, we use the information available over the entire commodity term-structure averaged over time.

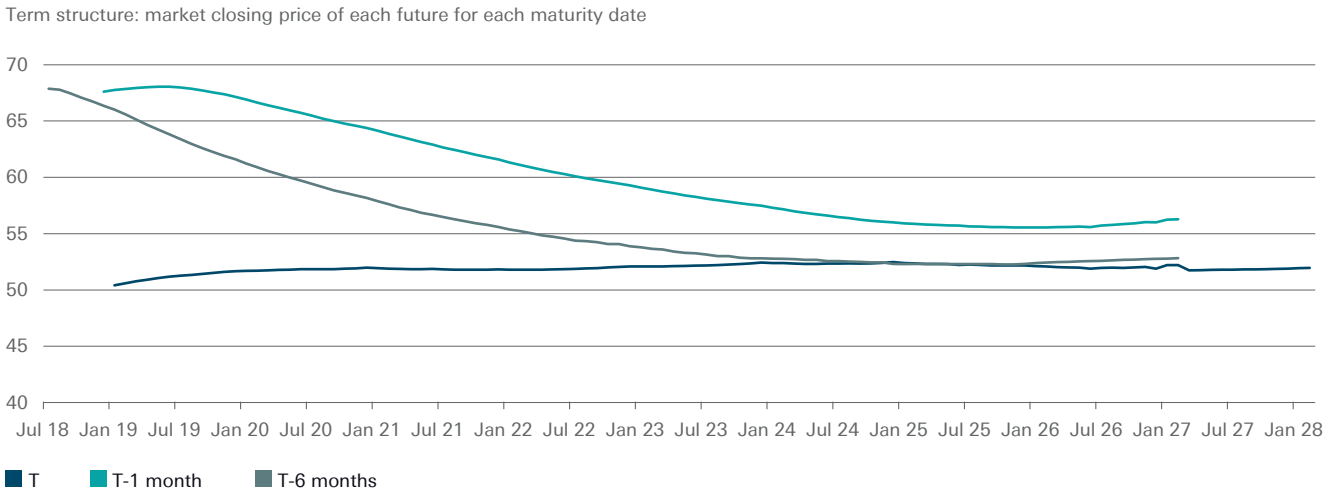
Gleaning information across term structure and over time

Depending upon the interplay of current financing costs, storage costs and convenience yield, a commodity curve is either in backwardation and contango[31]. Hence to estimate the average roll yield over a long term period we use the average of the roll yield over an expanding window. Figure 69 shows the variation in term-structure of WTI over time. In this example, WTI term-structure changes from a steep backwardated structure six months ago, to a less steep backwardated curve about a month ago. At time T it is in an almost flat conganto structure. Given such changes in term-structure and contracts, it is 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 estimated by taking an exponentially weighted average over an expanding window. The approach is the same which has been used in the fixed income model.

[30] Funds deposited to initiate and maintain futures contract
[31] 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 is opposite of backwardation

FIGURE 69: CHANGES IN CRUDE OIL (WTI) CURVE OVER THE PAST SIX MONTHS

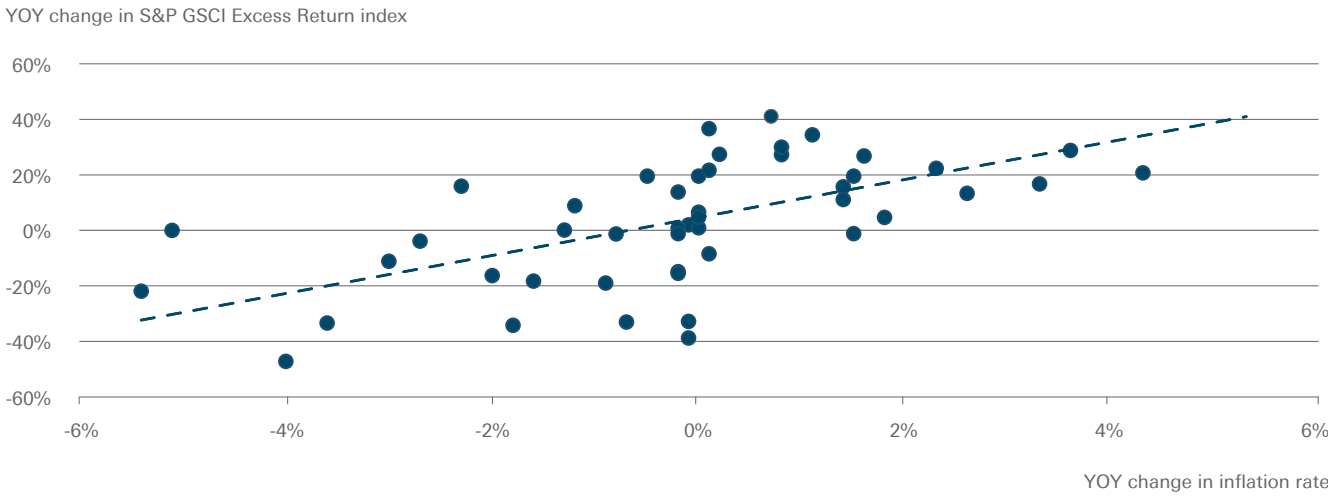


Source: Bloomberg, DWS calculations. Data from July 2018 to December 2018. May not be indicative of future results

Inflation

The inflation component raises commodity prices, as can be seen in Figure 70, whereas inflation adjusted prices exhibit a tendency to mean-revert (Figures 71 and 72). Certain commodities can also act as hedges against unexpected inflation[32].

FIGURE 70: THERE IS A STRONG LINK BETWEEN COMMODITIES AND UNEXPECTED INFLATION



Source Bloomberg, DWS calculations. Data from of 12/31/71 to 12/31/18. May not be indicative of future results.

[32] If we consider unexpected inflation to be equal to a change in year-on-year changes in inflation, we can see a long term positive relationship between commodity excess returns and changes in inflation. Figure 70 shows the relationship between excess returns of the GSCI and year-over-year change in inflation from 1970 through 2017. Since 1970 contemporaneous changes in the annual rate of inflation have seemingly explained about 41 percent of the time-series variation in the GSCI's annual excess returns.

Valuation

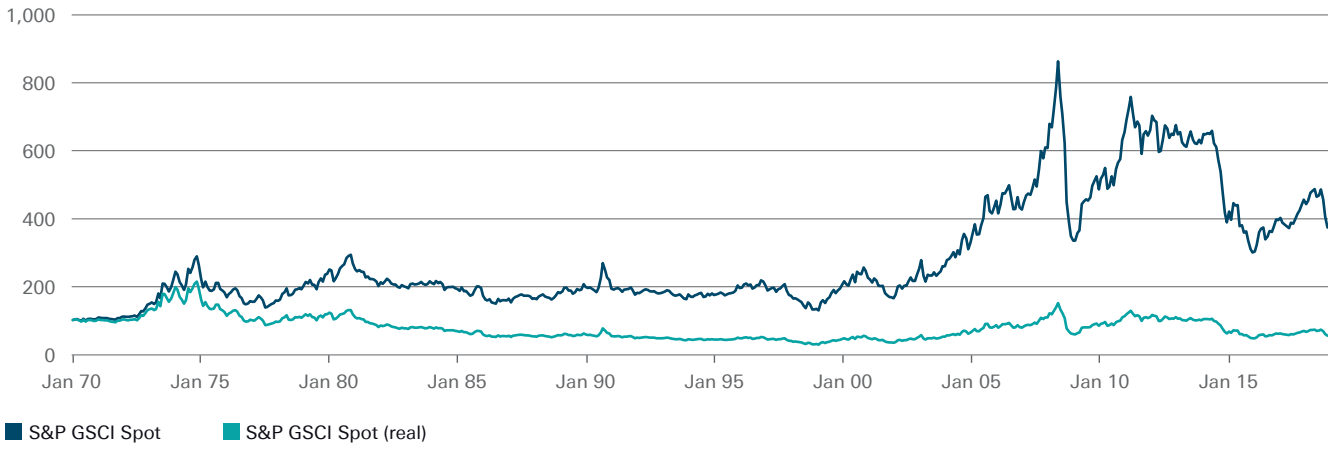
The nominal price of a commodity can be decomposed into real price and inflation. If we look at the long term trend of the real S&P GSCI Spot index, as shown in Figure 71, we see they mean revert.

Furthermore, as we model single commodities and then aggregate the long run into indices, we also need to understand the mean reversion tendencies of single commodity real spot prices. Four examples are shown in Figure 73.

Most single commodities mean revert, that is show negative (low) 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 or new deposits, the invention or price reduction of a substitute, to name but a few.

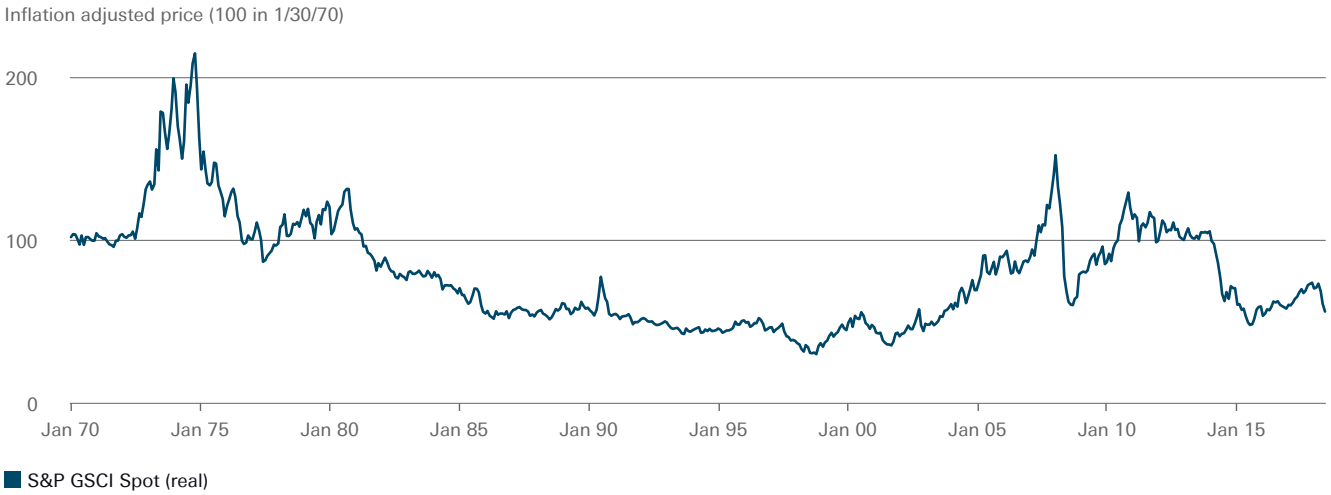
We incorporate mean reversion into our valuation pillar, where current real spot prices are expected to revert to long-term real average prices.

FIGURE 71: HISTORICAL PERFORMANCE OF S&P GSCI UNADJUSTED AND ADJUSTED FOR INFLATION



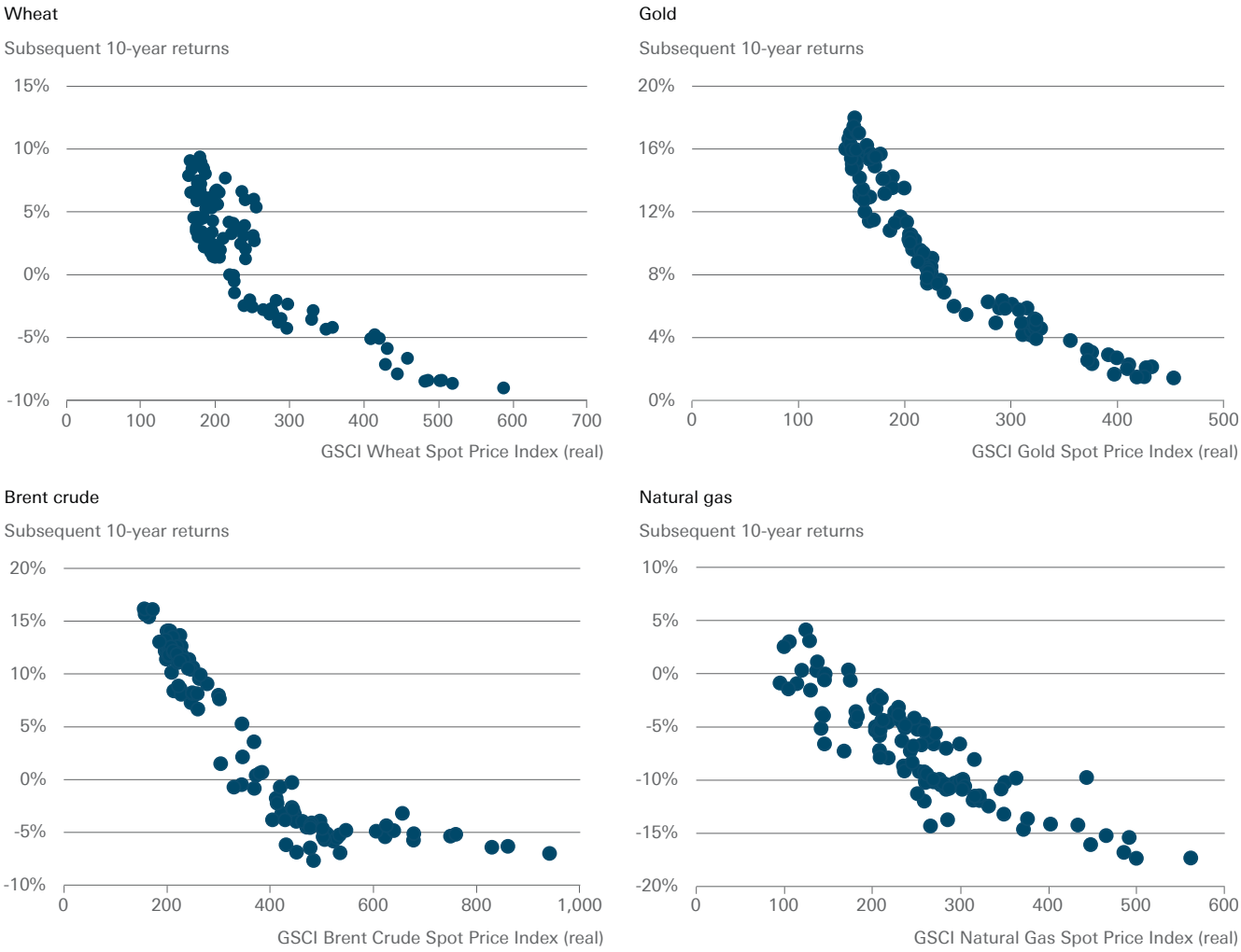
Source: Bloomberg, DWS calculations. Data from 1/30/70 to 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 72: ONCE ADJUSTED FOR INFLATION, THE S&P GSCI EXHIBITS A MEAN REVERTING BEHAVIOUR



Source: Bloomberg, DWS calculations. Data from 1/30/70 to 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 73: SINGLE COMMODITIES EXHIBIT A STRONG MEAN REVERSION BEHAVIOUR



Source: Bloomberg, DWS Calculations. From 1/31/00 to 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results.

Alternative assets

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

Alternative Long View framework

The analytical framework we rely on for alternative assets is similar to that of traditional assets presented in the previous chapter, as shown in Figure 74.

More precisely, most alternative assets are modelled 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 model them through a regression of their historical performances.

FIGURE 74: LONG VIEW FRAMEWORK FOR ALTERNATIVE ASSETS

Asset Class	Income	Growth		Valuation			Premium
Hedge funds	Hedge funds' 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	Inflation	Earnings growth	Valuation change	Credit migration	Credit default	Liquidity premium
Listed infrastructure	Dividend yield	Inflation	Earnings growth	Valuation adjustment			
Private infra-structure debt	Yield	Inflation	Earnings growth	Valuation change	Credit migration	Credit default	Liquidity premium

Source: DWS. For illustrative purposes only.

Hedge funds

Expected returns for 2019 – 2029

As can be seen in Table 5, our long term forecast are differentiated depending on hedge fund category. The returns are somewhat lower than history, which reflects among other reasons our conservative approach due to biases in hedge fund performance reporting.

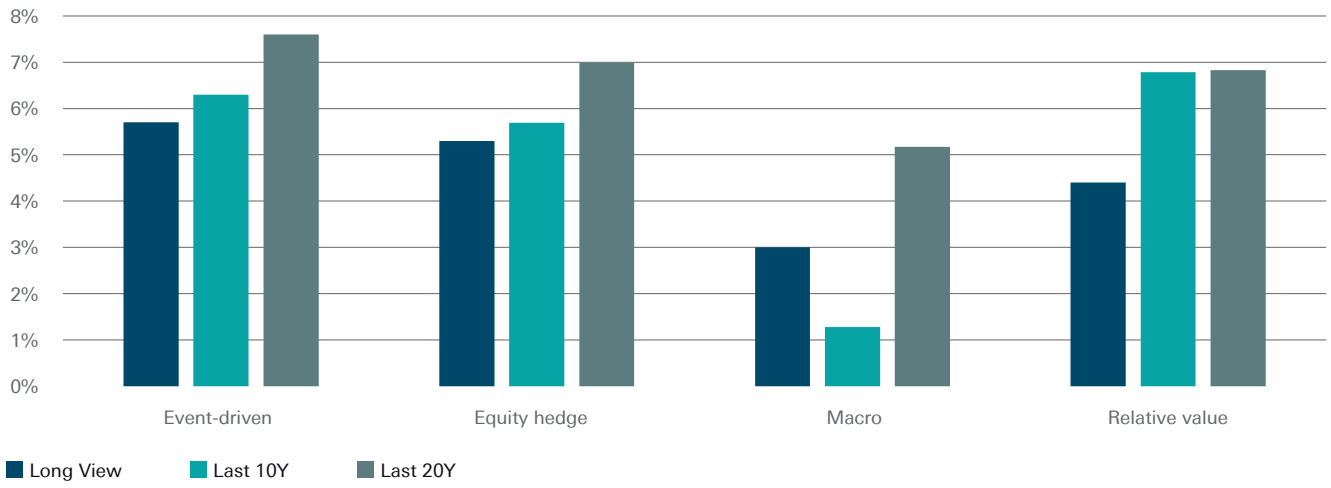
Compared with past performance, Figure 75 highlights that expected returns for hedge funds reflect a declining trend for industry returns over two decades.

TABLE 5: EXPECTED RETURNS FOR HEDGE FUNDS

Hedge fund strategy	Expected return (local currency)
Event-driven	5.7%
Macro	3.0%
Relative value	4.4%
Composite	4.6%

Source: DWS. Data as of 31/12/2018. See page 80 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.

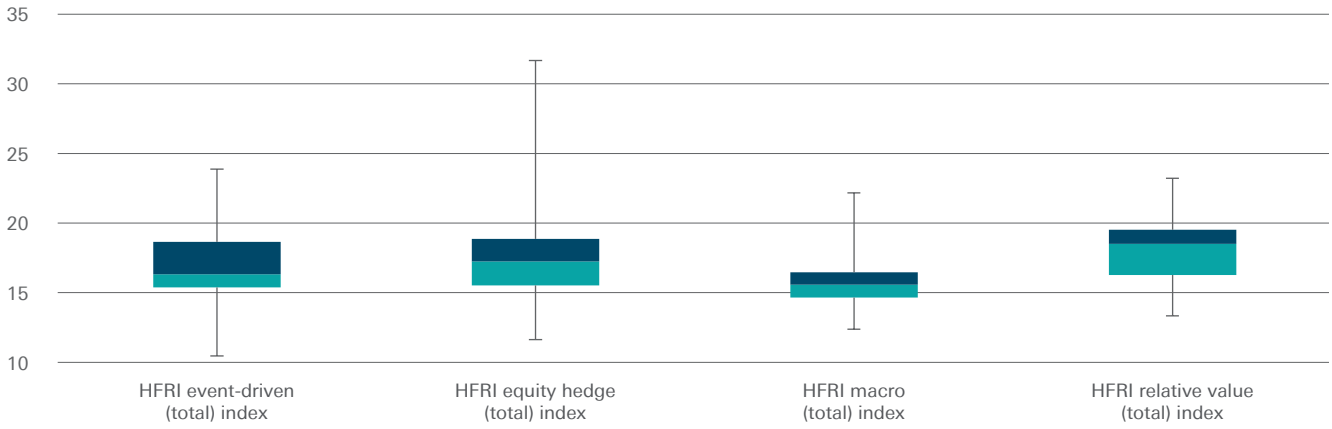
FIGURE 75: HEDGE FUNDS EXPECTED RETURN VERSUS HISTORY IN DOLLARS



Source: DWS. Data as of 12/31/18. See page 80 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.

It is worth remembering that expected returns are only average values across all funds and the performance dispersion between funds has been and is expected to be high. Historical dispersion can be seen in Figure 76.

FIGURE 76: HEDGE FUND PERFORMANCE DISPERSION OVER THE LAST 5 YEARS BY QUARTILE



Source: Morningstar, DWS. Data as of 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results.

Constructing our hedge funds Long View

We build our long term 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. Second is alpha. This can be thought of as a hedge fund premium that should be delivered by hedge funds over time.

Main challenges when modelling hedge fund returns

Unlike most of our other Long View models, hedge fund expected returns are essentially modelled via a regression of historical performance. Therefore the choice of universe considered for any regression is important. Our aim is to be as comprehensive as possible and so we have included the HFRI universe, 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.

_ Survivor ship arises when dying funds stop reporting into the index making it representative only of successful funds. Using the findings of various academic studies we modify the historical returns to correct for that bias[33].

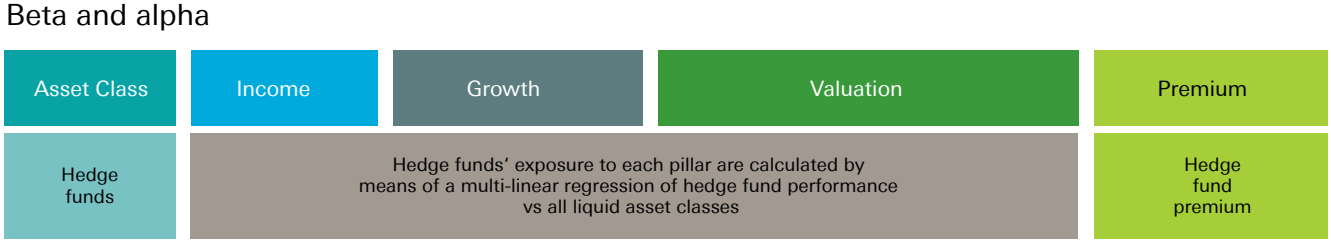
_ Backfill or instant history bias arises when new funds come onto the database with instant histories (back filled returns since the incubation period). The impact is less documented but has been taken into account in our analysis.

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 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[34] tend to be more beta driven 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 long run view of their respective underlying liquid investments.

FIGURE 77: MULTI-ASSET LONG VIEW – PILLAR DECOMPOSITION FOR HEDGE FUNDS



Source: DWS. As of 12/31/18

[33] See (Ibbotson, Chen und Zhu 2010) (Fung and Hsieh 2000)
[34] We rely on the HFRI classification, available at (HFR 2018)

Private infrastructure debt

Expected returns for 2019 – 2029

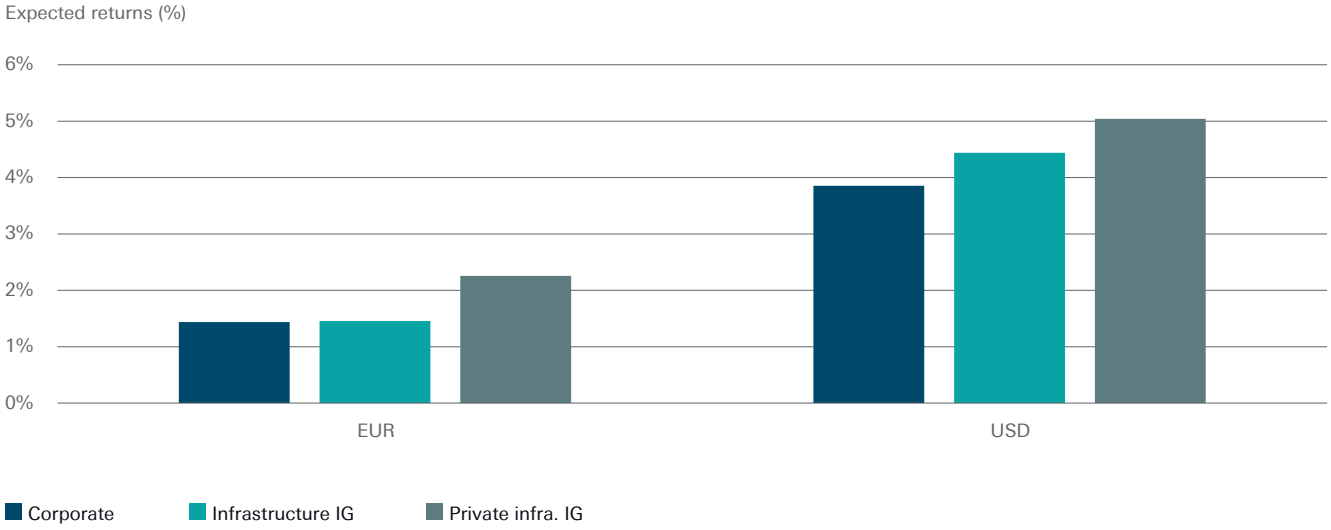
Historically, private infrastructure debt has offered a spread premium over listed debt with a comparable credit rating and duration. This spread premium is driven by several factors, including the relative illiquidity of private debt, but also differences in credit profile, security and covenant packages.

It is difficult to quantify exactly the illiquidity 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 80 basis points for euro investment grade private infrastructure debt with seven years duration, and 60 basis points for dollar investment grade private infrastructure debt with the same duration[35].

Meanwhile, for dollar high-yield private infrastructure debt, historically we have observed an illiquidity premium of 110 basis points for durations of four years.

Although the illiquidity 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 in line with the listed benchmark.

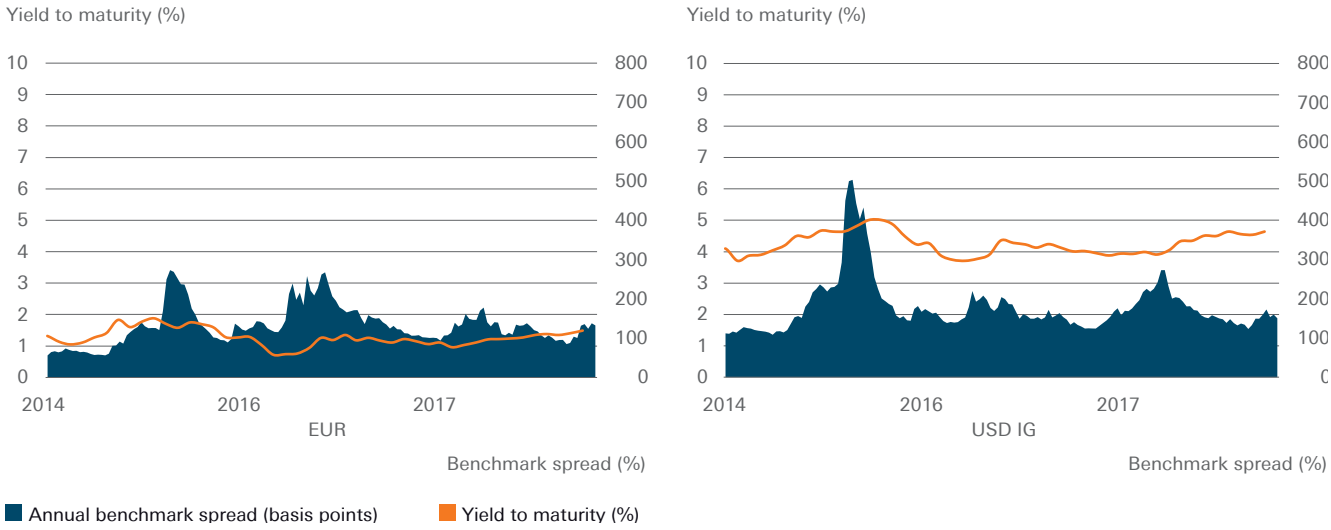
FIGURE 78: LONG TERM PRIVATE INFRASTRUCTURE EXPECTED RETURNS



Source: DWS. Data as of 12/31/18. See page 80 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.

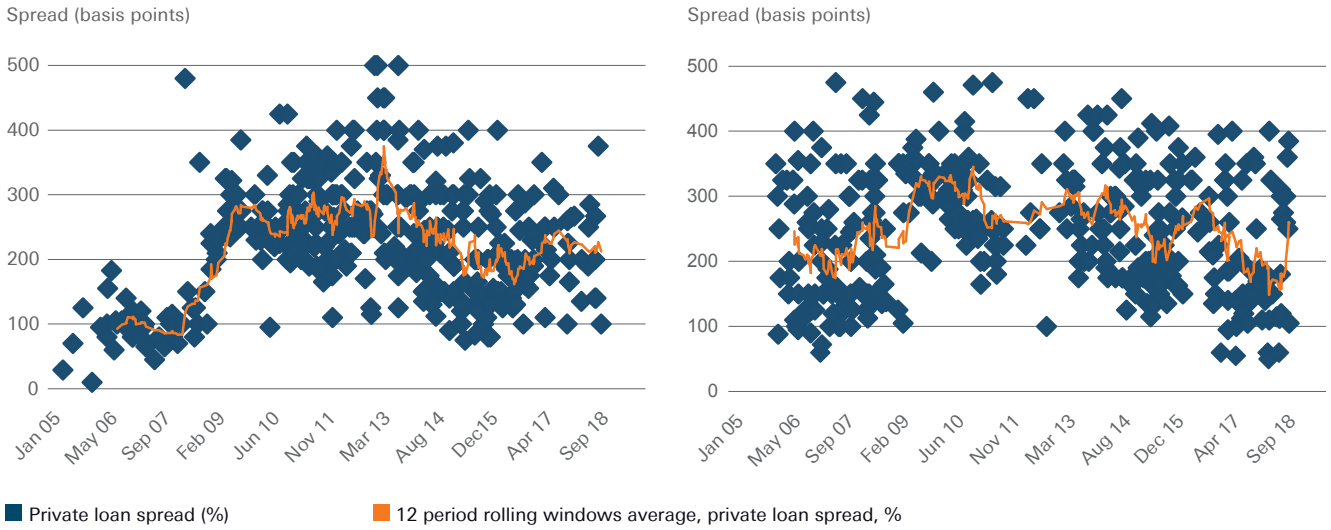
[35] Estimate based on a comparison of DWS proprietary database of private infrastructure debt transactions and IHS Markit iBoxx Infrastructure Debt Indices

FIGURE 79: LISTED INFRASTRUCTURE DEBT YIELD TO MATURITY



Source: Markit iBoxx infrastructure debt indices in euros and dollars. Data from 12/31/14 to 9/30/18. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 80: INFRASTRUCTURE PRIVATE LOAN DEBT SPREADS FOR EUROPE AND NORTH AMERICA 2015-2018



Source: DWS. Proprietary database of private infrastructure debt transactions, November 2018. Past performance, actual or simulated, is not a reliable indicator of future results.

Constructing our private infrastructure debt Long View

Contemplating an investment methodology similar to our reference case for fixed income[36], private infrastructure debt return assumptions can be modelled using a modified version of our fixed income approach.

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

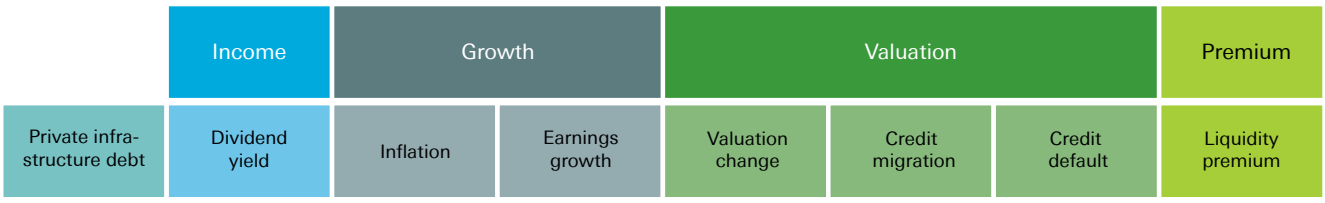
Moreover, credit migration and credit default are modified to reflect the credit profile of private infrastructure debt. Default studies demonstrate that infrastructure debt credit ratings migrate less compared with non-financial corporate fixed income securities, with infrastructure assets supported 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[37] For example, the average ten year cumulative default rate for BBB rated infrastructure debt is about two per cent[37], compared with 3.1 per cent for equally rated non-financial corporate issues.

Moreover, 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 per cent, compared with 54 per cent for equivalent non-financial corporates debt.

A stronger credit profile, supported by lower default rates and higher recovery rates translates 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 81: OUR LONG VIEW MODEL FOR PRIVATE INFRASTRUCTURE DEBT.



Source: DWS. As of 12/31/18

[36] 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.
[37] Moody's Investors Service, "Infrastructure default and recovery rates, 1983–2017", 27. September 2017

Private real estate debt

Expected returns for 2019 – 2029

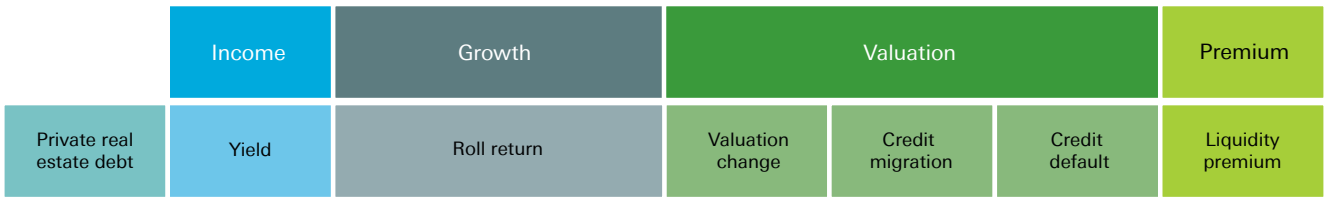
Similar to private infrastructure debt, we find that private real estate debt behaves in line with the listed part of the market with some variations. The performance of listed, senior real estate bonds denominated in euros, pounds and dollars therefore represents a useful tool for analysing return attributes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

Constructing our private real estate debt Long View

The non-listed real estate debt expected return model is derived from our fixed income one. Similar to private infrastructure debt, returns should reflect a yield plus a spread due to illiquidity.

Private debt can 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, translate into a spread premium over listed real estate debt.

FIGURE 82: OUR LONG VIEW MODEL FOR PRIVATE REAL ESTATE DEBT



Source: DWS. As of 12/31/18

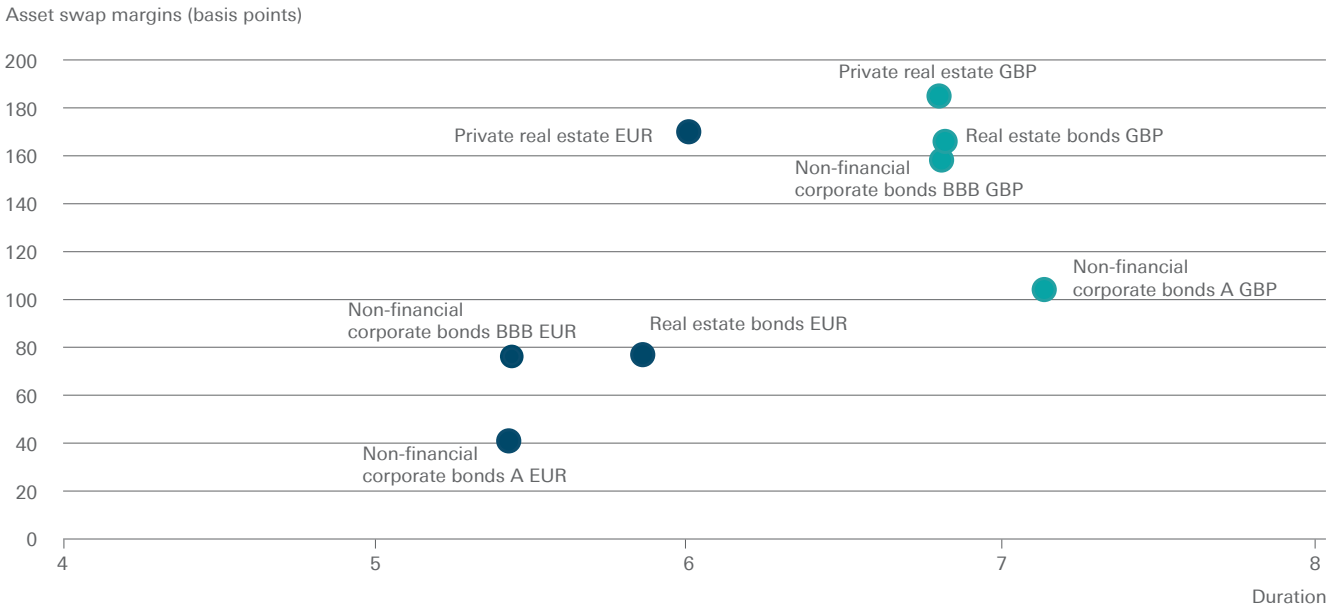
An analysis comparing listed real estate debt indices with our own estimates of the private debt market based on a proprietary market transactions database, give a broad indication of the asset swap premium achievable for private real estate debt across euro and sterling markets.

As can be seen in Figure 83, for example, between October 2016 and September 2017, we estimated that the spread was 27 basis points for sterling and 93 basis points for euros[38].

Private real estate debt also exhibits different migration and default behaviour and this need to be translated into our model. Historically, average default rates for real estate debt have been lower than for non-financial corporate bonds. Data for the period between 1983 and 2016 show that annual default rates for real estate bonds were just 1.1 per cent, compared with 1.6 per cent for non-financial corporate bonds. In addition, the cumulative ten-year default rate for real estate debt has been 6.3 per cent historically, versus 14.5 per cent for non-financial corporates[39].

In addition, debt secured by real assets 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 also tended to recover a significant proportion of their investment in the event of default. Analysis of defaulted loans from US real estate transactions between 2009 and 2017 showed that the average recovery rate for real estate has been 71 per cent, rising to 75 per cent during the first three quarters of 2017[40].

FIGURE 83: PRIVATE REAL ESTATE DEBT OFFERS A SPREAD PREMIUM OVER LISTED DEBT



Sources: HIS Markit, DWS, October 2017. Asset swap margins (Basis points, October 2016 until September 2017). 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. Past performance, actual or simulated, is not a reliable indicator of future results.

[38] IHS Markit, DWS, October 2017
[39] Moody's, July 2017
[40] Real Capital Analytics, November 2017

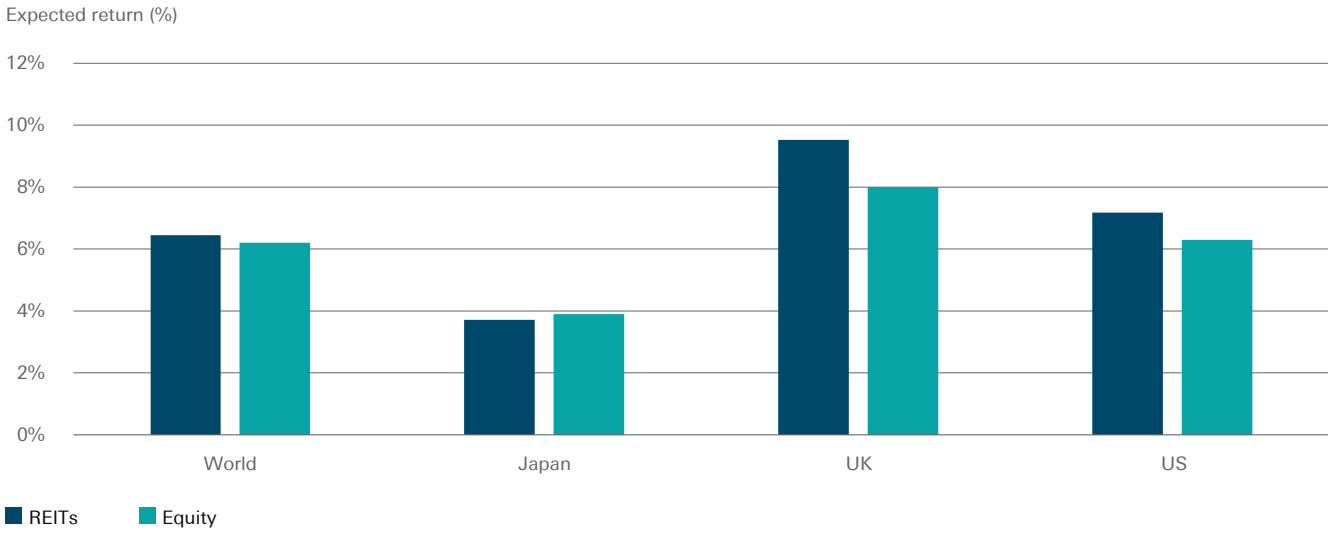
Listed real estate equity

Expected returns for 2019 – 2029

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

Our expected returns for REITs still show relative value compared with traditional equities, though they are on the lower end of historical returns.

FIGURE 84: LONG TERM REAL ESTATE EQUITY EXPECTED RETURNS (LOCAL CURRENCIES)



Source DWS. Data as of 12/31/18. See page 80 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 long view

The pillars of our listed real estate Long View model follow the same principles as the equity model but REITs have unique characteristics, such as a higher relative share of income in the total return. Our model is presented in Figure 85.

Income

REITs are a popular option for income investors. Real estate companies generally receive 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.

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 86 displays the development of three pillars of the US REITs index return: dividend, inflation and valuation adjustment.

Valuation

Figure 87 shows US REITs dividend yields versus TIPS yields. REITs dividend yields have largely kept a constant elevated spread over the TIPS spread, however this does fluctuate. Over the long term, however, the spread mean reverts. This relationship appears to hold across geography.

Our view is that on average, 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 financial crisis, suggesting that REITs were under-priced. On the contrary, when REITs spreads are 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.

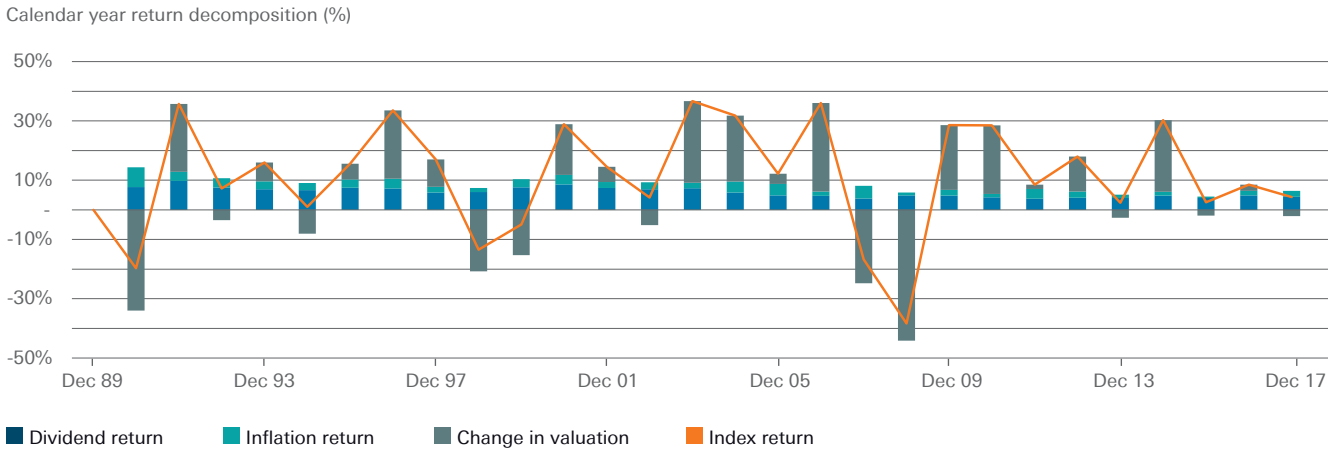
If we look at historic REITs-TIPS spreads and subsequent ten year realised returns, we can see this relationship empirically across a number of major markets, as shown in Figure 88.

FIGURE 85: MULTI-ASSET LONG VIEW – PILLAR DECOMPOSITION FOR LISTED REAL ESTATE

Asset Class	Income	Growth		Valuation
Listed real estate equity	Dividend yield	Inflation	Earnings growth	Valuation adjustment

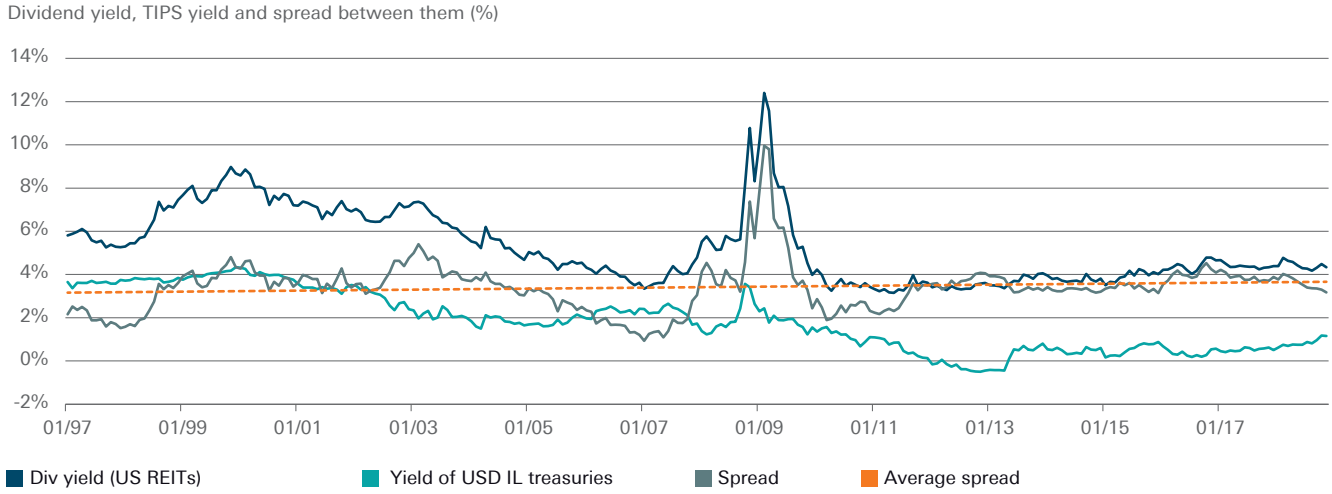
Source: DWS. As of 12/31/18

FIGURE 86: RETURN DECOMPOSITION OF S&P US REIT INDEX



Source: Bloomberg, DWS calculations. Data from 1989 to 2018. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 87: US REITs YIELDS AND TIPS YIELDS OVER THE LONG TERM



Source: Bloomberg, DWS Calculations. Data from 7/31/89 to 11/30/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 88: THE REITs SPREAD IS A GOOD PREDICTOR OF SUBSEQUENT 10Y REITs PERFORMANCE

Source: Bloomberg, DWS calculations. Data from 7/31/89 to 11/30/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

Private real estate equity

Expected returns for 2019 – 2029

Since 2001, private global real estate has produced an annual total return of 7.3 per cent[41]. The majority of this has been the result of a consistent income return, which has averaged 5.7 per cent annually while capital growth has been averaging close to inflation at 1.6 per cent.

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 89, income yields also declined from roughly seven per cent in the early part of the 2000s, to 4.5 per cent by the end of 2017.

Similar trends occurred across Europe. Since 2004, for example, the MSCI Pan-European property funds index (PEPFI) had returns averaging 7.4 per cent, of which 6.1 per cent came from income, while the UK Association of Real Estate Funds index returned 2.5 per cent over the same period. The low return in the UK predominantly reflects the adverse impact of the financial crisis on the sector. However, over a longer 20 year view, UK returns have averaged 6.9 per cent per annum.

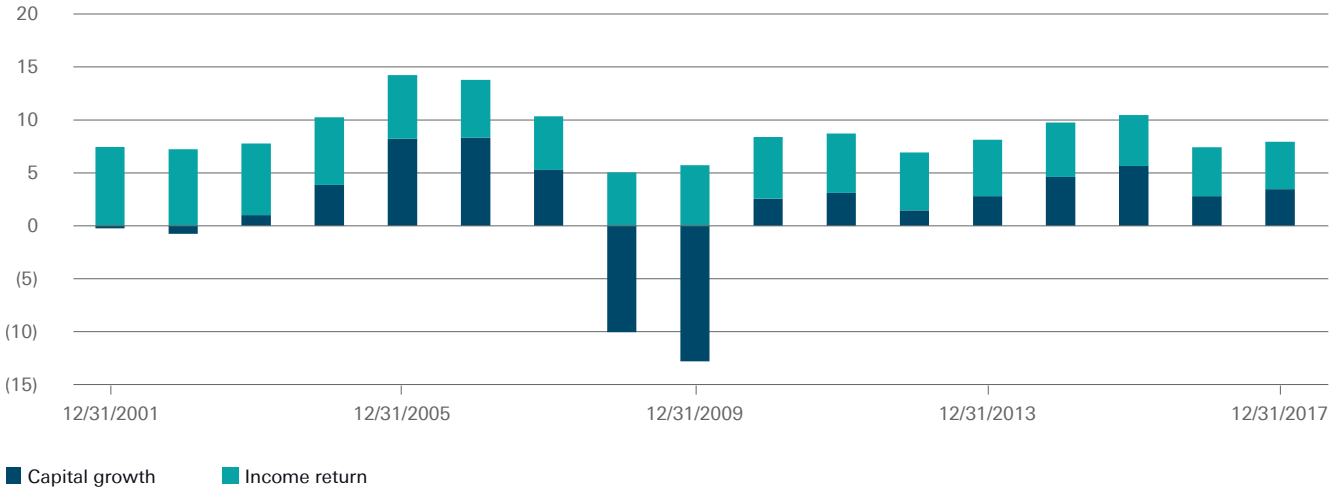
Likewise, the income return has been trending lower across Europe. Using the MSCI Pan-European property funds index again, we see that since 2004 the annual income return has averaged around six per cent, compared with 4.6 per cent today.

In the US, returns based on the NCREIF open-end diversified core equity fund index (NFI-ODCE) averaged 8.9 per cent since 2001. Income returns average six per cent during the time period. Similar to the UK and the eurozone, income returns have also been trending down in America to around four per cent. 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 returns for US non-listed real estate to be 6.2 per cent based on inflation of two per cent and a current income return of 4.2 per cent.

Across regions our expectations are in Figure 90. When compared with traditional equities, they show similar to better expectations despite the relatively low leverage of the assets considered here.

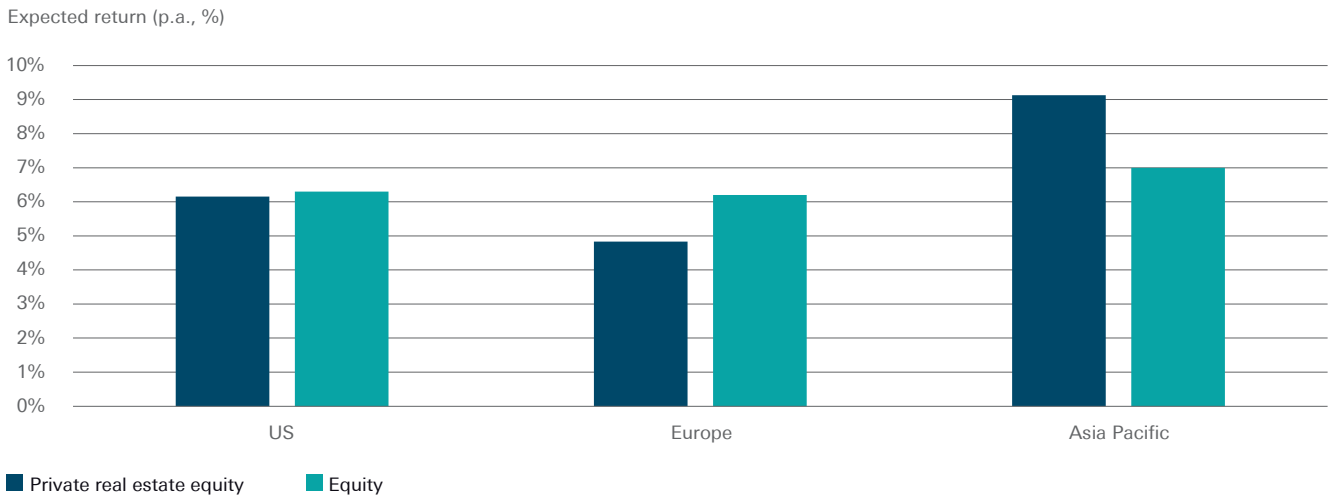
[41] According to MSCI Global Annual Property Index

FIGURE 89: DECOMPOSITION OF THE MSCI GLOBAL ANNUAL PROPERTY INDEX



Source: MSCI, DWS calculations. Data from 2001 to 2018. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 90: LONG TERM PRIVATE REAL ESTATE EQUITY EXPECTED RETURNS (LOCAL CURRENCY)



Source DWS. Data as of 12/31/18. See page 80 or 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 private real estate equity Long View

The non-listed real estate expected return model is derived from the equity model. It relies on three pillars: income, growth and valuation.

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

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

Over the long term, therefore, capital growth should 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, ensuring that over the longer term, rents are aligned with global price growth.

Around this board trend of income return and inflation expectations, there is a change in valuation factor to consider. In this case, it would be the spread between the income return and the TIPS spread.

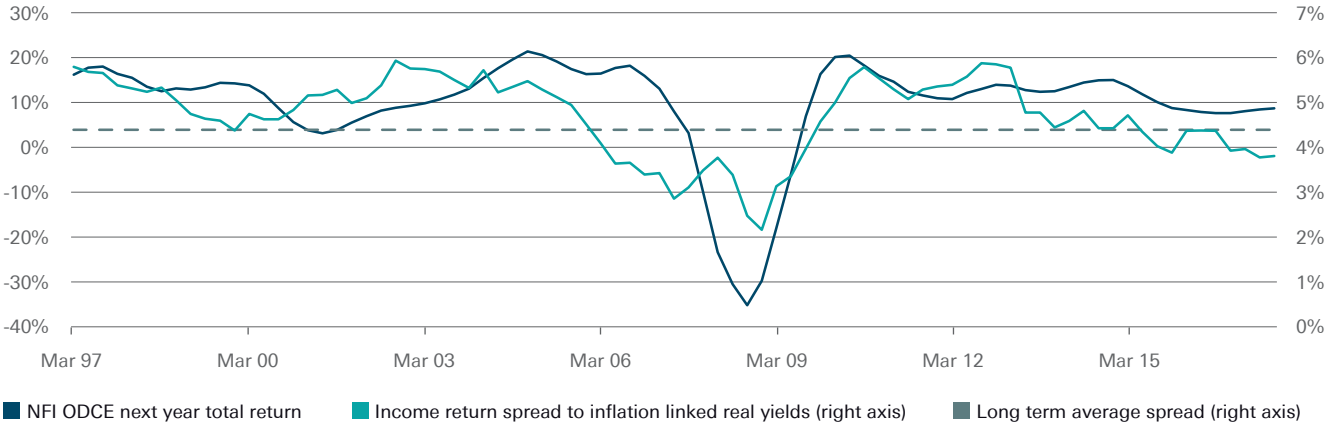
Total yield is the latest income return (income yield or cap rate) from the relevant market[42]

Finally, the valuation adjustment refers to the income return spread over the relevant TIPS real yield. Similar to REITs, there is a high correlation between total returns and the income return spread over the ten-year government bond yield on a lagged basis.

FIGURE 91: MULTI-ASSET LONG VIEW – PILLAR DECOMPOSITION OF PRIVATE REAL ESTATE

Source: DWS. As of 12/31/18

FIGURE 92: NCREIF ODCE INDEX TOTAL RETURN VS INCOME RETURN SPREAD OVER TEN-YEAR GOVERNMENT BOND YIELD



Source: NCREIF, DWS calculations. Data from 3/31/97 to 12/31/18. Past performance, actual or simulated, is not a reliable indicator of future results.

[42] Income yield, income return and cap rate are equivalend and used interchangeably

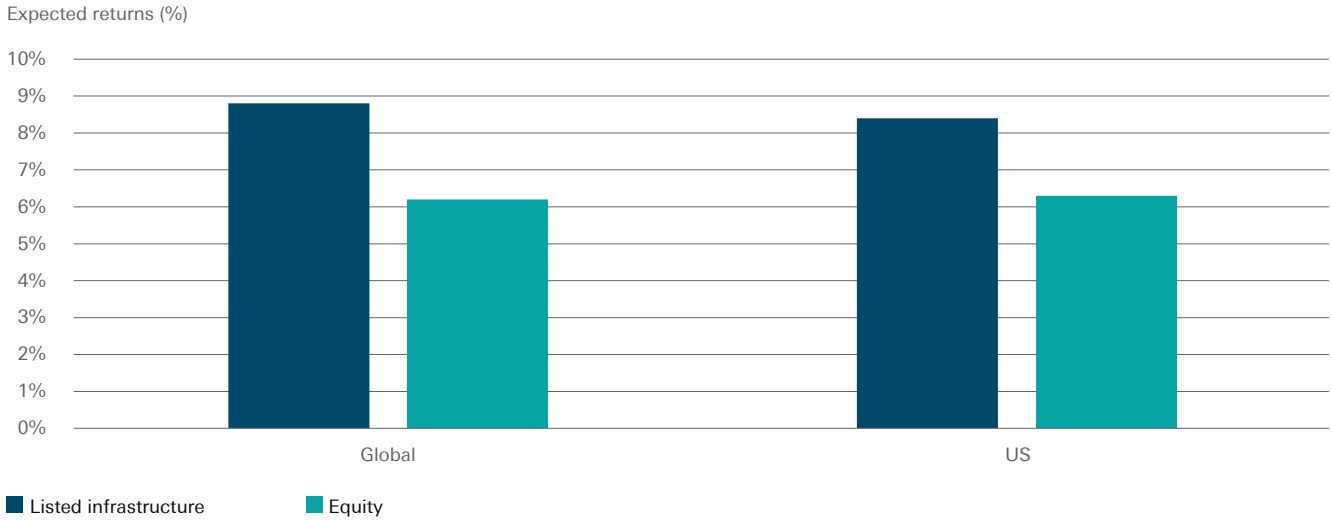
Listed infrastructure equity

Expected returns for 2019 – 2029

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

Infrastructure is a good inflation hedge as most assets are backed by specific contractual or regulatory arrangements. Infrastructure assets also have the potential to offer investors steady dividend growth with low volatility as they are more defensive due to the essential nature of their underlying services, monopolistic characteristics, high barriers to entry and regulation.

FIGURE 93: LONG VIEW EXPECTED RETURNS FOR LISTED INFRASTRUCTURE EQUITY (LOCAL CURRENCY)



Source: DWS. Data as of 12/31/18. See page 80 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 private real estate equity Long View

Our listed infrastructure expected return model is based on the listed equities approach, with some ad-hoc adjustments, factoring in the defensive nature of the asset class, and comparatively lower volatility, particularly with regard to long-term valuation adjustments.

Inflation used in the model is weighted by respective country, using index market weights. Compared with listed equities, listed infrastructure has a stronger ability to recover inflation. Depending on the type of infrastructure asset, price inflation can sometimes 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.

Valuation

Listed infrastructure valuations have shown to be relatively resilient over the long-term, underpinned by the defensive characteristics of the underlying assets and by regulatory frameworks providing protection to long-term income return. During economic and market volatility, this defensive characteristic has been an attractive feature of the asset class and reflected in valuations.

For this reason, in our methodology to estimate the valuation adjustment, we use a spread of dividend yield over inflation linked bonds. As infrastructure is a regulated defensive asset class and would serve income-seeking investors well, we assume that investors would demand a premium on the risk free investment.

FIGURE 94: MULTI-ASSET LONG VIEW – PILLAR DECOMPOSITION OF LISTED INFRASTRUCTURE EQUITY

Source: DWS. As of 12/31/18

Volatility and correlation

Expected volatility and correlation for 2019 – 2029

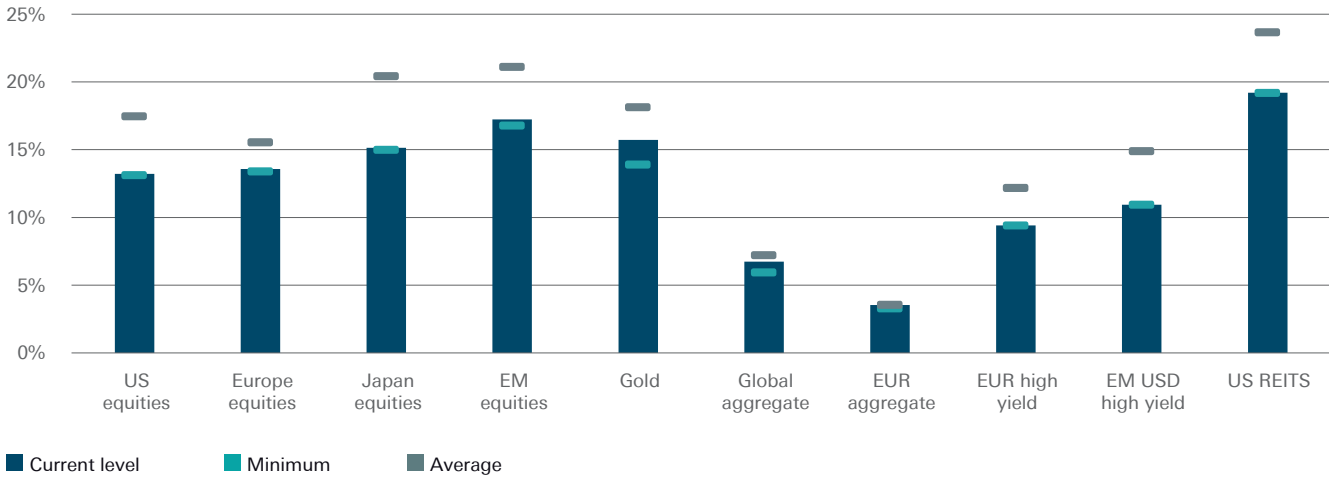
The benign macroeconomic conditions that have prevailed over the past few years have also seen asset correlations steadily decrease. Figure 96 shows the rolling six month average correlations in our asset universe, which, as can be seen, are near historic lows.

The usual problem with correlation analysis is the large number of data points to look at, hence the role of graphics. We show in Figure 97 two levels of information: the correlation matrix and the corresponding hierarchy of relationships between asset classes.

It can be seen that gold, global aggregate and Europe IG aggregate asset classes have the least correlation whereas emerging markets and Asia Pacific ex Japan exhibit the highest correlation.

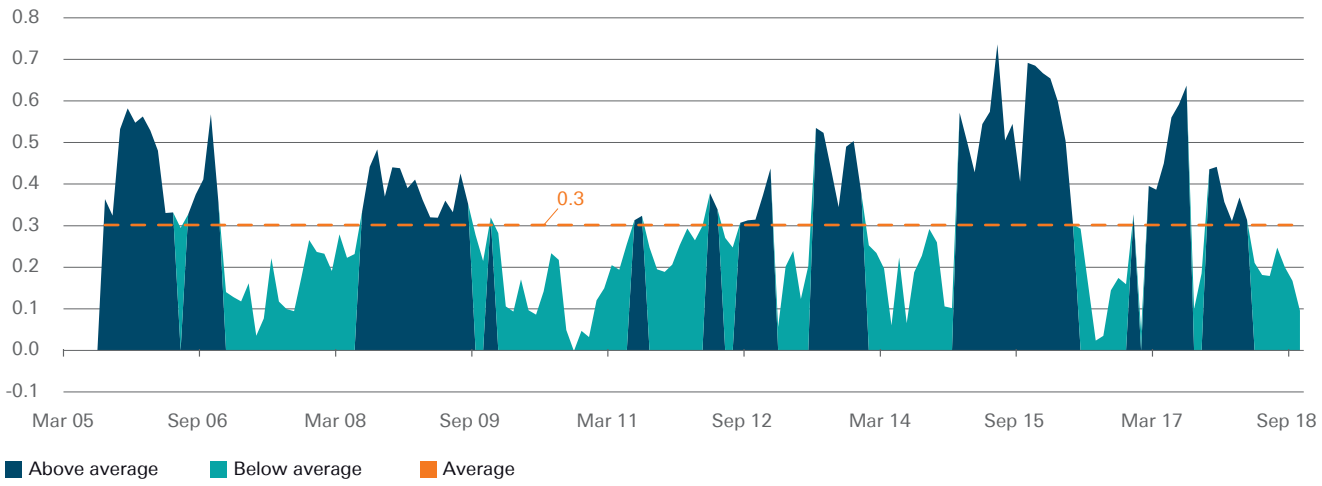
The hierarchical tree diagram in the same chart clusters assets together based on their correlation values – for example, global aggregate and euro IG aggregate are shown as one tight cluster, as are emerging markets and Asia Pacific ex Japan equities. Less closely correlated assets are further apart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

FIGURE 95: HISTORICAL AND CURRENT LEVEL OF ASSET CLASS VOLATILITY



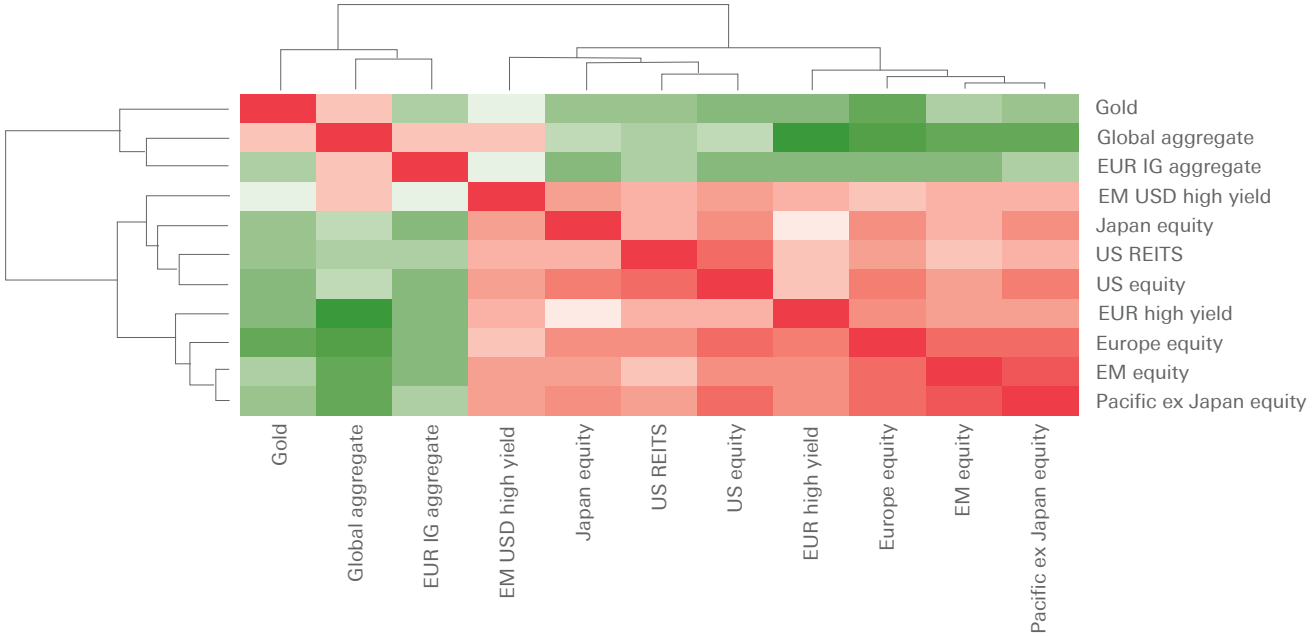
Source: Bloomberg, DWS calculations. Data as of 10/31/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 96: HISTORICAL AVERAGE OF THE CORRELATION AMONG MAIN ASSET CLASSES



Source: Bloomberg, DWS calculations. Data as of 10/31/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results.

FIGURE 97: CORRELATION AND HIERARCHICAL RELATIONSHIP BETWEEN ASSET CLASSES



Source: Bloomberg, DWS calculations. Data as of 10/31/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results

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.

What is more, in volatility/covariance matrix estimations 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.

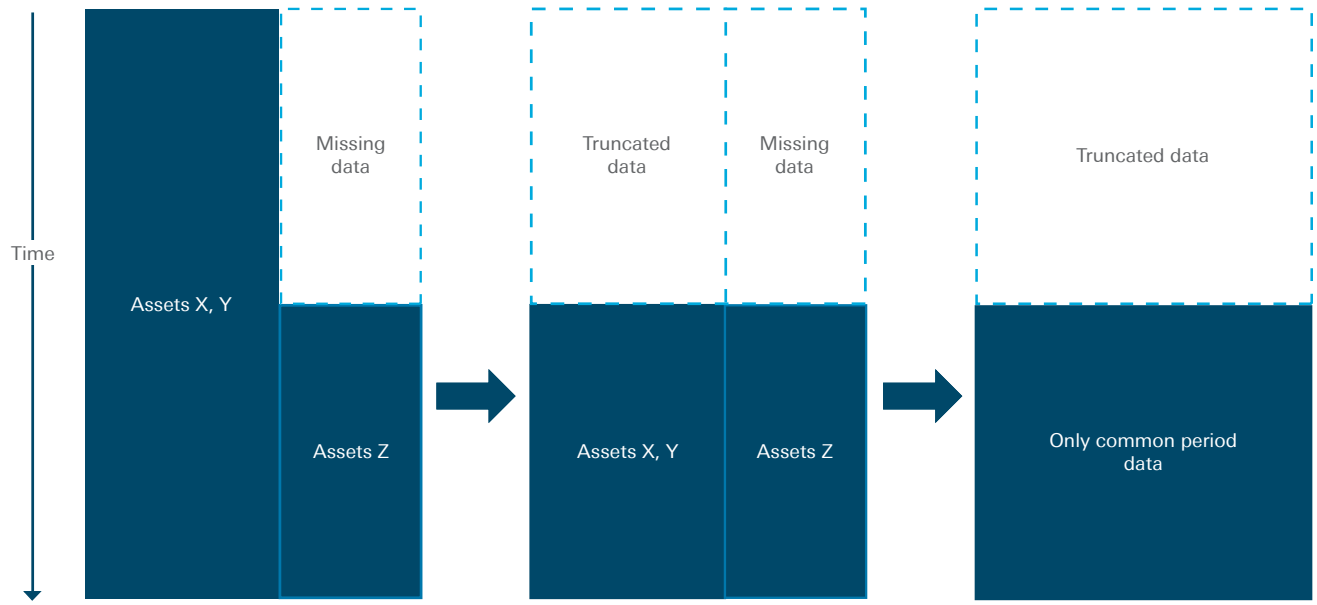
As shown in Figure 98 such truncation could result in the loss of valuable information. Therefore we employ an alternative approach (Stambaugh 1997) that utilises the complete history of the sample to estimate a covariance matrix.

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 many REITs indices available today have only been launched since the financial crisis. Price volatility will be underestimated because these funds have only experienced a long bull market. But we know that real estate assets carry liquidity risks in times of crises.

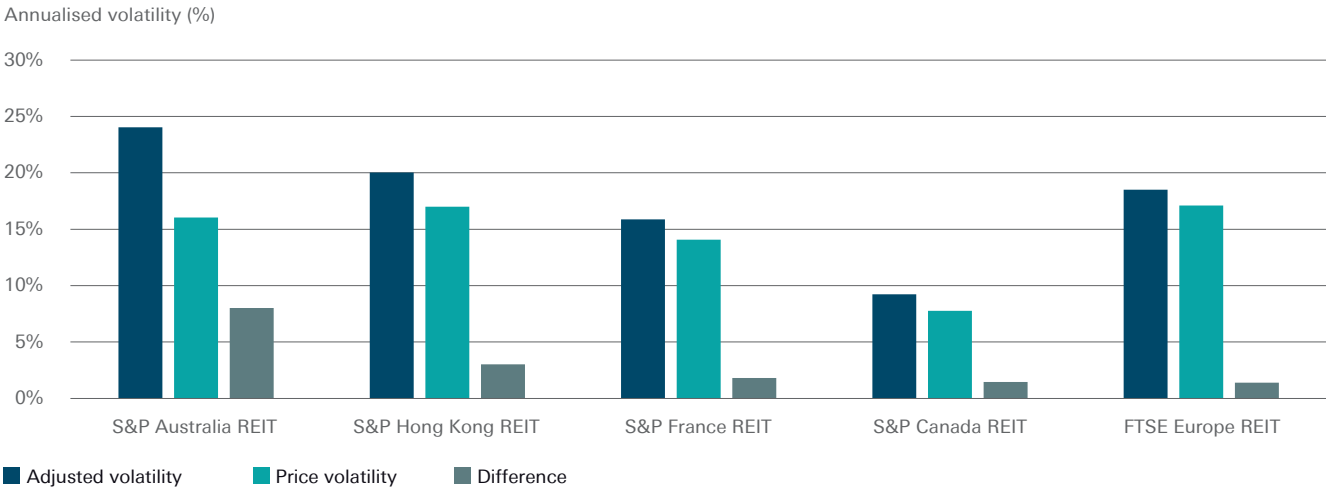
Using our methodology, we see below that REITs funds launched post 2008 have systematically higher adjusted volatility.

FIGURE 98: BUILDING THE CORRELATION LONG VIEW



Source: DWS. As of 12/31/18. For illustration purposes only.

FIGURE 99: REITs VOLATILITY – PRICE VOLATILITY UNDERESTIMATES LATEST RISK ADJUSTED VOLATILITY USING LONG TERM TIME SERIES



Source: Bloomberg, DWS calculations. Data as of 10/31/18. See page 80 for the representative index corresponding to each asset class. Past performance, actual or simulated, is not a reliable indicator of future results

Appendix

Representative indices

TABLE 6: EACH ASSET CLASS IN THIS PUBLICATIONS IS MODELLED AS PER ITS CORRESPONDING REPRESENTATIVE INDEX

Broad Asset Class	Asset Class	Representative Index	2018	2017	2016	2015	2014
Fixed Income	EM USD High Yield	Bbg Barclays EM USD Aggregate High Yield	-4.73%	9.54%	15.89%	6.92%	-1.40%
Fixed Income	EM USD Sovereign	Bbg Barclays Emerging Markets USD Sovereign	-4.20%	9.29%	9.34%	1.49%	7.15%
Fixed Income	EUR Aggregate	Bbg Barclays Euro Aggregate	0.41%	0.68%	3.32%	1.00%	11.10%
Fixed Income	EUR Cash	EUR 3M Libor TR	-0.34%	-0.38%	-0.34%	-0.07%	0.13%
Fixed Income	EUR Corporate	Bbg Barclays Euro Aggregate Corporate	-1.26%	2.41%	4.73%	-0.56%	8.39%
Fixed Income	EUR Corporate	Bbg Barclays Euro Aggregate Corporate	-1.26%	2.41%	4.73%	-0.56%	8.39%
Fixed Income	EUR Corporate 1-3	Bbg Barclays Euro Aggregate Corporate 1-3 Years	-0.23%	0.52%	1.57%	0.59%	2.38%
Fixed Income	EUR Corporate 3-5	Bbg Barclays Euro Aggregate Corporate 3-5 Years	-0.65%	1.64%	3.55%	0.55%	5.67%
Fixed Income	EUR Corporate 5-7	Bbg Barclays Euro Aggregate Corporate 5-7 Years	-1.42%	2.87%	5.53%	-0.59%	10.51%
Fixed Income	EUR Corporate 5-7	Bbg Barclays Euro Aggregate Corporate 5-7 Years	-1.42%	2.87%	5.53%	-0.59%	10.51%
Fixed Income	EUR Corporate 7-10	Bbg Barclays Euro Aggregate Corporate 7-10 Years	-2.36%	4.19%	7.03%	-1.45%	15.29%
Fixed Income	EUR High Yield	Bbg Barclays Pan-European High Yield (Euro)	-3.82%	6.90%	9.13%	1.00%	5.83%
Fixed Income	EUR High Yield	Bbg Barclays Pan-European High Yield (Euro)	-3.82%	6.90%	9.13%	1.00%	5.83%
Fixed Income	EUR Treasury	Bbg Barclays Euro Treasury	0.98%	0.17%	3.23%	1.65%	13.13%
Fixed Income	EUR Treasury 10-20	Bbg Barclays Euro Aggregate Treasury 10-20 Years	-0.15%	0.21%	5.18%	2.51%	25.05%
Fixed Income	EUR Treasury 1-3	Bbg Barclays Euro Aggregate -Treasury 1-3 Years	-0.09%	-0.34%	0.38%	0.68%	1.68%
Fixed Income	EUR Treasury 3-5	Bbg Barclays Euro Aggregate - Treasury 3-5 Years	0.09%	0.03%	1.55%	1.40%	5.60%
Fixed Income	EUR Treasury 5-7	Bbg Barclays Euro Aggregate Treasury 5-7 Years	0.17%	0.50%	2.26%	1.89%	10.94%
Fixed Income	EUR Treasury 7-10	Bbg Barclays Euro Aggregate Treasury 7-10 Years	1.37%	1.20%	3.78%	1.84%	16.79%
Fixed Income	Global Aggregate	Bbg Barclays Global Aggregate	-1.20%	7.40%	2.09%	-3.15%	0.59%
Fixed Income	Global Corporate	Bbg Barclays Global Aggregate Corporate	-3.57%	9.09%	4.27%	-3.56%	3.15%
Fixed Income	Global Government	Bbg Barclays Global Aggregate Treasuries	-0.38%	7.29%	1.65%	-3.29%	-0.79%
Fixed Income	Global High Yield	Bbg Barclays Global High Yield	-4.06%	10.43%	14.27%	-2.72%	0.01%
Fixed Income	US Agg Intermediate	Bbg Barclays US Aggregate Intermediate	0.92%	2.27%	1.97%	1.21%	4.12%
Fixed Income	US Aggregate	Bbg Barclays US Aggregate	0.01%	3.54%	2.65%	0.55%	5.97%

Fixed Income	US Corporate	Bbg Barclays US Corporate	-2.51%	6.42%	6.11%	-0.68%	7.46%
Fixed Income	US Corporate 5-7	Bbg Barclays US Corporate 5-7 Years	-0.74%	4.92%	5.41%	1.13%	5.38%
Fixed Income	US High Yield	Bbg Barclays US High Yield	-2.08%	7.50%	17.13%	-4.47%	2.45%
Fixed Income	US Treasury	Bbg Barclays US Treasury	0.86%	2.31%	1.04%	0.84%	5.05%
Fixed Income	US Treasury 5-7	Bbg Barclays US Treasury: 5-7 Years	1.44%	1.87%	1.30%	1.98%	4.83%
Fixed Income	USD Cash	USD 3M Libor TR	1.86%	1.13%	0.50%	0.20%	0.16%
Fixed Income	USD IL Treasuries	Bbg Barclays US Govt Inflation Linked Bonds	-1.48%	3.30%	4.85%	-1.72%	4.43%
Equities	AC Equities	MSCI ACWI	-7.38%	18.48%	9.00%	2.08%	9.81%
Equities	EM Equities	MSCI EM	-10.08%	30.55%	9.69%	-5.76%	5.17%
Equities	EMU Small Cap Equities	MSCI EMU Small Cap	-17.44%	24.29%	3.23%	24.33%	3.75%
Equities	Europe Equities	MSCI Europe	-10.59%	13.06%	7.23%	4.91%	4.66%
Equities	Europe Small Cap Equities	MSCI Europe Small Cap	-15.86%	19.03%	0.86%	23.53%	6.47%
Equities	Eurozone Equities	MSCI EMU	-12.75%	12.63%	4.33%	9.82%	4.32%
Equities	Japan Equities	MSCI Japan	-14.85%	20.14%	-0.40%	10.27%	9.83%
Equities	Switzerland	MSCI Switzerland	-8.03%	17.47%	-3.42%	1.18%	11.63%
Equities	Switzerland	MSCI Switzerland	-8.03%	17.47%	-3.42%	1.18%	11.63%
Equities	US Equities	MSCI USA	-5.04%	21.19%	10.89%	0.69%	12.69%
Equities	US Small Cap Equities	MSCI USA Small Cap	-10.40%	16.75%	19.15%	-4.11%	7.07%
Equities	World Equities	MSCI World	-7.38%	18.48%	9.00%	2.08%	9.81%
Alternative	Australia REITs	S&P AUSTR REIT	4.52%	4.87%	11.89%	12.68%	24.62%
Alternative	Broad Commodities	Bbg Commodity	-11.25%	1.71%	11.77%	-24.66%	-17.01%
Alternative	Crude Oil	Bbg Composite Crude Oil	-17.64%	9.87%	16.32%	-44.74%	-44.33%
Alternative	Energy	Bbg Energy	-12.69%	-4.32%	16.27%	-38.87%	-39.34%
Alternative	EUR Infrastructure IG	Markit iBoxx EUR Infrastructure Index	-1.24%	2.30%	4.89%	-0.50%	10.29%
Alternative	EUR Infrastructure IG	Markit iBoxx EUR Infrastructure Index	-1.24%	2.30%	4.89%	-0.50%	10.29%
Alternative	Global Infra. Equity	DJ Brookfield Global	-7.87%	15.79%	12.52%	-14.40%	16.34%
Alternative	Gold	Gold Futures	-3.43%	12.62%	7.87%	-10.35%	-1.63%
Alternative	Hedge Funds: Composite	Hedge Funds	-4.07%	8.59%	5.44%	-1.12%	2.98%

Alternative	HF - Equity Hedge	HFRI Equity Hedge	-6.90%	13.29%	5.47%	-0.97%	1.81%
Alternative	HF - Equity Market Neutral	HFRI EH: Equity Market Neutral	-1.21%	4.88%	2.23%	4.27%	3.06%
Alternative	HF - Event-Driven	HFRI Event-Driven	-1.73%	7.59%	10.57%	-3.55%	1.08%
Alternative	HF - FoF Composite	HFRI Fund of Funds Composite	-3.48%	7.77%	0.51%	-0.27%	3.37%
Alternative	HF - Macro	HFRI Macro	-3.21%	2.20%	1.03%	-1.26%	5.58%
Alternative	HF - Macro: Systematic	HFRI Macro: Systematic Diversified	-5.25%	2.12%	-1.37%	-2.41%	10.73%
Alternative	HF - Merger Arbitrage	HFRI ED: Merger Arbitrage	3.25%	4.31%	3.63%	3.32%	1.69%
Alternative	HF - Relative Value	HFRI Relative Value (Total)	0.66%	5.14%	7.67%	-0.29%	4.02%
Alternative	Japan REITs	S&P Japan	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 REITs	FTSE NAREIT All Eqty	-4.04%	8.67%	8.63%	2.83%	28.03%
Alternative	United States REITs	FTSE NAREIT All Eqty	-4.04%	8.67%	8.63%	2.83%	28.03%
Alternative	United States REITs	S&P USA REIT	-3.79%	4.33%	8.49%	2.54%	30.26%
Alternative	US Infra. Equity	DJ Brookfield US	-10.53%	7.39%	22.24%	-24.59%	17.36%
Alternative	USD Infrastructure IG	Markit iBoxx USD Infrastructure Index	-3.33%	7.59%	10.30%	-3.86%	9.99%

Source: Bloomberg, DWS calculations. As of 12/31/18. 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.

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