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Shaping bond allocations to hedge equity risk: think carry, not just correlation

KEY POINTS

- Our research indicates that developed market sovereigns such as US Treasuries can't hedge sufficiently against the risk of a significant equity-market downturn.
- Examining a range of options, we consider how investors can position themselves if they believe a meaningful fall in equity values will occur in the medium term.
- Investors concerned about equity risk should think about broadening their fixed income allocations to include sectors such as investment-grade and high-yield corporates, hard-currency emerging markets debt and liquid alternatives. Even though such assets may be more highly correlated with equities than developed market sovereigns are, their higher yields and expected returns can cushion equity losses.
- For hedging 20%+ equity-market corrections, investors should stick with core-bond investments because credit spreads typically widen during major stock-market shocks.

DURING A CRISIS, WE ARE TOLD, "ALL CORRELATIONS GO TO ONE".

A correlation that does not go to one, though, is that of perceived safe-haven bonds to equities. In periods of market stress, when central banks typically hurry to cut interest rates and money flows from risky to safe assets, bonds of highly rated government and corporate issuers rise — at least partly offsetting the losses from equity assets and pushing the correlation to something more like minus one. With equity valuations at all-time highs at this writing, one might take comfort from this. Yet bond yields are at all-time lows; surely they cannot go low enough to offset a significant downturn in equities?

The good news: sovereign bonds diversify equity risk

The good news is, developed market (DM) sovereign bonds historically have diversified equity risk in periods of market stress. To show this, we examine a hypothetical 50/50 equity/bond portfolio, with equities represented by the MSCI World Index and DM sovereign bonds by

an even (25/25) mix of the BofA Merrill Lynch Global Government and US Treasury indexes.[1] **Figure 1** reveals no upward spike in correlations between bonds and equities during bouts of market volatility, represented here by the Chicago Board Options Exchange (CBOE) Volatility Index, or VIX. (Although the VIX is tied to the S&P 500, it is generally regarded as a good proxy for global market volatility.)

Figure 1
Correlation of DM government bonds with global equities typically has not spiked in market stress periods
20 years ended 30 June 2017

DM government bonds proxied by a 50/50 blend of the BofA Merrill Lynch Global Government and US Treasury indexes, global equities by the MSCI World Index | Past results are not necessarily indicative of future results. Source: Bloomberg

Some good news we didn't know: low rates aren't a problem

Some investors believe that low bond yields have made bonds less effective at hedging equity risk. To test this belief, we examined historical data since 1997 to see if we could find a relationship between the level of bond yields and the amount of protection they have offered when equities decline. A key metric we used to gauge this relationship was something we call the Fixed Income Loss Prevention ratio. This is the percentage of an equity decline that would be offset by a fixed income gain in our hypothetical 50/50 equity/bond portfolio. For example, if the equities fell in value by 6% and the bonds rose by 3%, this would be a 50% loss prevention. We constrained our analysis to all occasions over approximately the past 20 years when equities fell by a medium-sized 4% to 6%. To align the analysis with many investors' time frames, returns were measured over a series of rolling 90-day periods.

[1]Since US Treasuries are a component of the BAML Global Government Index, this mix results in an overall DM sovereign allocation that is approximately two-thirds US Treasuries and one-third non-US DM sovereigns. Of note, our research did not reveal any major differences in performance between US and non-US DM sovereigns for the analyses in this paper. A complete list of the market indexes used as asset-class proxies in this piece is included in "Important disclosures" at the end of the paper.

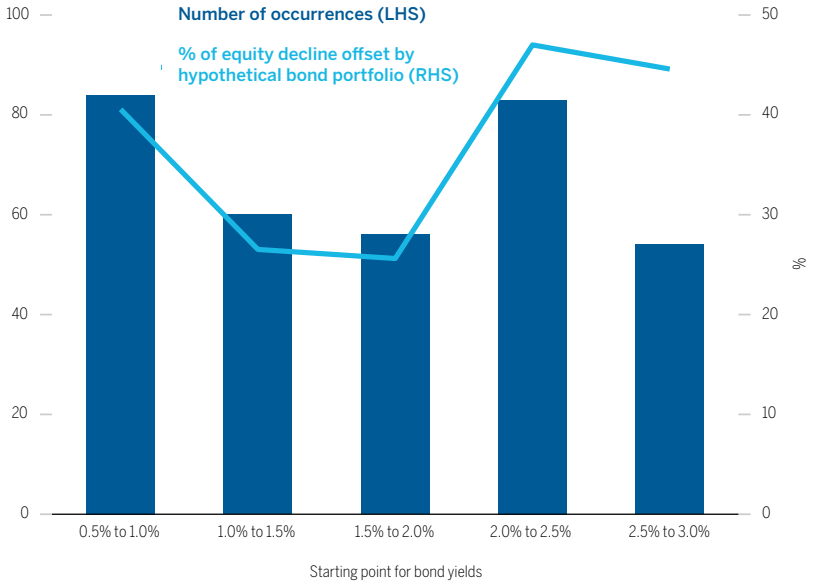
Even though DM government bonds have historically diversified equity risk, their values simply haven't had have enough variability to match the magnitude of major stock-market declines.

As can be seen in **Figure 2**, over this period a very low starting yield for yields (leftmost bar) would not have affected the level of equity-loss prevention that the bond half of our hypothetical 50/50 equity/bond portfolio would have provided.

Figure 2

Very low starting yields may not impair DM government hedging ability

1 January 1997 – 30 June 2017



Examines all instances over the review period in which equities as represented by the MSCI World Index fell between 4% and 6%. This range was selected by Wellington Management in its discretion for purposes of this analysis; however, we believe the use of alternatively sized shocks (larger or smaller) would yield similar results. Past results are not necessarily indicative of future results. | Please refer to "Important disclosures" for a list of market indexes used as asset-class proxies. | Sources: Bloomberg, BofA Merrill Lynch.

The not-so-good news: government bonds can't protect a portfolio against major stock-market downturns

Even though DM government bonds have historically diversified equity risk as seen in **Figure 1**, their values simply haven't had have enough variability to match the magnitude of major stock-market declines; hence, they haven't been able to adequately offset the risk of a big stock-market fall. Returning to our 50/50 portfolio, there is a clear relationship between the size of the fall in the equity assets and the loss-prevention capabilities of the hypothetical fixed income allocation (again, an even mix of the BAML Global Government and BAML US Treasury indexes).

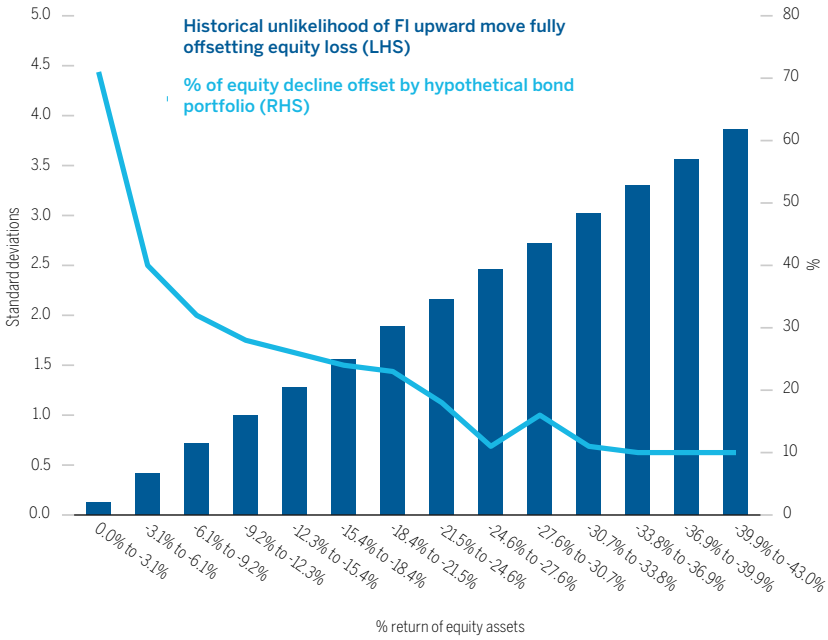
Our research suggests that changes in central bank policy rates don't have an effect on the equity-loss-prevention ability of fixed income assets.

Figure 3 shows that DM governments have offered excellent loss prevention in smaller equity downturns. However, the level of loss protection decreases as the equity falls grow in size. For equity declines greater than 25%, fixed income assets are only offsetting about 10% of that loss; that is, they are only gaining 2.5% of value, leaving the aggregate hypothetical portfolio with a 22.5% loss. For larger equity declines, multiple-standard-deviation (and therefore highly improbable) appreciation in the hypothetical bond allocation would be needed to fully mitigate the decline in equities.

Figure 3

Loss-protection power of DM sovereign bonds fades as magnitude of equity downturn rises

1 January 1997 – 30 June 2017



See "Important disclosures" for a list of market indexes used as asset-class proxies. Height of bars denotes the probability, expressed in standard deviations, of a rise in the hypothetical bond portfolio sufficient to fully offset the specified equity decline. The higher the bar, the more unlikely it has historically been that such a rise could occur. Past results are not necessarily indicative of future results. | Sources: Bloomberg, BofA Merrill Lynch

Whilst the level of long-dated bond yields appears to be irrelevant, is it possible that changes in central bank policy rates might have an effect on the loss-prevention ability of fixed income assets? Our research suggests that they do not. **Figure 4** shows four periods over the past two decades during which equities, as represented by the MSCI World Index, suffered significant declines. The level of policy rates as proxied by the US federal funds rate differed markedly across these periods. In two of the periods the fed funds rate was cut sharply, and in two of them it was not. Yet the level of loss prevention offered by bonds appears not to have been affected by the level of rates, or by whether or not there were cuts.

FIGURE 4
The loss-prevention power of US Treasuries seems not to have been affected by policy rates

Market crisis	When occurred	Equities fell by	Change in fed funds rates	Loss prevention provided by USTs*
Tech bust	March 2000 – October 2002	-48.4%	-4.25%	36%
Global financial crisis	July 2007 – March 2009	-57.7%	-5.00%	22%
Eurozone crisis	April 2011 – October 2011	-18.7%	0.00%	44%
Chinese stock panic	May 2015 – January 2016	-17.8%	0.25%	11%

Includes the four major fundamental stock market declines occurring in the past two decades. See "Important disclosures" for a list of market indexes used as asset-class proxies and additional disclosures. | Sources: Bloomberg, BofA Merrill Lynch. Past results are not necessarily indicative of future results. * Percent of losses in global equities as proxied by the MSCI World Index that would have been offset by US Treasuries, for a hypothetical portfolio of 50% equities and 50% US Treasuries, based on daily historical market data 1 January 1997 —30 June 2017. From this data, rolling three-month returns were calculated to mimic the typical observation period of an institutional investor.

We're not sure when the shock will be, so the carry matters

The analysis so far of the equity-hedging effectiveness of DM governments is only looking at half the total picture. The loss-prevention power of defensive assets also needs to be evaluated in light of their carry: the cost (negative or positive) of holding the asset over a period of time.

In order to bring carry into the analysis, we established a hypothetical scenario in which equities experience a 10% fall in value lasting two years. (We believe this scenario approximates the size and length of downturn that many asset owners are concerned about.) Since the defensive asset will be held for two years, carry costs are important. We also created a hypothetical portfolio consisting 50% of the MSCI World and 50% of a specific fixed income asset type, as laid out in **FIGURE 5** below.

FIGURE 5
Behaviour of various fixed income asset types in 8% – 12% equity falls
1 January 1997 – 30 June 2017

Asset type	Yield as of 1 July 2017	Valuation change if equity shock	Loss prevention	Total portfolio performance
DM governments	1.05%	2.31%	23%	-2.89%
US Treasuries	1.95%	3.25%	33%	-1.62%
US IG corporates	3.28%	1.74%	18%	-1.18%
US high yield	6.10%	-2.94%	-30%	-0.97%
External EMD	4.52%	-1.15%	-12%	-1.51%

The hypothetical portfolio consists of a 50% allocation to the MSCI World and a 50% allocation to the indicated fixed income asset class. A range of 8% to 12% equity falls was chosen for purposes of this analysis as typical of the magnitude of shock that many clients are concerned about; other ranges yielded similar results. For additional disclosure regarding hypothetical portfolios and market indexes used as asset-class proxies, please refer to Important Disclosures at the end of the document. Past results are not necessarily indicative of future results.

> Assets with little to no correlation to equities, or even a modestly positive correlation, can still be considered defensive assets if their expected return outweighs any valuation losses they experience during an equity fall.

Initially, we looked at a range of fixed income assets under this scenario: DM sovereigns ex-US, US Treasuries, US investment-grade and high-yield corporate bonds, and hard-currency-denominated emerging markets debt.[2] The "Valuation change if equity shock" column shows how the specific bond asset type has historically tended to perform when equities have fallen 8% – 12%.[3] "Loss prevention" shows the change in value of the bond asset as a percentage of the equity decline. "Total portfolio performance" is the return of the overall hypothetical portfolio — the accrued carry from the bonds, plus the equity and bond valuation changes — over the two-year period.

Correlation is not the sole measure of hedging power: carry also matters

As shown in the previous figure, DM sovereigns are less than optimal assets for hedging a medium-sized equity downturn. The hypothetical portfolios with corporate bonds as their fixed income allocations, by contrast, have the best total performance. This is because — even though we have observed that corporate bonds do not perform as well as sovereign bonds in an equity shock situation — they accumulate a significant buffer of additional return over the period, which can also be offset against equity losses.

A counterintuitive conclusion to be drawn from this analysis is that assets with little to no correlation to equities, or even a modestly positive correlation — that is, assets that underperform when equities do — can still be considered defensive assets **if their expected return outweighs any valuation losses they experience during an equity fall**. In a perfect world, a defensive asset would have a negative correlation to risky assets. But if such assets have both a low expected return and only a weak offsetting response to equity declines, non-correlated or mildly correlated assets can fare better than conventionally defensive assets — those with negative correlations to equities — when stock markets take a sharp tumble.

To further illustrate this point, we now add a new hypothetical investment to the menu of hedging assets, one with an assumed return of 4% and a moderately positive beta to the MSCI World Index ("Liquid Alternative"). These characteristics are similar to those targeted by many absolute-return or liquid alternative assets. This investment functions as a hedging asset because it typically does not lose much value when equities are performing poorly, and could gain a reasonable amount of value when they are not.[4]

Correlation, beta and loss prevention

Correlation, beta and loss prevention are all measures of the degree to which two assets diversify one another. Correlation (which is most commonly used) measures the extent to which two assets move together; thus a negative correlation is desirable for diversification. However, correlation is not useful for assessing bond and equity diversification effects, because it standardises by their variance, and so ignores the fact that bonds have much lower risk. So a bond index and an equity index can have a highly negative correlation even when the bonds are only offsetting a tiny percentage of equity losses. Beta is a better metric for our purposes, because it more accurately measures the degree to which bonds offset equity gains. However, we believe that loss prevention (used in this paper) is a better measure still, since it specifically gauges the potential impact of downside equity scenarios.

[2]Indexes used to proxy asset types are listed in "Important disclosures".

[3]Both the equity shock and the fixed income valuation changes are measured over a 90-day time-frame. Over the 20-year-plus data period, we found that the valuation changes of fixed income assets in response to equity shocks varied only modestly, allowing us to be confident that this scenario is realistic.

[4]We also considered derivative-based hedging strategies such as buying equity put options, taking a long position in the VIX index and more subtle variations such as selling put options on the VIX. Whilst these strategies can work as ways to hedge equity risk, their negative carry makes them uncompetitive versus assets with a positive expected return over our two-year assumed time frame. Thus we excluded them from this analysis. If investors expect a nearer-term equity shock — say, one occurring within a few months — such tools can be effective hedges. If alternative assumptions were selected for the hypothetical hedging strategy, results would differ.

The most effective hedging asset? Depends on the size of the shock

We next look at how well the hedging assets we have introduced so far perform under other shock scenarios, while keeping our scenario time-frame constant at two years. To do this, we compare the total (un-annualised) change in the value of various hypothetical portfolios consisting of a 50/50 mix of equities and specific hedging assets over the two-year period across a range of equity-fall sizes (**Figure 6**).

Figure 6

Performance of various hypothetical portfolios by size of equity fall

Equity fall	0% to -5%	-5% to -10%	-10% to -15%	-15% to -100%
% of total falls observed 1 January 1997 – 30 June 2017	48.08%	27.31%	16.72%	7.89%
DM governments	0.36%	-1.80%	-3.79%	-8.87%
US Treasuries	1.28%	-0.64%	-2.49%	-7.43%
US IG corporates	2.40%	0.23%	-2.18%	-10.02%
US high yield	4.38%	1.04%	-2.25%	-12.75%
External EMD	3.55%	0.25%	-2.50%	-11.44%
Liquid alternative	2.82%	-0.07%	-2.60%	-8.57%

Wellington Management analysis based on BofA Merrill Lynch and MSCI index data via Bloomberg. Analysis based on historical market data 1 January 1997 – 30 June 2017. Results of more than one standard deviation from the mean are highlighted in red or dark green. Past results are not necessarily indicative of future results. The hypothetical portfolios consist of a 50% allocation to the MSCI World (equities) and a 50% allocation to the indicated asset type. For additional disclosure regarding hypothetical portfolios and market indexes used as asset-class proxies, see Important Disclosures at the end of the document.

As can be seen in the second row of the table (and as common sense would denote), declines greater than 10% were a minority, comprising only a quarter of the equity falls during the review period. For falls of up to 10%, the higher-carry assets — high yield and emerging-markets bonds — performed best, and DM government bonds performed the worst. In fact, the pattern of DM sovereign underperformance persisted for all equity falls apart from the very largest (greater than 15%), for which US Treasuries did better and US high yield worst as spreads for the sector widened. But overall, it is clear that DM government bonds historically have not been good diversifiers of equity risk.

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>
> US investment-grade corporates are reasonably effective for all equity falls.

US investment-grade corporates are reasonably effective for all equity falls; they are roughly as effective at offsetting equity risk as DM sovereigns, but have a higher yield. This implies that their credit spreads do not tend to widen enough, even during fairly large equity falls, to eliminate their equity-hedging qualities.

Diversifying beyond core bonds may better hedge small- and medium-sized equity downturns

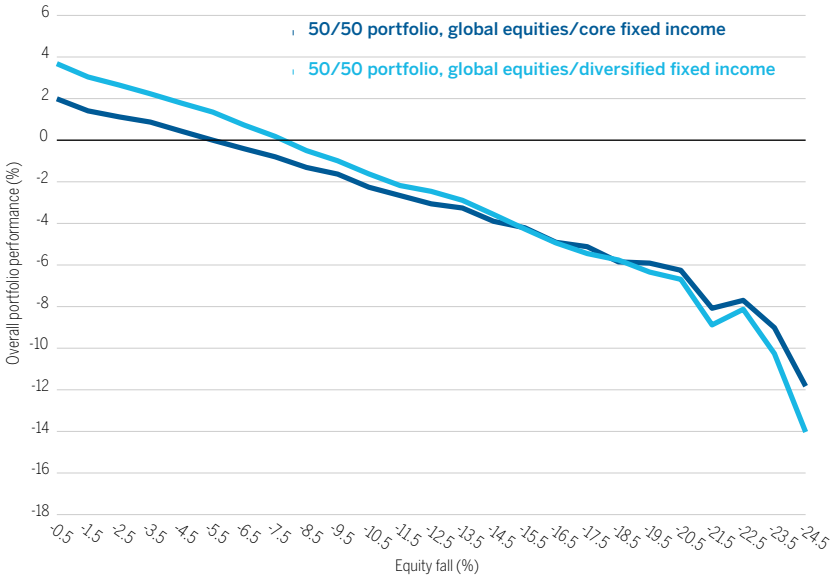
The fixed income allocations of many institutional investors are composed solely of "core" sectors such as DM governments and investment-grade corporates. In **Figure 7** we compare the performance of two hypothetical portfolios: one composed of equities and core bonds, the other of equities and "diversified" bonds — mostly US investment-grade corporates, with additional smaller allocations to high-yield bonds, external-currency EMD and our hypothetical liquid alternative. The total performance of these two portfolios is plotted across ascending levels of equity losses.

It is clear from our analysis that for small- or medium-sized equity falls, the hypothetical portfolio with diversified bonds offers generally better carry and loss-prevention capabilities than the portfolio with only core bonds. Of course, these equity-hedging benefits come at the price of taking on more credit risk.

> "For small- or medium-sized equity falls, our hypothetical portfolio with diversified bonds offers generally better carry and loss-prevention capabilities than the portfolio with only core bonds.

Figure 7

Riskier FI assets hedge equity risks better than "core" assets — up to a point



Wellington Management analysis based on BofA Merrill Lynch and MSCI index data via Bloomberg. Analysis based on historical market data 1 January 1997 – 30 June 2017. "Core" assets are 17.5% DM government bonds, 17.5% US Treasuries, 15% US investment-grade corporate and 50% MSCI World; "Diversified" bonds are 25% US investment-grade corporate, 5% US high yield, 5% US dollar-denominated emerging markets bonds, 15% the hypothetical liquid alternative and 50% MSCI World. Past results are not necessarily indicative of future results. For additional disclosure regarding hypothetical portfolios, see "Important disclosures" at this end of this paper.

For the core bonds, an equity fall of around 5.5% generated negative overall performance, versus a fall of around 8% for the diversified hedging assets. The two lines cross at around a 15% equity decline; beyond that size, the core fixed income assets tended to slightly outperform, as their loss prevention characteristics are generally more stable. Should the expected equity

shock fail to occur, the diversified hedging assets also have a higher yield and a shorter duration than the core assets. These characteristics could prove desirable in the event of higher inflation or rising rates (as discussed below).

Regime change?

Many investors are worried about rising interest rates, potentially higher inflation and the market impact of central banks beginning to sell assets they purchased as part of their post-crisis quantitative easing programmes. The risks that these developments could pose to the bond/equity correlation are discussed in greater detail in a paper published by two Wellington colleagues earlier this year, "Do bonds diversify equity risk?"[5] That paper also shows that over a very long time-frame, the bond/equity correlation has been positive for extended periods.

It is beyond the scope of this paper to forecast the next paradigm markets may face, but we believe that:

- Over shorter time frames, the returns of safe-haven assets and risky assets are greatly influenced by flows between the two, and should remain inversely correlated.
- Healthy, demand-driven inflation will tend to boost equities while harming safe-haven bonds, creating a negative correlation. Stagflation — a scenario in which the central bank has lost control of inflation — would probably create a positive correlation, but this is less likely.
- It is difficult, if not impossible, to identify a situation where a developed economy that issues bonds in its own (fiat) currency has faced a sovereign credit crisis. We think sovereign credit risk among developed countries is consistently overestimated by market commentators.
- The unwinding of quantitative easing may push down the prices of both bonds and equities. However, it is unclear if this risk is avoidable, and even cash — the main alternative to bonds and equities — has a negative real return for most investors, and a negative nominal return for many.

To hedge equities, think beyond sovereign bonds

The negative correlation of higher-credit-quality bonds to risk assets — the tendency for perceived safe-haven bonds such as DM sovereigns to outperform during periods of market turmoil — has historically helped stabilise portfolios at such times. Whilst we do not see any immediate reason for this correlation to turn positive, the low variability of many sovereign bond assets means that, viewed in terms of carry and loss prevention, they are not optimal hedging assets. Simply put, we think DM sovereign bonds offer too little diversification to equity risks in relation to their carry.

If sovereign bonds are the surprising "losers" in our equity-hedging competition, then the surprising "winners" may be the riskier fixed income sectors. These have had a higher correlation to equities than DM sovereigns, and carry higher credit risk. But they also tend to have a higher expected return, which allows a buffer of value to be built up over time that can offset equity losses to a meaningful degree. Furthermore, our hypothetical liquid alternative — with an assumed return of 4% and a beta to equities of 0.1 — is, for all equity falls but those that are either very large or expected very soon, a better defensive asset than DM sovereigns. ■

"If sovereign bonds are the surprising "losers" in our equity-hedging competition, then the surprising "winners" may be the riskier fixed income sectors.

[5]https://www.wellington.com/en/pub/do-bonds-diversify-equity-risk

Important disclosures

Market indexes used as asset-class proxies in this paper

- Developed market sovereign bonds: BofA Merrill Lynch Global Government Index
- US Treasuries: BofA Merrill Lynch US Treasury Index
- US investment-grade corporate bonds: BofA Merrill Lynch US Corporate Index
- US high-yield corporate bonds: BofA Merrill Lynch US High Yield Index
- External emerging markets debt (EMD): BofA Merrill Lynch Emerging Markets External Debt Sovereign Index
- Global equities: MSCI World Index

Calculation of the Loss Prevention Ratio

The loss-prevention data shown in the article is based on daily historical market data for the period 1 January 1997 —30 June 2017. From this data, rolling three-month returns were calculated to mimic the typical observation period of an institutional investor.

Hypothetical portfolio disclosures

Hypothetical portfolios are provided for illustrative purposes only and are represented by blends of indexes. Hypothetical results are developed with the benefit of hindsight (i.e., actual knowledge of market conditions, results of similar strategies) and are subject to numerous other limitations. Index blends are not representative of an actual portfolio or Wellington Management strategy. Assumptions were selected by Wellington Management, and using different indexes or time periods might produce different results. Indexes are unmanaged and cannot be invested into directly. Index returns do not reflect trading costs, commissions, investment management fees, custody charges and other expenses associated with investments, but do include reinvestment of dividends and interest. If these costs were considered, the results would be lower.

Since trades in an actual client account have not been executed, results may have under- or overcompensated for the impact, if any, of certain market factors, such as lack of liquidity, and may not reflect the impact that certain economic or market factors may have had on a manager's decision-making process if client funds were actually managed in the manner shown. Hypothetical performance cannot completely account for the impact that financial risk would have on actual trading. Certain of the assumptions have been made for modelling purposes and might not be repeated. The management of an actual account would produce different results than the hypothetical results presented. **PAST RESULTS AND HYPOTHETICAL RESULTS ARE NO GUARANTEE OF FUTURE RESULTS.**

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