



Diversifiers Forever

How foundations, endowments and other ultra-long-term investors can harness diversifiers for higher expected returns

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Thomas Maloney

Portfolio Solutions Group

Josh Stone

U.K. and Benelux Client Solutions

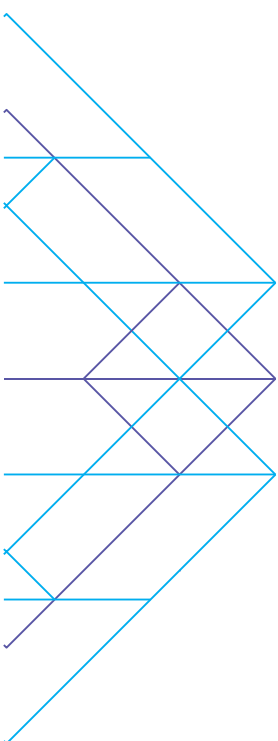
Executive summary

In a portfolio whose investment horizon is forever, do diversifying investments add any value? While a smoother ride may be useful for nest-egg savers or retirees, for investors who can serenely allow market volatility to pass them by, what's the point?

In this short paper, we illustrate the surprising power of diversification for ultra-long-term investors. A modest re-allocation from equity-correlated investments to a strongly diversifying alternative has the potential to increase compound returns and generate more constant payouts to beneficiaries - even if the new investment looks unspectacular on its own.

The most innovative investors can go one better. By adding the diversifying source of return as a capital-efficient overlay (for example, by using a portable alpha structure), such investors can substantially increase expected compound returns and payouts over the long term, at the same level of portfolio risk.

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Setting the Scene

Foundations and endowments are in it for the very long haul - their investment horizon is effectively forever. Not surprisingly, they tend to favour high-returning assets, embrace illiquidity (in line with the so-called Yale or Endowment Model popularized by David Swensen), and have a high tolerance for short-term volatility. Their investment objective is typically to maintain the real value of the portfolio while paying out regular distributions to help fund an institution or charitable activities. Their risk appetite tends to be limited only by the desire to maintain a reasonable constancy of payouts (often a fixed percentage of a rolling average of the portfolio value) without eroding their capital to the extent that it will be difficult to recover.

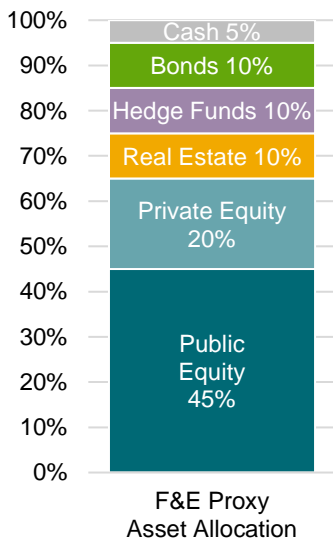
Exhibit 1A shows a typical asset allocation for a UK foundation or endowment.¹ Details differ across investors and regions, but the common trait

tends to be a large allocation to public and private equity, which are perceived - with good reason - to offer the highest expected return over the long term. This has been a highly profitable strategy since the 2008 Global Financial Crisis, powered by a 15-year bull market in U.S. equities. Private equity firms made effective use of ultra-cheap leverage in the 2010s to magnify those returns. Meanwhile, U.S. dollar appreciation delivered an extra bonus for unhedged non-U.S. investors.

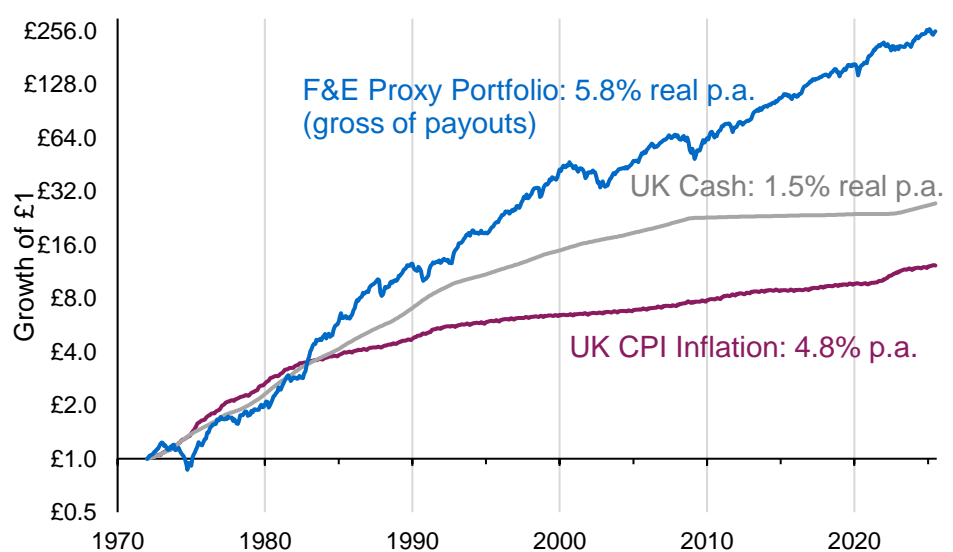
The 1980s and 1990s decades also saw strong returns for equity-focused portfolios - as shown in **Exhibit 1B** - but some other periods were tougher. The 1970s and the 2000s saw much smaller or negative real returns. We'll argue that the next decade is shaping up to be another difficult one, and foundations and endowments would do well to make adjustments sooner - with markets still riding high - rather than later.

Exhibit 1: Equity-Dominated Portfolios Have Served Investors Well Since the GFC

A. Typical F&E Portfolio



B. Hypothetical Performance Jan 1, 1972 - Jun 30, 2025



Sources: Bloomberg and AQR. Chart A is based on various surveys as described in the text. Chart B is based on monthly data in GBP. See Appendix for details of asset class proxies, which include both index and hypothetical data (some gross and some net of fees). F&E Proxy Portfolio is hypothetical, for illustrative purposes, and not representative of a portfolio AQR currently manages. Past performance is not a guarantee of future performance. Hypothetical data has certain inherent limitations, some of which are disclosed in the appendix.

¹ Based on various surveys including Mercer's Endowment and Foundation Investment Survey, Cambridge Associates Endowments Quarterly and UK Foundations and Endowments report, Prequin Institutional Allocation Study, and others.

Public and Private Equity Headwinds

Strong global equity returns from 2010 to 2025 were driven by *rising valuations*, as shown in **Exhibit 2A**. This chart decomposes the average return into its more sustainable and less sustainable components. Even if valuations stay near mid-2025 levels going forward, future returns are likely to be much lower – around half of the 8% real per annum that investors have enjoyed in the past. Any reversion towards historical valuations will cause further reductions. Currency moves are unpredictable, but U.S. dollar richness makes ongoing tailwinds unlikely for non-U.S. investors.

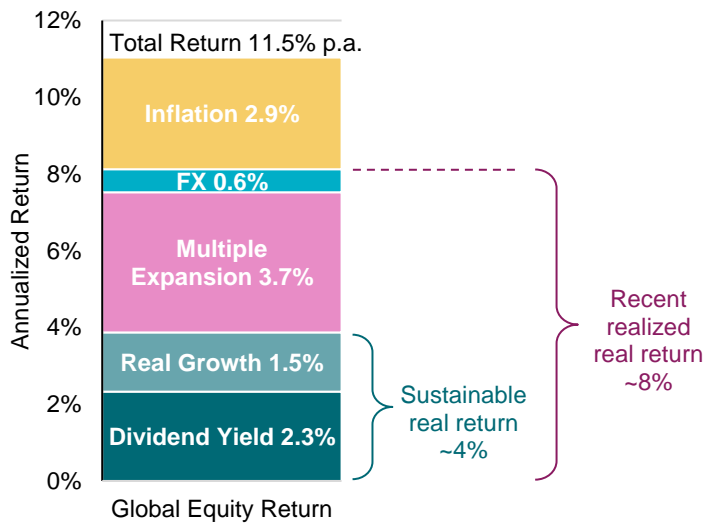
Private equity (PE) prospects also look gloomy, as the tailwinds from ultra-cheap debt in the 2010s have decisively reversed. **Exhibit 2B** shows, on the left, cost of debt estimates from AQR’s capital market assumptions for U.S. buyouts, and on the right, the resulting annual return boost from leverage, which has fallen by 3-4% (see AQR (2025)). Many investors have faced delayed distributions as the private equity industry

struggles to adapt to this new economic reality. Over the longer term, PE managers will need to find other and tougher ways to deliver strong returns to their investors.

How might these gloomy forecasts be proved wrong? Technological advances (artificial intelligence) *could* boost productivity and earnings growth for decades to come, outweighing the triple drag of demographics, deficits and deglobalization, sustaining high valuations and even pushing them higher. The private equity industry *could* indeed find new ways to outperform. It’s possible. But this “best case” does not seem sensible a central scenario, when so many less favourable outcomes are also possible. We believe investors should resist the market’s tendency to over-extrapolate “good times”, respect market valuations, and accept the likelihood of lower returns going forward. But is there anything they can do about it?

Exhibit 2: Beware the Rearview Mirror (and Prepare for Lower Returns)

A. Global Equity Returns Jan 2010 - Jun 2025



B. Estimated PE Cost of Debt



Sources: Pitchbook, Bloomberg and AQR. Chart A is based on MSCI World in GBP, gross of fees. Return components do not exactly add up to total due to compounding. Chart B shows PE cost of debt estimates from AQR’s capital market assumptions for U.S. buyouts, which are based on real short rate forecasts plus a spread estimate. Average return boost depends on the unlevered expected real return derived from purchase multiples (5.4% for 2012-2021, 5.0% as of Dec 2024) and the average debt to equity (124% for 2012-2021, 69% as of Dec 2024).

Wanted: Orthogonal Returns

Where can high-risk-appetite investors find value in this world of low expected returns on equity-related assets? Some will put their trust in **manager alpha**, which can play a role, but is unlikely to fill the expected return gap on its own.

Many already invest in **hedge funds**, which can use financial tools such as shorting and leverage to generate diversifying returns independent of the broad market’s prospects. That sounds promising. But analysis of hedge fund returns often yields mostly passive market exposure and little alpha (Asness et al. (2001) is one early example), so we’ll have to be more specific in our requirements.

We suggest investors seek out strategies that are both capital efficient and strongly diversifying to equity risk. Examples include **equity market**

neutral strategies, which aim to deliver pure levered stock selection views without the beta; dynamic macro strategies such as **trend following**, which can go long or short and have tended to thrive in “bad times” for equity markets, including inflation shocks like 2022; and **multistrategy absolute return** funds that may span both categories in one capital-efficient package.

But can these diversifiers really deliver enough “bang for the buck” to be viable substitutes for – or complements to – equity-like exposures? And if so, how significant are the potential benefits for a typical foundation or endowment strategy? This is what we explore in the remaining two sections. We focus on GBP returns here, but U.S. dollar and euro perspectives are shown in the appendix.

Historical Analysis

We first build a proxy foundation or endowment portfolio (“F&E Proxy”) using the typical asset allocation shown in Exhibit 1A and representative indices for each asset class, assembling monthly data right back to 1972. **Exhibit 3** shows performance statistics for our asset class proxies, with construction details given in the appendix.

The “Liquid Diversifier” is represented here by trend following or managed futures; we choose this strategy because it is more easily and reliably

extended back in time, compared to other more complex long/short strategies, and has a useful tendency to outperform in tough market environments. Other diversifying strategies such as equity market neutral may also be considered (and may offer smoother sources of alpha). Our trend proxy joins industry index data from 1990 with heavily discounted hypothetical data for the earlier period. The last row highlights the fact that many so-called alternatives are in fact highly correlated to equity markets.

Exhibit 3: Hypothetical Performance of Asset Classes and Portfolio Jan 1972 - Jun 2025

	Public Equity	Private Equity	Real Estate	Hedge Funds	Bonds	Liquid Diversifier	Cash	F&E Proxy Portfolio
Real Return (GM)	5.4%	8.9%	5.4%	4.3%	3.0%	5.6%	1.5%	5.8%
Volatility	14.7%	16.0%	8.9%	6.3%	3.7%	10.1%		10.4%
Sharpe Ratio	0.33	0.52	0.47	0.46	0.42	0.44		0.46
Max Real Drawdown	-51%	-61%	-45%	-27%	-29%	-22%	-30%	-43%
Equity Correlation	1.00	0.78	0.61	0.63	0.16	0.10		0.97

Sources: Bloomberg, AQR. Monthly data in GBP. See Appendix for asset class proxies. F&E Proxy allocations from Exhibit 1. F&E Proxy Portfolio is hypothetical, for illustrative purposes, and not representative of a portfolio AQR currently manages. Past performance is not a guarantee of future performance. Hypothetical data has certain inherent limitations, some of which are disclosed in the appendix.

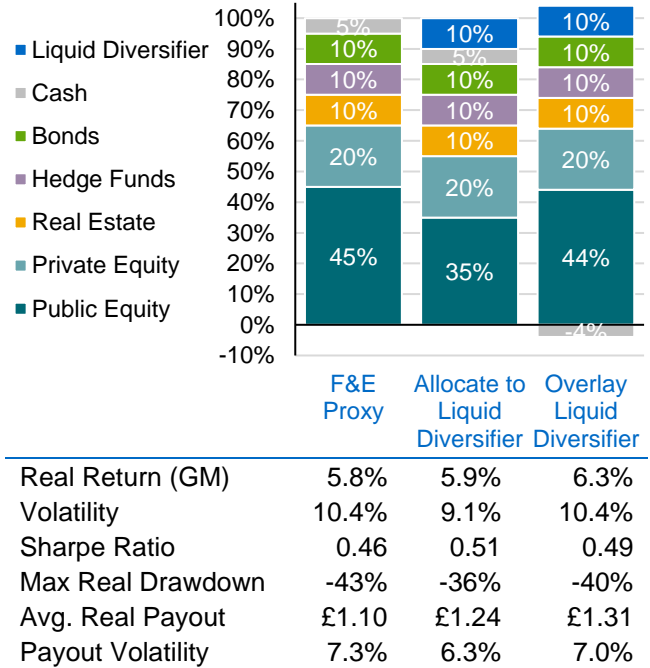
The last column in Exhibit 3 shows that our foundation proxy earned nearly 6% p.a. real return gross of any payouts, though it lost over 40% of real (inflation-adjusted) value in the 1970s, and around 30% during the Financial Crisis.

Exhibit 4 presents two potential modifications to the F&E portfolio. The first reallocates 10% from public equity to the liquid diversifier, while the second adds 10% exposure to the diversifier as an unfunded overlay, and then adjusts the equity and cash allocations so that the total risk of the portfolio (proxied by volatility) is unchanged. The table shows that both modifications result in higher compound returns at a similar or lower level of portfolio risk, with smaller drawdowns. The reallocation gives a larger risk reduction, while the overlay gives a larger return boost.

The last two rows in Exhibit 4 reflect a simple distribution strategy that pays out 5% of the past 36-month average NAV each year (deducted monthly), with the objective of delivering stable real value of payouts, while maintaining or growing the real value of the principal. **Exhibit 5** shows the cumulative real value of the portfolio (adjusted for CPI inflation) gross and net of these distributions. As all three portfolios have earned higher than 5% real return, all are able to maintain or grow real principal value over the long term, but there are long periods of principal depletion in the

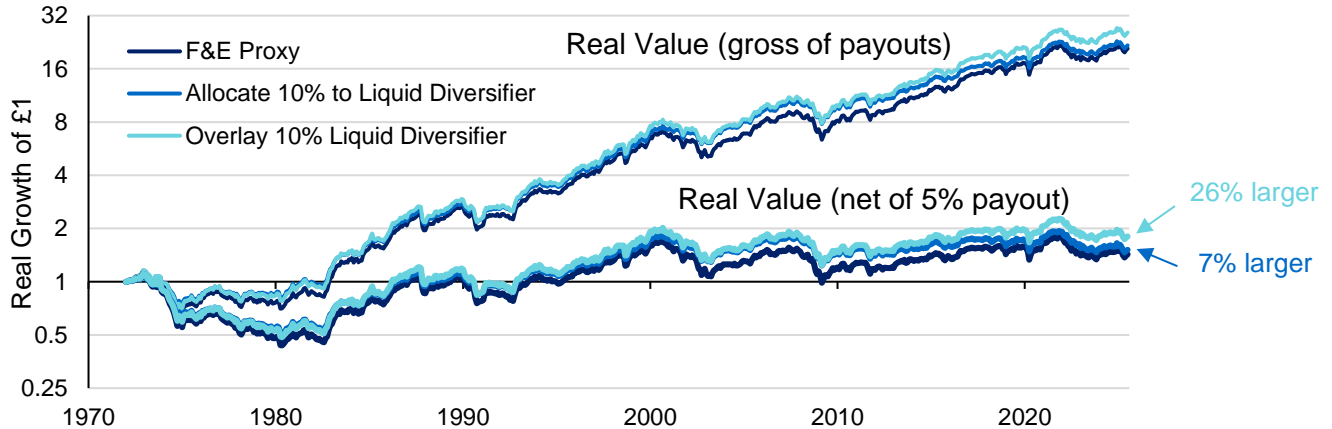
1970s, the early 1990s, and the 2000s. These episodes are mitigated by the inclusion of the liquid diversifier, which was able to earn positive real returns during equity bear markets. A small increase in average annual real return translates to a substantially larger principal in the long term (26% larger for the overlay strategy).

Exhibit 4: Illustrative Allocations and Hypothetical Performance Jan 1972 - Jun 2025



Sources: Bloomberg, AQR. Monthly data in GBP. Real payout starts at £1 in 1972 (see Exhibit 6). Payout volatility calculated from 1-year % changes in real payout. Past performance is not a guarantee of future performance. Hypothetical data has certain inherent limitations, some of which are disclosed in the appendix. For illustrative purposes only. Not representative of a portfolio AQR currently manages.

Exhibit 5: Hypothetical Cumulative Real Value of Principal Jan 1, 1972 - Jun 30, 2025

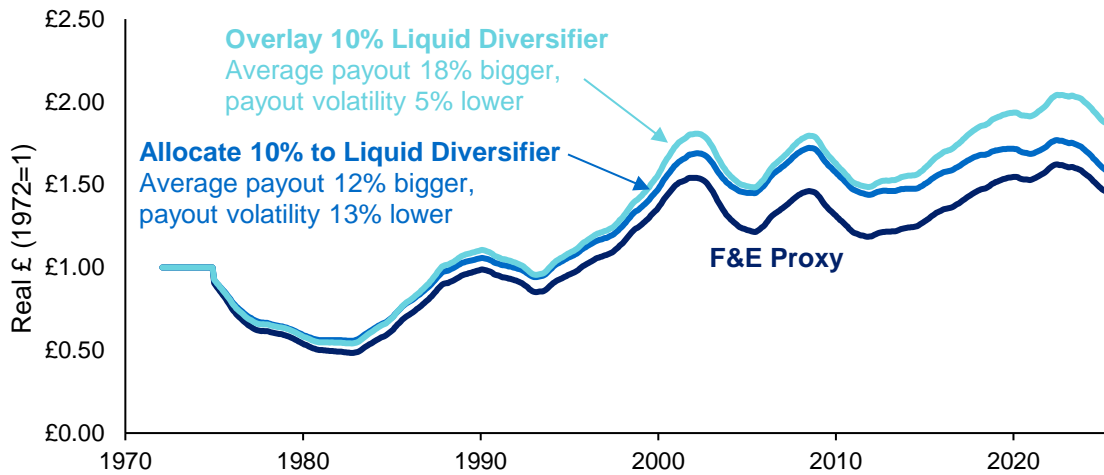


Sources: Bloomberg and AQR. See Appendix for asset class proxies and Exhibit 4 for portfolio allocations. Real value adjusted for UK CPI. Annual net payout (distributions minus donations) is 5% of 3-year smoothed net real value, deducted monthly. Past performance is not a guarantee of future performance. Hypothetical data has certain inherent limitations, some of which are disclosed in the appendix. For illustrative purposes only and not representative of a portfolio AQR currently manages.

Exhibit 6 shows the real value of the payouts through time. The payouts vary substantially despite the smoothing mechanism of the strategy, shrinking by 25-50% during the tougher investment environments of the 1970s and 2000s, and restricting the activities of their beneficiaries. Adding a liquid diversifier funded from equities

(mid-blue line) reduces this variability by 13% while also increasing the average payout. Adding the diversifier exposure as an overlay (light blue) gives a larger boost in the size of payouts (18% larger payouts than the typical F&E portfolio), with a smaller reduction in risk.

Exhibit 6: Hypothetical Real Value of Annual Distribution (1972 = £1) Jan 1972 - Jun 2025



Sources: Bloomberg, AQR. See Appendix for asset class proxies and Exhibit 4 for allocations. Real value adjusted for UK CPI. Annual payout is 5% of 3-year smoothed net real value, deducted monthly. Payout volatility is calculated from 1-year % changes in real payout. Past performance is not a guarantee of future performance. Hypothetical data has certain inherent limitations, some of which are disclosed in the appendix. For illustrative purposes only and not representative of a portfolio AQR currently manages.

How representative is our historical sample? It certainly covers a wide range of different market environments - it starts with a sustained period of real wealth destruction (the 1970s Great Inflation), but it ends on a high, with a 15-year bull market since 2009. If we remove both those extreme episodes by truncating our sample to the 30-year 1980-2009 period - now starting strong and ending weak - average real returns for the portfolios are

generally higher but the broad impact of adding diversifiers remains similar. Over that period, *allocating to* a diversifier reduces real payout variation by 15% while maintaining similar principal value and average payout value. *Overlaying* a diversifier increases real principal value by 13% and average real payouts by 5%, while maintaining similar payout variation.

Looking (A Long Way) Forward

Historical analysis has many limitations, especially for alternatives including private equity, hedge funds and liquid diversifiers, where we must rely in part on public proxies, indices with inherent biases, and hypothetical data. We can instead use forward-looking assumptions to estimate the impact of allocation changes over long horizons. These assumptions can incorporate

economic theory and investor beliefs, and can adjust for various biases that may persist in historical data despite our attempts to correct them. There will inevitably be a subjective element, but if investors substitute their own assumptions for the numbers below, they may still find similar results.

Exhibit 7 reproduces one possible set of long-term Sharpe ratio assumptions as discussed in AQR (2024) “Broad Strategic Asset Allocation” (yellow cells). Here, major public and private asset classes are all assumed to earn similar risk-adjusted returns in the long run. We ignore current valuations (even though these look unfavourable for equity-related assets in the medium term, as discussed above), and we assume any illiquidity premia are offset by higher fees and investors’ preference for smooth returns. Hedge funds are given a small Sharpe ratio bonus to reflect their ability to combine many different return sources, and the liquid diversifier is given a small penalty to reflect the constraint of delivering near-zero average equity beta. Volatilities and correlations are taken directly from our historical analysis, except that we override the questionable private equity risk assumption with public equity * 1.3 to

reflect typical leverage in the industry (purple cell). Real returns are calculated based on long-term assumptions for U.K. cash and inflation.

Even with a fairly conservative assumption for the liquid diversifier’s standalone prospects, an allocation can improve the portfolio’s expected risk-adjusted return, either by reducing risk while maintaining returns (if funded from equities) or by raising returns at a similar level of risk (if added as an overlay).

This positive result stems from the powerful combination of diversification and compounding. Allocating to an investment with a modest expected return need not reduce the portfolio’s compound return, if that investment is sufficiently diversifying - especially during stress periods for the rest of the portfolio - and sufficiently liquid for periodic rebalancing.

Exhibit 7: Example Long-Term Assumptions for Asset Classes and F&E Portfolios

	Public Equity	Private Equity	Real Estate	Hedge Funds	Bonds	Liquid Diversifier	F&E Proxy	Alloc. 10% to Liq. Div	Overlay 10% Liq. Div.
Real Return GBP	4.8%	5.4%	3.8%	3.6%	2.5%	3.4%	4.6%	4.6%	4.8%
Volatility	14.7%	19.1%	8.9%	6.3%	3.7%	10.1%	11.0%	9.7%	10.9%
Sharpe Ratio	0.30	0.30	0.30	0.36	0.30	0.24	0.34	0.37	0.36
Equity Correlation	1.00	0.78	0.61	0.63	0.16	0.10	0.97	0.95	0.96

Sources: Bloomberg and AQR. Sharpe ratio assumptions from AQR (2024). Volatilities and correlations from Exhibit 3. Real returns calculated based on long-term assumptions for U.K. cash (3.8%) and inflation (2.3%) as of March 31, 2025 – see AQR (2025) for methodology details.

Note that the assumptions in Exhibit 7 suggest a 5% real return target may be challenging over the long-term, even for a risk-seeking portfolio with large allocations to public and private equity. Investors have several levers to improve their chances of success. Some, such as capturing

manager alpha and raising more from donations, are probably already being pursued.² But that good old “free lunch” of investing - diversification - is under-used in many portfolios and can be harnessed to good effect even by ultra-long-term investors.

References

AQR Portfolio Solutions Group, 2024, “Broad Strategic Asset Allocation,” AQR *Alternative Thinking*.
 AQR Portfolio Solutions Group, 2025, “Capital Market Assumptions,” AQR *Alternative Thinking*.
 Asness, C., R. Krail, and J. Liew, 2001, “Do Hedge Funds Hedge?” *Journal of Portfolio Management*.
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² See Ilmanen (2022) for a discussion of the responses of different investor types to this “low expected return challenge”.

Appendix

Other Currency Perspectives

We have chosen to model a U.K. investor perspective in the main exhibits. Here we repeat the analysis for U.S. and eurozone foundations or endowments. Although allocation patterns tend to differ across regions (larger hedge fund allocations for U.S.-based institutions, for example), here we maintain the same allocations and focus on the

impact of currency effects, local cash rates and local inflation. The main results hold regardless of the investor’s home currency, as shown in **Exhibits A1** and **A2**. The diversifier improves the return and risk characteristics in all cases, with more of a risk benefit if funded from equities, and more of a return benefit if added as an overlay (see green numbers in table).

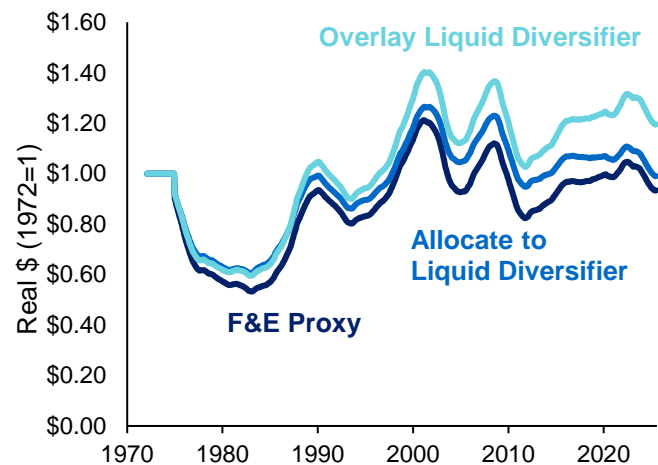
Exhibit A1: Hypothetical Performance in Different Currency Domiciles Jan 1972 - Jun 2025

	GBP Investor			USD Investor			EUR Investor		
	F&E Proxy	Alloc to Liq. Div.	Overlay Liq. Div.	F&E Proxy	Alloc to Liq. Div.	Overlay Liq. Div.	F&E Proxy	Alloc to Liq. Div.	Overlay Liq. Div.
Real Return (GM)	5.8%	5.9%	6.3%	5.2%	5.2%	5.6%	6.3%	6.2%	6.7%
Volatility	10.4%	9.1%	10.4%	10.6%	9.2%	10.5%	10.6%	9.3%	10.6%
Sharpe Ratio	0.46	0.51	0.49	0.48	0.54	0.52	0.54	0.59	0.58
Max Real Drawdown	-43%	-36%	-40%	-44%	-37%	-41%	-40%	-33%	-37%
Real Payout Impact		+12%	+18%		+8%	+17%		+4%	+17%
Payout Vol. Impact		-13%	-5%		-15%	-5%		-15%	-4%
Average Inflation			4.8%			3.9%			2.7%

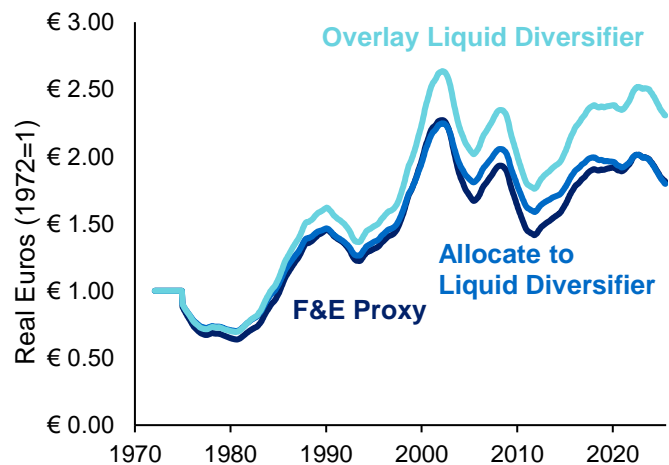
Sources: Bloomberg, AQR. Past performance is not a guarantee of future performance. Hypothetical data has certain inherent limitations, some of which are disclosed in the appendix. For illustrative purposes only and not representative of a portfolio AQR currently manages.

Exhibit A2: Hypothetical Real Value of Annual Distribution (1972 = 1) Jan 1972 - Jun 2025

A. USD Investor Perspective



B. EUR Investor Perspective



Sources: Bloomberg, AQR. Monthly data in GBP, USD and EUR. Euro analysis uses Germany CPI, and uses the deutschmark before 1999. See Appendix for asset class proxies and Exhibit 4 for portfolio allocations. Real value is adjusted for respective CPI. Annual payout is 5% of 3-year smoothed net real value, deducted monthly. Payout volatility is calculated from rolling 1-year % changes in real payout. Past performance is not a guarantee of future performance. Hypothetical data has certain inherent limitations, some of which are disclosed in the appendix. For illustrative purposes only and not representative of a portfolio AQR currently manages.

Asset Class and Hypothetical Strategy Proxies

Asset Class	Proxy
Public Equity	MSCI World Index (unhedged in GBP, USD or EUR as labeled)
Private Equity	1986-2025: 50% Cambridge Associates US Private Equity Index (hedged), 50% Russell 2000 Index 1.2x levered (50% hedged). 1979-1986: Russell 2000 Index 1.2x levered (50% hedged). 1972-1978: MSCI USA Index 1.2x levered (50% hedged).
Real Estate	1990-2025: 50% NCREIF Index, 25% FTSE Nareit All REITs (hedged), 25% FTSE EPRA Nareit Developed in GBP, USD or EUR. 1978-1990: 50% NCREIF Index, 50% FTSE Nareit All REITs (hedged). 1972-1977: 60% FTSE Nareit All REITs (hedged), 40% cash.
Hedge Funds	1994-2025: 50% HFRI Fund-Weighted Composite Index, 50% Credit Suisse Hedge Fund Index. 1972-1993: 30% MSCI World, 70% cash, hypothetical long/short U.S. academic multi-factor strategy scaled to 5% volatility to represent active risk. The hypothetical long/short U.S. academic multi-factor strategy is 40% "HML Devil" value factor based on B/P (Asness and Frazzini, 2013), 40% UMD momentum factor based on 12M return excluding most recent month, and 20% defensive, where defensive is 50% BAB low beta factor (Frazzini and Pedersen, 2014) and 50% QMJ quality factor (Asness, Frazzini and Pedersen, 2014). All factors are cap-weighted long the 1/3 best stocks and short the 1/3 worst stocks following the methodology of Fama and French (1993), rebalanced annually every January. All factors except BAB are dollar long and short. For BAB the long side is levered to make the portfolio ex-ante beta-neutral as described in Frazzini and Pedersen (2014). The combined returns are discounted by 75% to reflect transaction costs, fees, and possible biases in the data.
Bonds	1990-2025: Bloomberg Global Aggregate Index (hedged). 1972-1989: GDP-weighted portfolio of developed market 10-year government bonds (hedged).
Liquid Diversifiers	2000-2025: SG Trend Index rescaled to 10% volatility. 1990-1999: HFRI Macro Systematic Diversified Index 60% discounted and rescaled to 10% volatility. 1972-1989: Hypothetical Price-Based Trend Following Strategy (Discounted) rescaled to 10% volatility. The Hypothetical Price-Based Trend Following Strategy (Discounted) is constructed with an equal-weighted combination of 1-month, 3-month, and 12-month trend-following strategies for 67 markets across 4 major asset classes: 29 commodities, 11 equity indices, 15 bond markets, and 12 currency pairs. Since not all markets have return data going back to 1972, we construct the strategies using the largest number of assets for which return data exist at each point in time. We use futures returns when they are available. Prior to the availability of futures data, we rely on cash index returns financed at local short rates for each country. The strategy targets a long-term volatility target of 10%. The strategy is not based on an actual portfolio managed by AQR. Returns are net of estimated transaction costs and net of 1.25% management fee and 20% performance fee. Net returns are then discounted by 60% to reflect possible biases and additional frictions.
Cash	3-Month UK, US or Germany T-Bill

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Broad-based securities indices are unmanaged and are not subject to fees and expenses typically associated with managed accounts or investment funds. Investments cannot be made directly in an index.

Index Definitions:

The **MSCI World Index** is a free float-adjusted market capitalization weighted index that is designed to measure the equity market performance of developed markets.

The **MSCI USA Index** is designed to represent the performance of large and mid-cap stocks in the United States equity market. It covers approximately 85% of the free float-adjusted market capitalization of the US market and is composed of 547 constituents.

The **Bloomberg Global Aggregate Index** is a market-weighted index of global government, government-related agencies, corporate and securitized fixed-income investments.

The **Russell 2000 Index** is a small-cap U.S. stock market index that makes up the smallest 2,000 stocks in the Russell 3000 Index.

The **Cambridge Associates U.S. Private Equity Index** is based on data compiled from approx. 2,000 funds, including fully liquidated partnerships.

The **NCREIF Property Index** measures the performance of real estate investments on a quarterly basis and evaluates the rate of returns in the market. The NPI covers properties that are acquired in place of institutional investors that are exempted from taxes in the fiduciary environment.

The **FTSE Nareit All REITs Index** contains all publicly traded US REITs. It is not free float adjusted, and constituents are not required to meet minimum size, liquidity or minimum voting right criteria.

The **FTSE EPRA Nareit Developed Index** is designed to track the performance of listed real estate companies and REITs worldwide.

The **SG Trend Index** is designed to track the largest 10 (by AUM) CTAs and be representative of the managed futures trend-following space.

The **HFRI Macro: Systematic Diversified Index** measures the aggregate performance of Investment Managers who employ Systematic Diversified strategies, which employ an investment process designed to identify opportunities in markets exhibiting trending or momentum characteristics across individual instruments or asset classes.

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www.aqr.com

AQR Capital Management, LLC

One Greenwich Plaza, Greenwich, CT 06830

P +1.203.742.3600

F +1.203.742.3100