Rethinking Portfolio Diversification: Why Relative Volatility Outweighs Correlation

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1. ABSTRACT

Reducing portfolio volatility is a primary goal for insurers, often pursued by diversifying into corporate bonds, private credit, infrastructure, and real estate. However, these assets frequently embed equity risk, exacerbating portfolio volatility during market crises. This research challenges the traditional reliance on correlation for diversification, showing that relative volatility and volatility predictability are more critical metrics for effective risk reduction. Assets with lower volatility relative to the portfolio consistently deliver stronger diversification benefits, regardless of their correlation with other assets. Furthermore, predictable volatility minimises drawdowns, reduces recovery times, and mitigates tail risks, enhancing portfolio resilience. We also demonstrate that many alternative assets fail to provide meaningful diversification due to shared risk factors with equities. By focusing on relative volatility and stable risk characteristics, insurers can achieve more robust and consistent volatility reduction, offering a practical framework for building resilient portfolios in turbulent markets.

2. INTRODUCTION

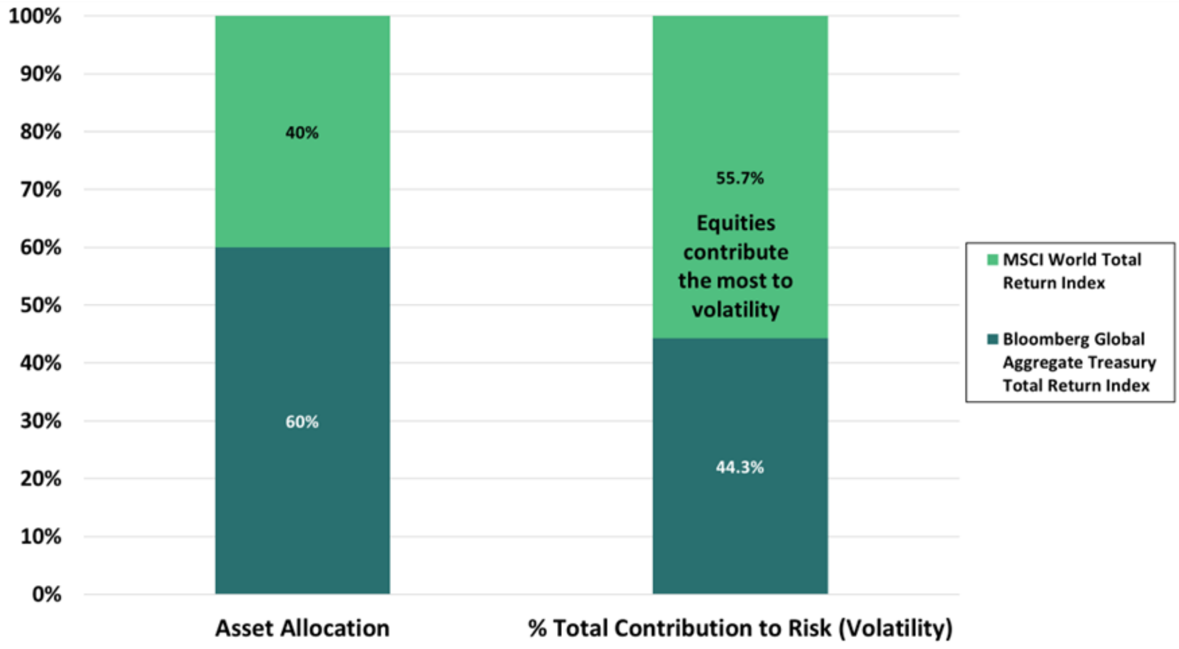
Many insurers attempt to reduce the volatility in their portfolios by adding assets such as corporate bonds and alternatives like private credit and private equity, infrastructure, real estate, and hedge funds. However, this approach faces two significant challenges:

Embedded Equity Risk: Most of these assets are also exposed to embedded equity risk, which tends to increase in volatility during periods of crises.

Disproportionate Contribution to Volatility: Equity risk contributes disproportionately to overall portfolio volatility.

Disproportionate contribution to volatility means that even if an asset allocation is primarily comprised of Government bonds, equity risk may be a dominant driver of volatility. **Error! Reference source not found.** below shows that despite equities comprising only 40% of the portfolio, they contribute a disproportionate 56% to volatility.

Figure 1 – Risk Decomposition for a Portfolio of 60% Government Bonds and 40% Equities[1]



Our analysis shows that there are very few true diversifiers for an insurers' multi asset portfolio given the embedded equity risk across most asset classes. There are also few diversifiers for duration risk in Government bond heavy portfolios. Furthermore, we demonstrate that, instead of focusing on correlation, relative volatility and predictability of volatility should be the main focus for portfolio construction.

With respect to relative volatility, the key is to compare the relative volatility of an asset with other assets in the portfolio. The smaller the volatility of an asset compared to the rest of the portfolio, the stronger the volatility-reducing benefits at the portfolio level, regardless of the correlation between that asset and the rest of the portfolio. While better outcomes can be achieved under negative correlation, this is secondary to the impact of relative volatility.

We also demonstrate that predictability of volatility is a critical consideration for portfolio construction, as lower volatility of volatility (vol of vol) contributes to smaller drawdowns, shorter recovery times, and reduced periods spent underwater, thus enhancing portfolio stability.

In summary, relative volatility, and vol of vol rather than correlation, are the key metrics for reducing total portfolio volatility.

1 Monthly Historical Data from 31/07/2012-30/09/2024, Source: Bloomberg

3. RELATIVE VOLATILITY – A TWO ASSET EXAMPLE

The article "Bonds Don't Need to Be Negatively Correlated with Equities" by Dr Laura Ryan, Head of Research at Ardea Investment Management demonstrates that a negative correlation between bonds and equities is not necessary to reduce total portfolio volatility in an equity heavy portfolio. The key takeaway is that low bond volatility will reduce total portfolio volatility even with 100% positive correlation. We summarise the key supporting analytics from the paper below:

a. Low bond volatility with varying correlation

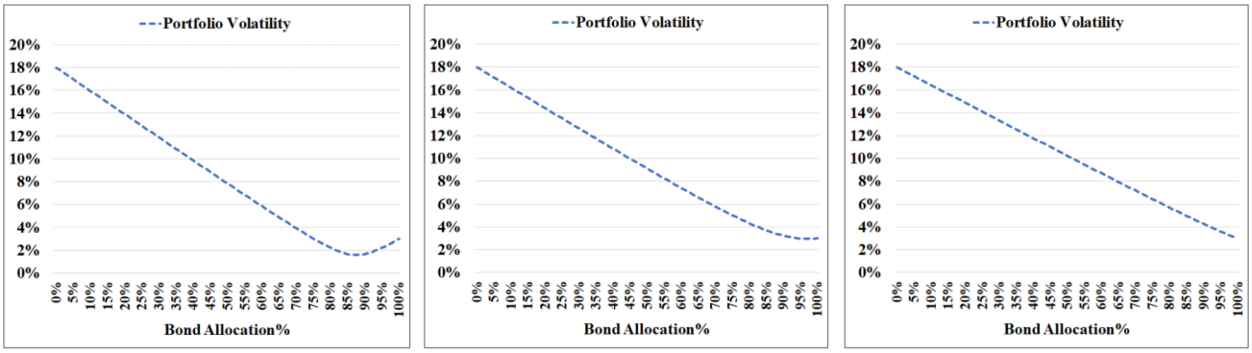
We are first going to look at the importance of correlation when bond volatility is low using the three charts appearing in Exhibit 1, under which all inputs stay the same except for correlation. In the boxes below each chart are the assumptions. Both bond and equity volatility remain constant at 3% and 20% respectively across the three examples, with correlation varying from -80% in the first box, 0% in the middle box and +80% in the last box.

First consider the -80% correlation chart on the left, and focus on the total portfolio volatility dotted line as the bond weight varies from 0% to 100%. Portfolio volatility steadily decreases as bond weights increase up until around 89%, and then rises slightly. Bonds not only act as a diversifier but also consistently reduce volatility until they form the bulk of the portfolio under a substantially negative correlation. Shifting to the 0% correlation chart in the middle, again portfolio volatility decreases as the bond weight increases – in this case up to 98%. Finally, the 80% correlation chart on the far right shows that minimum portfolio volatility is attained at a 100% bond weight.

What is happening? The scope to decrease portfolio volatility is greater under negative correlation. Portfolio volatility decreases at a faster rate as the bond weight increases, and bottoms at a lower level. However, the bond weight required to maximize the reduction in volatility then goes up as correlation rises. This arises because the relative volatility between equities and bonds matters even more for portfolio risk reduction when correlation is higher. In other words, a higher correlation between equities and bonds may actually be a reason to hold more bonds rather than less, if the aim is to reduce volatility. This is the opposite of what the current narrative seems to be implying.

EXHIBIT 1

Effect of Varying Correlation Under Low Bond Volatility



Bond Volatility = 3% Equity Volatility = 20% Correlation = -80%	Bond Volatility = 3% Equity Volatility = 20% Correlation = 0%	Bond Volatility = 3% Equity Volatility = 20% Correlation = 80%

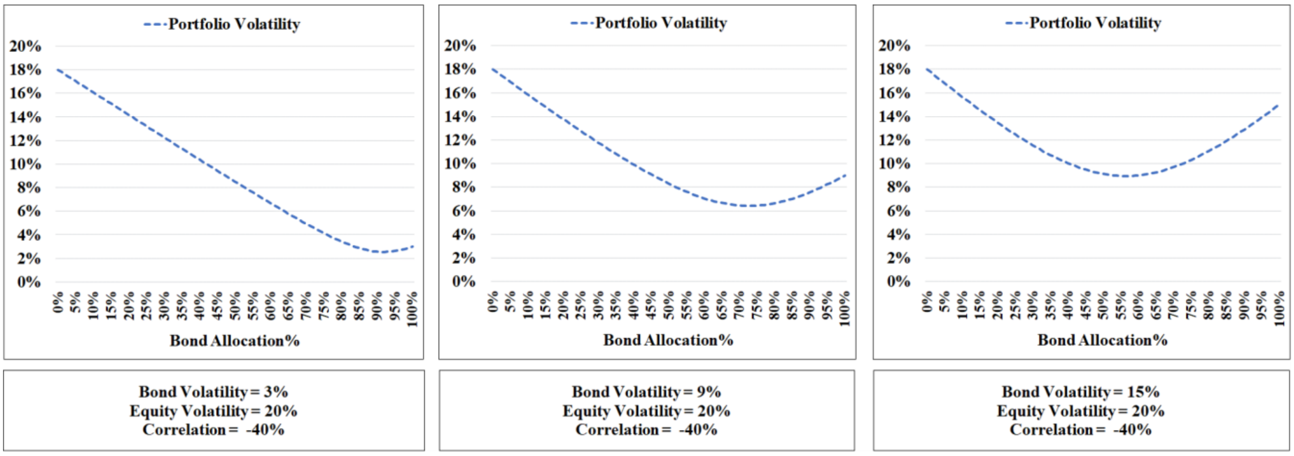
If we compare the total portfolio volatility line across charts, we can see volatility decreases faster at the portfolio level when correlation is negative. That is, better outcomes can be achieved if correlation is negative. However, what matters most is the relative volatility between equities and bonds. When bond volatility is relatively low, bonds still provide diversification even if correlation is positive.

b. Negative correlation with varying bond volatility

Now let’s examine the impact of varying bond volatility while holding correlation constant at -40%. Exhibit 2 represents the equivalent three charts, with bond volatility of 3%, 9% and 15%. The main effect of increasing bond volatility is that the inflection point moves to the left, at which point additional bond holdings no longer reduce portfolio volatility. By the chart on the far right where bond volatility is increased to 15%, the minimum volatility is attained at a bond weight of about 55%. Further, the minimum attainable portfolio volatility rises notably as bond volatility increases.

EXHIBIT 2

Effect of Varying Bond Volatility at Negative Correlation



The above examples indicate that bond volatility is more influential than correlation both for the amount of volatility reduction that is attainable by allocating to bonds, and the bond weight that minimises volatility. While the best outcome is obviously achieved when there is negative correlation and low volatility, an increase in bond volatility would be of more concern for their ability to dampen equity volatility than a switch back to a positive correlation.

4. EMBEDDED EQUITY RISK AND ALTERNATIVES

In this paper we will show that the same argument applies to any investment strategy (or asset) which is tasked with reducing the impact of equity risk, or duration risk induced volatility in a multi asset portfolio. To do so we will model a typical UK insurance portfolio which has exposure to equities, government bonds, corporate bonds, private credit, private equity, infrastructure and property. Many of these asset classes are touted as offering diversification properties for a multi asset portfolio, and in particular diversification for the dominant (with respect to volatility) equity risk factor or for the dominant allocation to duration. However, the literature identifies that the embedded equity risk in some of these assets, leads to an increase in volatility during times when equity markets are volatile. The paper "Common Risk Factors in the Returns on Stocks, Bonds (and Options), Redux" (Chen, Roussanov, Xiaoliang, & Dongchen, 2024) shows that different types of investments, such as equities, corporate bonds, and options, share some common sources of risk. These shared risks help explain why the returns on these investments often move together over time. (Pedersen, Page, & He, 2014) examine several categories of alternative assets, including private equity, venture capital, real assets (such as real estate, infrastructure, farmland, and timberland), and hedge funds. It highlights that equity risk[2] is a common factor across all these alternative investments, influencing their volatility and correlation with public market assets. The paper underscores that despite the perceived diversification benefits, these assets are exposed to similar risk factors as equities, making them more volatile than traditionally reported. The paper "Factor Investing in the Corporate Bond Market" (Houweling & Van Zundert, 2017) demonstrates that common risk factors—Size, Low-Risk, Value, and Momentum—are influential across corporate bonds, just as they are in equities. This finding highlights that corporate bonds, often considered a diversifier to equities, are driven by similar underlying factors, suggesting a strong link in risk dynamics across these asset classes. This reinforces the idea that so-called alternatives to equities, including corporate bonds, share common risk factors, contributing to their performance and volatility in ways comparable to equity markets. The analysis of "Measuring Systematic Biases in Real Estate Returns" (Anson, 2012) highlights that real estate, despite its perceived uniqueness due to illiquidity, is significantly exposed to the same systematic risks as equity markets. By incorporating lagged pricing effects (i.e. desmoothing the returns to account for the lack of mark to market), the study demonstrates that real estate returns closely align with equity market returns, leading to comparable volatility and reducing its purported diversification benefits.

In the paper "*Risk Everywhere: Modeling and Managing Volatility*" (Bollerslev, Hood, Huss, & Pedersen, 2018), argue that volatility is driven by common, pervasive risk factors that affect multiple markets. Markets exposed to the same risk factors will experience synchronised increases in volatility during periods of stress. Their model highlights that these risk factors are not confined to a single market or asset class but are present "everywhere"—across stocks, bonds, options, and even international markets. Their empirical results demonstrate that volatility increases are not idiosyncratic to individual markets but are largely driven by common macroeconomic shocks, such as monetary policy changes, financial crises, or geopolitical events. The paper also discusses volatility spillovers—how shocks in one market or asset class can lead to increases in volatility in others, due to interconnectedness. This reinforces our argument that risk factors can spread across markets, especially during crises. Further, the concept of volatility clustering—where periods of high volatility tend to be followed by more high volatility supports the idea that once stress hits the market, it affects (most) assets similarly due to common risk factors. The persistence of these effects further highlights the unified impact of shared risks.

We now examine the embedded equity risk in a multi-asset "average" insurance portfolio. Table 1 presents the correlation matrix for this portfolio, with the asset allocation modelled based on data obtained from the Insurance Asset Risk database[3]. The capital market assumptions are derived from the 2024 JP Morgan Capital Market Assumptions.

2 And duration risk
3 https://www.insuranceriskdata.com/

Table 1 – Multi Asset Insurance Portfolio[4]

Correlation Matrix												
	World Government Bonds hedged	UK Gilts	Developed World Equity	UK All Cap	Global Credit hedged	UK Inv Grade Corporate Bonds	Direct Lending	Global REITs	UK Core Real Estate	Global Core Infrastructure	Weight	Vol
World Government Bonds hedged	1.000	0.843	0.106	-0.030	0.710	0.554	0.104	0.567	-0.117	-0.073	3.9%	3.9%
UK Gilts	0.843	1.000	0.167	0.038	0.596	0.657	0.148	0.299	-0.135	-0.014	7.7%	7.7%
Developed World Equity	0.106	0.106	1.000	0.855	0.454	0.490	0.071	0.833	0.209	0.081	13.8%	13.8%
UK All Cap	-0.030	0.038	0.855	1.000	0.426	0.492	-0.152	0.714	0.251	0.032	13.3%	13.3%
Global Credit hedged	0.710	0.596	0.454	0.426	1.000	0.840	-0.197	0.526	0.086	-0.015	5.5%	5.5%
UK Inv Grade Corporate Bonds	0.554	0.657	0.490	0.492	0.840	1.000	-0.172	0.567	0.104	0.042	8.2%	8.2%
Direct Lending	0.104	0.148	0.071	-0.152	-0.197	-0.172	1.000	0.044	-0.218	0.181	15.4%	15.4%
Global REITs	0.567	0.299	0.833	0.747	0.526	0.567	0.044	1.000	0.267	0.099	14.5%	14.5%
UK Core Real Estate	-0.117	-0.135	0.209	0.251	0.086	0.104	-0.218	0.267	1.000	-0.097	13.1%	13.1%
Global Core Infrastructure	-0.073	-0.014	0.081	0.032	-0.015	0.042	0.181	0.099	-0.097	1.000	10.6%	10.6%

The asset allocation includes real estate, government bonds, corporate bonds, equities, infrastructure, and private assets (such as direct lending). With this understanding of a typical insurance portfolio, we can begin to examine the impact of embedded equity risk on our understanding of relative volatility.

The table below, sourced from (Pedersen, Page, & He, 2014), summarises the risk factor exposures used to model private equity, venture capital, real assets, and hedge funds, alongside univariate regression equity betas for comparison with equities and bonds. The analysis highlights two key findings:

1. Once the returns on unlisted assets are de-smoothed, their volatility is comparable to that of equivalent listed assets (results not shown in this paper)
2. Many so-called alternative asset classes exhibit significant mapping to equity risk factors.

In Table 2, the highlighted section (red box) displays the beta to the equity risk factor and the corresponding t-statistic for each asset class. The significant betas highlight embedded equity risk.

The challenge this poses arises when embedded equity risk manifests as increased volatility during periods when equity market volatility is also rising. In such cases, these alternative assets may fail to deliver the desired volatility reduction and diversification benefits.

4 Source: J.P. Morgan Asset Management Capital Market Assumptions 2024

Table 2 – Risk Factor Exposures and t-statistics for Alternative Investments and Sample Public Markets[5]

Asset Class	US Equity	EM Equity	Size	Value	Liquidity (Avg. – High)	Industry Factors	Nominal Duration	Real Duration	IG Comp. Spread	HY Spread	EM Spread	Commod	Vol	Mom	Equity Beta
Private equity	0.8 6.5		-0.9 -1.4	-1.4 -3.3	0.2 1.9					1.2 1.5					0.9 12.1
Venture capital	1.4 5.4			-3.9 -2.9	0.2 0.6										1.6 5.8
Infrastructure	0.5 3.8			0.7	0.2 1.4	1.1		0.6 0.4	7.3 2.6						0.6 5.8
Farmland	0.1 1			1.1		0.9		9.7 2.3							0 -0.2
Timberland	0.3 1.4					2		9.1 1.2	2.6 0.4						0.2 1.1
Real estate (core)	0.4 5.2				0.5 4.9	0.6		2.8 1.8	2.7 1.4						0.5 5.7
Hedge funds (avg)	0.3 8.4	0.1 6.4	-0.9 -6.5	-0.2 -1.7	00.3 1.5		-0.6 -1.5		2.5 3	-0.8 -3.5	0.5 3.6	0.03 1.8	0.1 2.1	0.04 2	0.4 16.8
Equities	1 19.3		0.8 1.5	0.3 0.8											1 43.5
Gov't bonds							5.1 26								-0.2 -5.3

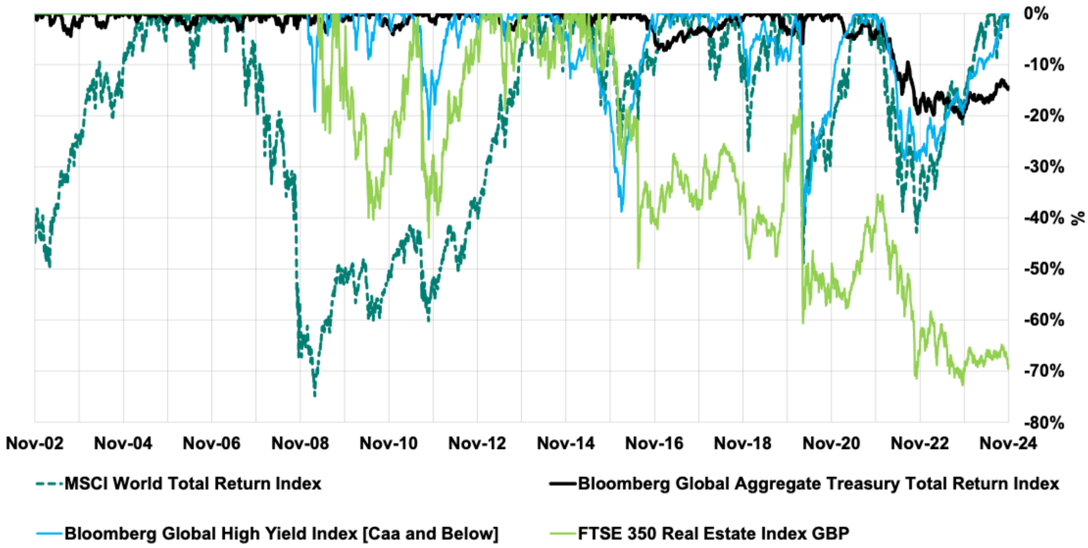
In Figure 1, we've plotted the drawdowns for equities, bonds, real estate indices, and private credit as proxied by high-yield (HY) bonds[6]. There are two important observations to note from this chart:

1. The embedded risk represented in the real estate index results in it exhibiting a volatility profile like equities. This suggests that if we consider relative volatility as the key metric for establishing a defensive, volatility-reducing asset, then despite being labelled an alternative, real estate is effectively just an alternative carrier of equity volatility.
2. This chart further supports the idea that correlation is not the most critical metric. Suppose we calculated the correlation between all three indices—the correlation has been positive and at times strongly positive. However, if you asked an investor which drawdown profile they would prefer for an asset tasked with diversifying and mitigating equity volatility, they would likely choose the index with relatively smaller drawdowns. The key takeaway is that when equities are down, you want your defensive asset to experience smaller losses. Should the investor truly care whether the correlation is one, or whether the asset reduces their overall losses?

5 Pedersen, N., Page, S., & He, F. (2014). Asset Allocation: Risk Models for Alternative Investments. *Financial Analysts Journal, 70*(3), 34–45. https://doi.org/10.2469/faj.v70.n3.4

6 We proxy private Credit using a High Yield index given the findings in (Pedersen, Page, & He, 2014) and other similar papers which find that once the returns on unlisted assets are de-smoothed, their volatility is comparable to that of equivalent listed assets.

Figure 2 – Maximum Drawdowns over Time[7]



5. THE IMPORTANCE OF RELATIVE VOLATILITY AND PREDICTABILITY OF VOLATILITY

This section demonstrates the importance of relative volatility and the predictability of volatility when selecting assets tasked with reducing total portfolio volatility.

We introduce a volatility controlled Relative Value strategy which exhibits low and predictable return volatility[8] and compare its volatility reducing properties to various other asset classes. We first examine how various assets and strategies interact with equity risk and then with duration risk.

Table 3 – Asset Volatility Statistics[9]

Asset[10]	Annualised Volatility (%)
RV[11]	2.5
Global Credit	5.2
Infrastructure	5.7
Global Treasury	7.6
UK Credit	8.1
Gilts	8.2
Private Credit	10.9
UK Equities	11.8
MSCI World Hedged	13.1
UK Real Estate	18.2

7 Note: BBG High Yield Index starts 24/12/2008

8 Relative value (RV) investing seeks to exploit price inconsistencies between closely related securities, such as government bonds. Unlike traditional strategies, which involve subjective judgement and carry broader market risk, pure RV investing utilises specialised derivatives to eliminate unwanted risks, isolating and profiting from temporary mispricing's caused by structural market inefficiencies. This strategy offers return potential independent of interest rate movements and macroeconomic factor with low and predictable volatility we are proxying.

9 Historical Data from 31/07/2012-30/09/2024

10 **Proxy Indices** – Global Treasury: *BBG Global Agg. Treasury Hedged*, UK Equities: *FTSE 350, Gilts: BBG Gilt*, UK Credit: *Morningstar UK Corporate Bond*, UK Real Estate: *FTSE 350 Real Estate*, Global Credit: *BBG Global Agg. Credit Hedged*, Private Credit: *BBG Global High Yield Index Hedged [Caa and Below]*, Infrastructure: *BBG European Infrastructure Hedged*

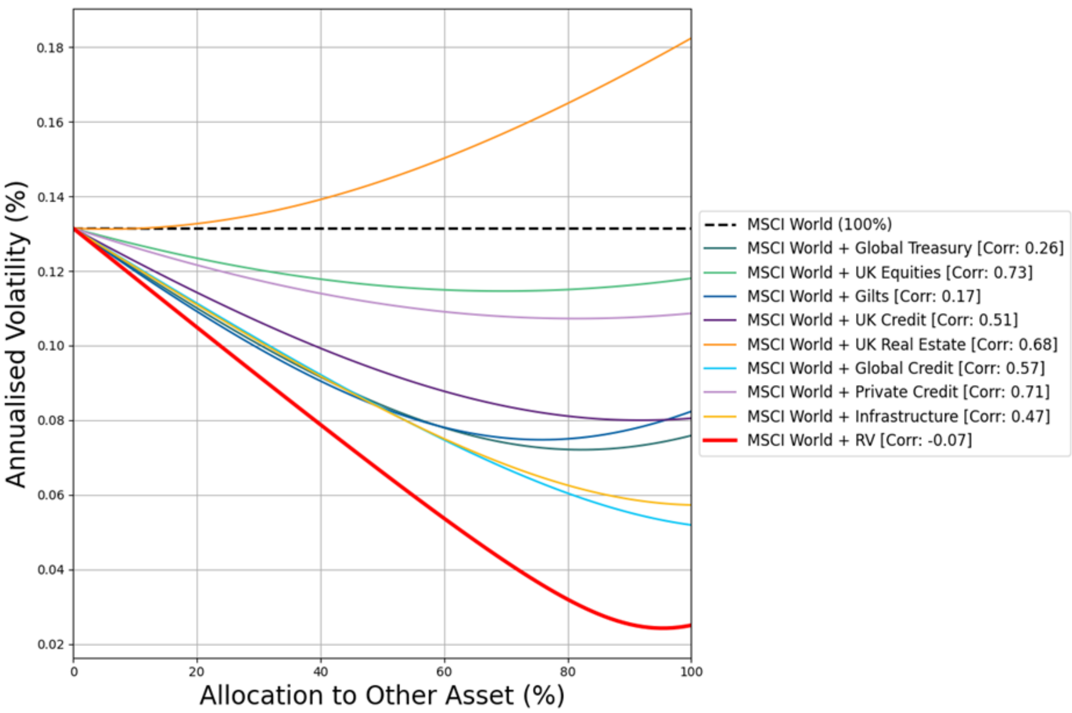
11 We are proxying RV by the Ardea Real Outcome Fund

Table 4 – Asset Volatility of Volatility Statistics

Asset[12]	Volatility of Volatility (%)
RV[13]	1.1
Global Credit	2.4
Infrastructure	2.4
Global Treasury	2.6
UK Credit	2.7
Gilts	3.3
Private Credit	3.8
UK Equities	5.4
MSCI World Hedged	5.9
UK Real Estate	6

Error! Reference source not found. highlights the effects of adding various 'diversifiers' to a portfolio composed entirely of equities. Among the analysed asset classes, volatility-controlled relative value strategies provide the most substantial volatility reduction, followed by Global Credit and Infrastructure. Depending on the allocation percentage, Global Treasuries, Gilts, and UK Credit occupy the next positions, while Private Credit and UK equities follow. Notably, UK real estate offers no volatility-reducing benefits relative to equity risk.

Figure 3 – MSCI World vs Other Assets



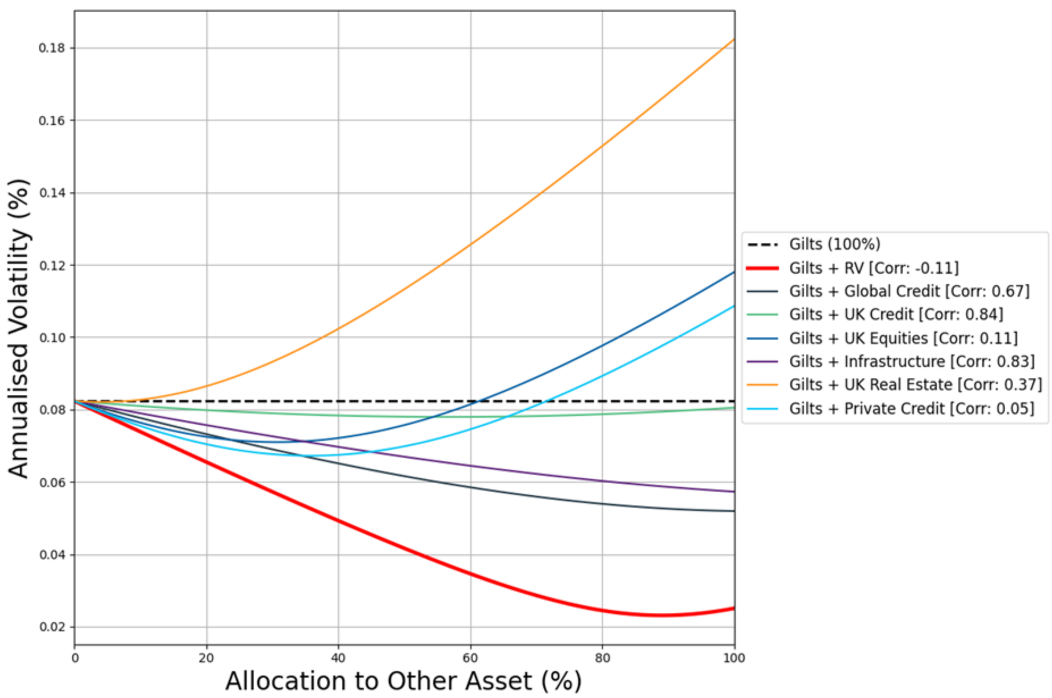
12 **Proxy Indices** – Global Treasury: *BBG Global Agg. Treasury Hedged*, UK Equities: *FTSE 350, Gilts: BBG Gilt*, UK Credit: *Morningstar UK Corporate Bond*, UK Real Estate: *FTSE 350 Real Estate*, Global Credit: *BBG Global Agg. Credit Hedged*, Private Credit: *BBG Global High Yield Index Hedged [Caa and Below],* Infrastructure: *BBG European Infrastructure Hedged*

13 We are proxying RV by the Ardea Real Outcome Fund

The results underscore that lower-volatility assets consistently provide greater diversification benefits, indicating that an asset's relative volatility is more critical to its effectiveness as a diversifier than its correlation with equities. For instance, Gilts and UK Credit have the second and fifth lowest correlations with global equities, respectively. However, their similar volatility profiles result in comparable volatility-reducing benefits. Similarly, Global Credit, despite having a relatively high correlation with equities (0.57), ranks second in volatility-reducing effectiveness, further emphasising the importance of relative volatility over correlation.

Error! Reference source not found. repeats this analysis using gilts as a proxy for duration in the portfolio. The trend remains consistent, with volatility controlled relative value strategies providing significant and sustained volatility reduction from a 0% to 100% allocation (as shown by the red line). In contrast, some other asset classes offer limited volatility reduction. For example, the real estate, UK equities and private credit allocations, represented by the orange, navy and light blue lines respectively, exhibit no or much smaller volatility reducing properties for duration risk. Infrastructure and global credit provide stronger volatility reducing benefits. The relative value strategy exhibits the strongest and most consistent volatility reducing properties for duration risk.

Figure 4 – Duration vs other asset classes



We now extend the analysis to a multi asset insurance portfolio. **Error! Reference source not found.** shows that substituting a volatility-controlled RV strategy for IG credit, private credit and government bonds in a typical insurance portfolio also significantly reduces the overall portfolio volatility. The chart shows RV being substituted for the other asset classes up until there is a 0% allocation to the respective asset[14]. See **Error! Reference source not found.** for the initial allocation proxying a typical insurance portfolio.

14 RV is substituted at equal rates for the foreign and domestic components where relevant.

Figure 5 – Typical Insurance Portfolio Analysis

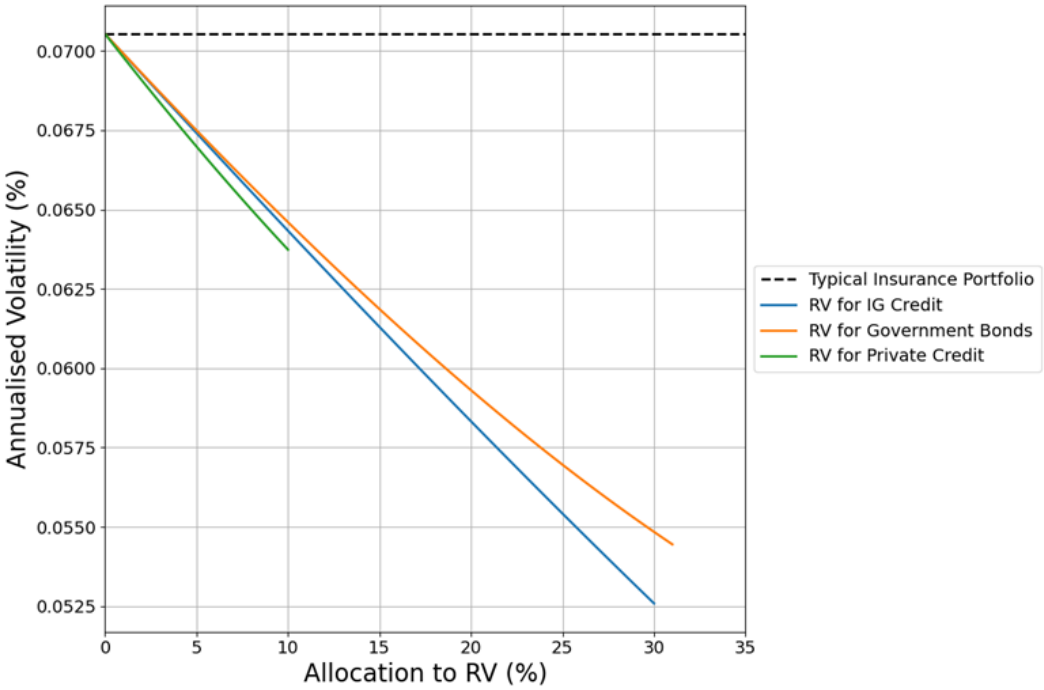
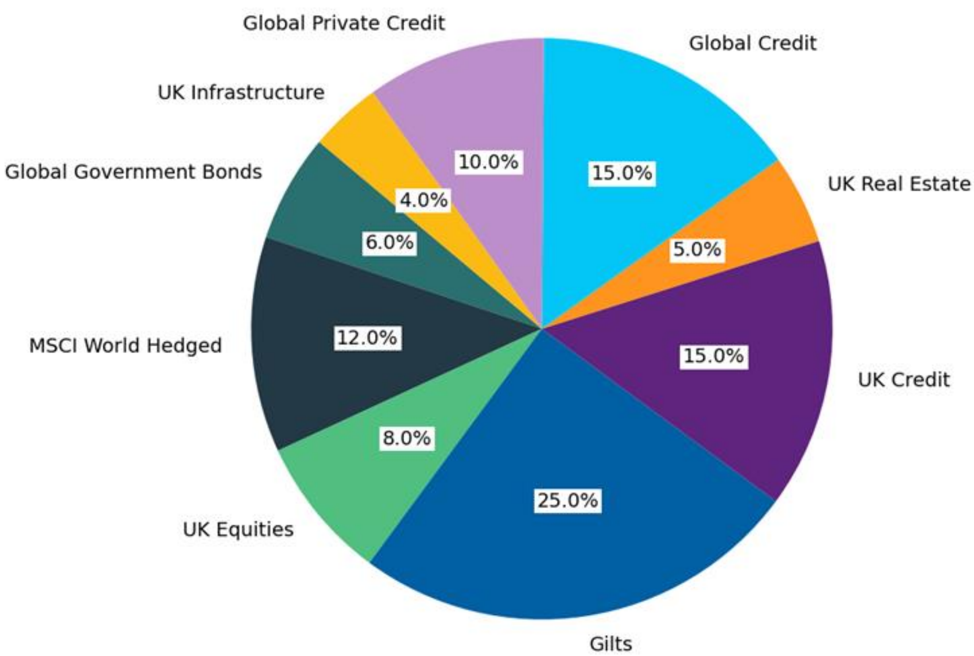


Figure 6 – Typical Insurance Allocation (before RV is added)



6. PREDICTABILITY OF VOLATILITY

In addition to relative volatility, the predictability of volatility plays a crucial role in effective portfolio construction. The analysis below illustrates that it's not only low volatility that matters, but also the stability of that volatility over time. To understand the importance of predictability of volatility for portfolio construction we analyse these portfolio metrics under various assumptions for the volatility of the assets in a two-asset portfolio:

1. Maximum Drawdown: The largest peak-to-trough decline in cumulative returns.
2. Time Underwater: The total number of months the portfolio remains below its previous peak.
3. Average Time to Recovery: The average time it takes to recover from a drawdown
4. Conditional Value at Risk (CVaR): The average loss in the worst 5% of return outcomes.

Portfolio Construction:

The portfolio is constructed by with a fixed 80% weight for a bond-like component and 20% weight for an alternative asset tasked with diversifying duration with daily portfolio returns calculated as a weighted sum of the two components.

Asset 1 Model (Gilts like component)

Asset 1 is modelled as a normal distribution. Returns are simulated with fixed assumptions (taken again from JP Morgan 2024 Capital Market assumptions):

- The mean return per annum 4.2%)
- volatility of returns (4.47%)

Asset 2 Model (Alternative asset tasked with diversifying duration)

Asset 2 is proxying an alternative asset, here we have used assumptions for UK Direct Lending for volatility and returns values:

- The mean returns per annum (7.4%)
- Mean annualised volatility (15.44%) [from JP Morgan CMAs]

Simulating Returns

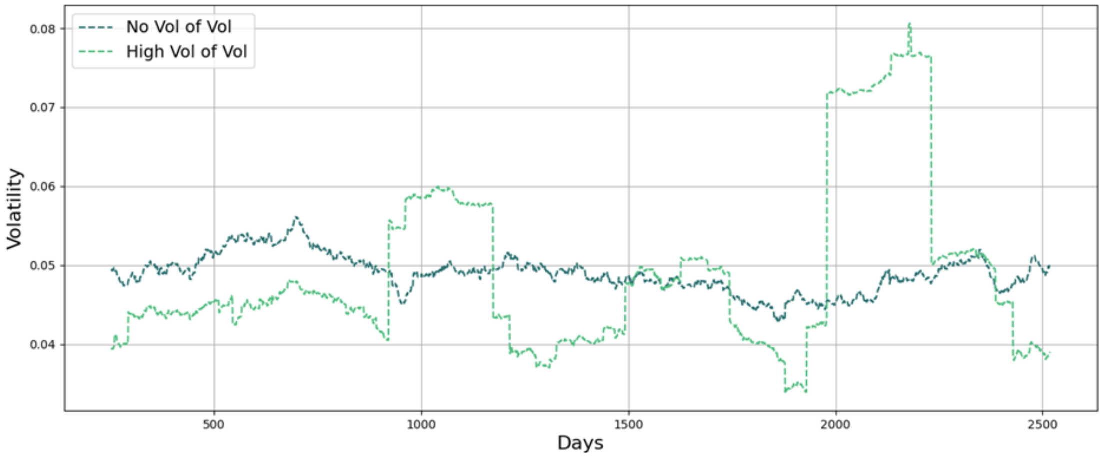
Returns are simulated daily for a 10-year investment horizon. Asset 1 returns remain fixed. Asset 2 returns are simulated for two scenarios:

1. **Fixed Volatility:** Constant daily volatility, returns fit normal distribution
2. **High Vol of Vol:** Daily volatilities are sampled from a log-normal distribution to model fluctuating volatility.
    a) The standard deviation of this volatility is 0.1 (the vol of vol)
    b) The generated returns are then scaled to align with the target annualised volatility to ensure that both scenarios have the same average annualised volatility

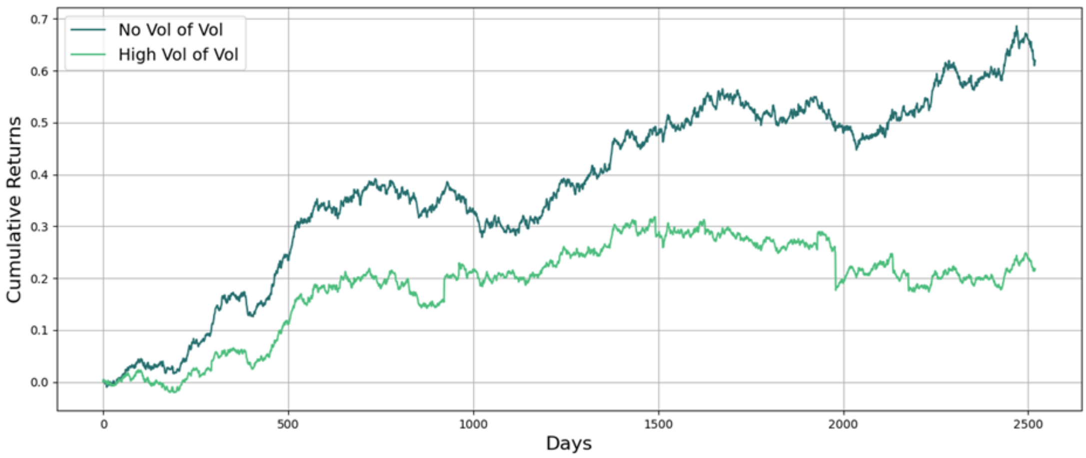
Portfolio returns are then calculated as weighted sum of Asset 1 and Asset 2 returns. See Figure 7 for the results of one portfolio simulation. Here you can see how the orange rolling volatility line is highly volatile compared to the blue.

Figure 7 – One Portfolio Simulation

Rolling Volatility (1-Year Window)



Cumulative Returns



These simulations can vary depending on the random variables involved, so 10,000 portfolio simulations are run, with Asset 1 returns remaining constant and Asset 2 returns varying with each simulation but centred around a long run mean. The results are then averaged across all 10,000 simulations and are tabulated in **Error! Reference source not found.**. Here you can see how both scenarios have the same annualised portfolio volatility on average across the simulations but one has a higher volatility of this volatility, which interestingly impacts the average returns across all the simulations. This difference in mean annualised returns arises because, even with the same annualised volatility, higher volatility-of-volatility introduces periods of extreme volatility that amplify the drag on compounded returns, reducing the mean annualised return for the portfolio in the high volatility-of-volatility scenario. However, over an infinite horizon, this effect would average out, and both scenarios would converge to the same mean annualised return.

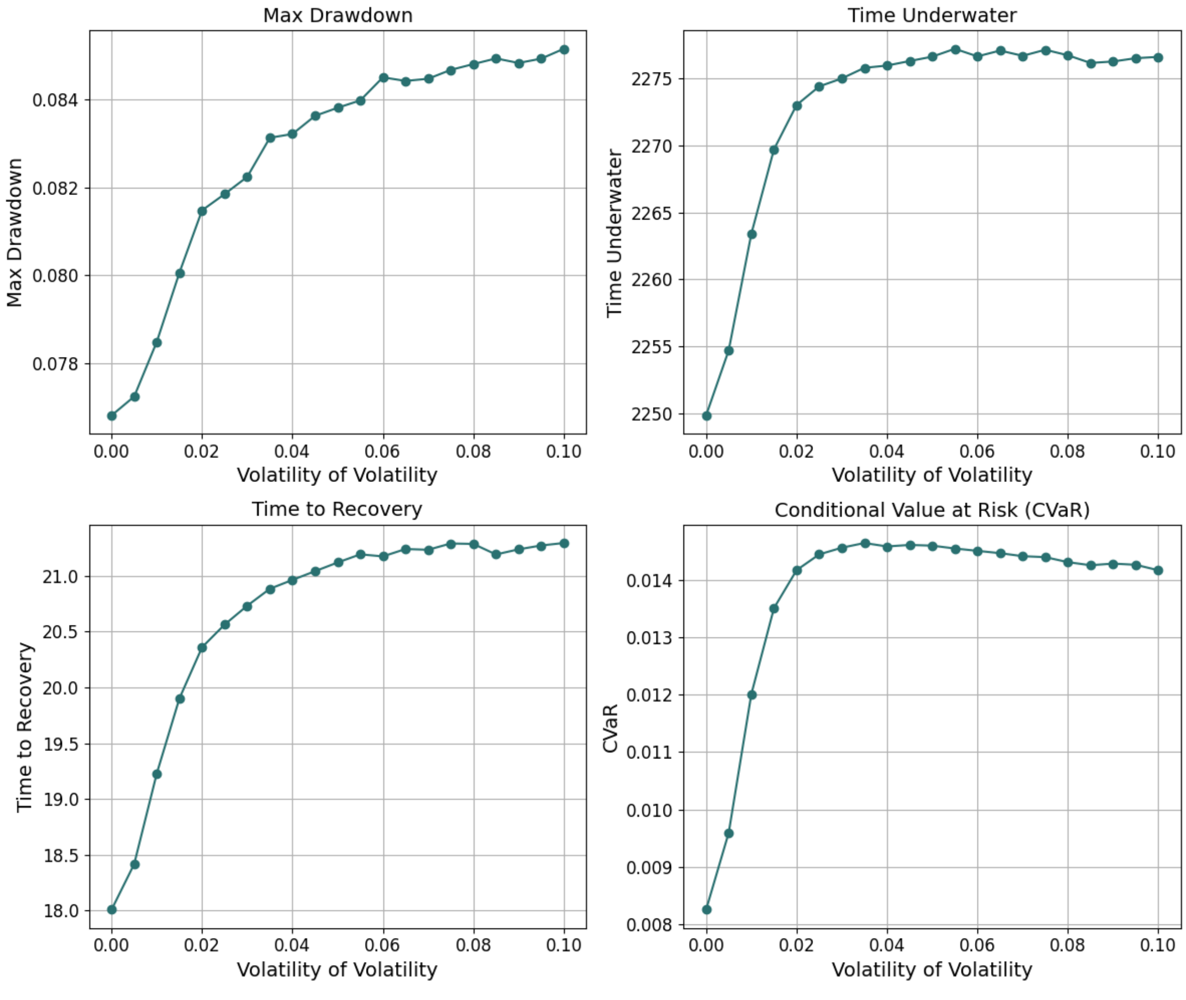
Table 5 – Portfolio Statistics (Average of 10,000 Simulations)

Scenario	Annualised Portfolio Volatility (%)	Asset 2 Vol of Vol (%)	Annualised Portfolio Returns
No Vol of Vol	4.77	0.6%	5.8%
High Vol of Vol	4.77	9.7%	4.7%

The final step here is to see what happens when we increase the vol of vol, with varying portfolio risk metrics averaged across the simulations. The vol of vol for Asset 2 was iteratively increased from 0-10%, with metrics plotted in **Error! Reference source not found.**. The results reveal that increasing the volatility of volatility of a "diversifying asset" significantly impacts the portfolio's risk profile in several critical ways:

1. Maximum Drawdown: With higher volatility of volatility, the likelihood of deeper drawdowns increases. This is because greater fluctuations in Asset 2's returns lead to larger peak-to-trough declines in cumulative returns.
2. Time Underwater: Higher volatility of volatility prolongs the periods during which the portfolio remains below its previous peak. When Asset 2 exhibits greater unpredictability, the portfolio experiences more frequent and severe drawdowns, resulting in extended durations before a new high is reached.
3. Average Time to Recovery: The average time required for the portfolio to recover from drawdowns lengthens with higher volatility of volatility.
4. Conditional Value at Risk (CVaR): Greater volatility of volatility worsens the CVaR, meaning the average loss in extreme scenarios becomes more severe. Since CVaR focuses on the tail end of the return distribution, an unpredictable diversifier amplifies the potential downside risk.

Figure 8 – Risk Metrics with increasing Vol of Vol



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These findings underscore that relative volatility plays a critical role in reducing overall portfolio risk. Additionally, a stable and predictable volatility profile enhances portfolio resilience, as increased unpredictability leads to deeper drawdowns, longer recovery times, and heightened exposure to tail-risk events even when annualised volatility remains constant. Therefore, both relative volatility and the predictability of volatility (vol of vol) must be considered when constructing resilient portfolios.

CONCLUSION

This research challenges the conventional reliance on correlation as a primary driver of portfolio diversification and underscores the critical importance of relative volatility and volatility predictability in achieving effective risk reduction. Our analysis demonstrates that traditional diversifiers such as corporate bonds, private credit, and real estate often fail to deliver consistent volatility reduction due to their embedded equity risk, which amplifies during periods of market stress. As such, these asset classes may provide illusory diversification benefits, undermining portfolio stability when it is most needed.

Relative volatility emerges as the fundamental metric for portfolio construction. Assets with lower volatility relative to the portfolio consistently deliver superior risk mitigation, regardless of correlation. Furthermore, the stability of an asset's volatility—its "vol of vol"—is a crucial determinant of its effectiveness as a diversifier. Assets with highly predictable volatility profiles minimise drawdowns, shorten recovery periods, and reduce exposure to tail risks, enhancing portfolio resilience even under volatile market conditions.

By prioritising strategies that focus on relative volatility and predictable volatility, insurers can construct multi-asset portfolios that offer superior risk-adjusted returns. This approach shifts the paradigm from correlation-focused diversification to a more robust, volatility-centred framework. The findings provide actionable insights for insurers seeking to mitigate portfolio risk, demonstrating that low-volatility assets with predictable risk characteristics are indispensable in achieving sustainable volatility reduction and enhancing portfolio stability in the face of crises.

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