

Scientific Portfolio Market Review

July 2025



Scientific Portfolio
An EDHEC Venture



Volatile Markets Put ‘Extreme Risk’ in the Spotlight

Introduction

Market and geopolitical events through the first half of 2025 have again highlighted the limitations of traditional volatility metrics in equity portfolios and reasserted the importance of considering **extreme risk measures** such as **Conditional Value-at-Risk (CVaR)**.

The events of April 2025 exemplified the kind of tail event that volatility alone underrepresents. The peak-to-trough move in the S&P 500 stands as one of the steepest single-month drops in recent decades, with the 30.8 spike in the VIX representing a 99th percentile event. Conventional volatility-based risk models were likely to be caught off-guard by both the extent of losses and the speed of the recovery.

In this Market Review, we look at recent active equity manager data through a CVaR (a.k.a. expected shortfall) lens and consider recent research on CVaR and risk-based diversification ahead of an Extreme Risk webinar taking place later this month.

- There is **huge dispersion in active CVaR levels** of different strategies. U.S. active equity managers in the highest-CVaR quintile at end-February 2025 (before the period of greatest turbulence) had an average CVaR nearly six times greater than those in the lowest-CVaR quintile; in Europe, the figure was three times larger for the highest-CVaR quintile.
- **Active CVaR levels strongly predicted relative performance during the H1 drawdown.** Strategies with higher active CVaR at end-February suffered larger ‘worst-week’ losses in the three months to end-April 2025. In many cases, the worst-week relative return exceeded active CVaR: 125 out of 153 U.S. active equity funds experienced these unexpectedly large losses.
- **Higher active risk diversification mitigated worst-week losses**, based on high-level data from early 2025. In addition, a recent in-depth research paper has examined a longer timeframe and concluded that CVaR in equity portfolios can be lessened through risk-based diversification. Moreover, this can be done *without* compromising the overall degree of active risk that a manager is able to take to generate returns. The same, interestingly, is not true for holdings-based diversification.

Today’s environment—featuring increased likelihood of asymmetric shocks—highlights the need for investors to incorporate extreme risk measures into portfolio construction, monitoring and stress testing. Vigilant oversight can help investors to understand potential vulnerabilities, as well as consider strategic shifts that may improve resilience.

> Register here for the Extreme Risk webinar

> Sign up to review your equity strategy’s CVaR, active risk diversification and more on the Scientific Portfolio Platform.

Active Manager CVaR Levels Vary Hugely

Data from end-February 2025, taken before the period of greatest market turbulence in the first half of the year, shows large variation in the expected shortfalls of actively managed equity portfolios in extreme loss scenarios.

Exhibit 1 summarizes the 95% active CVaR levels of 226 funds (153 U.S., 73 Europe) at end-February, representing the average loss that one would expect in scenarios where portfolio losses exceed the 95% VaR threshold. The sample is restricted to funds with a stated management fee of 50 basis points or higher, ensuring a focus on strategies where investors are essentially paying a premium for manager ‘skill’ (as opposed to non-passive but purely systematic approaches).

Exhibit 1: Active 95% CVaR of active equity funds

U.S. manager group	Average active 95% CVaR	Europe manager group	Average active 95% CVaR
Lowest-CVaR quintile	0.39	Lowest-CVaR quintile	0.82
2	0.91	2	1.28
3	1.44	3	1.66
4	1.69	4	1.93
Highest-CVaR quintile	2.29	Highest-CVaR quintile	2.58

Source: Scientific Portfolio, Morningstar. 153 U.S. funds and 73 European funds. Active 95% CVaR calculated at end-February 2025.

The potential losses of the highest-CVaR quintile in the U.S. are nearly six times greater than those of the lowest-CVaR quintile, while in Europe the potential losses are over three times greater for the highest-CVaR quintile.

Active CVaR and ‘Worst Week’ Relative Performance

Turning now to look at subsequent active performance, we see a very strong relationship between the end-February active CVaR levels and the relative performance of fund managers during the ‘worst week’ over the three months to end-April. This period encompasses the sharp tariff-driven drawdown when many major indices lost 8-10% over three or four trading sessions and the S&P 500 fell 12-15%. Below, Exhibit 2—which can be directly compared with Exhibit 1—showcases this effect. Indeed, we can see that the average worst-week active return versus the benchmark in the three months to end-April was worse than the 95% active CVaR level from end-February in the majority of cohorts.

Exhibit 2: Relative return of active equity funds in ‘worst week’

U.S. manager group (by active CVaR)	Worst week active return (%)	Europe manager group (by active CVaR)	Worst week active return (%)
Lowest-CVaR quintile	-0.72	Lowest-CVaR quintile	-1.10
2	-1.54	2	-1.43
3	-2.09	3	-1.75
4	-2.28	4	-1.99
Highest-CVaR quintile	-3.00	Highest-CVaR quintile	-2.24

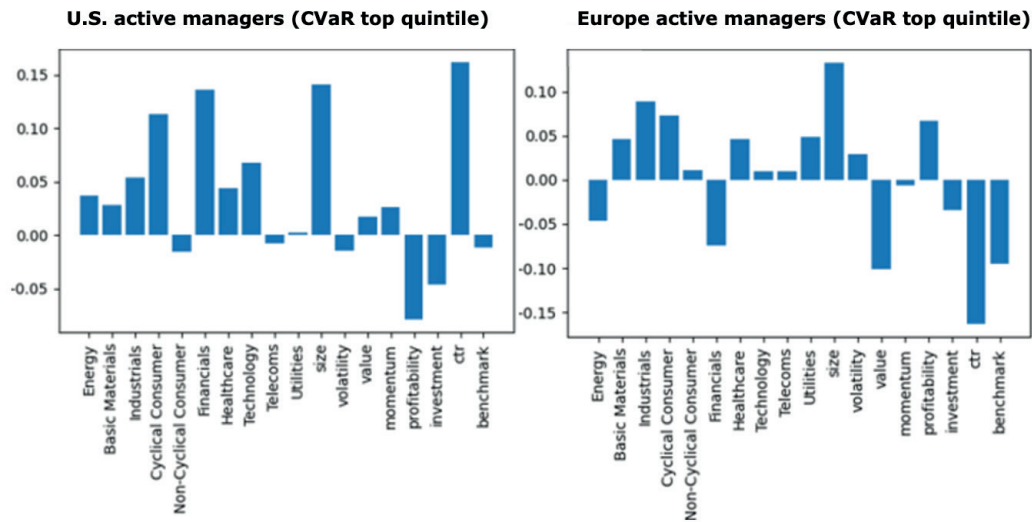
Source: Scientific Portfolio, Morningstar. 153 U.S. funds and 73 European funds. Active 95% CVaR calculated at end-February 2025. Worst-week active return for the 3 months ending in April 2025.

In total, 125 of 153 U.S. active equity managers had a worst-week active return exceeding (worse than) their active CVaR, while the same was true for 37 of the 73 European strategies.

A Closer Look at Exposures

Exhibits 3 and 4 provide a closer look at the funds in the highest-CVaR quintile. In the U.S., a factor exposure analysis (Exhibit 3) reveals significant long positions in the Cyclical Consumer and Financials sectors, as well as strong positive exposure to the Size factor and negative exposure to the Profitability factor.

Exhibit 3: Active factor exposures of funds with highest CVaR, April 2025

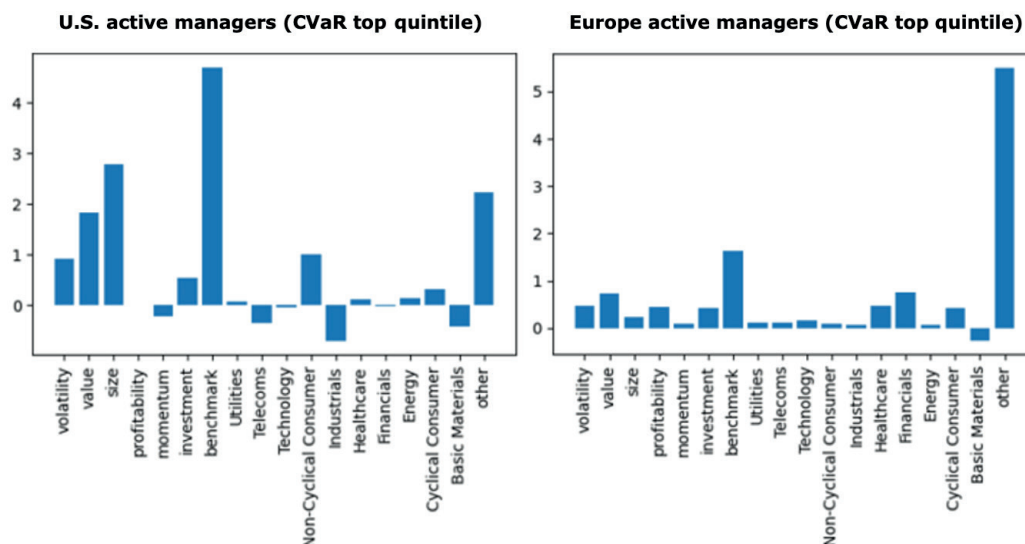


Source: Scientific Portfolio, Morningstar. 153 U.S. funds and 73 European funds. CVaR top quintile as shown in Exhibit 1. Factor exposures at April 30th 2025. Active exposures relative to Scientific Portfolio Cap-Weighted (SP CW) US and European indices.

Viewed broadly, U.S. strategies with higher active CVaR levels at end-February tended to have higher-than-average exposure to tariff-sensitive sectors as a group; the subject of tariff sensitivity was discussed in a previous market review.

The European high-CVaR strategies were also exposed to the size factor, but their profile is rather different overall: here, strategies with high CVaR are somewhat more likely to have a 'quality' orientation (with a positive tilt toward Profitability and a negative tilt on Value). From a sector perspective, European high-CVaR strategies tended to be overweight Industrials, and overweight Cyclical Consumer (though to a lesser degree than their U.S. counterparts).

Exhibit 4: Three-month active risk decomposition (annualized, %) for funds with highest CVaR, April 2025



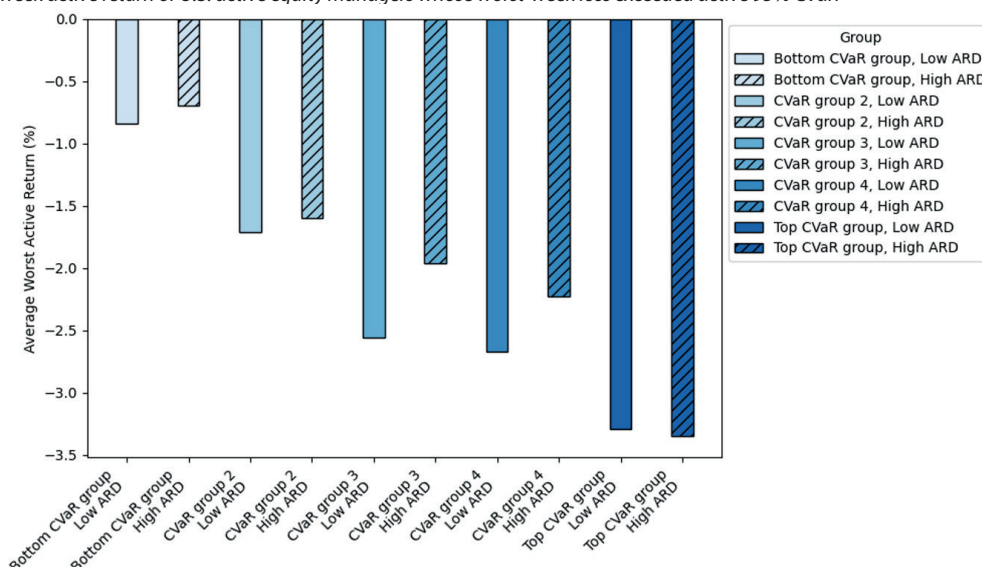
Source: Scientific Portfolio, Morningstar. 153 U.S. funds and 73 European funds. CVaR top quintile as shown in Exhibit 1.. Active risk decomposition relative to SP CW US and European indices.

Meanwhile, a three-month active risk decomposition for the highest-CVaR strategies (Exhibit 4) illustrates the extent to which sectors and fundamental factors drove active risk in these managers' portfolios over the period. Again, the U.S. and European pictures are very different, with the U.S. sample showing active risk contribution heavily dominated by fundamental factors (particularly Size and Value) as opposed to sectors.

Risk-Based Diversification Mitigated Losses

Examining strategies whose worst-week relative return exceeded their active CVaR, we find that active risk diversification may have helped to reduce the damage. Exhibit 5 shows data from the 125 U.S. active equity managers whose unexpectedly large losses were discussed above, categorized not only by their active CVaR quintile (in line with the approach above) but also separated into groups with higher and lower active risk diversification (ARD) within the same CVaR quintile. Here, we find that strategies with higher ARD produced, on average, better relative returns in their worst week than those with lower ARD in four out of the five cohorts shown. In other words, risk-based diversification seems to have helped containing 'unexpected losses' given a similar starting CvaR.

Exhibit 5: Worst-week active return of U.S. active equity managers whose worst-week loss exceeded active 95% CVaR



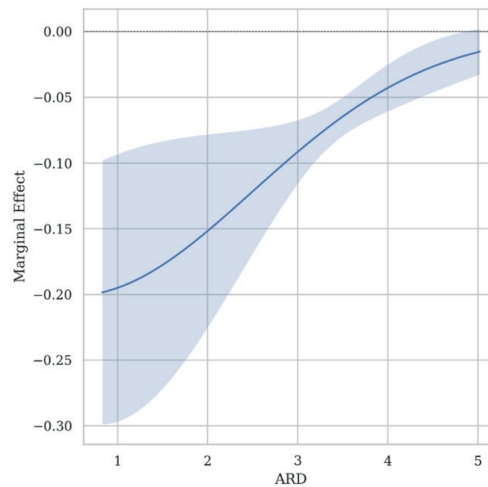
Source: Scientific Portfolio, Morningstar. 125 U.S. funds whose worst-week active return exceeded active CVaR in the three months to 30th April 2025. CVaR group determined by CVaR at 28th February. ARD is active risk diversification. Returns relative to SP CW US and European indices.

Does Risk-Based Diversification Affect CVaR? New Research Paper

Our upcoming webinar will explore the relationship between risk-based diversification and CVaR in greater depth, drawing from the findings of a recently published paper: *Mitigating Tail Risks without Sacrifice: Empirical Evidence of Risk-Based Diversification's Benefits for Equity Investors*¹. Analyzing U.S. equity portfolios (both empirical and synthetic data) for the period 2019-2023, this research asserts that greater risk-based diversification typically reduces CVaR even at the **same level of active risk** versus a benchmark. Indeed, U.S. data suggests that funds are on average 15% less likely to experience a larger-than-normal extreme loss if they increase their ARD. However, this mitigating effect fades away if a fund is already well-diversified: maximizing diversification is not necessary to enjoy its benefits, as illustrated in Exhibit 6.

1 - Bagnara, M., Vaucher, B., *Mitigating Tail Risks without Sacrifice: Empirical Evidence of Risk-Based Diversification's Benefits for Equity Investors*, forthcoming in the Research for Institutional Money Management Supplement in Pensions & Investments.

Exhibit 6 Marginal effects of Active Risk Diversification (ARD) on probability of experiencing a higher-than-normal extreme loss



Source: *Mitigating Tail Risks without Sacrifice: Empirical Evidence of Risk-Based Diversification's Benefits for Equity Investors*, Vaucher & Bagnara, 2025, forthcoming in the *Research for Institutional Money Management Supplement in Pensions & Investments*. See paper for more information on methodology.

The relationship between greater risk-based diversification and CVaR reduction (even while active risk-taking is maintained) holds across virtually all risk levels. Importantly, the same is not consistently true for holdings-based diversification.

Finally, the paper finds no statistical evidence for a potential detrimental effect of risk-based diversification from an [alpha generation perspective](#), countering the argument that greater diversification necessarily inhibits an active manager's ability to outperform their benchmark.

Overall, the paper suggests that risk-based diversification could be a viable [alternative to de-risking](#) as a strategy for reducing CVaR levels (and thereby mitigating extreme losses). Interestingly, the relationship between risk-based diversification and extreme risk has remained somewhat under-explored by academic literature.

Readers can register for the Extreme Risk webinar, which explores the findings of this paper in detail, by clicking [here](#).

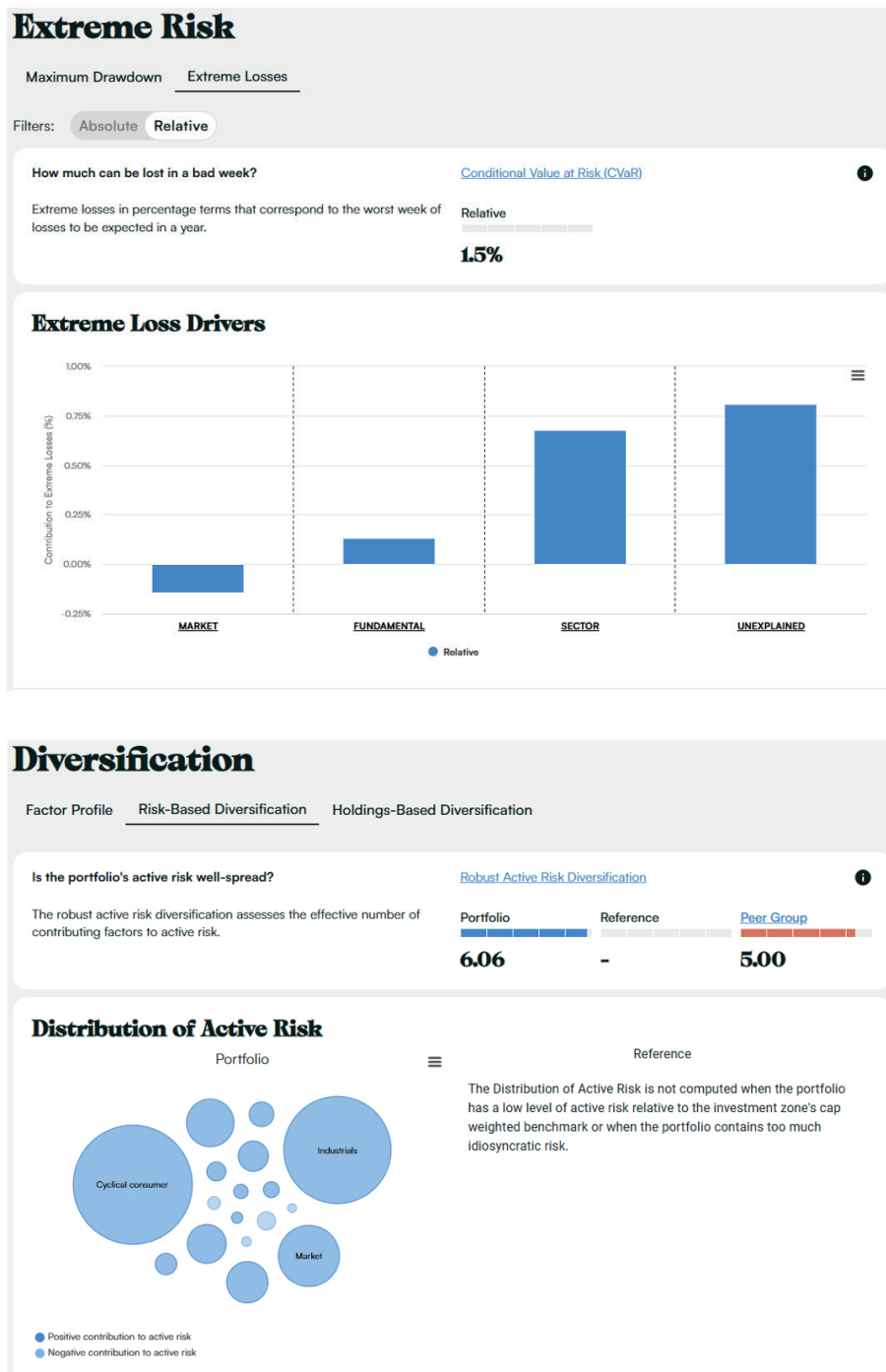
Looking Ahead: Oversight and Strategy

With volatility remaining elevated and geopolitical risks continuing to foster uncertainty, investors may wish to re-evaluate the question of extreme risk. Are CVaR metrics being appropriately considered within risk models? Should investors be seeking to monitor, manage or even reduce CVaR levels? Is the portfolio adequately diversified from a risk perspective, and could greater risk-based diversification contribute to a reduction in extreme risk without sacrificing active risk-taking and alpha generation potential?

These are not questions that can be answered simplistically. Portfolio construction and risk modelling decisions will depend on each investor's specific risk tolerance, regulatory framework, liability profile and more.

That being said, we would—at the very least—encourage investors to keep a close eye on extreme risk metrics pertaining to equity managers and portfolios and consider whether active risk is appropriately diversified.

Exhibit 7: Screenshots from Scientific Portfolio platform showing extreme risk and active risk diversification for an equity strategy



Source: Scientific Portfolio Platform

Exhibit 8: US Funds with highest active risk diversification, April 2025

Instrument Name
American Beacon Man Large Cap Growth Fund
American Century Disciplined Growth Fund
MassMutual Disciplined Growth Fund
Carillon ClariVest Capital Appreciation Fund
American Century Growth Fund
Victory RS Growth Fund
American Century Ultra® Fund
BNY Mellon Sustainable U.S. Equity Fund
William Blair Large Cap Growth Fund
Nuveen Large Cap Value Fund

Source: Scientific Portfolio Platform

This article contains data from the Scientific Portfolio platform. Users can access analytics to conduct analyses of available funds and upload [their own equity portfolios](#) to examine performance and exposures. Entry-level access is free of charge, via self-registration.

[Access the Scientific Portfolio Platform](#)

About Scientific Portfolio

Scientific Portfolio is the latest commercial venture incubated within the research ecosystem of EDHEC Business School (EDHEC), one of the world's leading business schools.

Scientific Portfolio has assembled a team with a broad range of expertise and backgrounds, including financial engineering, computer science, sustainable and climate finance, and institutional portfolio and risk management. It proudly carries EDHEC's impactful academic heritage and aspires to provide investors with the technology they need to independently analyse and construct equity portfolios from both a financial and extra-financial perspective.

To achieve this, it offers investors three sources of value through its portfolio analysis & construction platform:

- Helping investors to analyse their equity portfolios, identify actionable insights and enhance portfolios with allocation functionalities. Indeed, Scientific Portfolio likes to promote portfolio analysis as a means to the concrete goal of building portfolios that are both more efficient and better aligned with their investment objectives.
- Providing investors with an integrated framework where financial and extra-financial (ESG) considerations are jointly captured in analysis and portfolio construction. The ability to incorporate ESG-related insights in the portfolio allocation process is now a common requirement among many investors.
- Giving investors access to a Knowledge Centre catering to all types of learners and providing guidance through the portfolio analysis and construction process. This aligns with Scientific Portfolio's commitment to remaining connected with its academic roots and bridging the gap between investors and academia.

<https://scientificportfolio.com/>

