Scientific Climate **Indices**
An EDHEC Venture

Does Climate Ambition Always Create Risk Biases?

Risk Management Series
Episode 2

SciX Insights — October 2026



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In the first episode of our Risk Management Series, we illustrated the benefits of using a factor risk model when constructing climate-aware indices—as opposed to a conventional 'tilting' approach—in order to control tracking error in live portfolios and improve efficiency.

Yet what about other risk biases beyond tracking error alone? In Episode 2, we consider this crucial follow-up question, including **sector or regional deviations** that can be created when constructing a climate-aware strategy, even when tracking error is properly managed ex-ante. We also consider the question of **turnover**, since 'risk model' approaches may naturally tend to incur higher turnover (and therefore implementation cost) versus 'tilting' methodologies.

Key takeaways:

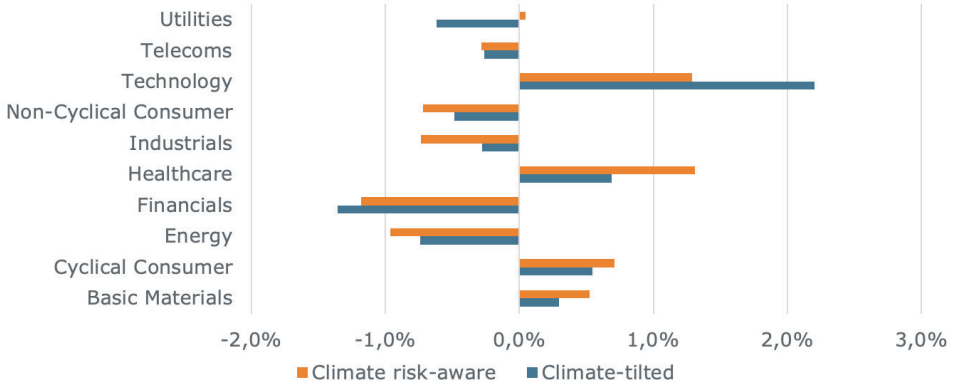
- **If left unchecked, climate objectives can create intended or unintended sector or regional bets** that can have adverse consequences on short-term performance of climate-aware strategies. The underperformance of Paris-Aligned Benchmark strategies in the 2020s, due to their tendency to underweight the energy sector, brings this challenge to the foreground.
- **Using a risk model (as opposed to tilting) provides more flexibility to implement additional risk management constraints** such as sector, style or regional exposures.
- **Turnover cannot be controlled ex-ante with portfolio tilting**. Risk model approaches can produce higher turnover, but this can be controlled explicitly (and limited if desired), with transparent trade-offs regarding the dilution of the climate objective.

Future episodes of our Risk Management Series will compare different risk models, including approaches based on the management of **active share**, and their ability to support an index construction process.

Sector and regional biases affect the performance of climate strategies

The pursuit of a climate objective can generate unintended sector and regional deviations relative to the benchmark, if they are not explicitly controlled in the design of the strategy. For instance, an investor trying to decarbonize its portfolio, whether by screening or underweighting carbon intensive companies, will typically underweight carbon-intensive sectors and countries.

Exhibit 1: Average sector deviations relative to the benchmark

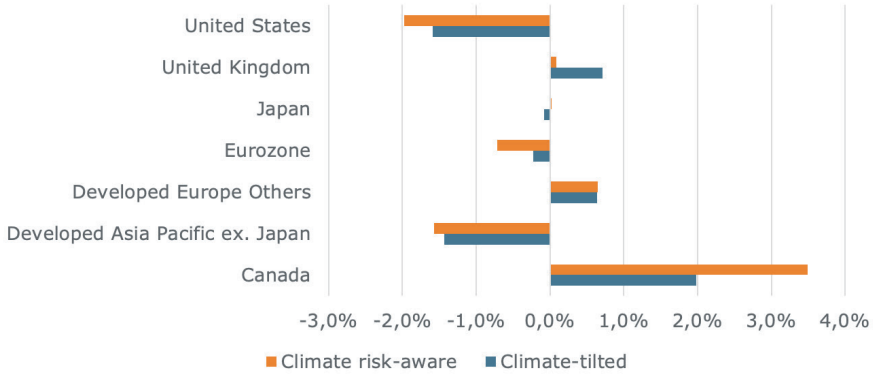


Source: SciX. Sector deviations are computed on quarterly data from June 2004 to June 2026. The SciX Developed index is used as the benchmark.

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Exhibits 1 and 2 illustrate these consequences by showing the sector and regional allocation deviations implied by two contrasting climate-aware strategies discussed in the previous episode [KS2.1]in this series. As a recap, both are designed to reduce climate physical loss relative to the benchmark with an ex-ante annual tracking error budget of 0.5%; the 'climate-tilted' strategy uses the portfolio tilting approach[1], while the 'climate risk-aware' strategy relies on the SciX risk model[2].

Exhibit 2: Average regional deviations relative to the benchmark



Source: SciX. Regional deviations are computed on quarterly data from June 2004 to June 2026. The SciX Developed index is used as the benchmark.

We see that both strategies have sector deviations ranging from -1.35% to 2.20% for the climate-tilted strategy and from -1.18% to 1.31% for the climate risk-aware strategy. The regional deviations range from -1.59% to 1.98% for the climate-tilted strategy and from -1.97% to 3.49% for the climate risk-aware strategy. The magnitude and stability of sector and regional deviations depend on the construction of the climate score and how often it is updated.

Exhibit 3 then provides a concrete illustration of the impact that sector or regional deviations can have on the short-term performance of climate-aware strategies. For this example, we focus on sector deviations and the first quarter of 2025. This quarter was characterized by a significant underperformance of technology stocks. At the beginning of the quarter, the climate-tilted strategy was overweight in the Technology sector by +3.6%. This led to an underperformance of the strategy of -0.53%, of which -0.32% came from the allocation to the Technology sector itself.

Exhibit 3: Climate-tilted strategy, relative sector allocation and Brinson performance attribution

Sector	Relative sector allocation	Brinson performance attribution		
		Allocation	Selection	Total
Basic Materials	-0.01%	0.00%	0.04%	0.04%
Cyclical Consumer	0.23%	-0.02%	0.06%	0.04%
Energy	-0.60%	-0.07%	0.00%	-0.07%
Financials	-1.61%	-0.11%	-0.03%	-0.14%
Healthcare	0.23%	0.02%	-0.01%	0.01%
Industrials	-0.65%	-0.03%	0.05%	0.03%
Non-Cyclical Consumer	-0.47%	-0.02%	-0.01%	-0.03%
Technology	3.60%	-0.32%	-0.03%	-0.35%
Telecoms	-0.12%	-0.01%	0.00%	-0.01%
Utilities	-0.61%	-0.04%	0.00%	-0.04%
Total		**-0.59%**	**0.06%**	**-0.53%**

Source: SciX. The relative sector allocation is computed as of 20-Dec-2024. The Brinson performance attribution is computed from 20-Dec-2024 to 21-Mar-2025. The SciX Developed is used as the benchmark.

1 - We use a tilt of 5 to approximately calibrate the historical tracking error to the ex-ante tracking error budget.
2 - The climate-tilted strategy uses the SciX Developed index as the benchmark for the tilting. The climate score is a physical climate loss developed in collaboration with the EDHEC Climate Institute. The tilting is done as follows: $w_i(1+\text{tilt} \times s_i)$ where tilt is set at 5, w_i is the weight of stock i in the benchmark and s_i is the physical climate score. Weights are then normalised to sum up to 100%. The weighting is applied every quarter. The climate risk-aware strategy is built using SciX' risk model to estimate a stock-level covariance matrix of returns. The optimization objective is to minimize the ex-ante tracking error under three constraints. The first constraint is a budget constraint, i.e. the sum of weights should be equal to one. The second constraint is based on a robust optimization principle and imposes that the sum of squared active weights should be below the ratio 1/N, where N is the number of stocks in the SciX Developed index; this aims to spread active risk across multiple positions and avoid large idiosyncratic active bets. The third constraint is on the physical climate loss. We require the physical climate loss reduction to be at least equal to a given percentage level. To find the optimal solution, we build an efficient frontier, where the physical loss reduction starts at 0% and then increases until no solution is possible. We then pick the optimal solution (on the frontier) that is closest to the ex-ante tracking error budget of 0.5%.

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Of course, there are other cases in which this overallocation to technology stocks would have paid off. Nonetheless, it is important for investors to understand that leaving sector and regional allocations uncontrolled has consequences for the short-term performance of their climate investments. Hence, whether or not to control sector and regional allocations is a fiduciary decision for the investor.

Defining clear risk management objectives

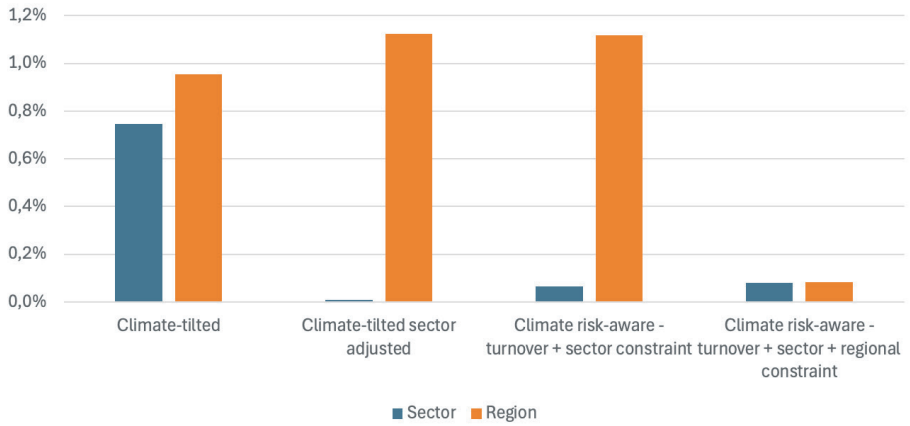
Yet how can investors actually control for these biases and overall augment their set of risk management objectives?

It is evidently difficult to manage a variety of risks within tilting methodologies: for example, using simple heuristics, it is possible to adjust a climate score to control either sector or regional deviations, but not both simultaneously.[3] Moreover, it is not possible to control the turnover of a strategy ex-ante. Turnover can only be observed ex-post in the backtest or in the historic track-record of the live portfolio. By contrast, risk model frameworks can accommodate additional risk management constraints, such as sector and regional control and turnover limits.

Below, we compare the **climate and financial characteristics** of two climate-tilted strategies and two 'climate risk-aware' (risk model) strategies. One of the climate-tilted strategies and both of the risk-aware strategies are adjusted to ensure sector neutrality. In addition, the two risk-aware strategies are subjected to an annualized one-way turnover constraint of 10%, while one of the risk-aware strategies additionally features a regional neutrality constraint.[4]

To begin with, Exhibit 4 reports the mean absolute deviations of sector and regional allocations. Unsurprisingly, we observe that the risk controls imposed ex-ante on each strategy have the expected effect on sector and regional deviations.

Exhibit 4: Mean absolute deviations of sector and regional allocations relative to the benchmark



Source: SciX. The sector and regional deviations are averages based on quarterly data computed from June 2004 to June 2026.

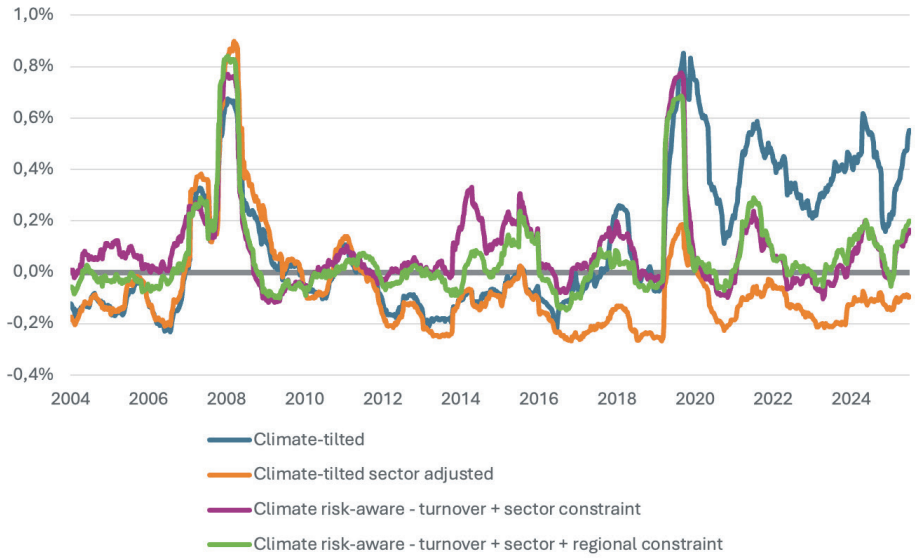
Exhibit 5 then presents the tracking error over- or undershoot of each strategy. Here, it becomes clear that the heuristic sector adjustment used in the climate-tilted strategy has almost no impact on the tracking error in the first part of the sample up to 2016 but starts to **significantly reduce tracking error** from 2017 onwards. This reflects one limitation of the portfolio tilting approach already discussed in Episode 1: choosing (in a backward-looking way) a tilt level to target an ex-ante tracking error is not robust out of sample as there is no guarantee that the past will repeat itself. Second, both climate-tilted

3 - This is due to sectors generally not nesting inside countries (or vice versa), but rather *intersecting* with countries. This means that a sector neutral score necessarily creates country biases; conversely, a country neutral score necessarily leads to sector biases.
4 - The sector and regional neutrality constraints impose a +/- 0.1% maximum deviation to the sector and regional benchmark allocation. The optimization uses the same constraints as depicted in footnote 2, with the additional turnover, sector and regional constraints. The optimal solution is found using the same procedure.

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strategies tend to under- or overshoot the tracking error budget of 0.5%. This is reflected by the average absolute deviation from the ex-ante risk budget, which is 0.21% for the climate-tilted strategy and is slightly reduced to 0.16% with the heuristic sector adjustment. Third, the climate risk-aware strategies both show lower absolute deviation from the ex-ante risk budget (0.11% for the strategy using the turnover and sector constraints; 0.10% for the strategy using the additional regional constraint).

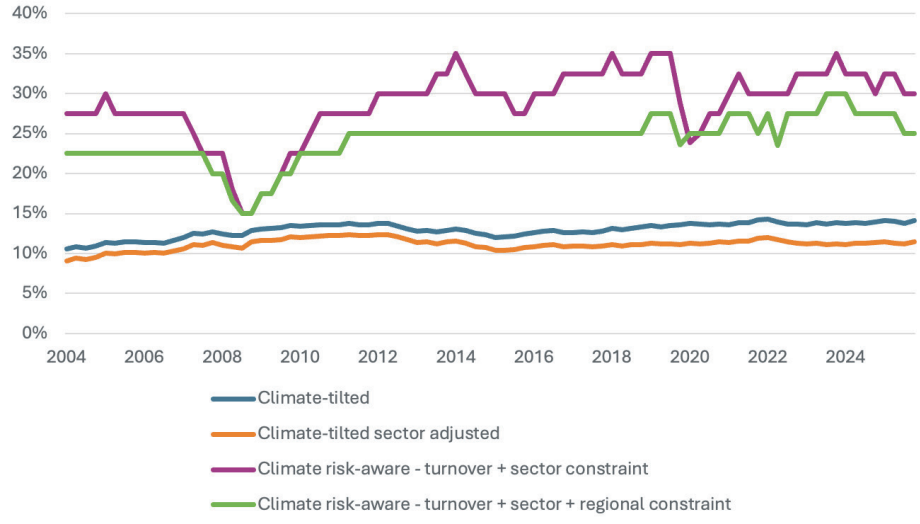
Exhibit 5: Tracking error over- or undershoot of climate-tilted and climate-aware strategies



Source: SciX. The over- or undershoot is calculated as the 6-month rolling tracking error minus the ex-ante tracking error budget of 0.5%.

Finally, Exhibit 6 reveals the reduction of climate physical loss relative to the benchmark: 29% (on average) for the climate risk-aware strategy without the regional constraint and 24% for the version with the additional regional constraint, contrasting with a mere 13% reduction for the climate-tilted strategy without heuristic sector control and 11% for the one with sector control. In other words, this evidence suggests that climate risk-aware strategies may be more financially efficient at delivering climate objectives.

Exhibit 6: Climate physical loss reduction relative to the benchmark of the climate-tilted and climate risk-aware strategies



Source: SciX.

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Keep the climate ambition but control the risks

Climate ambition is never free, but its hidden costs can vary. Left unmanaged, a climate objective quietly turns into sector and regional bets that can adversely affect short-term performance. A natural response is to implement simple heuristics aimed at controlling these risk biases. However, this approach only partially addresses the issue, fails to reliably comply with a risk budget out of sample, and leaves financial efficiency on the table.

A risk model methodology can change the game, letting investors implement transparent risk management controls, fully consume their risk budgets and control for sectors, regions and turnover.

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About Scientific Climate Indices (SciX)

Scientific Climate Indices, or SciX, is an EDHEC Venture and European provider of climate equity indices for institutional investors, asset managers and investment-product providers. SciX translates climate science, climate-risk data and quantitative risk management into investable equity indices. Its approach combines scientifically grounded methodologies with transparent and financially disciplined customization.

SciX has launched two initial index ranges reflecting areas where investor demand is particularly pressing:

- The SciX Physical Climate Resilience Index Series is designed to integrate physical climate risk into core equity allocations. Existing physical-risk climate analytics often rely on highly granular bottom-up approaches that can be difficult to scale for index design across broad investment universes. SciX addresses this challenge through an original top-down framework designed for index construction, which can be enriched with company-level data as well as customized to client-specific requirements. In its Core version, the series targets an average 15% reduction in long-term physical climate risk for around one percentage point of tracking error relative to the benchmark.
- The SciX Climate Mitigation Index Series addresses the need for more pragmatic and financially disciplined approaches to climate mitigation, in response to investors' desire to focus on real-world decarbonization and their disappointment with respect to the first generation of low-carbon indices. The methodology recognizes the limitations and noise in emissions data and trajectories, the structural differences in carbon footprint between economic sectors and the undesirable consequences of broad exclusions. It also recognizes the importance of testing company-level emissions trends against independent external real-world assessments rather than relying mechanically on self-reported information.

For both ranges, SciX has introduced a new series of core indices based on the robust implementation of defined climate objectives designed to remain very close to traditional benchmarks. These core indices can be used as climate-aware building blocks or replacements for traditional capitalization-weighted benchmarks, or as the starting point for further customization.

Where investors require different climate objectives, exclusions or financial constraints, SciX applies a disciplined customization framework, relying on live analytics, backtesting and simulation to assess the financial and climate consequences of design choices before implementation, including benchmark deviation, sector exposures, risk concentrations and portfolio constraints.

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