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Turning the lens: Rotating risk models for insight

June 2025

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Turning the lens: Rotating risk models for insight

Risk models are foundational tools in modern portfolio management. They help identify where risk is coming from, whether it is excessive, and where performance surprises might originate. Yet despite decades of refinement, the way risk models are used still leaves room for deeper alignment with the actual investment process.

This paper examines a concept we call risk model rotation—a method that can be used to adapt any off-the-shelf risk model to the specific lens of your investment mandate. We'll explore three key ideas:

- Aligning risk model factor structure to your specific investment philosophy
- Enriching the model with additional factors not originally incorporated in the risk model
- Stressing volatilities and correlations to better reflect forward-looking or possible adverse conditions

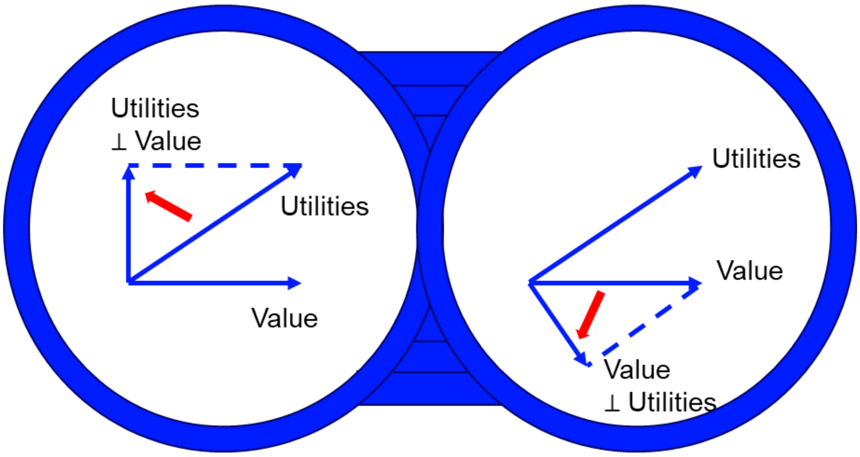
Each of these unlocks a different layer of insight—and together, they help make risk attribution not just more accurate, but more relevant. We'll tease the mechanics, show you what the model looks like, and invite you to explore how much better the new risk attribution captures your investment process.

Rotation for alignment

Risk models come in many shapes, built around sectors, regions, or style factors such as value and size, or derived from purely statistical decompositions. They deploy stepwise procedures to identify hierarchies of factors and the order of their importance to capture risk in the market as well as across a large number of typical portfolios in the best way. But when the investors use these risk models, the goal isn't just to reflect market dynamics—it's to reflect their investment process as well. And that process might be very different from the risk model provider's goal of targeting a broad user base.

Let's look at an example. Suppose you are running a sector-focused strategy—expressing views through stock selection within favoured sectors. In this case, you would want the risk model to attribute risk primarily to sectors, and only secondarily to styles or regions. By contrast, a style-centric investor wants the opposite: risk attribution should focus on styles first, and only then fill in the residuals through sectors and countries.

Figure 1: Factors rotation principle



Source: Index Research and Design, FTSE Russell, June 2025.

Here's the issue: standard risk models don't accommodate these nuances. They treat all factors equally, or at least in a fixed hierarchy. That's where rotation comes in. Our method re-engineers the factor structure by setting an explicit priority — for example, a sector-centric priority order could be Market > Sectors > Styles > Countries — and then orthogonalises each group relative to the higher-priority ones. This conveniently isolates the risk in a way that aligns with the investment process. So instead of letting the model decide how risk is split, you define what comes first. The effect can be dramatic.

In the sector-centric view, sectors absorb more of the systematic risk, pulling common components from countries and styles. In the style-centric view, the same components are attributed to styles first. The total risk hasn't changed—but what the portfolio manager can see and respond to has.

Table 1: Decomposition of tracking error using unrotated vs. sector-centric vs. style-centric risk model for a FTSE Russell All-World Developed Paris-Aligned Benchmark as of Dec 2024

	Original		Sectors centric		Style centric
Market	0.00%	**Market**	0.39%	**Market**	0.39%
Styles	0.91%	**⊥ Sectors**	1.73%	**⊥ Styles**	1.15%
Sectors	1.27%	**⊥ Styles**	0.16%	**⊥ Sectors**	0.74%
Countries	0.34%	**⊥ Countries**	0.24%	**⊥ Countries**	0.24%
Stock Specific	0.87%	**Stock Specific**	0.87%	**Stock Specific**	0.87%
Total	3.38%	**Total**	3.38%	**Total**	3.38%

Source: Index Research and Design, FTSE Russell, June 2025.

Enrichment with macro and thematic factors

Even the best risk models aren't exhaustive. At times, investors care about exposures that aren't in the default factor set at all. Oil, gold, bond yields, inflation expectations, or even ESG or climate themes — they aren't standard "style" or "sector" factors—but they matter, especially for macro-aware or sustainability-driven investors.

So, our method goes a step further: it enriches a given risk model by introducing new custom factors. This is more than just slapping on a regression—it's a thoughtful integration into the rotation process.

Take for example, climate-aligned portfolios. An investor might want to explicitly include oil as a macro factor. By inserting it before style, sector, or region in the rotation, it will capture systematic oil risk first — rather than leaving it to be buried in residuals or misattributed.

Notice how the model correctly attributes risk stemming from oil as a primary driver of risk. This isn't just clearer—it's actionable. Our method provides insight of where the portfolio stands relative to forces that matter to the investment process.

Table 2: Risk attribution (% of tracking error) to factors orthogonalised with respect to those listed above (⊥), before and after inclusion of macro factors FTSE Russell All-World Developed Paris-Aligned Benchmark as of Dec 2024

		Original	+ Macro
Stock Market	**Stock Market**	11.5%	11.5%
⊥ Macro	**⊥ Oil**		11.2%
	⊥ Bonds		1.8%
	⊥ Inflation		0.0%
	⊥ USD		2.1%
	⊥ Climate		
⊥ Industries	**⊥ Technology**	20.7%	17.2%
	⊥ Consumer Discretionary	8.3%	5.9%
	⊥ Energy	13.0%	8.0%
	...	…	...
Total		100%	100%

Source: Index Research and Design, FTSE Russell, June 2025.

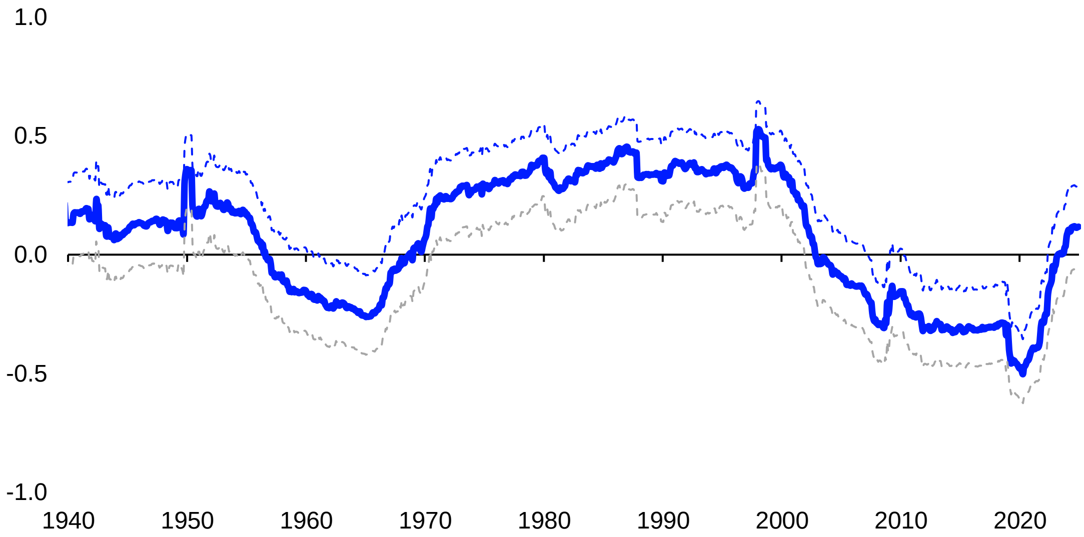
Stressing volatilities and correlations

With this rotated, enriched model in hand, it's now possible to explore *what-ifs*. What if volatilities change? What if correlations break down? In a world where asset relationships shift fast, risk models need to be flexible, too.

One powerful use case: changing the stock-bond correlation.

The stock-bond correlation has fluctuated wildly over the past 40 years—from strongly negative to significantly positive. What happens if it flips again? Can your portfolio handle that?

Figure 2: Historical stock-bond correlation



Source: Ibbotson, Roger G. and Harrington, James P., Stocks, Bonds, Bills, and Inflation® (SBBI®): 2020 Summary Edition (September 14, 2020). CFA Institute Research Foundation Publications, August 2020 and Index Research and Design, FTSE Russell, June 2025. Correlation between stocks and bonds is the rolling 120-month correlation including 5% confidence interval

To examine this, we set the stock and bond markets as the top-tier factors in the rotation[1]. Everything else is orthogonalised away. This allowed us to manually override their correlation — for example at the historical extremes of +40% to -40%.

When we impose this new correlation structure, the model updates not just the stock-bond pair, but the entire factor covariance matrix. Risk attributed to Utilities vs. Tech, Value vs. Growth, etc. — all adjust dynamically[2]. The model propagates the shock correctly, providing you with a sense of where fragility might lie in each scenario. This kind of stress-testing is no longer theoretical. It's precise, controlled, and anchored in your investment priorities.

[1] We use US Treasury bonds as a proxy to Bond factor.

[2] Changing correlation between Stock Market and Bonds alters the combined Stock Market + Bonds attribution to the tracking error, while leaving intact the attribution to the orthogonalised factors (⊥). The increase of the contribution from the former for negative Equity-Bond correlation is a consequence of underweighting Utilities in FTSE Russell All-World Developed Paris-Aligned Benchmark.

Table 3: Portfolio risk decomposition under +40% and -40% stock-bond correlation scenarios. FTSE Russell All-World Developed Paris-Aligned Benchmark as of Dec 2024

	Risk 40% Corr	Risk -40% Corr
Stock Market + Bonds	0.43%	0.67%[3]
⊥ Other Macro Factors	0.47%	0.47%
⊥ Factors	0.89%	0.89%
⊥ Industries	0.49%	0.49%
⊥ Country	0.23%	0.23%
Stock Specific	0.87%	0.87%
Total	3.38%	3.62%

Source: Index Research and Design, FTSE Russell, June 2025.

Let's talk about your rotation

This paper only scratches the surface. What we've shown is that risk models can—and should—be tailored to fit investment processes, not the other way around. Whether it's aligning with your process, incorporating new macro risks, or stress-testing correlation scenarios, the tools exist to rotate your model into something sharper, smarter, and more reflective of your view of the world.

So, here's our invitation: let's talk. We're happy to walk you through what a risk model rotation could look like for your strategy, and how small tweaks could lead to much more actionable risk reporting.

[3] The increase in risk when stock-bond correlation is negative requires some explanation. The Paris-Aligned Benchmark has a positive beta to the stock market (as seen in the earlier risk attribution chart), but it also underweights bond-like sectors like Utilities, i.e. it has a negative beta to bonds. When stock-bond correlation is positive, the positive stock market exposure and the negative bond beta diversify. On the other hand, when stock-bond correlation is negative, the risk is compounded.

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