I. Summary:

Qi's new Macro Equity Factor Risk Model (MFERM) offers a powerful yet straightforward way to improve risk-adjusted returns. By forecasting daily macro factor volatility for the S&P500 and scaling back exposure during predicted volatility spikes, we significantly enhanced performance over the past 11 years. This approach lifted the S&P500's information ratio from 0.8 to 1.0, with a more aggressive shorting strategy raising it further to 1.2. These results highlight just how remarkable and effective a macro factor approach like MFERM can be in an environment of macro volatility: it cuts drawdowns and improves returns by acting quickly when market macro stress appears. Although many funds apply more complex optimization, integrating MFERM's forecasts can deliver a strong, credible edge in managing portfolio risk.

II. Introduction:

Qi's Macro Equity Factor Risk Model (MFERM) provides a daily macro factor risk forecast for an equity security or portfolio. This forecast is a function of the security's macro factor exposures and an exponentially-weighted covariance matrix of the macro factors themselves.

Our basic hypothesis is that Mr. Market is a neurotic patient that would prefer a backdrop of factor stability over rising volatility. By way of example, equities want tighter credit spreads, but if the sensitivity to credit spreads is increasing as opposed to stable, market attention is clearly more focused on the health of the credit cycle.

When Qi's factor risk forecast spikes, we should reduce risk. By reducing the impact from the left-tail of the potential distribution of outcomes, we should be able to improve risk-adjusted returns. We ran the below exercise for the S&P500.

III. Exercise:

- Run Qi's Risk Model on the S&P500 Index to obtain a daily risk forecast, split between factor and specific. We went back 11 years to 2014. For **both** total and factor predicted risk we executed the below steps:

- Convert the daily risk forecast into a z-score based on a short lookback period to capture sudden spikes in predicted vol. Without any optimisation, we use a fixed look back of 50 trading days - akin to using a 50d MA to represent the intermediate trend.

- When the risk z-score is greater than or equal to 2.5 sigma at the session close, **reduce your 100% long in the index to 50% long** in the NEXT session. In other words, you are long 2 lots of S&P500 futures but the following day you go short 1 lot leaving you effectively long 1 lot. Given the short lookback window for the z-score, we wanted to identify meaningful risks deep in the tail to signify outliers to the prevailing regime. No trading costs are assumed, but given we look deep in the tail we assume this will not be highly active strategy.

- When the risk z-score falls below the 2.5 sigma threshold at the session close, go back to 100% long i.e. fully invested in the NEXT session.

Finally, we tested a further variation:

- When the risk z-score is greater than or equal to 2.5 sigma at the session close, **reduce your 100% long in the index to 50% short** the NEXT session. In other words, if you are long 2 lots of S&P500 futures, the following day you go short 3 lots leaving you short 1 lot.

IV. Results:

Applying Qi predicted total risk:

- Since 2014, there have been **24 events** where our MFERM Risk Z-Score has been greater than or equal to 2.5 sigma.
- **67%** of those events saw our intervention yield better results than staying fully invested. In other words, 16 out of 24 times, the market was lower during our adjustment period.
- Of those 16 winning events, the average unannualized outperformance was 1.50%. Of the 9 losing events, the average unannualized underperformance was 0.61%. In other words, the **size of win to loss ratio is 2.5x**.
- The impact of this is to lift the information ratio (average annualised return / annualised vol) of the S&P500 from **0.8 to 1.0**.
- On a calendar year basis, the adjusted portfolio delivered an **annual outperformance of 1.8%**, **outperforming in 8 out of the 11 years** from 2014 to 2024.
- The top 3 calendar year improvements were seen in order – 2020, 2022 and 2018 – years associated with higher volatility. 2014 was really the nadir of the "sell the vol" mantra post the GFC.

Applying Qi predicted factor risk:

- Reducing risk when the MFERM factor risk z-score rose above 2.5 sigma also lifts the information ratio from **0.8 to 1.0, confirming that factor risk is indeed the dominant feature of total risk for the S&P 500.** Annualised returns and vol are almost identical over the period.
- Importantly, **max drawdowns also improved significantly** using both approaches.
- A final sense check: If instead of reducing risk to 50% long **we went 150% long** when we hit our trigger events, the information ratio drops from **0.8 to 0.6**. This confirms that our intuition to

minimise the impact of factor vol shocks was correct. **Factor risk spikes are a headwind not tailwind.**

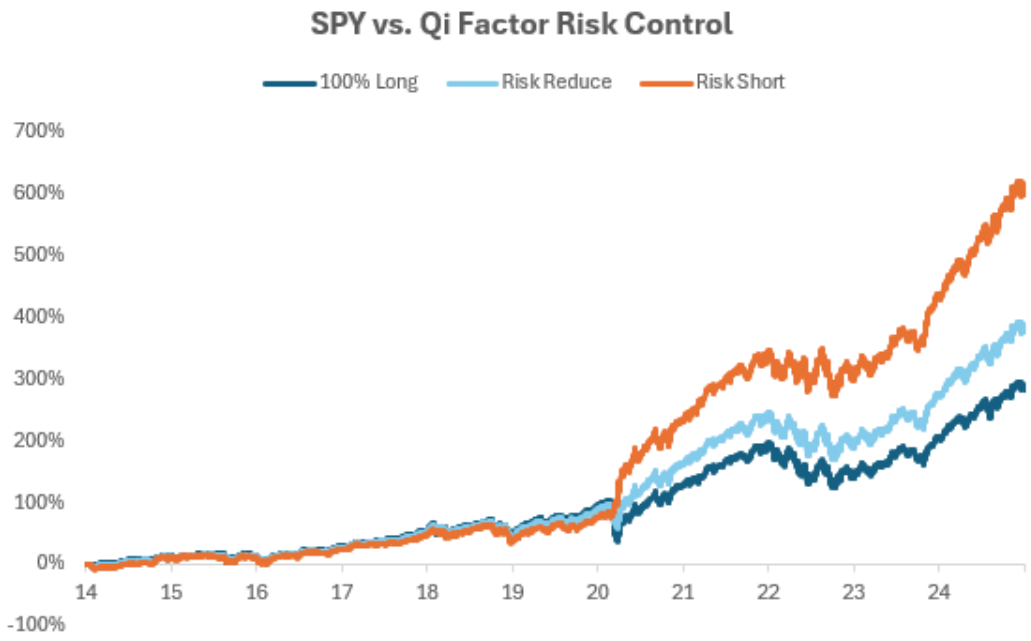
What if we went net 50% short on a trigger event?

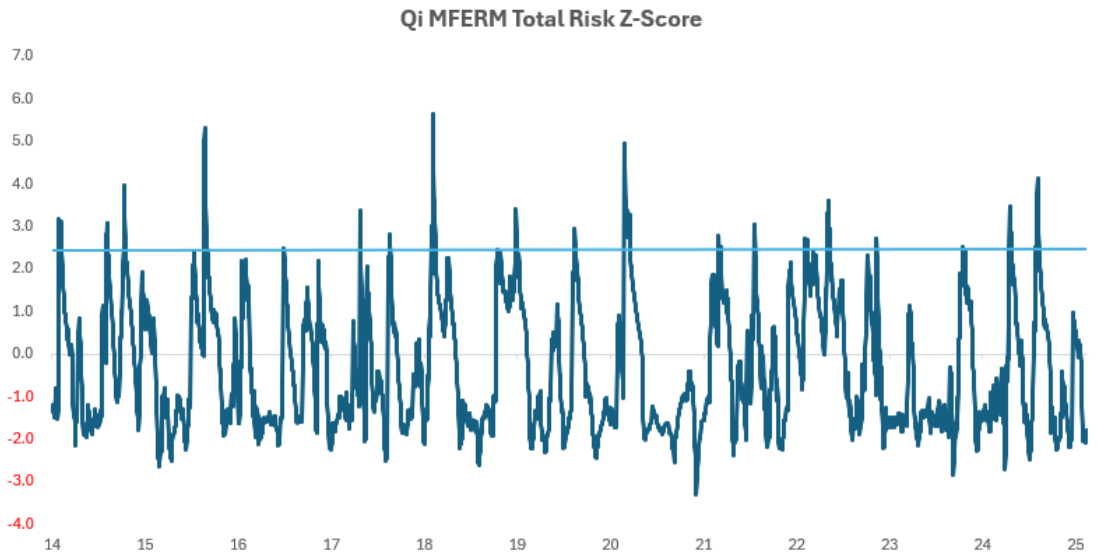
- **Going 50% net short** on our trigger events, lifts the information ratio further from **1.0 to 1.2 whether we used predicted total risk or factor risk**

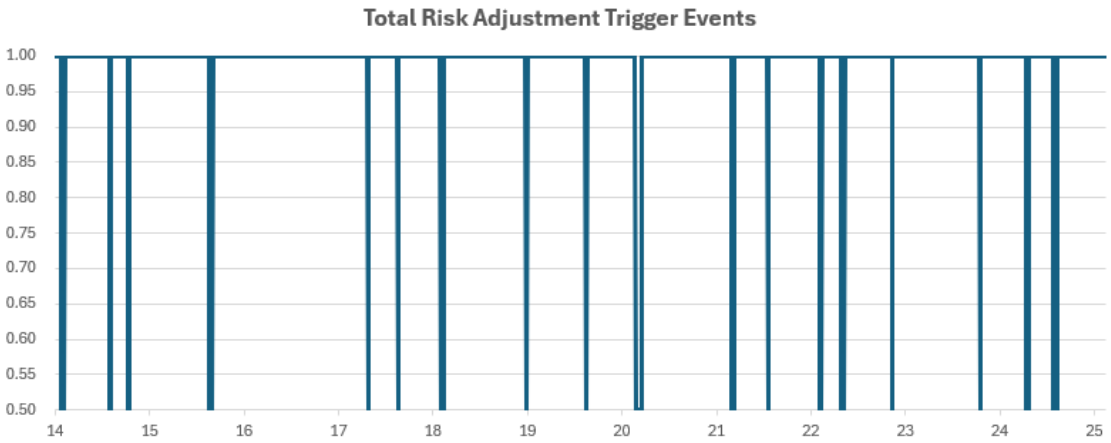
V. Charts & Tables:

Full analysis available on request.

USING QI FACTOR VOL 50D Z-SCORE ON SPY			
	100% Long	Risk Reduce	Risk Short
Average Ann Return	13.3%	15.0%	18.3%
Annualised Vol	16.8%	15.3%	15.3%
Information Ratio	**0.8**	**1.0**	**1.2**
Max DD	-33.7%	-21.9%	-19.3%







	SPY 100% Long				SPY Risk Reduce				SPY Risk Reduce - 100% Long		
	Avg Ann Return	Vol	IR	Max DD	Avg Ann Return	Vol	IR	Max DD	Avg Ann Return	IR	Max DD
2014	12.1%	11.1%	1.1	-7.3%	12.9%	10.7%	1.2	-6%	0.8%	0.1	1.6%
2015	2.3%	15.2%	0.2	-11.9%	2.7%	13.8%	0.2	-11%	0.4%	0.0	1.3%
2016	11.3%	12.8%	0.9	-13.0%	11.3%	12.8%	0.9	-13%	0.0%	0.0	0.2%
2017	19.3%	6.6%	2.9	-2.6%	18.7%	6.5%	2.9	-3%	-0.5%	0.0	0.0%
2018	-3.1%	16.7%	-0.2	-19.3%	-2.0%	15.6%	-0.1	-18%	1.2%	0.1	0.9%
2019	27.0%	12.3%	2.2	-16.0%	26.9%	12.3%	2.2	-15%	-0.1%	0.0	0.7%
2020	21.6%	32.8%	0.7	-33.7%	36.4%	25.9%	1.4	-21%	14.8%	0.7	12.7%
2021	25.2%	12.7%	2.0	-5.1%	24.3%	12.6%	1.9	-5%	-0.9%	0.0	0.0%
2022	-16.6%	23.8%	-0.7	-24.5%	-13.2%	23.5%	-0.6	-21%	3.4%	0.1	3.1%
2023	23.7%	12.9%	1.8	-19.3%	24.5%	12.8%	1.9	-16%	0.7%	0.1	2.9%
2024	22.1%	12.3%	1.8	-8.4%	22.2%	11.6%	1.9	-6%	0.0%	0.1	2.3%
14-24	**13.3%**	**16.8%**	**0.8**	**-33.7%**	**15.1%**	**15.3%**	**1.0**	**-21%**	**1.8%**	**0.2**	**12.3%**

VI. Conclusion:

The simplicity of this approach is appealing - Take risk mitigating action when MFERM predicted vol spikes. Many funds will run more sophisticated optimisation processes. However, integrating Qi's forecasts also into decision making has the potential to provide an edge for risk-adjusted returns.

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