LOMBARD ODIER
INVESTMENT MANAGERS

Global Perspective

Building a diversified Alternative Risk Premia portfolio

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July 2019

In the effort to build a robust diversified alternative risk premia portfolio, the Lombard Odier Investment Managers systematic team spends a considerable amount of time researching and developing its own premia. A frequent question we have been asked time and again is the process behind the decision to include a new premia in our portfolio. In our opinion, the key aspect in incorporating a new premia lies in its diversification benefits. One of our core beliefs is that a portfolio manager who can develop and effectively combine a robust set of orthogonal alternative risk premia, should be able to deliver the most attractive uncorrelated risk/adjusted returns for their investors.

In this short analysis, we will discuss the diversification benefits of our set of alternative risk premia, along with the proprietary combination process we have developed specifically for our portfolio.

Selection

When we gain interest in a premia, we first decide if it fits into our selection criteria. In order to be considered for inclusion in our portfolio, the premia needs to:

- Have a clear rationale
- Be persistent
- Be liquid
- Have a realistic implementation i.e. not just theory, but be viable after execution costs

Once all the above boxes are ticked, we observe the behaviour of these premias under different market conditions, their sensitivity to traditional asset classes, as well as their tail risk profile (right tail/left tail). This is done with an aim to judge if this premia makes sense on a qualitative basis according to our global objective, i.e provide uncorrelated source of returns/diversification among a long-only multi-asset portfolio.

Finally, we are looking at its diversification properties once combined with the other premias held in the portfolio.

People familiar with our methodology know that we group our premia based on asset classes. For example, our ARP FX strategy is a combination of Carry and Value premia. We currently include 22 different premia in our portfolio that we group into 8 distinctive strategies.[1]

[1] We have excluded Macro Tail Hedge in the portfolio analysis as we do not consider it to be a premia per se but rather consider it as part of the portfolio construction process. The Macro Tail Hedge has an activation/de-activation feature on it which is driven by changes on US financial conditions.

Diversification analysis is performed with a two-step analysis which aims at understanding the diversification benefits of our individual premia strategies as well as the value added by our portfolio combination process.

The aim of this paper is therefore to show the diversification benefits of the set of premia developed and managed by LOIM.

Step 1

- Build and analyse all different portfolio combinations composed of 1 to n premia (i.e. 255 combinations with 8 strategies)
- Use a standard risk model (1/Expected Shortfall) for the allocation process
- Assign an equal risk budget across strategies
- Apply a monthly rebalancing
- Test this over the last 10 years at a miniumum

The diversification ratio compares the sum of the premia performance contribution volatility to the overall portfolio volatility.

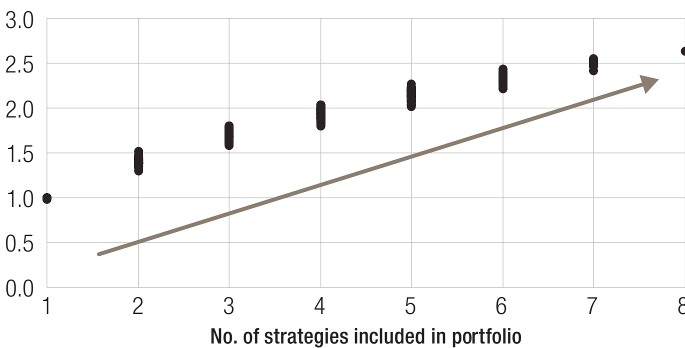
$$DR = \sum \text{(premia contribution volatility)/Portfolio volatility}$$

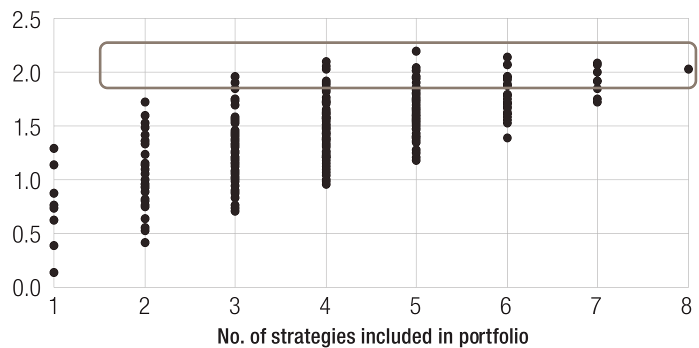
The results suggest that the diversification ratio is maximized when the portfolio is composed of our 8 premia strategies. We can also observe that the portfolio composed of 8 premias delivers one of the best Sharpe Ratios.

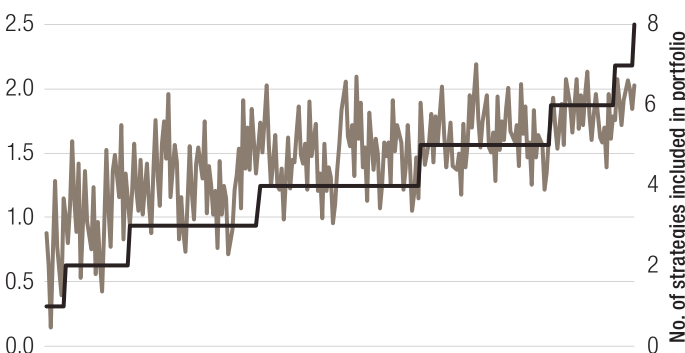
However, while interesting in theory, these portfolios are not always implementable in our view as they can lead to an uncontrolled use of leverage and can be exposed to considerable risks. We can also observe that while ranking well on diversification and Sharpe Ratios, these portfolios tend to score poorly on tail risk observations such as Maximum Drawdown, Maximum Daily Loss and Drawdown /Volatility ratio (as can be seen from Figure 1). They also tend to exhibit a large negative skew.

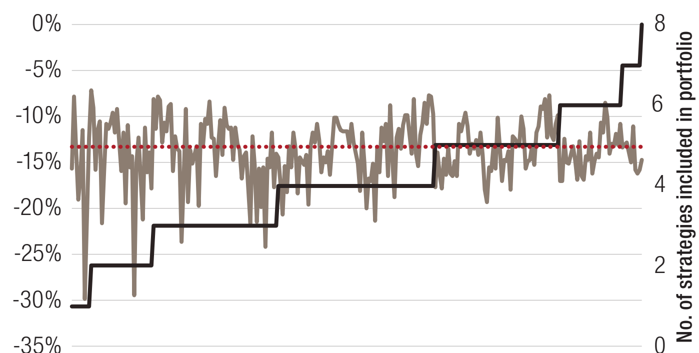
This highlights that even with an orthogonal set of risk premia, it is not sufficient to achieve an optimal and robust portfolio. We believe that the key aspect on top of your premia diversification, is the manner that you assess the risk. In our opinion, long/short investment requires a sophisticated risk model that allows you to go well beyond traditional risk models. This is a critical step and a reason why we have put a significant amount of effort in developing our proprietary ARP allocation model.

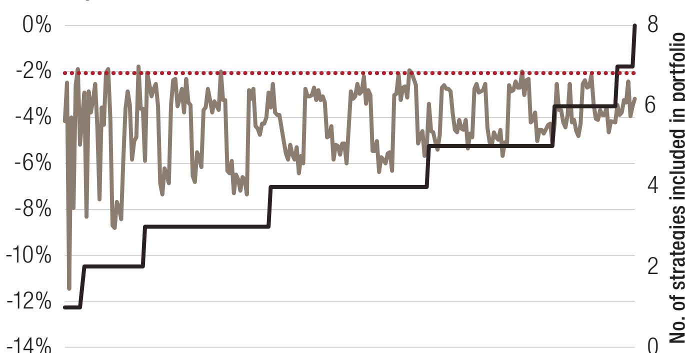
FIG. 1 PORTFOLIO ANALYSIS USING A STANDARD RISK MODEL (1/ES) – 7% VOLATILITY TARGET

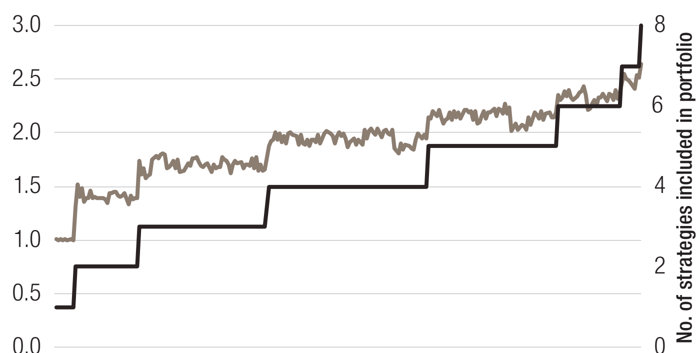












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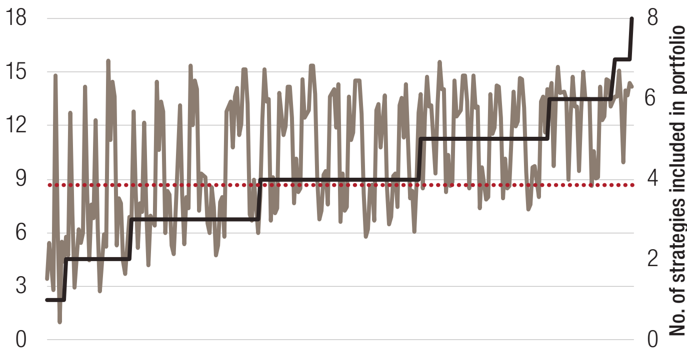
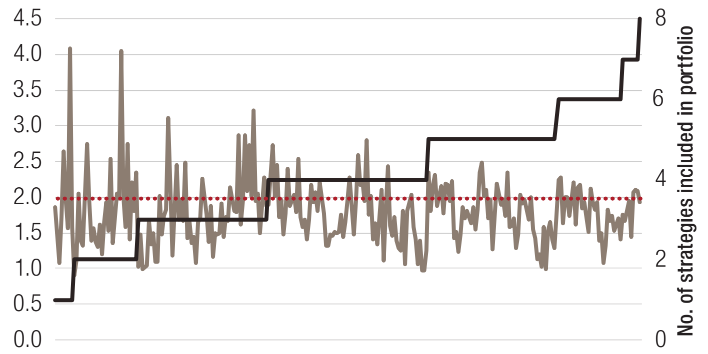
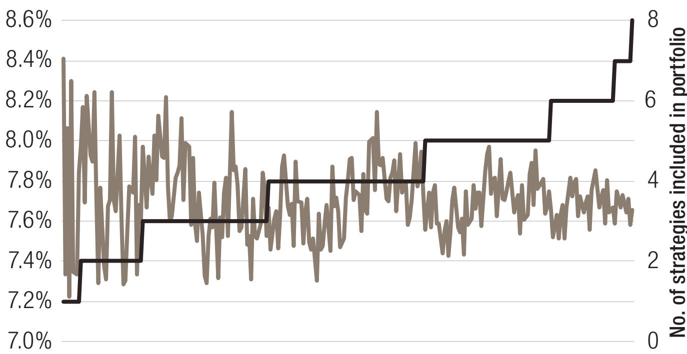
Max Leverage



Drawdown/Volatility



Volatility



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Step 2

The next step is to perform the same analysis as in step 1 but now using our dedicated ARP risk-based allocation model.

As a reminder, our proprietary risk method is based on a **Modified Expect Shortfall** model under tail risk constraints. The main objective of our model is to take into account specific risks linked to ARP strategies that we believe you cannot control through a standard risk model. Our proprietary risk measure is modified over 3 criteria:

- Asymmetric Risk (i.e. does the premia suffer from large losses during periods of stress)
- Re-correlation Risk (i.e. does the premia re-correlate to equities during periods of stress)
- Levereage Risk (i.e. does the premia suffer from liquidity risk during periods of stress)

In order to add further constraints, we optimize the portfolio under tail risk considerations, such as maximum drawdown contribution, daily shock contribution, concentration & leverage limits

We believe our model described above addresses key concerns and negative biases of alternative risk premia strategies.

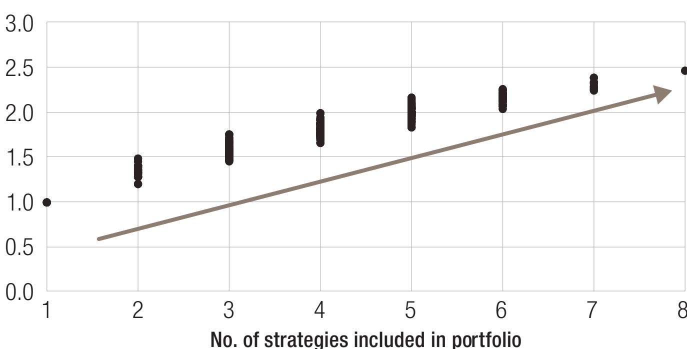
Under some constraints (such as our model), one could say that the drawback would be a reduction of the diversification effect. However, in our opinion, if the set of premia chosen for the portfolio is truly robust and orthogonal, then your diversification should not be impacted no matter the constraints applied to the process. **Our goal is therefore to keep the diversification benefits while trying to manage the tail risks exhibited in Step 1.**

The results shown in Figure 2 appear to prove the above theory: while diversification benefits remain, tail risk is now seen to be better managed.

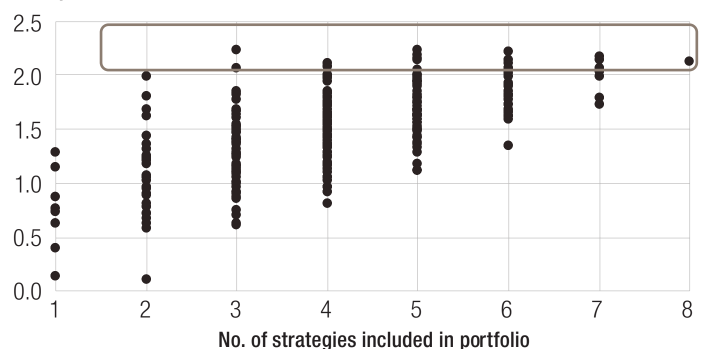
Indeed the portfolio composed of 8 premia continues to exhibit the best diversification ratio and amongst the best Sharpe Ratios while limiting the use of leverage. It also has a considerable impact on all risk metrics as seen in Figure 2.

FIG. 2 PORTFOLIO ANALYSIS USING OUR PROPRIETARY RISK MODEL – 7% VOLATILITY TARGET

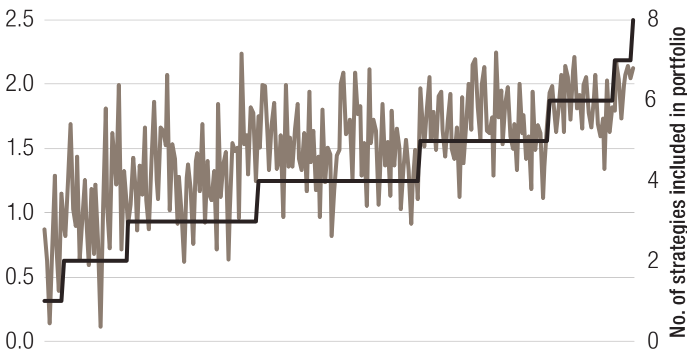
Diversification Ratio



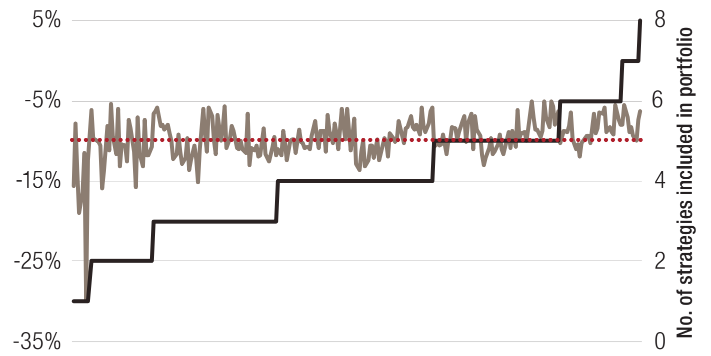
Sharpe Ratio



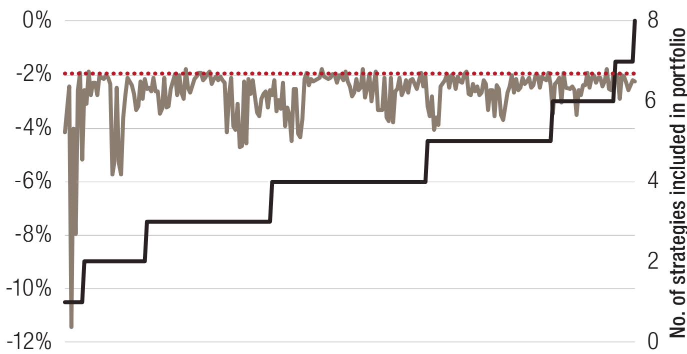
Sharpe



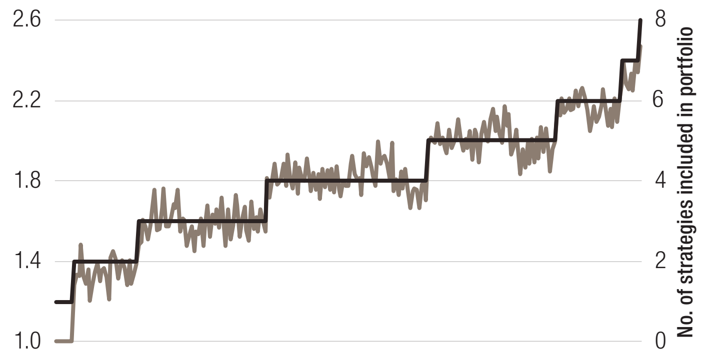
Max Drawdown



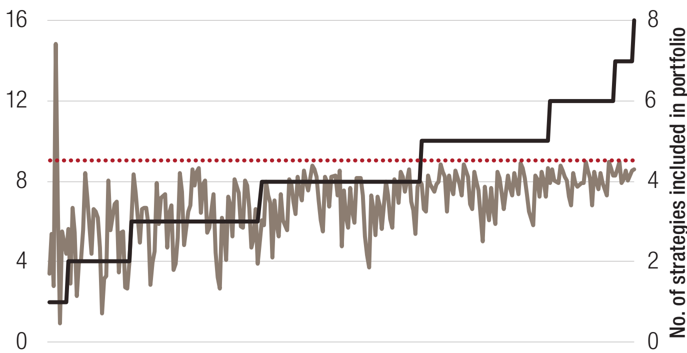
Min Daily



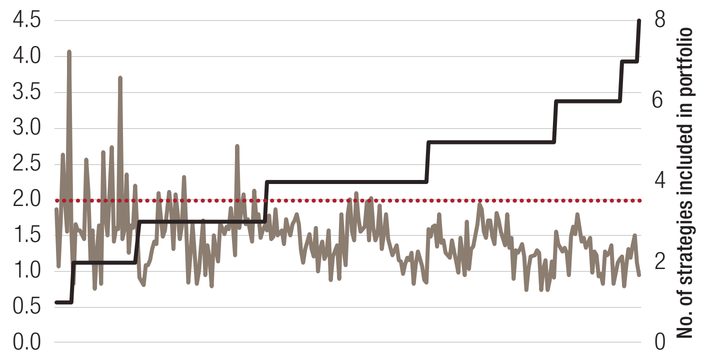
Diversification



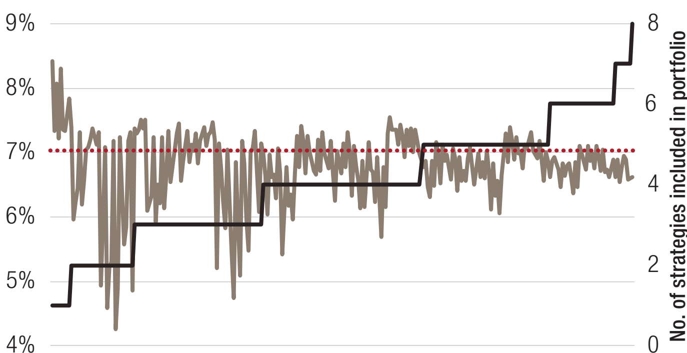
Max Leverage



Drawdown/Volatility



Volatility



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As can be seen from Figures 3 and Table 1, our results show that our proprietary risk model delivers the best risk/adjusted returns.

FIG. 3 HISTORICAL MAXIMUM DRAWDOWN

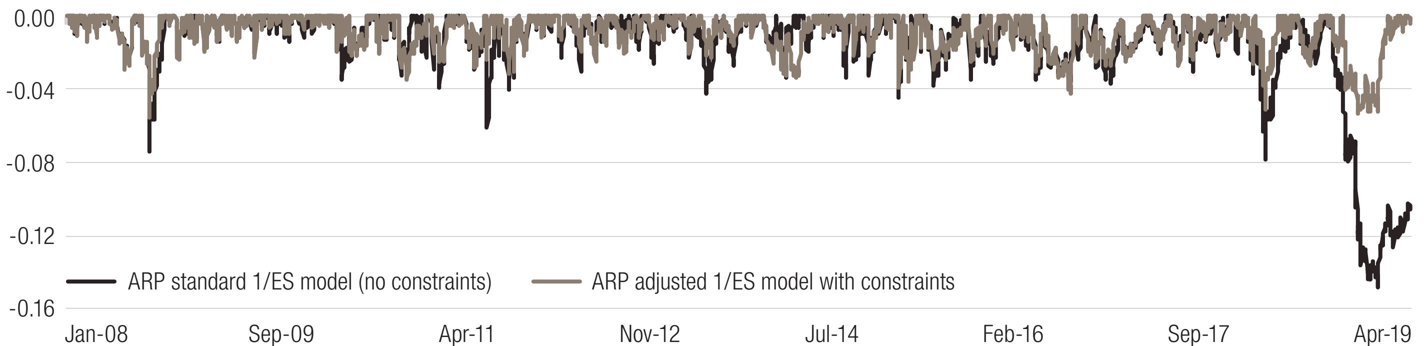

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TABLE 1: STATISTICAL ANALYSIS OF BOTH ARP PORTFOLIOS

	ARP STANDARD 1/ES MODEL NO CONSTRAINTS	ARP 1/ES MODEL WITH MODIFIED CONSTRAINTS
Avg.Ann ER	15.52%	14.43%
Volatility	7.66%	6.71%
Sharpe	2.03	2.15
Max DD	-14.77%	-5.51%
Min Daily	-3.18%	-1.98%
Diversification	2.64	2.45
Avg Leverage	14.17	8.62
Eq.Cor	0.11	0.00
Bds Cor	0.25	0.32
Skew M	-0.25	0.23
DD/VOL	1.93	0.82

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In conclusion, we demonstrate our process of incorporating new premia with respect to the diversification benefits it can bring to the portfolio, while placing equal emphasis on the risk measure used. Our aim with the above is to not only add robust, orthogonal premia that add diversification to the portfolio but also mitigate tail risk and biases with the proprietary risk measure we use.

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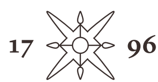

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