LOMBARD ODIER
INVESTMENT MANAGERS

Alternative Risk Premia

Review of LO Funds–Alternative Risk Premia following February 2018 market events

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I. ALTERNATIVE RISK PREMIA – OUR VISION, RATIONALE AND ECONOMIC OBJECTIVES

Our vision of Alternative Risk Premia

Back in 2013, global balanced portfolio investors were stuck in a low yield environment, forcing them to accumulate risky assets to meet their return objectives. Investors struggled to find tools with the true diversification and return enhancement properties they needed. To address this, our mandate was clear: we needed to engineer a tool targeting (1) true diversification and (2) return enhancement, that could fit in a global balanced portfolio.

Seeking to always provide true diversification

While Income Alternative Risk Premia offers low correlation to traditional asset classes over the medium to long term, they tend to re-correlate to equities and suffer in strong risk-off scenarios. Our aim has been to build an investment solution that provides de-correlation when it is most needed by investors in a global balanced portfolio, i.e. at times of prolonged bear markets in risky assets, such as the conditions experienced during the global financial crisis of 2008. At the heart of this are our **Risk-Mitigation** strategy premia, (notably including the ARP Cross-Asset Trend program) which are complementary to our “**Income**” risk premia. Indeed, in our view, strategies such as Cross-Asset Trend or CTAs are one of the few systematic strategies at our disposal that have the potential to bring protection in prolonged down market environments.[1] They hold the very interesting property of an insurance profile with limited cost, with their ability to short assets with a negative trend and go long assets with a positive trend

Targeting return enhancement

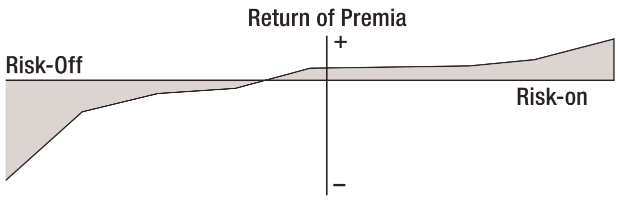
In order to target ambitious return objectives in a low yield environment, while seeking to avoid concentration risk, we have sought to identify and select an array of premia with interesting return potential and limited decay. ARP Volatility Risk Premia (VRP) and Commodity Risk Premia are a good example of this. However, these premia each have their specific risks, which need to be addressed, understood and accepted.

Figure 1 – Alternative Risk Premia – snapshot of strategy aims and means

INCOME RISK PREMIA – LEFT TAIL

- Deliver stable returns with low volatility
- Typically market neutral strategies
- Are exposed to large losses notably during risk off periods
- Insurance seller profile

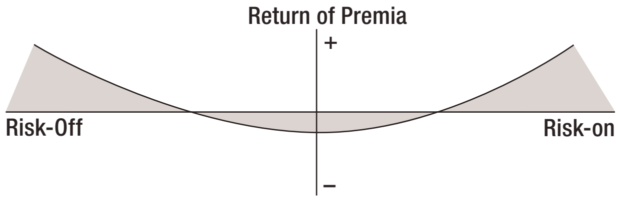
INCOME RISK PREMIA PAY OFF PROFILE



RISK MITIGATION PREMIA – RIGHT TAIL

- Deliver high positive returns in extreme scenarios
- Typically directional strategies
- Are exposed to small losses in trendless markets, but tend to benefits in prolonged trends and/or sharp reversals
- Insurance buyer profile

RISK MITIGATION PREMIA PAY OFF PROFILE



Source LOIM. For illustrative purposes only. Past performance is not a guarantee of future results.

[1] Capital protection/Capital preservation represents a portfolio construction goal and cannot be guaranteed.

Economic and risk objectives

Our flagship fund, LO Funds–Alternative Risk Premia, was designed to have a constant 7% volatility target, and a Sharpe ratio of 1, with a return objective of 5% to 7% above cash over a 2 year period.[2] We expect the potential drawdown to be twice the volatility, which is in line with what is observed in the fixed income asset class, and is considerably lower than what is observed in equities (drawdown of 4x the volatility). The product is entirely scalable and there are other versions available, with various volatility targets (3%, 7%, 10%, 14%).

II. ANALYSING ARP FOLLOWING THE EVENT OF THE 5 FEBRUARY 2018

Following the technical market selloff on 5 February, which highlighted an unprecedented dislocation between volatility and equities, combined with a sharp Trend reversal on major asset classes, our flagship fund was down -8.2% in February. With most of the media buzz instigated by the liquidation of multiple short-volatility products, the “culprit” seemed all too easy to find: volatility clearly seemed to be the elephant in the room.

However, when taking a step back, and looking over the month, it turns out that half of the drawdown effectively came from the ARP Cross-Asset Trend strategy, and one-third from ARP Volatility strategy. For a detailed performance attribution over the month, please refer to the February 2018 Newsletter (https://www.lombardodier.com/home/asset-management/investment-funds/fund-details.html?c_id=33594).

Following the sell-off in February, investors have frequently asked us about the justification of holding (1) Cross Asset Trend strategy and (2) Volatility strategy in our portfolio, when numerous competitors are not exposed to these two particular premia and were only moderately affected during the event. In order to demonstrate the value added of Cross-Asset Trend and Volatility Risk Premia, we tested the following:

- Current version of ARP, including Cross Asset Trend and VRP
- ARP portfolio excluding Cross Asset Trend
- ARP portfolio excluding VRP
- ARP portfolio excluding Cross Asset Trend risk premia and VRP

III. BACKTEST RESULTS

Table 1 – Alternative risk premia simulations

SINCE 2006	CURRENT MODEL	WITHOUT TREND	WITHOUT VOL	WITHOUT TREND & VOL
Annualized Return	13.3%	10.9%	10.3%	8.9%
Volatility	7.2%	7.1%	7.0%	7.1%
Sharpe Ratio	**1.8**	**1.5**	**1.5**	**1.3**
Max Daily Drawdown	-7.6%	-4.6%	-4.4%	-2.2%
Max Drawdown	-11.5%	-14.7%	-8.8%	-13.8%

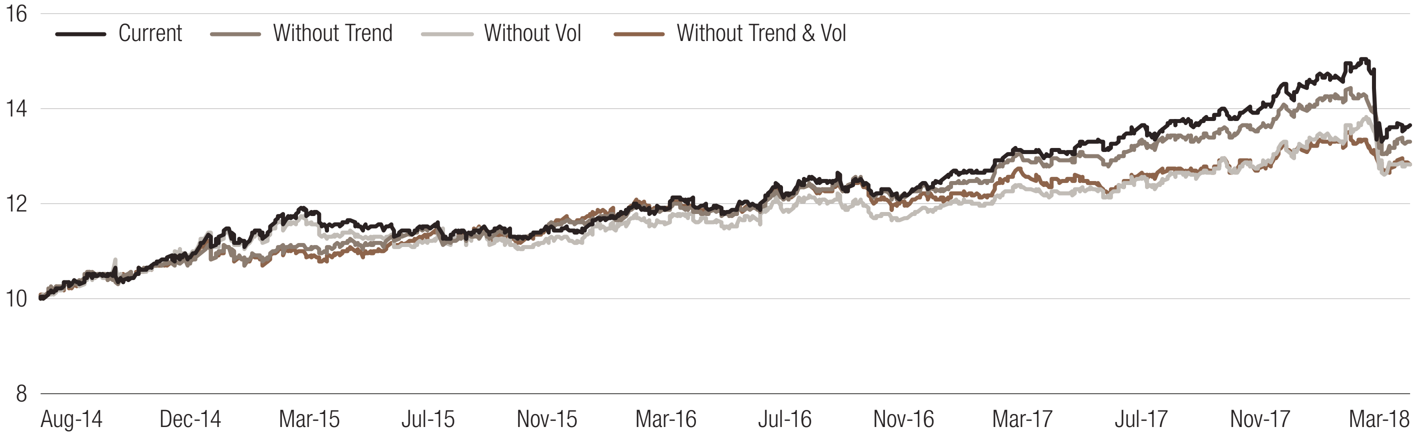
SINCE LAUNCH	CURRENT MODEL	WITHOUT TREND	WITHOUT VOL	WITHOUT TREND & VOL
Annualized Return	8.9%	8.1%	7.1%	7.0%
Volatility	8.4%	7.2%	7.7%	7.2%
Sharpe Ratio	**1.1**	**1.1**	**0.9**	**1.0**
Max Daily Drawdown	-7.6%	-4.6%	-4.4%	-2.2%
Max Drawdown	-11.5%	-9.8%	-8.8%	-6.2%

PERF TR	CURRENT MODEL	WITHOUT TREND	WITHOUT VOL	WITHOUT TREND & VOL
2008	25.0%	12.0%	18.9%	6.6%
2015	4.2%	7.0%	1.8%	6.4%
2016	10.6%	7.0%	7.2%	4.8%
2017	15.8%	14.4%	10.9%	9.0%
Feb 2018	-8.1%	-4.7%	-5.6%	-1.4%

Source: Lombard Odier. Data shown gross of all fees. Results shown reflect hypothetical simulated backtesting of the Strategy that is contemplated by LOIM (“Hypothetical Results”) and does not reflect the actual results of any investment product or the returns that any investor actually achieved. The period shown for the Hypothetical Results is based on available information and LOIM believes the period to be representative and statistically valid. However, prior periods, if selected, may have different results, including losses. Past performance is not indicative of future results. See Important Information at the end of this material, including Notes relating to Backtested Results.

[2] Target performance/risk represents a portfolio construction goal. It does not represent past performance/risk and may not be representative of actual future performance/risk.

Figure 2 – Since launch August 2014



Source: Lombard Odier. Data shown as cumulative return, gross of fees. Results shown therefore reflect hypothetical simulated backtesting of the Strategy that is contemplated by LOIM (“Hypothetical Results”) and does not reflect the actual results of any investment product or the returns that any investor actually achieved.
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Figure 3 – Since 2007

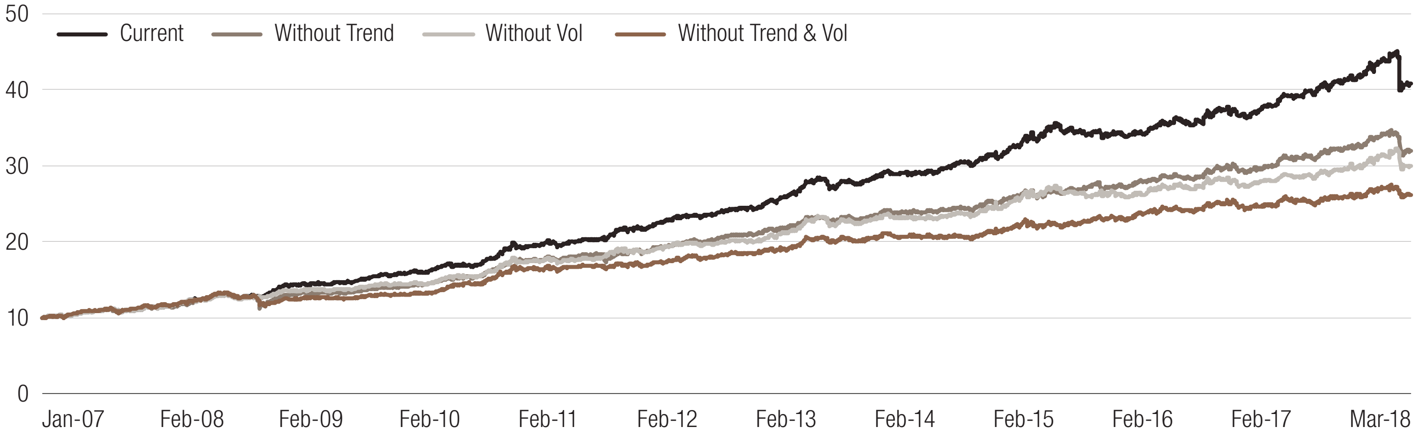

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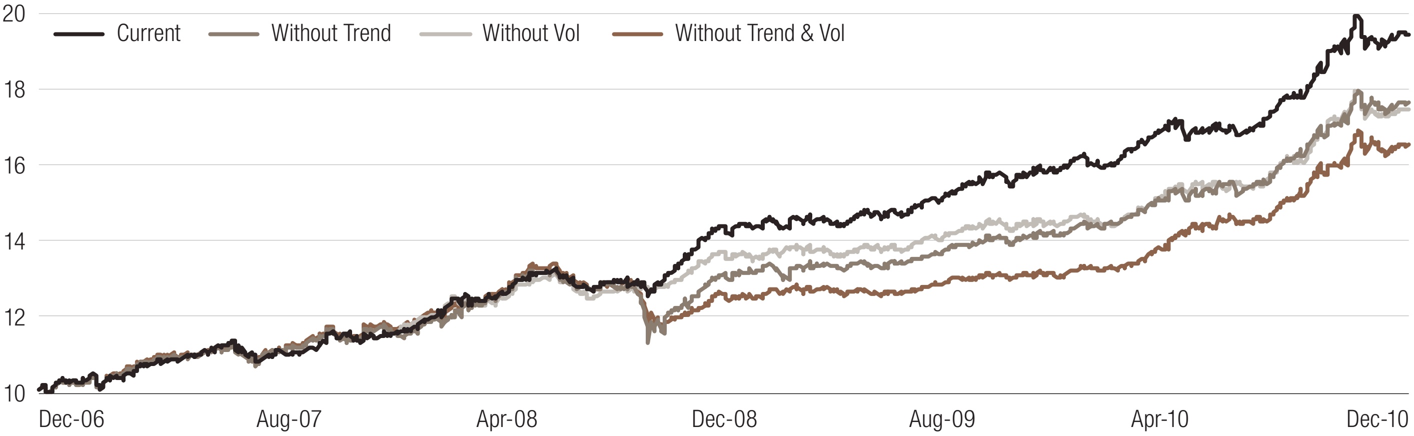
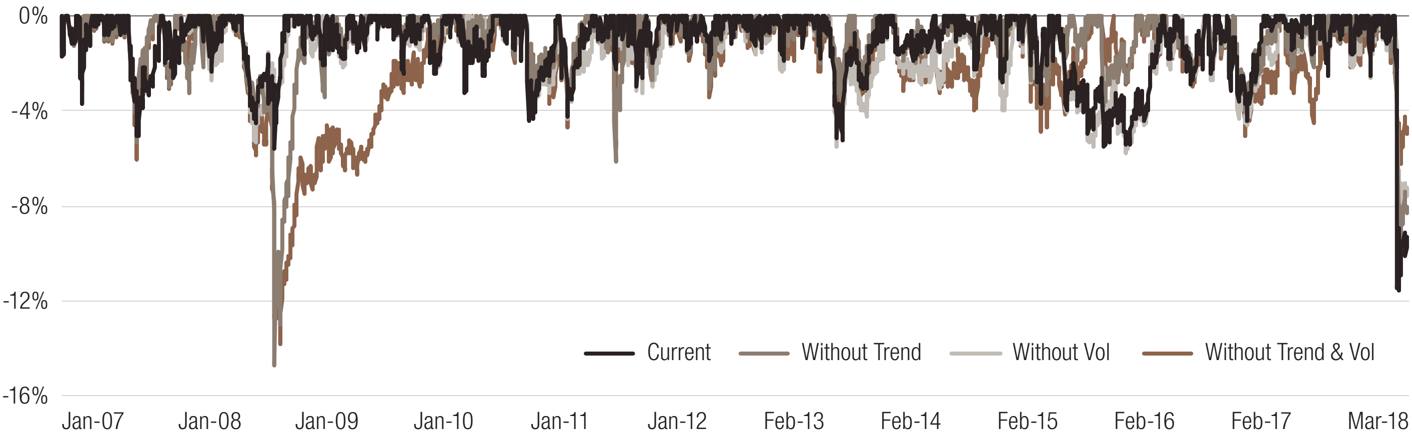
Figure 4 – 2007 - 2010



Source: Lombard Odier. Data shown as cumulative return, gross of fees. Results shown therefore reflect hypothetical simulated backtesting of the Strategy that is contemplated by LOIM ("Hypothetical Results") and does not reflect the actual results of any investment product or the returns that any investor actually achieved. The period shown for the Hypothetical Results is based on available information and LOIM believes the period to be representative and statistically valid. However, prior periods, if selected, may have different results, including losses. Past performance is not indicative of future results. See Important Information at the end of this material, including Notes relating to Backtested Results.

Figure 5 – Historical max drawdown



Source: Lombard Odier. Data shown gross of fees. Results shown therefore reflect hypothetical simulated backtesting of the Strategy that is contemplated by LOIM ("Hypothetical Results") and does not reflect the actual results of any investment product or the returns that any investor actually achieved. The period shown for the Hypothetical Results is based on available information and LOIM believes the period to be representative and statistically valid. However, prior periods, if selected, may have different results, including losses. Past performance is not indicative of future results. See Important Information at the end of this material, including Notes relating to Backtested Results.

IV. RESEARCH RESULTS INTERPRETATION AND CONCLUSION

1. **The long term view:** While a model including Cross Asset Trend and Volatility Risk Premia has suffered in February 2018, looking over a longer time period shows the benefits of these two premia: a) excluding one or both these premia results in lower annualized returns. b) excluding one or both these premia does not systematically reduce the drawdown risk of a portfolio.
2. **Cross Asset Trend Risk Premia** – portfolios without access to Cross Asset Trend risk premia would have experienced a large drawdown during the global financial crisis of 2008. In our view, in this particular type of market configuration (sustained, extreme bear market) the best results usually come from the cross asset trend. As a result, we believe, this not only justifies the inclusion of this premia but also reinforces the presence of this type of strategy in a product whose objective is to provide diversification to investors during periods of market turmoil.

   We believe that without such a strategy, a more traditional alternative risk premia product relying solely on **Income premia** would suffer in similar market conditions, along with traditional risk premia products. In our opinion, this would negatively affect a portfolio's ability to protect as well as its ability to fulfil its return enhancement objectives (Figure 5). However, we acknowledge that a Trend strategy can add short-term downside risk to a client's portfolio especially during risky asset reversal as experienced in February. Therefore, we

Figure 6 – Traditional premia decay observed in generic individual premias: expressed as excess current return over past excess return

AVERAGE ANNUAL EXCESS RETURN	CROSS-ASSET TREND	CARRY FX	CARRY BONDS	COMMODITY CURVE	EQUITY L/S FACTORS	EQUITY MEAN REVERSION	IMPLIED/ REALISED VOL S&P
2000 – 2007	4.37%	9.40%	6.50%	9.54%	3.88%	10.89%	23.41%
2009 – 2017	4.87%	0.40%	4.67%	4.96%	2.55%	8.18%	27.07%
Decay	0.00%	95.70%	28.10%	47.96%	34.26%	24.89%	0.00%
Sharpe Ratio (Full period)	0.72	0.43	0.68	0.91	0.62	0.83	0.91

Source: Bloomberg and Lombard Odier. Strategies represented above are a mix of premias accessed via Investment Banks and Lombard Odier strategies. The period shown for the Hypothetical Results is based on available information and LOIM believes the period to be representative and statistically valid. However, prior periods, if selected, may have different results, including losses. Past performance is not indicative of future results. See Important Information at the end of this material, including Notes relating to Backtested Results.

have researched ways of preventing our Cross-Asset Trend strategy to be massively long risk and subject to risk asset reversals. We have found an attractive solution and we will be implementing a Dynamic Cross-Asset trend strategy in our portfolio which will be discussed in a separate paper.

3. **Volatility Risk Premia** – we believe the results reveal four observations for our diversified Volatility Risk Premia (VRP) strategy:
   1. A higher return potential over the long term for a portfolio with VRP, as displayed by the performance results (Figures 2, 3 & 4).
   2. As can be seen from Figure 5, VRP does not systematically add downside risk when compared to portfolios without VRP strategies.
   3. As demonstrated in Figure 5 (Portfolio without Volatility versus Portfolio without Volatility & Trend), a portfolio with VRP seems to recover much faster than a portfolio without VRP, as can be seen in the drawdown figure.
   4. VRP premia exhibited the least decay (versus other premia as shown in Figure 6).

   We believe that VRP is clearly one of the most attractive income premia as it brings the best estimated risk reward, as well as least decay in comparison to other income premia such as Carry and Equity Factors (Figure 6). **We strongly believe that there is "no free lunch", and when embracing such risk premia the investor needs to be aware and agree on the specific risk linked to this premia (long-term profile versus short-term), which can be, as observed during the February event, abrupt but tend to recover relatively quickly.**
4. **Portfolio excluding Cross Asset Trend and VRP** – in addition of suffering in line with traditional assets during a prolonged risk-off scenario, a portfolio excluding Cross Asset Trend and VRP strategies could, in our opinion, face a longer recovery period as well (as per our backtests, this recovery could last up to two years. Please refer to Figure 5). In addition, the return objectives (Figure 1) of such a portfolio could also suffer, thereby compromising on the return objectives as well as diversification benefits.
5. **Portfolio including Cross Asset Trend and VRP – Conclusion** – As the portfolio was exposed to Cross Asset Trend strategies as well as VRP, the technical event in February could not have been avoided. However, this event is now integrated within our risk models and certain constituents of our VRP program will evolve and adapt, based on this unprecedented event. This implies that certain strategies in the VRP program will now have a permanently lower exposure in the portfolio. We believe the speedy recovery feature of VRP, which has been observed historically, will persist and support the recovery of our portfolio. As discussed above, we will also implement changes in our Cross Asset Trend strategy.

Given our philosophy and our objectives for our ARP product, we strongly believe in the necessity to mitigate Income premia with Risk Mitigation premia to achieve a robust portfolio at the time of a crisis scenario. We also believe in the importance of being exposed to premia such as volatility in order to meet our diversification and return objectives.

We recognise and acknowledge that the February event was challenging, nevertheless it is the result of a rare and extreme event and highlights a typical idiosyncratic risk when accessing such type of long/short strategies. In light of this analysis, we believe that our approach is the right one to offer (1) true diversification and (2) returns enhancement over the long term.

The Systematic Alternatives Team

Risks related to the Fund

The following risks may be materially relevant but may not always be adequately captured by the synthetic risk indicator and may cause additional loss:

- **Operational risk and risks related to asset safekeeping:** In specific circumstances, there may be a material risk of loss resulting from human error, inadequate or failed internal systems, processes or controls, or from external events.
- **Risks linked to the use of derivatives and financial techniques:** Derivatives and other financial techniques used substantially to obtain, increase or reduce exposure to assets may be difficult to value, may generate leverage, and may not yield the anticipated results. All of this could be detrimental to fund performance.
- **Model Risk:** Models may be misspecified, badly implemented or may become inoperative when significant changes take place in the financial markets or in the organization. Such a model could unduly influence portfolio management and expose to losses.