

Improving the Performance and Higher Order Return Properties of the Industry's Dominant Portfolios

WITH 2020 UPDATE



APRIL 2020



Proposed overlay strategies to enhance the risk-adjusted returns and higher order return properties

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Executive Summary

Exactly one year ago, we published a whitepaper titled *Improving the Performance and Higher Order Return Properties of the Industry's Dominant Portfolios*, which considered five portfolio constructions that dominate the investment industry and proposed overlay strategies to enhance the risk-adjusted returns and higher order return properties of those portfolios. In the original, April 2019 whitepaper, we argued that more than a decade of unorthodox policies had dramatically reduced risk-free returns and simultaneously lifted asset valuations to levels rarely seen, with the implications that not only were the industry's five dominant portfolios increasingly prone to drawdowns, but investors had few viable options to mitigate their negative convexity. To address this problem, we proposed three overlay strategies that could be used to enhance those portfolios.

In light of the Q1 2020 market dislocation, we felt it would be helpful to extend our analysis through 31 March 2020 to illustrate how those overlays performed and show their value to investors as they consider portfolio construction in the years to come. Our updated analysis presented in this whitepaper.

The five dominant industry portfolios that we consider are as follows:

- Long-Only Equity
- Traditional 60-40
- Risk Parity
- Diversified Hedge Fund
- Multi-Factor Risk Premia

To enhance the risk-adjusted returns of these industry portfolios and improve their higher order return properties, we present three overlay strategies:

One River Dynamic Convexity is a highly convex strategy built to respond rapidly to sharp equity market declines, take profit as markets stabilize, and size down during low volatility environments.

One River Systematic Trend is constructed to profit from medium to longer-term trends during persistent bull and bear markets while producing greater crisis alpha than peers in rapid market reversals.

One River 50-50 Dynamic Convexity and Systematic Trend combines the above two naturally complementary strategies in a 50-50 proportion. Dynamic Convexity's rapid responsiveness to sharp equity market reversals and Systematic Trend's ability to capture enduring bull and bear markets produces a return profile that is both convex and has positive expectancy.

We identify the ten worst quarterly drawdowns since 2007 for each of the five industry portfolios and show the performance of the three overlays in those quarters, to provide a sense for how they performed when they were needed most. We then show the performance and portfolio metrics for each industry portfolio on a stand-alone basis, and also show them as enhanced portfolios (which include a 20% overlay allocation to the One River strategies). For each industry portfolio, we see that the enhanced portfolio has a higher Sharpe ratio, less negative skewness, smaller excess kurtosis, and a higher MAR ratio (return/maximum drawdown) compared to the original portfolio.

One River Overlay Strategies

The economic expansion that started in 2009, which was one of the longest in history, had lifted asset valuations to levels rarely seen. Combined with the proliferation of volatility selling and carry harvesting strategies, investors recently found themselves with significant negative convexity. Even with the inevitable adjustments that have happened in Q1 2020 and will continue in the coming quarters, portfolios will remain prone to rapid drawdowns, and in addition, there are fewer effective and cost-efficient options to mitigate this risk given the decline in treasury yields to record lows across the curve.

To address this problem, we propose three overlay strategies which we will describe below.

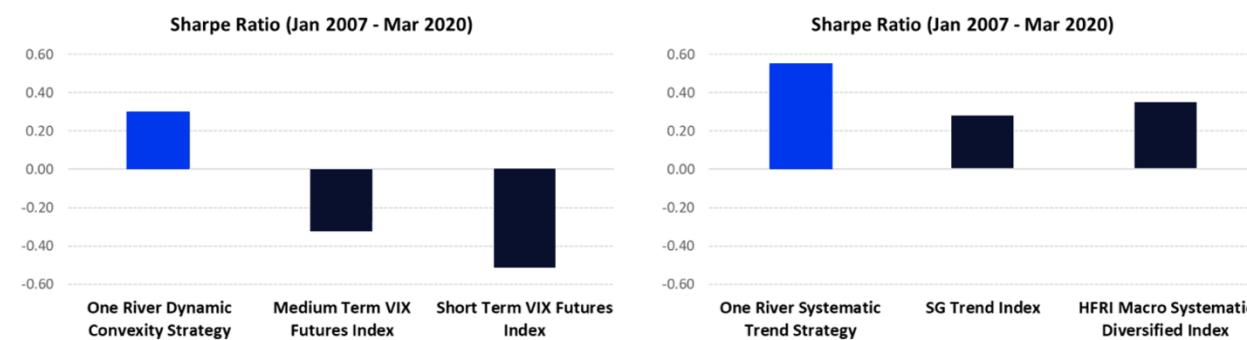
(1) One River Dynamic Convexity is a highly convex systematic strategy built to respond rapidly to sharp equity market declines, take profit as markets stabilize, and to size down during low volatility environments. It is the only convexity strategy we are aware of that had delivered a positive LTD return from its Apr 2015 inception through Feb 2020 (prior to the COVID-19 crisis), while never being short volatility. It also produced a positive return in the backtest period from Jan 2007 through Mar 2015, while generally performing best during the worst quarters for the S&P 500. For example, in Q1 2020, the strategy produced a +48.19% return.

(2) One River Systematic Trend is constructed to profit from medium to longer-term trends during persistent bull and bear markets while producing greater crisis alpha than peers in rapid market reversals. The strategy has a higher Sharpe ratio than the SG Trend Index in the period since its Dec 2014 inception, and has produced a positive return in that time. By limiting its capacity, the strategy is able to enter and exit positions rapidly if needed, and therefore is expected to deliver superior crisis alpha because it can get flat risk-assets much faster than peers that scale out of positions gradually. In addition, it can implement additional features that both enhance risk management and deliver alpha.

The return statistics of these strategies since 2007 (including backtest periods) and their comparisons with the respective benchmarks are as follows.

Statistics (Jan 2007 - Mar 2020)

	Annualized Net Return	Annualized Monthly Volatility	Sharpe Ratio
One River Dynamic Convexity	6.20%	20.94%	0.30
One River Systematic Trend	9.29%	17.16%	0.54

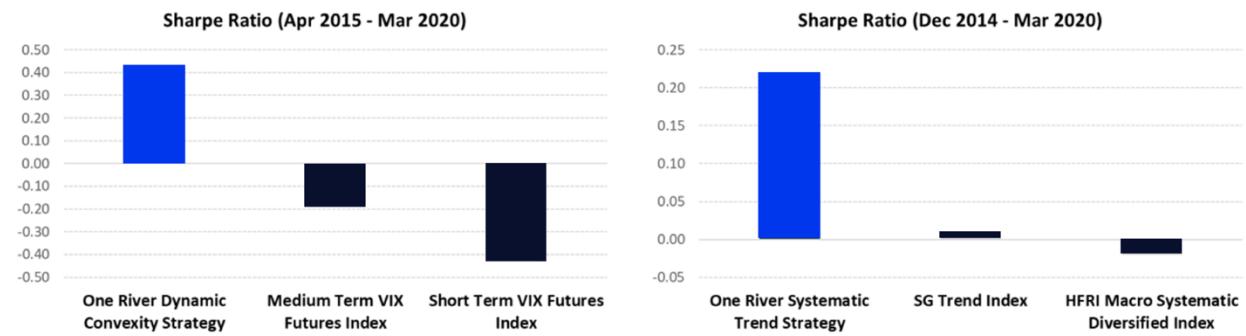


The above data include backtested returns until the respective strategy inceptions (Dec 2014 for One River Systematic Trend, and Apr 2015 for One River Dynamic Convexity). All the returns are net of 1%/year management fee and 10% performance fee for Dynamic Convexity, and 0.5%/year management fee and 0.2%/year fund expenses for Systematic Trend. Comparison is done with S&P 500 Medium Term VIX Futures Index (Bloomberg ticker SPVXMTR Index), S&P 500 Short Term VIX Futures Index (SPVXSTR Index), SG Trend Index (NEIXCTAT Index), and HFRI Macro Systematic Diversified Index (HFRIMTI Index). All Sharpe ratio calculations assume zero risk free rate. See Disclaimer for further details on the return calculation and analysis methodology.

The outperformance of these strategies versus their benchmarks have been consistent, not just in the backtest periods but also in their live periods, as shown in the below statistics.

Statistics from Strategy Inception

	Annualized Net Return	Annualized Monthly Volatility	Sharpe Ratio
One River Dynamic Convexity (Apr 2015 - Mar 2020)	8.62%	19.84%	0.43
One River Systematic Trend (Dec 2014 - Mar 2020)	3.65%	16.44%	0.22



Comparison data are from the respective strategy inceptions through Mar 2020. All the returns are net of 1%/year management fee and 10% performance fee for Dynamic Convexity, and 0.5%/year management fee and 0.2%/year fund expenses for Systematic Trend. Comparison is done with S&P 500 Medium Term VIX Futures Index (Bloomberg ticker SPVXMTR Index), S&P 500 Short Term VIX Futures Index (SPVXSTR Index), SG Trend Index (NEIXCTAT Index), and HFRI Macro Systematic Diversified Index (HFRIMTI Index). All Sharpe ratio calculations assume zero risk free rate. See Disclaimer for further details on the return calculation and analysis methodology.

In The Interplay Between Trend and Volatility (One River whitepaper, January 2018), we quantified the extent to which trend strategies require gradual equity trend reversals to deliver crisis alpha. We went on to describe how convexity strategies perform well in the types of sudden reversals that trend strategies are exposed to and can therefore complement trend allocations well. It is therefore natural to use a combination of the previous two strategies and propose it as the third overlay solution.

(3) One River 50-50 Dynamic Convexity and Systematic Trend combines the Dynamic Convexity and Systematic Trend strategies in a 50-50 proportion to benefit from their naturally complementary properties. Dynamic Convexity's rapid responsiveness to sharp equity market reversals and Systematic Trend's ability to capture enduring bull and bear markets produces a return profile that is both convex and has positive expectancy, making the combined strategy a particularly attractive overlay.

The return statistics of the combined overlay strategy since Jan 2007 and since Dec 2014 (Systematic Trend inception) are as follows. In both periods, this 50-50 overlay has the highest Sharpe ratio among the three overlay strategies that we propose.

One River 50-50 Dynamic Convexity and Systematic Trend Combination

	Annualized Net Return	Annualized Monthly Volatility	Sharpe Ratio
Jan 2007 - Mar 2020	8.51%	14.01%	0.61
Dec 2014 - Mar 2020	6.15%	11.83%	0.52

The above data include backtested returns until the respective strategy inceptions (Dec 2014 for One River Systematic Trend, and Apr 2015 for One River Dynamic Convexity). All the returns are net of 1%/year management fee and 10% performance fee for Dynamic Convexity, and 0.5%/year management fee and 0.2%/year fund expenses for Systematic Trend. All Sharpe ratio calculations assume zero risk free rate. See Disclaimer for further details on the return calculation and analysis methodology.

Enhancing Investment Portfolios Using One River Overlays

The following pages examine the addition of the One River Dynamic Convexity (“Dyna-C”), One River Systematic Trend (“Trend”), and 50-50 Combination (“50-50 Combo”) strategies to five of the dominant portfolio contructions used in the asset management industry. We study the period of Jan 2007 through Mar 2020, which includes the live period for Dynamic Convexity (Apr 2015 – Mar 2020), Systematic Trend (Dec 2014 – Mar 2020), and backtest data for the preceding years.

The five industry portfolios that we consider are as follows:

- **Long-Only Equity:** we use the MSCI World Gross Total Return USD Index, which represents large and mid-cap equity performance across developed country markets.
- **Traditional 60-40:** we use a portfolio consisting of 60% equity and 40% bond. For the equity part of the portfolio, we use the MSCI World Gross Total Return USD index, similar to what we used above, and for the bond part of the portfolio we use the Bloomberg Barclays Global Aggregate Treasuries Total Return Index, which represents a portfolio of government debt of investment grade countries. The portfolio is assumed to be rebalanced with a monthly frequency.
- **Risk Parity:** we use the HFR Risk Parity 12 Vol Inst Index, consisting of risk parity funds with a volatility target between 10% and 15% and with AUM of greater than USD 500 million.
- **Diversified Hedge Fund:** we use the Credit Suisse Hedge Fund Index, which is a broad asset-weighted hedge fund index consisting of hedge funds with a minimum of USD 50 million AUM. The hedge fund styles in this index include convertible arbitrage, emerging markets, equity market neutral, event driven, fixed income arbitrage, global macro, long/short equity, managed futures, and multi-strategy.
- **Multi-Factor Risk Premia:** we use the Eurekahedge Multi-Factor Risk Premia Index, which is calculated as a weighted sum of bank-provided risk premia strategy swaps, and includes strategies that attempt to harvest traditional as well as carry, value, momentum, volatility, and liquidity risk premia.

For each industry portfolio we identify the ten worst quarterly drawdowns since 2007 and show the performance of the three overlays in those quarters, to examine how they performed when they were needed most. We then show the performance and portfolio metrics for the industry portfolio as a stand-alone portfolio, as well as the performance and portfolio metrics for three enhanced portfolios which each includes a 20% overlay allocation to one of the three One River strategies. The analysis period for Multi-Factor Risk Premia starts in July 2010, as the index starts in that month. Multi-Factor Risk Premia became a matured concept in the investment industry only recently, and all available benchmark risk premia indices that we know of have even shorter history.

The results of the analysis can be found on the following pages.

Ten Worst Quarterly Returns

(31-Dec-2006 to 31-Mar-2020)

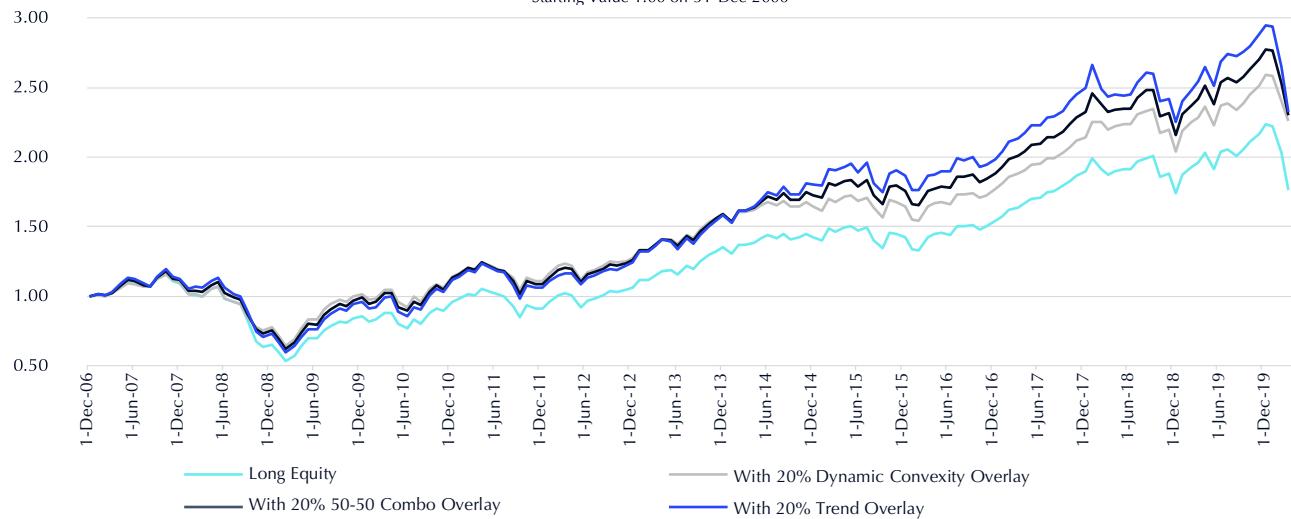
Statistics

(31-Dec-2006 to 31-Mar-2020)

With 20% Overlay

Quarter End	Long Equity	Dyna-C	50-50 Combo	Trend	Quarter End	Long Equity	Dyna-C	50-50 Combo	Trend
31-Dec-08	-21.65%	79.44%	46.00%	15.16%	Annualized Return	4.39%	6.36%	6.50%	6.56%
31-Mar-20	-20.93%	48.19%	22.28%	-1.51%	Volatility	15.92%	13.94%	14.78%	16.01%
30-Sep-11	-16.52%	20.59%	11.15%	1.37%	Sharpe Ratio	0.28	0.46	0.44	0.41
30-Sep-08	-15.15%	4.99%	0.24%	-4.54%	Skewness	-0.83	-0.32	-0.46	-0.68
31-Dec-18	-13.31%	1.48%	1.06%	0.63%	Excess Kurtosis	1.98	0.43	0.44	1.00
30-Jun-10	-12.49%	4.49%	-0.06%	-4.76%	Max Drawdown	-53.65%	-44.53%	-47.23%	-49.95%
31-Mar-09	-11.78%	2.93%	0.85%	-1.23%	MAR Ratio	0.08	0.14	0.14	0.13
31-Mar-08	-8.95%	0.35%	8.70%	17.46%	Min Monthly Return	-18.93%	-10.72%	-12.09%	-16.49%
30-Sep-15	-8.33%	7.50%	6.95%	5.39%	Max Monthly Return	11.32%	11.05%	10.77%	11.22%
30-Jun-12	-4.86%	-0.35%	3.42%	7.09%					

Long-Only Equity Portfolio Comparison
Starting Value 1.00 on 31-Dec-2006



The Long-Only Equity portfolio returns and statistics are based on the returns of the MSCI World Gross Total Return USD Index (Bloomberg tickerM2WO Index). See Disclaimer for further details on the return calculation and analysis methodology.

Ten Worst Quarterly Returns

(31-Dec-2006 to 31-Mar-2020)

Quarter End	60-40	Dyna-C	50-50 Combo	Trend
31-Mar-20	-12.38%	48.19%	22.28%	-1.51%
30-Sep-08	-10.35%	4.99%	0.24%	-4.54%
31-Dec-08	-10.21%	79.44%	46.00%	15.16%
30-Sep-11	-9.34%	20.59%	11.15%	1.37%
31-Mar-09	-9.01%	2.93%	0.85%	-1.23%
30-Jun-10	-7.44%	4.49%	-0.06%	-4.76%
31-Dec-18	-7.27%	1.48%	1.06%	0.63%
30-Sep-15	-4.44%	7.50%	6.95%	5.39%
30-Sep-14	-2.80%	-0.31%	1.93%	4.00%
31-Dec-16	-2.62%	-1.69%	-7.15%	-12.50%

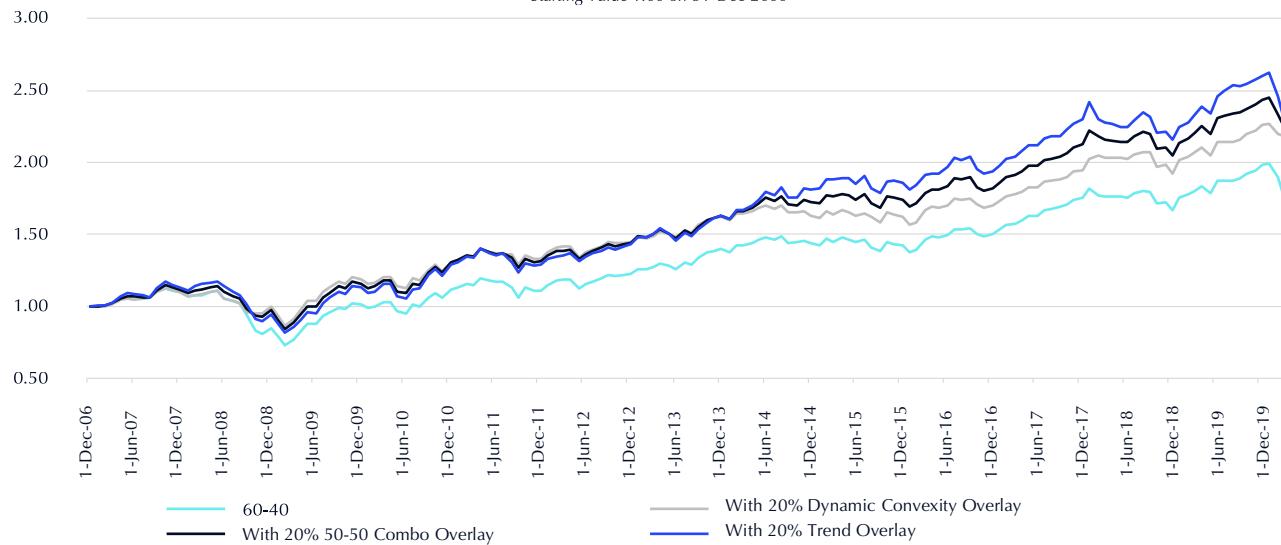
Statistics

(31-Dec-2006 to 31-Mar-2020)

With 20% Overlay				
Quarter End	60-40	Dyna-C	50-50 Combo	Trend
Annualized Return	4.26%	6.06%	6.27%	6.40%
Volatility	10.39%	8.84%	9.52%	10.80%
Sharpe Ratio	0.41	0.69	0.66	0.59
Skewness	-0.71	-0.19	-0.25	-0.50
Excess Kurtosis	2.03	0.81	0.33	0.59
Max Drawdown	-35.10%	-23.22%	-26.73%	-30.46%
MAR Ratio	0.12	0.26	0.23	0.21
Min Monthly Return	-12.15%	-7.17%	-7.17%	-9.71%
Max Monthly Return	6.91%	6.64%	7.50%	8.47%

Traditional 60-40 Portfolio Comparison

Starting Value 1.00 on 31-Dec-2006



The Traditional 60-40 portfolio returns and statistics are based on the returns of the MSCI World Gross Total Return USD Index (Bloomberg tickerM2WO Index) and the Bloomberg Barclays Global Aggregate Treasuries Total Return Unhedged USD Index (Bloomberg ticker LCTRTRUU Index) in a 60-40 proportion, rebalanced with a monthly frequency. See Disclaimer for further details on the return calculation and analysis methodology.

Ten Worst Quarterly Returns

(31-Dec-2006 to 31-Mar-2020)

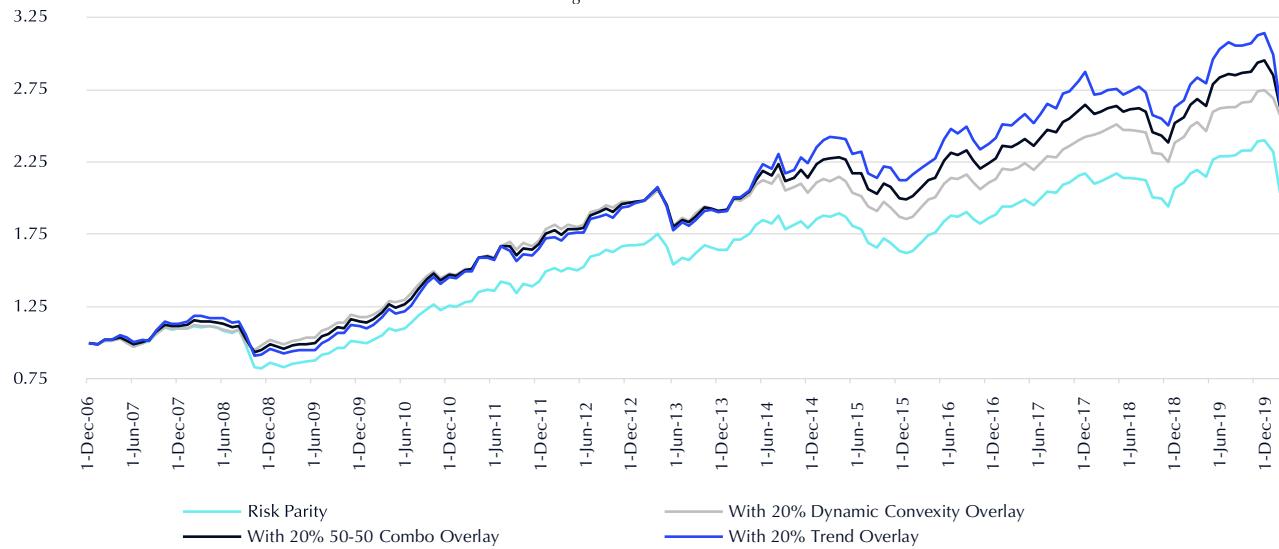
Quarter End	Risk Parity	Dyna-C	50-50 Combo	Trend
31-Mar-20	-14.82%	48.19%	22.28%	-1.51%
31-Dec-08	-12.52%	79.44%	46.00%	15.16%
30-Jun-13	-10.05%	-0.09%	-6.08%	-11.94%
30-Sep-08	-9.36%	4.99%	0.24%	-4.54%
31-Dec-18	-8.49%	1.48%	1.06%	0.63%
30-Sep-15	-7.92%	7.50%	6.95%	5.39%
30-Jun-07	-4.12%	-0.71%	6.45%	13.91%
30-Jun-15	-3.68%	-0.47%	-3.90%	-7.41%
30-Sep-14	-3.52%	-0.31%	1.93%	4.00%
31-Dec-16	-2.23%	-1.69%	-7.15%	-12.50%

Statistics

(31-Dec-2006 to 31-Mar-2020)

With 20% Overlay				
Quarter End	Risk Parity	Dyna-C	50-50 Combo	Trend
Annualized Return	5.52%	7.38%	7.55%	7.65%
Volatility	10.60%	8.66%	9.72%	11.30%
Sharpe Ratio	0.52	0.85	0.78	0.68
Skewness	-1.71	-0.61	-0.77	-1.06
Excess Kurtosis	6.51	0.90	1.35	2.72
Max Drawdown	-25.79%	-15.28%	-19.10%	-22.94%
MAR Ratio	0.21	0.48	0.40	0.33
Min Monthly Return	-16.05%	-8.53%	-9.21%	-13.61%
Max Monthly Return	6.35%	5.94%	5.65%	6.84%

Risk Parity Portfolio Comparison
Starting Value 1.00 on 31-Dec-2006



The Risk Parity portfolio returns and statistics are based on the returns of the HFR Risk Parity 12 Vol Inst Index (Bloomberg ticker HFRPV12I Index). See Disclaimer for further details on the return calculation and analysis methodology.

Ten Worst Quarterly Returns

(31-Dec-2006 to 31-Mar-2020)

Quarter End	Hedge Fund	Dyna-C	50-50 Combo	Trend
30-Sep-08	-10.33%	4.99%	0.24%	-4.54%
31-Dec-08	-10.21%	79.44%	46.00%	15.16%
31-Mar-20	-8.98%	48.19%	22.28%	-1.51%
30-Sep-11	-4.78%	20.59%	11.15%	1.37%
31-Dec-18	-4.30%	1.48%	1.06%	0.63%
30-Sep-15	-2.53%	7.50%	6.95%	5.39%
30-Jun-10	-2.39%	4.49%	-0.06%	-4.76%
31-Mar-16	-2.20%	-0.60%	-0.29%	-0.15%
31-Mar-08	-2.01%	0.35%	8.70%	17.46%
30-Jun-12	-1.76%	-0.35%	3.42%	7.09%

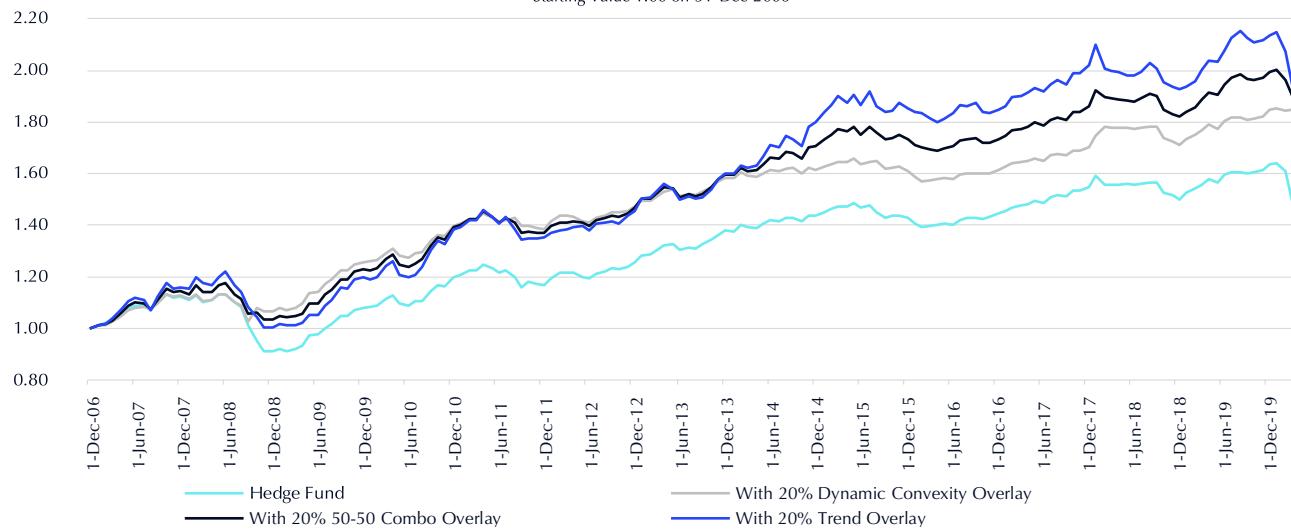
Statistics

(31-Dec-2006 to 31-Mar-2020)

With 20% Overlay				
Quarter End	Hedge Fund	Dyna-C	50-50 Combo	Trend
Annualized Return	3.06%	4.73%	4.96%	5.12%
Volatility	5.67%	4.47%	5.30%	7.06%
Sharpe Ratio	0.54	1.06	0.94	0.73
Skewness	-1.53	-0.27	-0.27	-0.43
Excess Kurtosis	5.13	2.89	0.75	0.59
Max Drawdown	-19.68%	-9.47%	-11.86%	-17.61%
MAR Ratio	0.16	0.50	0.42	0.29
Min Monthly Return	-7.28%	-5.42%	-5.06%	-6.39%
Max Monthly Return	4.06%	4.94%	4.32%	5.28%

Diversified Hedge Fund Portfolio Comparison

Starting Value 1.00 on 31-Dec-2006



The Diversified Hedge Fund portfolio returns and statistics are based on the returns of the Credit Suisse Hedge Fund Index (Bloomberg ticker HEDGNAV Index). See Disclaimer for further details on the return calculation and analysis methodology.

Ten Worst Quarterly Returns

(31-Jul-2010 to 31-Mar-2020)

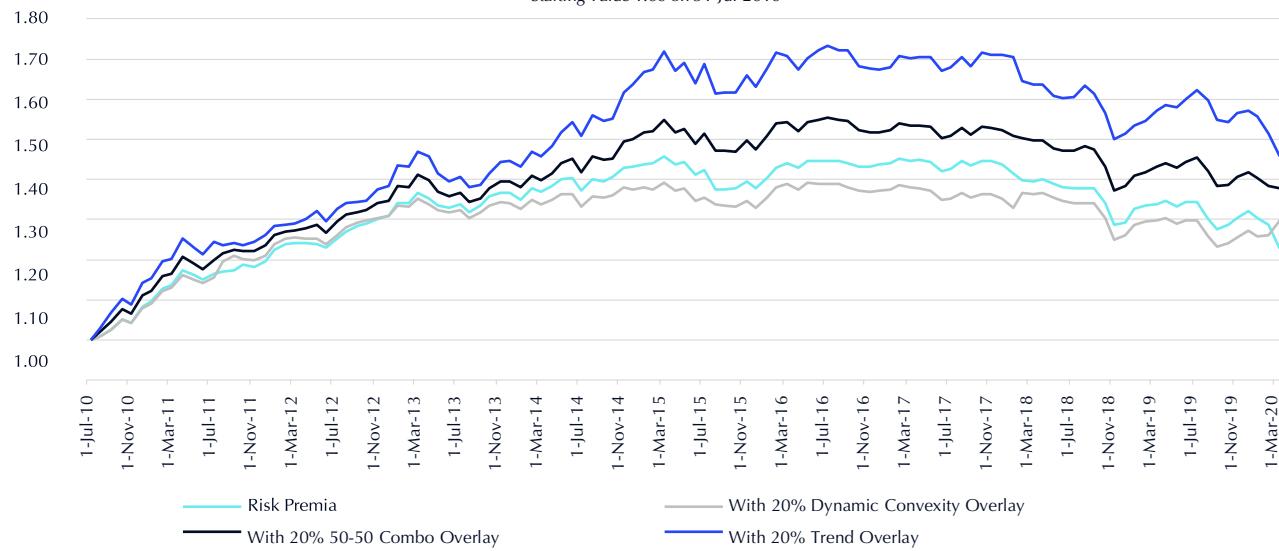
Statistics

(31-Jul-2010 to 31-Mar-2020)

With 20% Overlay

Quarter End	Risk Premia	Dyna-C	50-50 Combo	Trend	Quarter End	Risk Premia	Dyna-C	50-50 Combo	Trend
31-Mar-20	-7.02%	48.19%	22.28%	-1.51%	Annualized Return	2.15%	2.73%	3.38%	3.97%
31-Dec-18	-6.24%	1.48%	1.06%	0.63%	Volatility	4.83%	4.58%	5.13%	6.58%
30-Sep-19	-5.08%	0.03%	4.77%	9.39%	Sharpe Ratio	0.44	0.60	0.66	0.60
30-Jun-15	-3.07%	-0.47%	-3.90%	-7.41%	Skewness	-0.54	-0.06	-0.11	-0.14
31-Mar-18	-2.96%	18.97%	6.22%	-7.54%	Excess Kurtosis	1.18	0.65	0.23	-0.05
30-Jun-13	-2.63%	-0.09%	-6.08%	-11.94%	Max Drawdown	-15.67%	-11.49%	-11.70%	-15.84%
30-Sep-15	-2.51%	7.50%	6.95%	5.39%	MAR Ratio	0.14	0.24	0.29	0.25
30-Jun-17	-1.86%	-1.97%	-0.69%	0.58%	Min Monthly Return	-4.55%	-4.06%	-4.17%	-4.46%
30-Jun-12	-1.09%	-0.35%	3.42%	7.09%	Max Monthly Return	3.70%	3.55%	4.36%	5.17%
30-Jun-18	-1.06%	-1.26%	-3.52%	-5.78%					

Multi-Factor Risk Premia Portfolio Comparison
Starting Value 1.00 on 31-Jul-2010



The Multi-Factor Risk Premia portfolio returns and statistics are based on the returns of the Eurekahedge Multi-Factor Risk Premia Index (Bloomberg ticker EHF1900 Index). The analysis period starts on 31-Jul-2010 (the start date of the index). See Disclaimer for further details on thereturn calculation and analysis methodology.

As can be seen from the analysis above, most of the industry portfolios have significant negative skewness and excess kurtosis, even in the cases where the portfolio includes traditional diversifying instruments such as government bonds or defensive hedge fund strategies. They can also suffer from severe down quarters and drawdowns. While the Multi-Factor Risk Premia portfolio shows the least negative skewness and excess kurtosis in this analysis, it should be noted that in contrast to the other industry portfolios, its analysis period starts on 31-Jul-2010 and therefore does not include the 2008 Global Financial Crisis.

We also see that the overlay strategies provide positive returns in most of the industry portfolios' ten worst quarters. Overlaying any of the three strategies onto the industry portfolios improves the Sharpe ratio in all fifteen instances, and meaningfully reduces the negative skew as well as the excess kurtosis of the portfolios. The maximum drawdown is reduced in all but one instance, and the MAR ratio (annualized return/absolute maximum drawdown) is improved in all instances.

The Q1 2020 market decline happened after the original (April 2019) version of this whitepaper was written. With reference to this recent crisis, our observations are as follows.

We see that the quarter ending 31 March 2020 ranks as the worst quarter since 2007 for three of the industry portfolios (Traditional 60-40, Risk Parity, and Multi-Factor Risk Premia), the second worst quarter for the Long-Only Equity portfolio, and the third worst quarter for the Diversified Hedge Fund portfolio. It illustrated the negative skewness of these portfolio constructions.

Two of the proposed overlays (Dynamic Convexity, and 50-50 Dynamic Convexity and Systematic Trend) performed strongly in the above quarter as expected. The third overlay (Systematic Trend) produced a slightly negative return in the quarter – a negative return in February was mostly offset by positive returns in January and March. This medium-to-long-term trend strategy entered the quarter with a sizeable long equity exposure (in fact, in mid-February several equity indices were at all-time highs) and was hurt by the rapid reversal in the last week of February. Nevertheless, it quickly exited its long positions in risk assets and produced a strong positive return in March.

Conclusion

The longest economic expansion and equity bull market in United States history has come to a dramatic end. The Federal Reserve has cut interest rates to 0%, engaged in unprecedented unorthodox policies, and is likely to guide the treasury yield curve to remain low and stable. At such low yields, treasury bonds simply have very little room to appreciate in price, even in a continued recession or depression. As such, investors are no longer able to pair government bonds with equities and to build a portfolio that is robust through a wide range of possible market paths. This creates a dilemma for investors that requires them to (1) increase the portfolio risks that they must take in order to achieve their return targets in a world of low rates, and (2) allocate to investment strategies that can offer the return characteristics that their treasury bonds once did to help smooth their portfolio volatility.

While the above is certainly challenging for investors to achieve, it is not impossible. One River presents three unique overlay solutions to this challenge that in the period from Jan 2007 through Mar 2020 (using roughly 5 years of live performance and 8 years of backtest data) would have enhanced the returns of each of the five portfolios examined in this paper (Long-Only Equity, Traditional 60-40, Risk Parity, Diversified Hedge Fund, and Multi-Factor Risk Premia), while also improving their Sharpe ratio and higher order return properties.

The period of this analysis includes many of the worst years for both convexity and trend strategies during the past century and yet the cumulative overlay returns were positive and their impact on the investment portfolios we analyzed was material. Looking forward, we believe that the cycle change we have been forecasting has arrived. The consequences are sure to be manifold and play out over years, in waves. Lasting change will unfold in economics, politics, policy, and markets. We believe this will provide a conducive environment for the strategies we propose as portfolio overlays in this paper. Should returns for convexity and trend strategies revert to something more normal, and/or should the environment become less favorable for risk assets in the coming years, we would expect the positive impact of these overlays on investor portfolios to increase.

About One River

Founded in 2013 by Eric Peters, One River Asset Management is an innovative investment manager dedicated to delivering high-conviction absolute-return strategies that help our clients build superior portfolios. We see the world in a period of major economic and political transition, with the investment landscape shifting in ways that will make the coming five years look profoundly different from the past five. Our strategies are built to profit from this dynamic environment while providing strong diversification benefits to traditional investment portfolios. Each is developed and managed in-house by our diverse team of investment professionals with deep expertise in thematic macro, volatility, systematic, and inflation trading/investing. The strategies are delivered at sensible fees via commingled funds, and/or in bespoke combinations for large institutions via fund-of-one structures, managed accounts, swaps or UCITS compliant structures. Our commingled funds are as follows.

Volatility Relative Value: The discretionary market-neutral strategy takes long/short positions across global equity index, foreign exchange, interest rate and commodity volatility markets. The strategy is dynamic and can generate positive returns in both bullish and bearish equity environments. Since its September 2018 inception it has generated over a +3 Sharpe with 0% correlation to the HFRX Volatility RV Index - profiting during both the sharp equity market decline in Q4 2018 and the powerful rebound in H1 2019. Our expertise in finding ways to be long vol while minimizing negative carry is a distinct advantage when constructing a Vol RV book that can generate strong, differentiated returns and is built to withstand market dislocations.

Discretionary Long Volatility: The strategy is structured to profit from a rise in cross-asset volatility that is typical at cycle turns and we believe will be a historical outlier in the transition ahead. We take a value-oriented approach to portfolio construction, looking for the best risk-reward opportunities to be long volatility across the globe, with a dominant allocation to equity and high-beta volatility. The highly convex strategy is built to minimize negative carry, and partially crystallize profits through rebalancing and asset class rotation. It has outperformed a wide range of competing long-only volatility strategies since its inception in September 2014.

Dynamic Convexity: This highly convex systematic strategy trades VIX futures, VIX options, and straddles on major global equity indexes and ETFs from the long-side only. It codifies several discrete trading strategies developed and honed through years of trading these markets on a discretionary basis and combines them into a systematic portfolio. Risk is adjusted automatically using a range of signals and measures of value. Profit-taking is embedded into the algorithm, relieving investors of the pressure to time their exit. The strategy has produced positive net returns since its inception in April 2015 even prior to February 2020, with strong returns during crisis periods. We know of no other long-only volatility strategy with this performance profile.

Systematic Trend: The pure trend strategy is informed by deep quantitative research combined with our discretionary macro and volatility expertise. It is sensibly constructed, using a limited number of parameters to improve robustness, and trades 60 of the world's most liquid equity index, fixed income, foreign exchange and commodity markets. We embed common-sense risk management logic into our unique algorithm, combining the attractive attributes of medium to longer-term signals with the nimbleness to get out of positions quickly if needed. The strategy has consistently outperformed the SocGen Trend Index since its inception in December 2014.

Systematic Alternative Markets Trend: The strategy applies One River's existing systematic pure trend algorithm to 104 more esoteric global markets which include developed and emerging market interest rate swaps, emerging market foreign exchange, credit indexes, equity market sectors, European power and emissions markets, etc. One River has traded these global macro markets for years and has developed the systems to price, trade, and quantify/manage the risks. The fund is the first of its kind to offer a management fee-only share class.

Please contact Mara Peters, Investor Relations, for any questions on One River's strategies.

Disclaimer

Overlay Analysis Methodology

The monthly returns of the 50-50 Combo strategy are calculated from the net monthly returns of the One River Dynamic Convexity and One River Systematic Trend strategies in a 50-50 proportion. The monthly returns of the portfolio with 20% overlay are calculated by adding the monthly returns of the original portfolio (e.g., MSCI World Gross Total Return USD) and 0.2 times the monthly returns of the overlay (i.e., one of the Dynamic Convexity/50-50 Combo/Systematic Trend strategies). The returns data include backtested returns until strategy inceptions (Dec 2014 for Systematic Trend, and Apr 2015 for Dynamic Convexity). The calculation includes 1%/year management fee, 10% performance fee, and fund expenses (from Dec 2019 onward) for Dynamic Convexity and 0.5%/year management fee and 0.2%/year fund expenses for Systematic Trend, but does not include any financing costs for the overlay. The high water mark for Dynamic Convexity is assumed to be reset in Apr 2015 (strategy inception). All Sharpe ratio calculations assume zero risk-free rate. All backtested data used in this paper was obtained using models/strategies as of Apr 2019 (the original publication date of the paper).

Backtested Return Reporting Methodology

THE BACKTEST PERFORMANCE IS PURELY HYPOTHETICAL AND GENERATED WITH PROPRIETARY COMPUTER SIMULATIONS, USING ALGORITHMS APPLIED RETROACTIVELY WITH THE BENEFIT OF HINDSIGHT. IT BENEFITS FROM KNOWLEDGE OF FACTORS THAT HAVE FAVORABLE EFFECTS ON THE BACKTEST PERFORMANCE, AND CANNOT ACCOUNT FOR ALL RISKS THAT WILL AFFECT THE ACTUAL PERFORMANCE OF THE STRATEGY. ALTERNATIVE MODELING TECHNIQUES, ASSUMPTIONS, DATA, OR ALGORITHMS USED IN THE STRATEGY WILL GENERATE DIFFERENT RESULTS.

THERE IS NO GUARANTEE THAT ONE RIVER WILL NOT UPDATE OR CHANGE THE MODELS OR ALGORITHMS OF THE STRATEGY IN THE FUTURE. THE ACTUAL STRATEGY PERFORMANCE CAN BE SIGNIFICANTLY DIFFERENT FROM THE BACKTEST PERFORMANCE. FUTURES, FORWARDS AND OPTIONS TRADING IS SPECULATIVE, INVOLVES SUBSTANTIAL RISK AND IS NOT SUITABLE FOR ALL INVESTORS.

PAST BACKTESTED PERFORMANCE IS NOT NECESSARILY INDICATIVE OF FUTURE RESULTS. PLEASE READ AND UNDERSTAND THIS ENTIRE STATEMENT BEFORE USING THIS INFORMATION.

HYPOTHETICAL PERFORMANCE RESULTS HAVE MANY INHERENT LIMITATIONS, SOME OF WHICH ARE DESCRIBED BELOW. NO REPRESENTATION IS BEING

MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THOSE SHOWN. IN FACT, THERE ARE FREQUENTLY SHARP DIFFERENCES BETWEEN HYPOTHETICAL PERFORMANCE RESULTS AND THE ACTUAL RESULTS SUBSEQUENTLY ACHIEVED BY ANY PARTICULAR TRADING PROGRAM. ONE OF THE LIMITATIONS OF HYPOTHETICAL PERFORMANCE RESULTS IS THAT THEY ARE GENERALLY PREPARED WITH THE BENEFIT OF HINDSIGHT. IN ADDITION, HYPOTHETICAL TRADING DOES NOT INVOLVE FINANCIAL RISK, AND NO HYPOTHETICAL TRADING RECORD CAN COMPLETELY ACCOUNT FOR THE IMPACT OF FINANCIAL RISK IN ACTUAL TRADING. FOR EXAMPLE, THE ABILITY TO WITHSTAND LOSSES OR TO ADHERE TO A PARTICULAR TRADING PROGRAM IN SPITE OF TRADING LOSSES ARE MATERIAL POINTS WHICH CAN ALSO ADVERSELY AFFECT ACTUAL TRADING RESULTS. THERE ARE NUMEROUS OTHER FACTORS RELATED TO THE MARKETS IN GENERAL OR TO THE IMPLEMENTATION OF ANY SPECIFIC TRADING PROGRAM WHICH CANNOT BE FULLY ACCOUNTED FOR IN THE PREPARATION OF HYPOTHETICAL PERFORMANCE RESULTS AND ALL OF WHICH CAN ADVERSELY AFFECT ACTUAL TRADING RESULTS.

Return Reporting Methodology

Once a strategy is opened by One River's CIO, the investment team (in the case of a systematic strategy: through the models and algorithms that the team developed) constructs a portfolio of hypothetical trades that it believes best express the desired risk vs. reward characteristics of the strategy. Such a portfolio is allocated a theoretical \$10 million and then actively managed by the One River investment team. The strategy and portfolio are disclosed on the One River website. Changes to the portfolio are booked as trades into Integrata (the firm's portfolio management system) and sent to Risk Metrics daily. The return data of the portfolio is "Hypothetical" until the strategy is funded. Once a strategy is funded by a client, its return data is no longer considered hypothetical. The strategy then becomes "Active" and its performance data is provided by an independent administrator. The strategy is disclosed as Active until either (1) a client redeems from the strategy, or (2) One River's CIO decides to liquidate the portfolio and close the strategy. The list of both open and closed strategies are available upon request.

One River Dynamic Convexity Strategy

RETURNS PRIOR TO APR 2015 ARE BACKTESTED. Returns from Apr 2015 to Nov 2019 reflect the actual returns of the strategy within a Segregated Portfolio Company (SPC). Returns from Dec 2019 onward reflect

the actual returns of the One River Dynamic Convexity Fund. Returns prior to Dec 2019 are adjusted to be net of 1%/year management fee and 10% performance fee. Returns from Dec 2019 onward are adjusted to be net of 1%/year management fee, 10% performance fee, and fund expenses. The high water mark is assumed to be reset in Apr 2015 (strategy inception).

One River Systematic Trend Strategy

RETURNS PRIOR TO DEC 2014 ARE BACKTESTED. Returns from Dec 2014 through Mar 2015 are hypothetical returns as described in the Return Reporting Methodology, and returns from Apr 2015 through Aug 2017 reflect the actual returns of the strategy within a multi manager offshore fund, both multiplied by 1.8 to reflect the change of volatility target from 10% prior to 1 Sep 2017 to 18% after 1 Sep 2017. Returns from Sep 2017 onward reflect the actual returns of the One River Systematic Trend Fund. All the returns are adjusted to be net of 0.5%/year management fee and 0.2%/year fund expenses.

Use of Indices

Any indices and other financial benchmarks shown are provided for illustrative purposes only, are unmanaged, reflect reinvestment of income and dividends and do not reflect the impact of advisory fees. Investors cannot invest directly in an index. Comparisons to indexes have limitations because indexes have volatility and other material characteristics that may differ from the One River funds.

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