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The Salient Risk Parity Index

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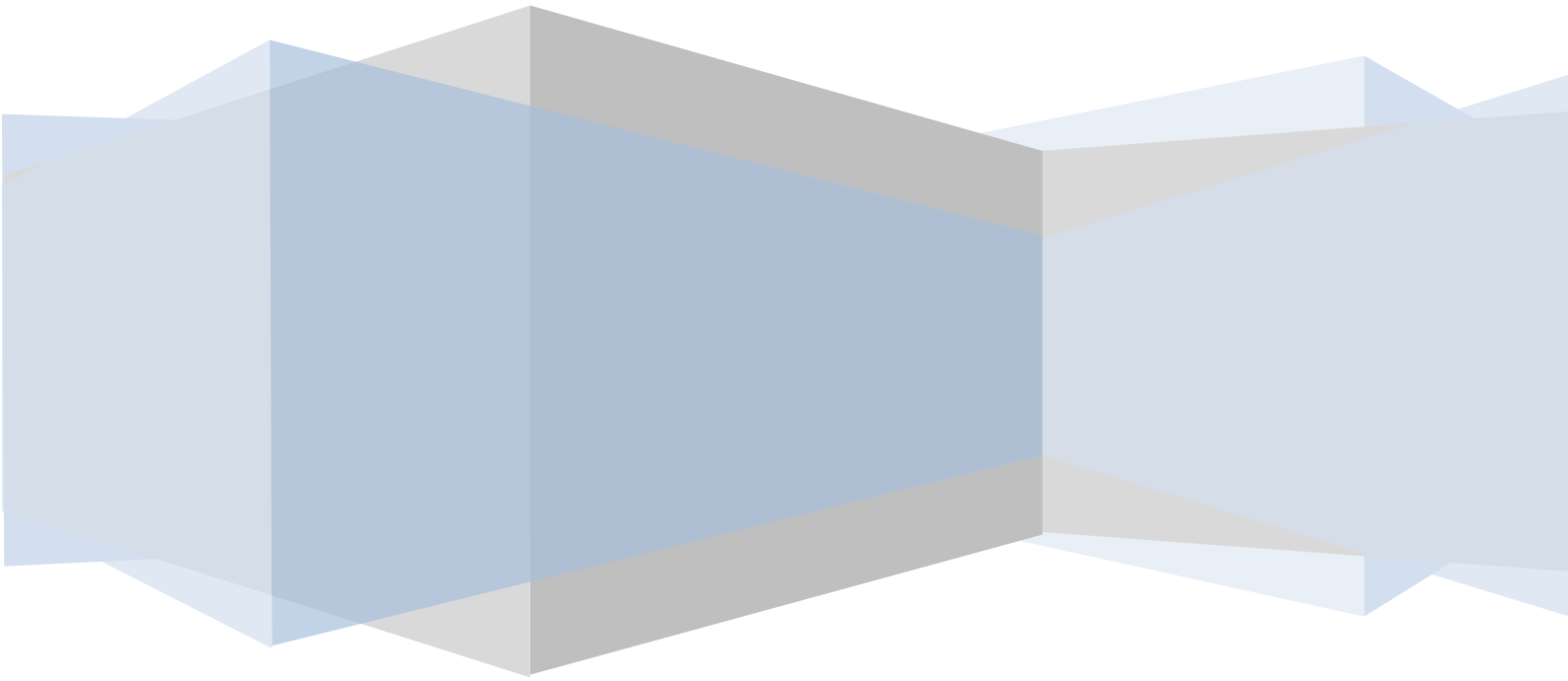

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The Salient Risk Parity Index is calculated on an on-going basis by third-party calculation agent Indxis. The Salient Risk Parity Index has been retrospectively calculated and did not exist prior to January 2012. Accordingly, the results shown during the retrospective periods do not reflect actual returns. Past performance is not necessarily indicative of how the index will perform in the future. Index performance does not reflect the deduction of any fees or expenses. Note that an investor cannot invest directly in the Index.

The Salient Risk Parity Index Committee selects, maintains, and reviews the list of futures contracts and credit default swap indices making up the Salient Risk Parity Index and oversees the computation of Index weights for each asset. The committee is chaired by Lee Partridge. Other members of the index committee are: Jeremy Radcliffe, Roberto Croce, Adam Thomas and Heinrich Grobler.

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SALIENT RISK PARITY INDEX

Abstract

This document serves as an introduction to the Salient Risk Parity Index, which offers a broadly-based benchmark for purveyors of risk parity strategies. It represents what we consider to be the most basic passive implementation of risk parity.[1] While each risk parity offering is implemented a bit differently from this index, we believe this implementation will serve the investment community as a reference point to which managers can compare their strategies to highlight differences in philosophy, methodology, and potential outcome.

[1] Because index allocations are not based on return forecasts, we consider the Index to be a passive benchmark. Note that an investor cannot invest directly in an index.

Authors: Lee Partridge, CFA, et. *al.*

1. Introduction

The Salient Risk Parity Index is intended to represent a generic, naïve implementation of the institutional investment strategy commonly referred to as risk parity. The index is composed of an equally risk-weighted allocation to 51 global equity, interest rate, credit, and commodity futures contracts and swaps. Monthly portfolio weights are computed based on monthly covariance estimates. Because the method for estimating covariance is an area of differentiation amongst purveyors of risk parity, we use the basic assumption of no exponential decay and rolling 2-year samples of daily data.

In addition to statistical methodology, risk parity implementations also typically differ along the following avenues:

1. Portfolio volatility target
2. Breadth of assets held

   Some purveyors only hold contracts that have forward curves of a particular shape; others hold assets well beyond what is available in the universe of liquid futures and swaps contracts through total return swaps
3. Inclusion of Emerging Market Currencies as an asset class
4. Inclusion of Treasury Inflation Protected Securities as an asset class
5. Risk allocations to each asset class
6. Tactical views expressed in the portfolio.

The Salient Risk Parity Index seeks to represent the performance of the most broad-based and naïve adaption of the various risk parity strategies. The volatility target is 10%, approximately equal to the long-run annual standard deviation of a 60/40 portfolio.[2] Assets in the Index were selected by the Index Committee from the universe of investable futures and standardized default swap indices deemed to be liquid based on interviews with brokers and market participants. Note that this set of assets does not include Emerging Market Currencies or Inflation Protected Securities. The rationale for this decision is two-fold. First, neither of these asset classes is accessible via standardized futures contracts. Because of this, we do not believe that they meet the Index liquidity criteria. Second, Inflation Protected Securities are not a derivative asset and therefore would likely reduce the free cash in the portfolio significantly. Because the Index allocation is unconstrained with respect to maximum notional exposure, we believe it would be unrealistic to include a large allocation to cash securities like Inflation Protected Securities in the portfolio.

The Salient Risk Parity Index is designed to have ¼ of its variance come from each of four asset classes: equities, interest rates, credit, and commodities. The allocations within each asset class will be detailed in Section 2. The Salient Risk Parity Index does not include tactical tilts of any kind. Because of this, we consider the Index to be representative of returns on a *passive* risk parity investment strategy.[3] While the

[2] The 60/40 portfolio is composed of 60% MSCI AC World Index and 40% Barclays Aggregate Bond Index (formerly Lehman's Aggregate Bond Index through November 2008), which has a historical volatility of 9.9% between 1/1/1990 and 11/30/2011.
[3] Passive in this context means that the allocation is *not* based on return *forecasts* of any kind.

dollar allocations adjust systematically each month to account for changes in the historical two-year daily covariance matrix, the risk allocations remain constant.

2. Index Holdings and Target Risk Allocations

The Salient Risk Parity Index allocates to 51 futures and credit default swap contracts such that, to the degree that the covariance between assets in the coming month mirrors covariance in the recent past, each asset will make a contribution to portfolio risk equal to its target risk contribution. The methodology used to compute the portfolio weights that achieve risk parity will be the topic of Section 3.

The Salient Risk Parity Index equally weights the underlying assets at both the asset class level and the sub-asset class level such that there are multiple levels of risk parity within the portfolio. A summary of the strategic risk allocations can be seen in Figure 1 below.

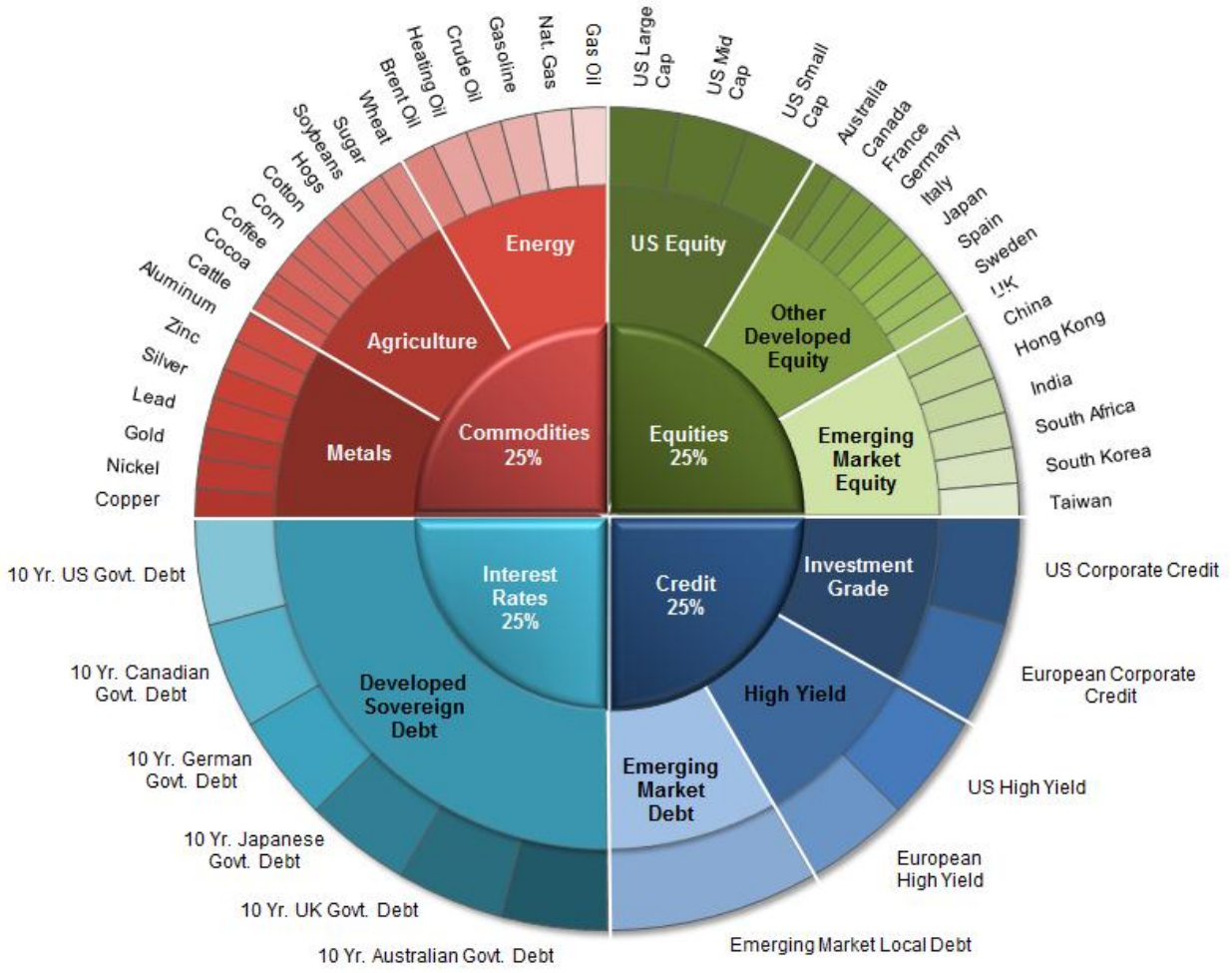

Figure 1: Salient Risk Parity Index Strategic Risk Allocations

Note: The chart above represents the target index risk allocations. The Index allocation may vary from the target strategic asset allocation at any point in time. There can be no assurance that the Index targets may be achieved.

Table 1A below details the strategic risk allocation to Global Equity. As shown in the table, Equities are divided into three sub-classes: U.S. Equity, Developed Non-U.S. Equity, and Emerging Market Equity.

Each of these sub-classes receives 1/3 of the total risk allocation to equities. Contracts within each sub-class are equally risk-weighted.

Global Equity Composite Strategic Risk Allocations

Asset Class	Sub-Asset Class	Contract	Target Risk Contribution
Equities	US	S&P Futures	2.8%
Equities	US	S&P Mid Cap Futures	2.8%
Equities	US	Russell 2000 Futures	2.8%
Equities	Developed (Ex-US)	TSX 60 Futures (Canada)	0.9%
Equities	Developed (Ex-US)	FTSE Futures (UK)	0.9%
Equities	Developed (Ex-US)	CAC Futures (France)	0.9%
Equities	Developed (Ex-US)	DAX Futures (Germany)	0.9%
Equities	Developed (Ex-US)	MIB Futures (Italy)	0.9%
Equities	Developed (Ex-US)	IBEX Futures (Spain)	0.9%
Equities	Developed (Ex-US)	OMX Futures (Sweden)	0.9%
Equities	Developed (Ex-US)	TOPIX Futures (Japan)	0.9%
Equities	Developed (Ex-US)	SPI 200 Futures (Australia)	0.9%
Equities	Emerging	Hang Seng Futures (Hong Kong)	0.9%
Equities	Emerging	MSCI Taiwan Futures (Taiwan)	1.4%
Equities	Emerging	JSE Futures (South Africa)	1.4%
Equities	Emerging	HSCEI Futures (China)	1.4%
Equities	Emerging	NIFTY Futures (India)	1.4%
Equities	Emerging	KOSPI Futures (Korea)	1.4%
Equities Total			**25.0%**

Table 1A: Strategic Risk Allocation to Equities.

Table 1B below details the strategic risk allocation to Global Interest Rates. The interest rates asset class is composed of six 10-year futures contracts where the risk is equally allocated each contract.

Interest Rate Composite Strategic Risk Allocations

Asset Class	Sub-Asset Class	Contract	Target Risk Contribution
Interest Rates	-	US 10-Year Futures	4.2%
Interest Rates	-	Canada 10-Year Futures	4.2%
Interest Rates	-	Bund 10-Year Futures	4.2%
Interest Rates	-	Gilt 10-Year Futures	4.2%
Interest Rates	-	Japan 10-Year Futures	4.2%
Interest Rates	-	Australia 10-Year Futures	4.2%
Interest Rates Total			**25.0%**

Table 1B: Strategic Risk Allocation to Interest Rates.

Commodity risk is spread equally among three sub-components: Energy, Agriculture (Grains, Livestock, and Softs), and Metals. The risk allocation is spread evenly across contracts within each sub-class. Table 1C below shows the percentage allocation to each commodity contract.

Commodity Composite Strategic Risk Allocations

Asset Class	Sub-Asset Class	Contract	Target Risk Contribution
Commodities	Energy	Crude Oil Futures	1.4%
Commodities	Energy	Brent Crude Futures	1.4%
Commodities	Energy	Natural Gas Futures	1.4%
Commodities	Energy	Heating Oil Futures	1.4%
Commodities	Energy	Gasoline Futures	1.4%
Commodities	Energy	Gas Oil Futures	1.4%
Commodities	Agriculture	Live Cattle Futures	0.9%
Commodities	Agriculture	Lean Hog Futures	0.9%
Commodities	Agriculture	Corn Futures	0.9%
Commodities	Agriculture	Soybean Futures	0.9%
Commodities	Agriculture	Sugar Futures	0.9%
Commodities	Agriculture	Cotton Futures	0.9%
Commodities	Agriculture	Wheat Futures	0.9%
Commodities	Agriculture	Coffee Futures	0.9%
Commodities	Agriculture	Cocoa Futures	0.9%
Commodities	Metals	Gold Futures	1.2%
Commodities	Metals	Copper Futures	1.2%
Commodities	Metals	Silver Futures	1.2%
Commodities	Metals	Zinc Futures	1.2%
Commodities	Metals	Nickel Futures	1.2%
Commodities	Metals	Lead Futures	1.2%
Commodities	Metals	Aluminium Futures	1.2%
Commodities Total			**25.0%**

Table 1C: Strategic Risk Allocation to Commodities.

Similarly, the allocation to credit is distributed equally among 3 sub-asset classes: Investment Grade, High Yield, and Emerging components. The risk allocations to the 5 underlying credit default swaps are outlined in Table 1D below.

Credit Composite Strategic Risk Allocations

Asset Class	Sub-Asset Class	Contract	Target Risk Contribution
Credit	Investment Grade	US Investment Grade CDS	4.2%
Credit	Investment Grade	European Investment Grade CDS	4.2%
Credit	High Yield	US High Yield CDS	4.2%
Credit	High Yield	European High Yield CDS	4.2%
Credit	Emerging	Emerging Market CDS	8.3%
Credit Total			**25.0%**

Table 1D: Strategic Risk Allocation to Credit.

3. Computation of Risk Contribution and Index Weights

The inputs used in the calculation of the Index weights are (i) two years of daily returns for each asset, (ii) the strategic risk allocation, and (iii) the target portfolio volatility. The strategic risk allocation and target

portfolio volatility are combined into a set of strategic variance contributions—a target for the amount of variance each asset should contribute to the portfolio.

The daily asset returns are used to estimate the monthly variance contribution of each asset in the Index and the covariance between each pair of assets. Based on these estimates, the Salient Risk Parity Index weights are found by minimizing the difference between the variance contributions of each asset and their target variance contributions.

The equation for the variance contribution of an asset to a portfolio is:

$$\partial\Sigma_i = w_i W' \Sigma_i$$

where:

- $\partial\Sigma_i$ is the variance contribution of asset i to the portfolio,
- W is the vector of portfolio weights,
- w_i is the i^{th} entry in W and is the weight on the i^{th} asset,
- Σ_i is the i^{th} column of the variance-covariance matrix Σ.

To make this more concrete, consider an allocation to three assets: $i, j,$ and $k,$ which have the following covariance matrix:

$$\Sigma = \begin{bmatrix} \sigma_{ii} & \sigma_{ij} & \sigma_{ik} \\ \sigma_{ji} & \sigma_{jj} & \sigma_{jk} \\ \sigma_{ki} & \sigma_{kj} & \sigma_{kk} \end{bmatrix}.$$

The risk contribution of asset i to this portfolio is then:

$$\partial\Sigma_i = w_i \cdot \begin{bmatrix} w_i & w_j & w_k \end{bmatrix} \cdot \begin{bmatrix} \sigma_{ii} \\ \sigma_{ji} \\ \sigma_{ki} \end{bmatrix}.$$

Mechanically, the Index weights are found by numerically searching for a set of weights $w_i, w_j,$ and w_k that minimizes the sum of squared differences between the forecasted risk contributions and the target risk contributions.

4. Historical Performance of the Salient Risk Parity Index

Historical performance of the Salient Risk Parity Index is shown in Figure 2 and Figure 3.[4] The figures highlight several noteworthy facts about risk parity strategies. First, historical returns on risk parity strategies are fairly consistent from year to year. Second, risk parity strategies tend to mildly underperform

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equity-heavy portfolios when equities outperform but often make up for this shortcoming in volatile markets where equities typically perform poorly. Third, risk parity strategies are subject to drawdowns more frequently than are equity-dominated portfolios, but these drawdowns typically tend to be transitory and less severe than drawdowns in equity-heavy portfolios.

The consistency of risk parity returns is demonstrated in the table of annual returns (Figure 2 below), where the Index is shown to have generated returns greater than 10% in 13 of the 22 years since 1990 and suffered only three losing years: 1994 (-1.3%), 2001 (-10.7%), and 2008 (-9.2%). The compound annual rate of return for the 22 year period was 11.1%. In contrast, a typical index of 60% equities and 40% bonds produced compound returns of 6% over the same period and suffered a loss of more than 25% in 2008.[5]

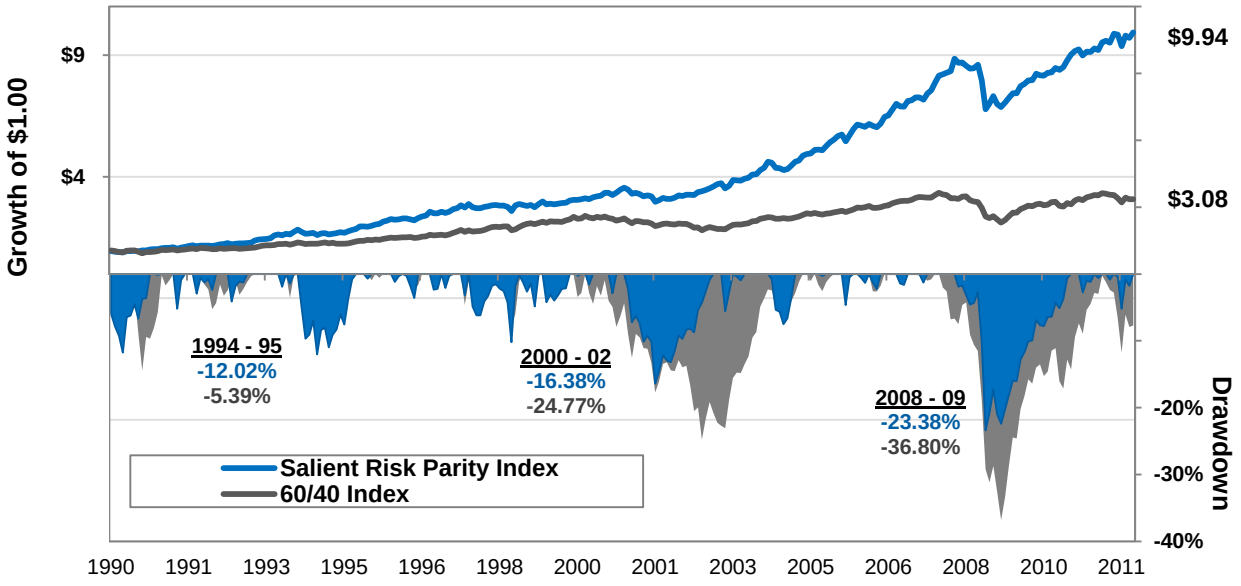
	Salient Risk Parity Index	60/40 Index
2011	8.66%	-0.84%
2010	11.95%	11.14%
2009	11.64%	23.47%
2008	-11.56%	-25.48%
2007	19.93%	10.35%
2006	15.77%	14.46%
2005	20.86%	7.82%
2004	15.39%	11.12%
2003	18.70%	21.76%
2002	16.37%	-7.15%
2001	-10.72%	-7.31%
2000	13.47%	-5.02%
1999	8.92%	14.18%
1998	3.76%	15.97%
1997	8.24%	11.82%
1996	13.53%	8.03%
1995	28.22%	17.67%
1994	-1.31%	0.60%
1993	36.25%	17.17%
1992	8.82%	-1.22%
1991	14.15%	16.82%
1990	2.64%	-8.08%
5 Yr	**12.38%**	**2.27%**
10 Yr	**7.57%**	**5.66%**
ITD	**11.00%**	**5.99%**

Figure 2: Salient Risk Parity Index Annual Returns, January 1990 – December 2011[5]

[5] The Salient Risk Parity Index is calculated on an on-going basis by third-party calculation agent Indxis. The Salient Risk Parity Index has been retrospectively calculated and did not exist prior to January 2012. Accordingly, the results shown during the retrospective periods do not reflect actual returns. The 60/40 portfolio is composed of 60% MSCI AC World Index and 40% Barclays Aggregate Bond Index (formerly Lehman's Aggregate Bond Index through November 2008). Past performance is not necessarily indicative of how the index will perform in the future. Index performance does not reflect the deduction of any fees of expenses. Note that an investor cannot invest directly in the Index.

The relative performance of the Salient Risk Parity Index is shown in Figure 3. This chart shows that $1.00 would have grown to $9.94 if invested in the Salient Risk Parity Index in January 1990 and held until December 2011. Meanwhile, $1.00 invested in the 60/40 index over the same time period would have grown to $3.08. During the financial crisis in 2008, the Salient Risk Parity Index saw a maximum drawdown of 23% between February and October (9 months). The 60/40 portfolio drew down over 36% between October 2007 and February 2009 (16 months), illustrating that the heavy diversification and dynamic nature of risk parity strategies may help protect portfolio value during tumultuous market environments[6].

Because the Salient Risk Parity Index reflects the performance of four asset classes, a major decline in any of those four assets will likely cause the Index to lose value. This reliance on multiple asset classes to drive potential returns causes the Index to typically experience more frequent drawdowns, but this same diversification means that those drawdowns will most likely be smaller than a portfolio concentrated in the falling asset.



	Salient Risk Parity Index	60/40 Index
Annualized Return	11.00%	5.85%
Annualized Volatility	10.03%	9.86%
Risk-Adjusted Return	1.10	0.53

Figure 2: Growth of $1.00 and Drawdown Comparison, January 1990 – December 2011[6]
Source: PerTrac, Salient Capital Advisors LLC as of 12/31/2011. Past performance is no guarantee of future results.

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5. Conclusion

This document introduces the Salient Risk Parity Index, which is designed to serve as a passive benchmark for the field of risk parity investment strategies. As managers enter the field with their own implementations of the risk parity strategy, the Index offers the potential to serve as a reference point to which these managers can compare their strategies and performance.