S&P DOW JONES INDICES
McGRAW HILL FINANCIAL

PRACTICE ESSENTIALS®

INDEXING 201 | U.S.

Understanding the S&P 500® Daily Risk Control (RC) 2 Indices

CONTRIBUTORS

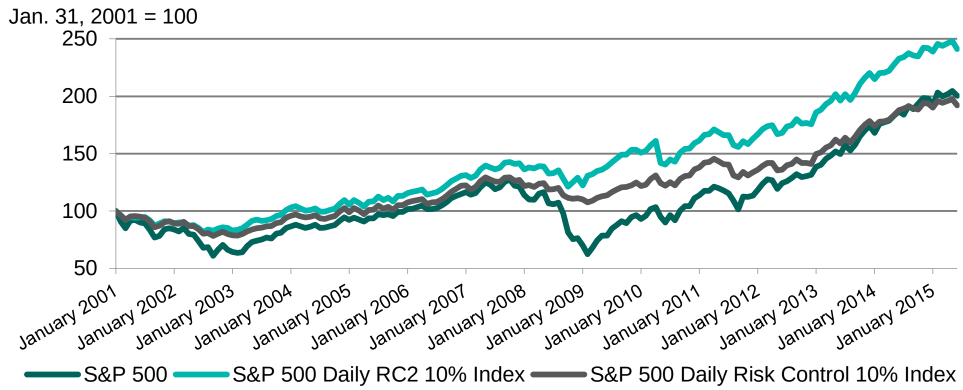
Jane Kim
Associate Director
Strategy Indices
jane.kim@spdji.com

Tianyin Cheng
Associate Director
Strategy Indices
tianyin.cheng@spdji.com

Vinit Srivastava
Senior Director
Strategy Indices
vinit.srivastava@spdji.com

S&P Risk Control 2 Indices represent the next generation of risk control indices. These indices replace the cash portion of the investment that is seen in the standard risk control strategy with a liquid bond index. For example, for the S&P 500 Daily RC2 10% Index, the allocation to U.S. government bond futures allows the potential for enhanced returns compared with that of first-generation risk control indices, in which cash represents the risk-free, zero volatility index component (see Exhibit 1). The S&P Risk Control 2 Indices assign positive weights to either the underlying index or a bond index so that the target volatility can be achieved. This exercise takes into consideration the volatility of both indices and the correlation between them.

Exhibit 1: The S&P 500 Daily RC2 10% Versus the S&P 500 Daily Risk Control 10% Index



Source: S&P Dow Jones Indices LLC. Data as of June 30, 2015. Index performance based on total return in U.S. dollars. Parameters for the S&P RiskControl2 Indices: Exponentially weighted volatility. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

The S&P Risk Control 2 Indices represent the next generation of risk control indices.

THE S&P 500 DAILY RC2 INDEX COMPONENTS

The S&P 500 Daily RC2 Indices allocate between three components:

- The targeted equity component—S&P 500 Total Return;
- The bond component—S&P 10-Year U.S. Treasury Note Futures Total Return Index (ticker: SPUSTTTR); and
- A cash constituent.

Combining these components, the indices are designed to provide dynamic exposure to a hypothetical blended portfolio. The S&P 500 Total Return component seeks to measure the well-capitalized securities of the benchmark S&P 500. For the bond component, the index uses the S&P 10-Year U.S. Treasury Note Futures Total

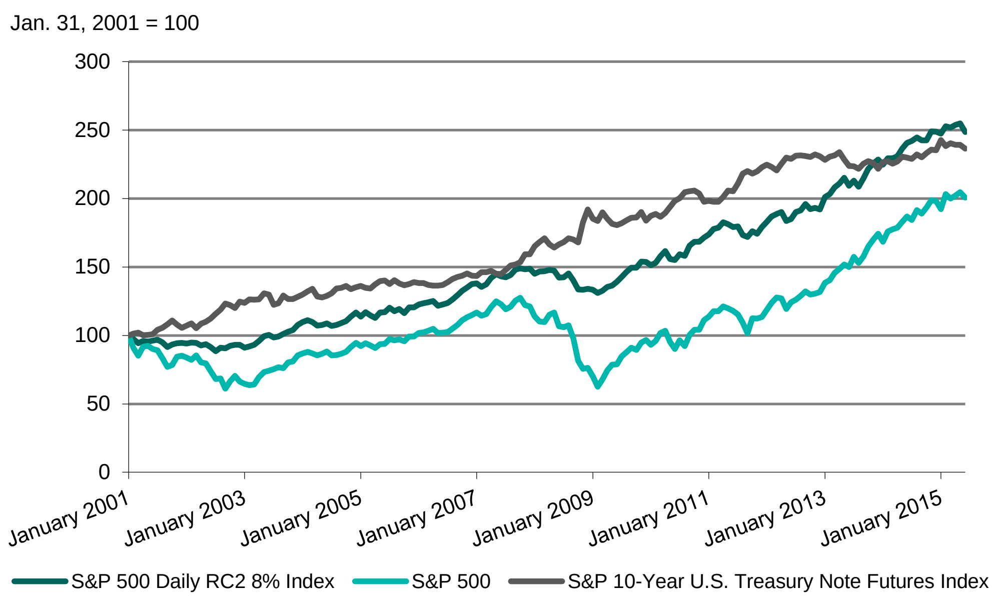
Return Index, which is designed to track the performance of a portfolio that is composed of a single futures contract: the 10-Year U.S. Treasury Note futures contract traded on the Chicago Board of Trade. On a quarterly basis, the Treasury note futures in the S&P 10-Year U.S Treasury Note Futures Index “rolls” its long position from the near-month futures contract (the Treasury futures contract closest to expiration) into the far-month futures contract (the Treasury futures contract that is set to expire the following month). The cash constituent of the index earns interest daily at a blended rate, which is a composite rate of interest based on the three-month and two- month LIBOR rates that are intended to track the overnight rate of return of a notional position in a two- or three-month time deposit in the U.S. dollar.

HOW THE INDEX WORKS

The S&P 500 Daily RC2 Indices are not a static basket; rather, the equity and bond exposures are adjusted on a daily basis based on historical realized volatilities and the correlation of the underlying indices, targeting a specific volatility level. Exhibit 2 illustrates how the S&P 500 Daily RC2 8% Index uses dynamic asset allocation to target a stable level of volatility in all market environments by taking advantage of the negative relationship between stock and bond market performance (although the relationship seems to be less stable since the late 1990s and 2000s). This asset allocation strategy should thus exhibit a smoother path of asset returns. The allocation between the underlying indices is derived from the overall volatility of a portfolio of two assets determined by three components: individual volatilities of the assets, correlation between the assets, and the weights allocated to each asset (see Exhibit 3). The basic premise is that the index will test all combinations and seek to identify a portfolio consisting of the two primary components (the equity and bond indices) with a historic volatility of 8%, subject to a minimum exposure of 0% and a maximum exposure of 100% for each constituent. Unlike the first generation of risk control indices, in which the maximum leverage is permissible, there is no leverage for the S&P Risk Control 2 Indices, as it caps the equity exposure at 100%.

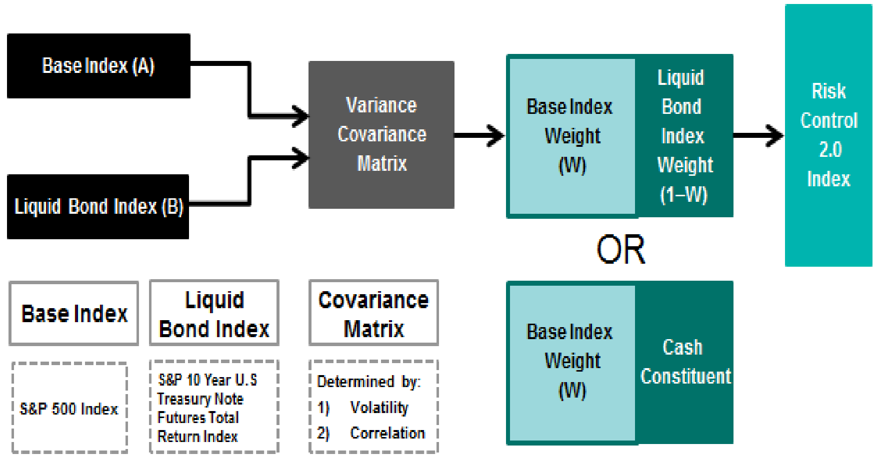
The S&P 500 Daily RC2 8% Index is not a static basket; rather, the equity and bond exposures are adjusted on a daily basis based on historical realized volatilities and the correlation of the underlying indices, targeting a volatility level of 8%.

Exhibit 2: Comparing Wealth Curves



Source: S&P Dow Jones Indices LLC. Data as of June 30, 2015. Index performance based on total return in U.S. dollars. Parameters for the S&P Risk Control 2 Indices: Exponentially weighted volatility. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 3: S&P Risk Control 2 Indices Methodology



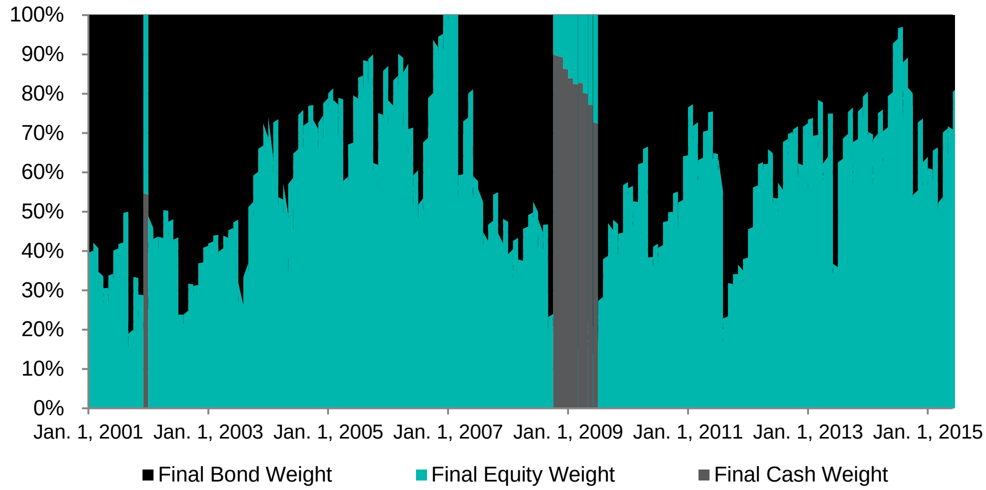
Source: S&P Dow Jones Indices LLC. Chart is provided for illustrative purposes.

Similar to the first generation of risk control indices, the S&P 500 Daily RC Indices also use the standard deviation of the underlying index's natural log returns to measure historical volatility with exponential weighting.

Similar to the first generation of risk control indices, the S&P 500 Daily RC2 Indices use the standard deviation of the underlying index's natural log returns to measure historical volatility with exponential weighting. As volatilities and correlations tend to vary over time, the older the returns are, the less relevant they are for revealing what the covariance structure was at that time; thus, exponential weighting is the preferred method, as it assigns higher weights to the natural log returns closer to the rebalancing date.

The indices allocate equity exposure ranging from 0% to 100%, with the remaining exposure allocated to the bond index. Exhibit 4 shows how the exposure of the two components of the S&P Daily RC2 8% changes over time. The teal section that represents the equity allocation tends to make up a fairly substantial portion of index exposure. The exhibit shows that the allocation has reached as high as 100% (in November 2006, which was a period of low market volatility) down to 10.13% (in October 2008, which was a period of relatively high market volatility). The black area represents the bond index and the gray is cash. Based on this graph, it is clear that cash only comes into play in extreme scenarios, such as during the financial crisis in 2008. Because a solution has usually been available historically, the index is primarily "fully vested." The cash is designated as a "safety valve" for the index; that is, the sleeve where funds can be moved if no suitable combination of the equity and bond indices can be found. However, there are certain circumstances in which the bond exposure is set to zero, as it not always possible to find an allocation in which the portfolio historical volatility is equal to the target volatility of 8% based on the volatilities and correlation between the underlying indices.

Exhibit 4: S&P 500 Daily RC2 8% Index Allocation



Source: S&P Dow Jones Indices LLC. Data as of June 30, 2015. Index performance based on total return in U.S. dollars. Parameters for the S&P Risk Control 2 Indices: Exponentially weighted volatility. Past performance is no guarantee of future results. Chart is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

With the 8% volatility target, the maximum drawdown is cut by 76%, and it takes less time to recover for the S&P Risk Control 2 Indices.

For example, when each underlying index has a historical volatility that is greater than the target volatility of 8%, the correlation will determine whether or not a combination of the two indices can yield a historical volatility equal to the target volatility. In an extreme case in which the two underlying indices are perfectly correlated, the index would be unable to create a portfolio with a historical volatility equal to the target volatility of 8%. In such a case, the index would allocate an equity exposure that is less than 100%, which would leave the remaining uninvested, as the bond index exposure would be at zero.

Another scenario could involve both of the individual historical volatilities being lower than the target volatility of 8% but equal to each other. As each constituent has a volatility lower than the target volatility of 8%, and there is no leverage, any combination of the indices would result in a portfolio with a volatility that is lower than 8%, regardless of the correlation between the two indices. In this situation, the index would allocate 100% to the equity index.

PERFORMANCE CHARACTERISTICS–S&P RISK CONTROL 2 INDICES

Exhibits 5, 6, and 7 provide detailed, comparative overviews of the S&P 500 Daily RC2 Indices and the S&P 500 from Jan. 31, 2001, to June 30, 2015. These statistics confirm that the risk reduction in these indices is not symmetric, which is evident from the improvement of skewness as well as the Sharpe, Sortino, MAR, and Omega ratios.

Drawdowns are significantly reduced in the second generation of risk control indices.

Exhibit 5: Statistical Summary of the S&P 500 Daily Risk Control 2.0 and the S&P 500

Summary Stats	From Jan. 31, 2001, to June 30, 2015				Past 10 Years			
	S&P 500 Daily Risk Control 2.0 8.0%	S&P 500 Daily Risk Control 2.0 10.0%	S&P 500 Daily Risk Control 2.0 15.0%	S&P 500	S&P 500 Daily Risk Control 2.0 8.0%	S&P 500 Daily Risk Control 2.0 10.0%	S&P 500 Daily Risk Control 2.0 15.0%	S&P 500
Annual Return (%)	6.53	6.32	6.65	4.95	7.91	8.41	9.79	6.65
Maximum Drawdown (%)	-12.80	-17.60	-30.90	-50.90	-12.80	-15.30	-24.00	-30.90
Annual Volatility (%)	6.32	8.32	11.03	15.01	6.28	8.47	10.91	11.03
Annual Skewness	-0.10	-0.13	-0.15	-0.19	-0.14	-0.18	-0.16	-0.15
Monthly Alpha against the S&P 500 (%)	0.37	0.33	0.26	-	0.39	0.41	0.36	-
T-Stats Of Alpha	4.74	2.76	2.45	-	4.54	2.56	2.56	-
Beta to the S&P 500	0.35	0.42	0.66	-	0.37	0.41	0.65	-
Correlation with the S&P 500	0.83	0.76	0.90	-	0.86	0.72	0.88	-
Sharpe Ratio	0.81	0.59	0.48	0.24	1.07	0.85	0.79	0.48
Sortino Ratio	1.29	0.88	0.69	0.33	1.78	1.32	1.21	0.69
MAR Ratio	0.51	0.36	0.21	0.10	0.62	0.55	0.41	0.21
Omega Ratio	2.04	1.72	1.57	1.35	2.34	2.00	1.89	1.57

Source: S&P Dow Jones Indices LLC. Data from Jan. 31, 2001, to June 30, 2015. Index performance based on monthly total return in U.S. dollars. Parameters for the S&P Risk Control 2 Indices: Exponentially weighted volatility. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

The S&P Risk Control 2 Indices seek to provide a means to measure volatility in an underlying index and limit the volatility of investments to a tailored level, while still allowing exposure to the index's returns.

Exhibit 6: Further Statistical Summary of the S&P 500 Daily Risk Control 2.0 and the S&P 500

Summary Stats	Past 5 Years				Past 3 Years			
	S&P 500 Daily Risk Control 2.0 8.0%	S&P 500 Daily Risk Control 2.0 10.0%	S&P 500 Daily Risk Control 2.0 15.0%	S&P 500	S&P 500 Daily Risk Control 2.0 8.0%	S&P 500 Daily Risk Control 2.0 10.0%	S&P 500 Daily Risk Control 2.0 15.0%	S&P 500
Annual Return (%)	10.03	11.55	15.05	17.34	10.02	12.29	17.00	17.31
Maximum Drawdown (%)	-6.70	10.00	-15.50	-16.30	-2.30	-3.30	-3.50	-3.50
Annual Volatility (%)	6.22	7.78	10.56	12.00	5.80	7.03	8.47	8.55
Annual Skewness	-0.13	-0.15	-0.18	-0.01	-0.10	-0.09	-0.07	-0.07
Monthly Alpha against the S&P 500 (%)	0.16	0.10	0.05	-	-0.06	-0.10	-0.01	-
T-Stats Of Alpha	1.48	0.83	0.36	-	-0.59	-1.00	-0.41	-
Beta to the S&P 500	0.47	0.60	0.84	-	0.64	0.80	0.99	-
Correlation with the S&P 500	0.90	0.93	0.95	-	0.94	0.97	1.00	-
Sharpe Ratio	1.61	1.48	1.42	1.44	1.72	1.74	2.00	2.02
Sortino Ratio	3.04	2.70	2.50	2.81	3.48	3.57	4.40	4.47
MAR Ratio	1.49	1.16	0.97	1.07	4.28	3.73	4.92	5.01
Omega Ratio	2.90	2.67	2.61	2.76	3.05	3.07	3.52	3.58

Source: S&P Dow Jones Indices LLC. Data from Jan. 31, 2001, to June 30, 2015. Index performance based on monthly total return in U.S. dollars. Parameters for the S&P Risk Control 2 Indices: Exponentially weighted volatility. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

A low-volatility strategy can be effective in delivering the target volatilities and associated returns.

Exhibit 7: Drawdown Histories			
S&P Daily Risk Control 2.0 8.0%	**Maximum Drawdown**	**Second-Largest Drawdown**	**Third-Largest Drawdown**
Drawdown	-12.80	-10.77	-6.74
Peak Date	October 2007	Beginning of the Period	April 2011
Trough Date	February 2009	July 2002	September 2011
Number of Months From Peak to Trough	16	18	5
Recovery Length (Number of Months)	9	10	4
Number of 5% Draw-downs: 3	3	-	-
S&P 500 Daily Risk Control 2.0 10.0%	**Maximum Drawdown**	**Second-Largest Drawdown**	**Third-Largest Drawdown**
Drawdown	-17.61	-15.29	-10.97
Peak Date	-	October 2007	March 2010
Trough Date	July 2002	October 2008	June 2010
Number of Months From Peak to Trough	18	12	3
Recovery Length (Number of Months)	17	10	6
Number of 5% Draw-downs: 3	4	-	-
S&P 500 Daily Risk Control 2.0 15.0%	**Maximum Drawdown**	**Second-Largest Drawdown**	**Third-Largest Drawdown**
Drawdown	-30.94	-23.97	-15.49
Peak Date	-	October 2007	April 2011
Trough Date	September 2002	October 2008	September 2011
Number of Months From Peak to Trough	20	12	5
Recovery Length (Number of Months)	27	18	11
Number of 5% Draw-downs: 3	4	-	-

Source: S&P Dow Jones Indices LLC. Data from Jan. 31, 2001, to June 30, 2015. Index performance based on monthly total return in U.S. dollars. Parameters for the S&P Risk Control 2 Indices: Exponentially weighted volatility. Past performance is no guarantee of future results. Table is provided for illustrative purposes and reflects hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

CONCLUSION

The S&P Risk Control 2 Indices seek to provide a means to measure volatility in an underlying index and limit the volatility of investments to a tailored level, while still allowing exposure to the index's returns. The data discussed show that, historically, these indices have shown protection in bear markets, while allowing participation in some of the upswings. Both academic research and these indices' historical performance have shown that this has been a result of the indices' predefined risk levels and their stock-bond correlation. The historical performance has also shown that a low-volatility strategy can be effective in delivering the target volatilities and associated returns.

PERFORMANCE DISCLOSURES

The S&P 500 Daily RC2 8% Index (the “Index”) was launched on June 3, 2011. The S&P 500 Daily RC2 10% Index (the “Index”) was launched on May 26, 2011. The S&P 500 Daily Risk Control 10% Index (the “Index”) was launched on May 13, 2009. The S&P 10-Year U.S. Treasury Note Futures Index (the “Index”) was launched on March 28, 2011.

All information presented prior to the launch date is back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. Complete index methodology details are available at www.spdji.com. It is not possible to invest directly in an index.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency on their products. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the Index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which the values of an index are first considered live: index values provided for any date or time period prior to the index’s Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company’s public website or its datafeed to external parties. For Dow Jones-branded indicates introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed “Date of introduction”) is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index’s public release date.

Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index may not result in performance commensurate with the back-test returns shown. The back-test period does not necessarily correspond to the entire available history of the Index. Please refer to the methodology paper for the Index, available at www.spdji.com for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Another limitation of using back-tested information is that the back-tested calculation is prepared with the benefit of hindsight. Back-tested information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities, fixed income, or commodities markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

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