S&P DOW JONES INDICES
McGRAW HILL FINANCIAL

THE ROLE OF MULTI-ASSET SOLUTIONS IN INDEXING

Over the past decade, key trends have developed that are helping to shape the future direction of growth for the index investment industry. As the once distinct line between active and passive management has become blurred, one direction of potential growth is the indexation of multi-asset solutions. In this paper, the Index Research & Design team at S&P Dow Jones Indices explores the potential role of multi-asset solutions in the indexing landscape.

Contributors:

Xiaowei Kang, CFA
Senior Director
Index Research & Design
xiaowei.kang@spdji.com

Aye Soe, CFA
Director
Index Research & Design
aye.soe@spdji.com

Keith Loggie
Senior Director
Index Research & Development
keith.loggie@spdji.com

1. Introduction

An important phenomenon that has shaped the global asset management industry since the 1970s is the rise of index investing and the separation of alpha and beta. In the traditional industry setup, passive managers provided low cost access to beta (primarily traditional asset classes such as equities and fixed income), but most asset managers were dedicated to generating alpha. Traditional long-only active managers focused on generating benchmark-relative returns, while alternative managers (such as hedge funds) charged high fees for seeking absolute returns or alternative sources of returns from exotic asset classes or investment strategies.

The following three patterns have developed in the past decade, which have continued to reshape investors' investment and asset allocation processes:

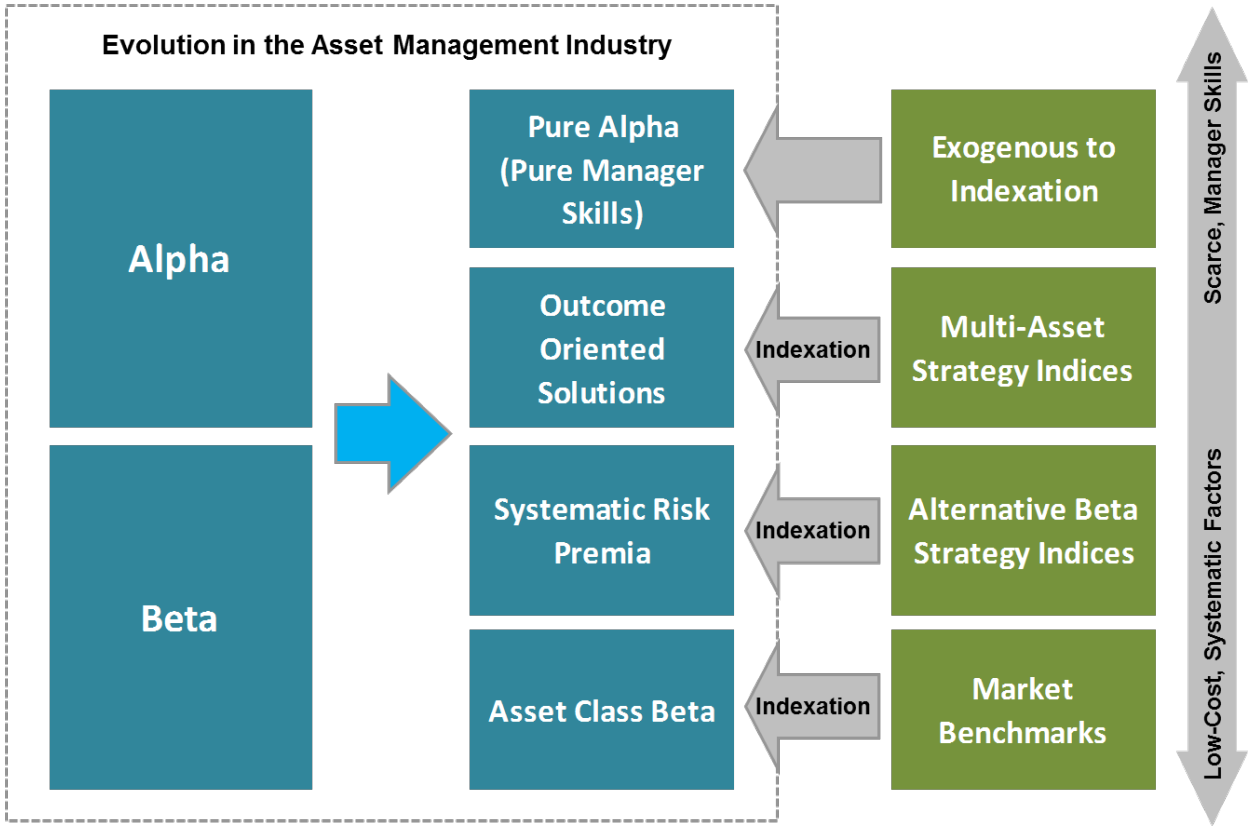
1. The first trend is with the continued shift from active to passive management, index-linked investment vehicles (in particular ETFs/ETPs) now offer efficient access to an enormous range of asset classes and market segments beyond core equities and fixed income. Investors can now access those asset classes that were traditionally considered "alternative" or "exotic" in a low cost and passive fashion— examples of which are commodities, emerging market local currency debt, leveraged loans and volatility.

2. The second trend involves investors thinking more and more of risk factors or risk premia as the building blocks of asset allocation, rather than asset classes. There has been a growing recognition that systematic risk factors explain the majority of long-term portfolio returns, and that a significant portion of the alpha delivered by active managers and alternative managers can be attributed to systematic risk factors (e.g., Ang et al, 2009). The true alpha from pure manager skills accounts for a smaller portion of portfolio returns. In such context, there has been increased interest in using low-cost systematic strategies to capture risk premia. Notably, many so called "alternative beta" or "smart beta" strategy indices have been developed to capture the most well-known systematic risk premia such as value, low volatility and quality in equities, momentum and roll yield in commodities and carry/value/momentum in currencies.

3. The third trend is the shifting focus from individual investment products to investment solutions. Institutional investors increasingly demand solutions that address their specific needs such as matching liabilities, reducing funding ratio volatility and achieving absolute return targets. On the retail front, retirees have been seeking outcome oriented solutions such as target date, income generation, and inflation protection—a trend driven by the demographic shift.

These three trends suggest that the traditional divide between passive and active management has become blurred. Investment products and mandates may be better differentiated by whether they provide access to asset class betas, systematic risk premia, outcome-oriented solutions or true manager alpha, which require different levels of active management skills (see Exhibit 1). Passive managers, traditional active managers and alternative managers may compete across multiple segments of this spectrum.

Exhibit 1: Evolution in the Asset Management Industry and Indexation



Source: S&P Dow Jones Indices. Charts are provided for illustrative purposes.

These trends may significantly affect further growth of the index investment industry. The role of index-linked investments in providing efficient access to asset class betas is solidly established in the investment industry. In addition, the notion of using alternative beta strategies to capture systematic risk premia is also gaining acceptance and is positioned to grow significantly. In contrast, the indexation of outcome-oriented investment solutions has received less attention. As such, in this paper we will discuss the potential role multi-asset strategy indices can play in investment solutions.

2. Case Studies

Exhibit 2 lists several examples of multi-asset solutions that can be indexed. It illustrates some of those solutions that can be potentially designed as pre-packaged investment products, as opposed to institutional solutions that need to be customized to fit specific investors. In this section, we discuss three case studies in more detail: risk parity, income generation and inflation protection. We refer readers to Murphy and Tsui (2011), Banerjee and Srivastava (2012) and Rennison et al (2011) for case studies of indexing target date,

target volatility and absolute return solutions. Note that each multi-asset solution listed here deserves a comprehensive discussion that is beyond the scope of this paper. For the purposes of this paper, we only aim to use stylized examples to shed some lights on the basic principles of indexing multi-asset solutions in general, while leaving more focused discussions on individual solutions to future companion papers.

Exhibit 2: Examples of Multi-Asset Solutions and Indexing Concepts

Multi-Asset Solutions	Example of Indexing Concepts
Target Date	Dow Jones Target Date Indices and S&P Target Date Indices adjust their asset allocations over time to reflect reductions in potential risk as an investor's target date approaches
Target Volatility	S&P Risk Control Indices seek to maintain an established volatility target by dynamically allocating between a risky asset (eg, equities or commodities) and cash. See Banerjee and Srivastava (2012)
Risk Parity	A multi-asset risk parity index aims to build a more diversified and balanced portfolio than traditional portfolios that are dominated by equity risk
Income Generation	A multi-asset income index may leverage income opportunities across asset classes, leading to more stable income generation and more balanced risk and return characteristics
Inflation Protection	Blending inflation sensitive assets can improve the inflation protection properties, and enhance risk adjusted performance
Tactical Asset Allocation	Systematic tactical asset allocation strategies such as those based on value and momentum can be potentially indexed
Absolute Return	Combining lowly correlated risk premia across asset classes can form the basis of an absolute return portfolio. See Rennison et al (2011)

Source: S&P Dow Jones Indices. Charts are provided for illustrative purposes.

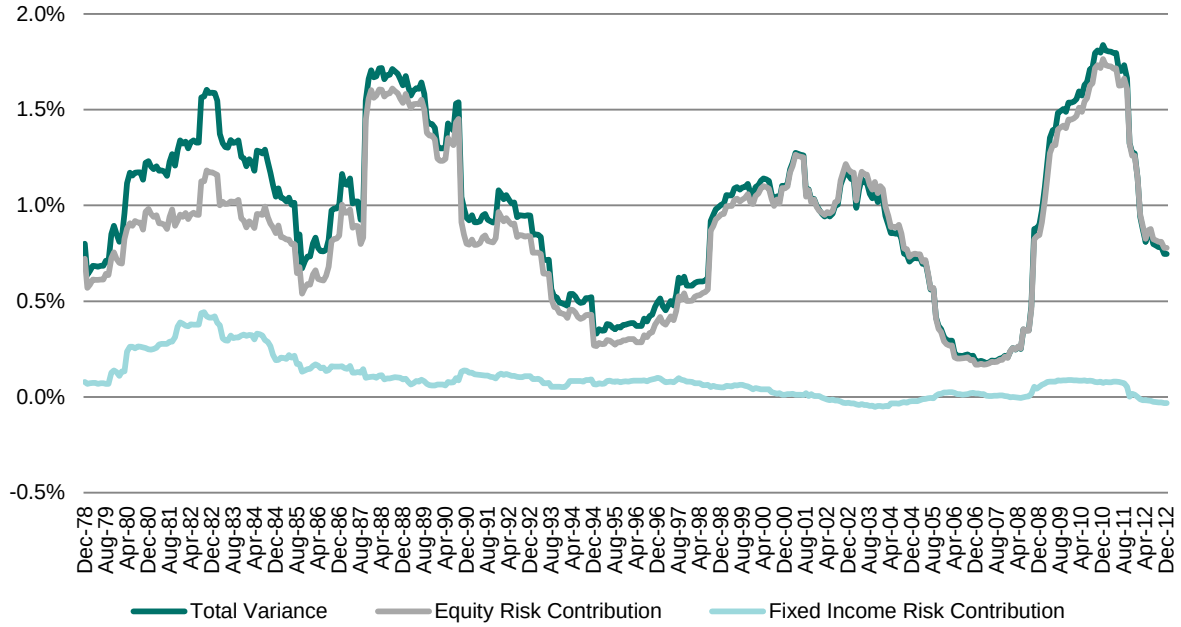
2.1. Risk Parity Strategy

Diversification is often considered the only free lunch in investing. The traditional approach to asset allocation focuses on dollar allocation across asset classes to achieve portfolio diversification[1]. As equities contribute a disproportionately higher amount of risk than its dollar allocation, traditional balanced portfolios are typically poorly diversified in terms of risk allocation. Exhibit 3 illustrates that, over the last few decades, the risk of a 60% equity/40% fixed income portfolio has been highly dominated by the risk allocation to equities, with the fixed income allocation contributing only marginally to the portfolio risk.

A risk parity strategy aims to address the over-concentration of portfolio risks in equities by balancing the risk contributions from individual asset classes or risk factors. As all asset classes have different exposures to key macro risk factors such as economic growth and inflation, one of the core principles of risk parity is to aim to achieve consistent performance across different economic environments by balancing the portfolio's exposure to future shocks in economic growth and inflation.

[1] All "portfolios" discussed in this paper are hypothetical based on the different strategies that were employed.

Exhibit 3: Risk Contributions of Traditional 60/40 Portfolio (Measured by Variance and Covariance)



Source: S&P Dow Jones Indices. Charts are provided for illustrative purposes. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used in creating the hypothetical portfolios. Additionally, this graph may reflect hypothetical historical data (back-testing).

Implementing risk parity can differ in many dimensions, including the use of risk factors/risk premia versus asset classes as the building blocks and the use of leverage, as well as the level of active management. Here we simulate a stylized example of an unlevered asset class based risk parity strategy, just as an illustration. The multi-asset risk parity portfolio ("risk parity portfolio") is constructed based on six asset classes: U.S. equities, emerging markets equities, REITs, commodities, long-term treasuries and high-yield bonds[2]. These asset classes are chosen to capture the exposures to key risk factors including equity risk, emerging markets risk, real estate risk, commodity risk, interest rate risk, inflation risk and credit risk.

Exhibit 4 shows the historical performance of the risk parity strategy and contrasts it with other simple asset allocation strategies, including equal weight, volatility weighted and minimum variance. As is widely accepted, these approaches all ignore information about asset class expected returns, but require different assumptions about asset class volatilities and correlations. Equal weight does not require any estimation of volatilities and correlations, volatility weighted requires estimation of volatilities and minimum variance and risk parity require estimation of volatilities and correlations. In this case study, we estimate the asset class volatilities and correlations based on 36-month return data, using an exponentially weighted moving average.

Not surprisingly, the risk parity portfolio consistently achieved much lower volatility and smaller drawdown than the equal weight and volatility weighted portfolios over the last five, 10 and 20 years. This confirms that, even by using a simple methodology solely based on historical returns to estimate volatilities and correlations, the risk parity portfolio was able to improve portfolio diversification. In particular, over the last five years of market turmoil when diversification was an important factor, risk parity produced significantly lower volatility than the volatility weighted approach that ignores asset class correlations.

[2] Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices which were used to represent those asset classes in creating the various hypothetical portfolios.

Exhibit 4: Performance of A Stylized Example of Risk Parity Strategy

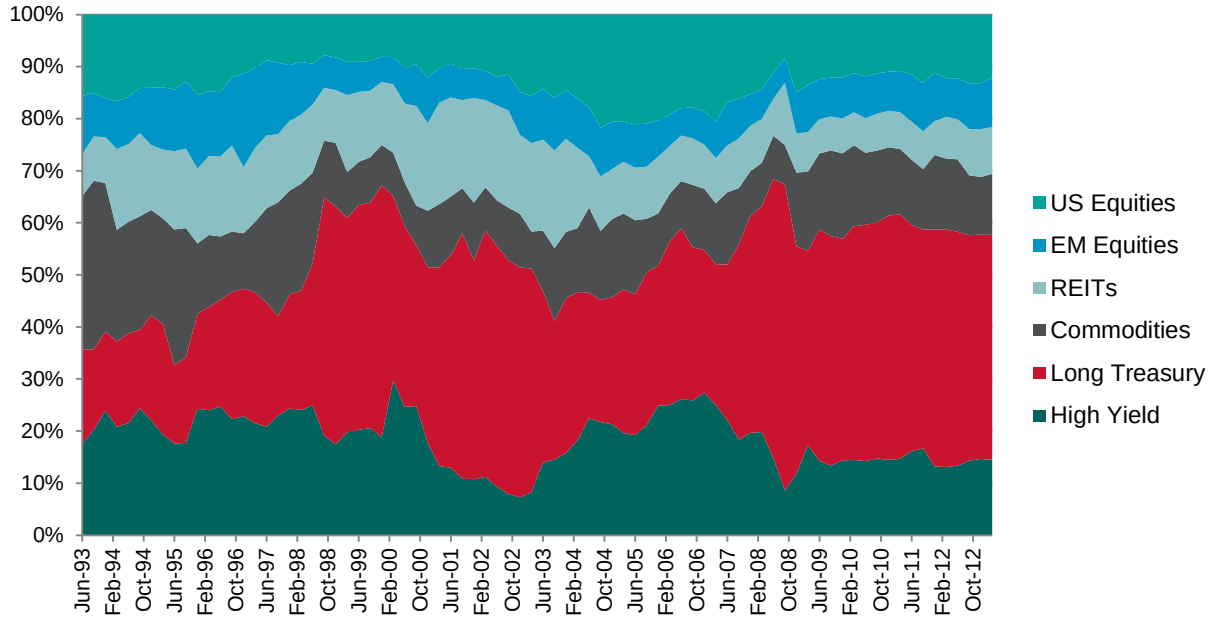
	Traditional 60/40	Equal Weight	Volatility Weighted	Risk Parity	Minimum Variance
20-Year					
Annual Return (%)	8.0	9.1	9.3	9.3	8.4
Annual Risk (%)	9.2	11.1	8.9	7.8	7.2
Sharpe Ratio	0.54	0.56	0.71	0.80	0.75
Max Drawdown (%)	-32.0	-40.7	-28.7	-17.8	-12.4
10-Year					
Annual Return (%)	6.6	10.2	10.4	10.7	9.3
Annual Risk (%)	8.8	12.8	10.3	8.5	7.9
Sharpe Ratio	0.56	0.67	0.85	1.07	0.97
Max Drawdown (%)	-32.0	-40.7	-28.7	-17.8	-12.4
5-Year					
Annual Return (%)	7.0	5.5	8.2	9.1	9.0
Annual Risk (%)	11.2	16.4	13.2	10.6	9.8
Sharpe Ratio	0.59	0.31	0.59	0.82	0.88
Max Drawdown (%)	-26.1	-38.8	-26.6	-16.3	-12.0

Source: S&P Dow Jones Indices. The hypothetical portfolios are rebalanced quarterly. Data from June 30, 1993, to June 30, 2013. Charts are provided for illustrative purposes. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used in creating these hypothetical portfolios. Additionally, this chart may reflect hypothetical historical data (back-testing).

Note that the unconstrained minimum variance portfolio had slightly lower volatility than the risk parity portfolio. This is because risk parity is equivalent to optimizing for minimum variance with an extra constraint of equal risk contribution. However, unconstrained minimum variance portfolios may be notoriously unstable, as the optimization is very sensitive to the covariance matrix estimation. Exhibit 11 in the appendix illustrates the unstable and high-turnover nature of the simulated minimum variance portfolio. In comparison, the risk parity portfolio had far more balanced asset class exposures historically (Exhibit 5). Note that the exposure of the simulated risk parity portfolio to long-term treasuries significantly increased around 2008, due to the volatility spike of other risky asset classes and the surge in asset class correlations during the financial crisis.

The risk parity portfolio illustrated here is just a highly stylized example. The actual implementation of risk parity may need to factor in many other considerations. One consideration could be that asset class based risk parity may not achieve true parity in terms of underlying risk factors. Many risky asset classes such as developed market equities, emerging markets equities, REITs, commodities and high yield bonds are all exposed to the same underlying risk of economic growth, but to a different degree. A risk parity portfolio that comprises these correlated risky asset classes may be over-concentrated in the economic growth risk factor, thus dampening its ability to achieve balanced exposures to different economic environments. One approach to address this potential concern is to use a risk factor based framework to implement risk parity (for instance, Bhansali et al (2012)).

Exhibit 5: Historical Asset Class Exposure of the Simulated Risk Parity Strategy



Source: S&P Dow Jones Indices. The hypothetical portfolio is rebalanced quarterly. Data from June 30, 1993, to June 30, 2013. Charts are provided for illustrative purposes. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used to create this hypothetical portfolio. Additionally, this graph may reflect hypothetical historical data (back-testing).

The other consideration is the use of leverage in typical risk parity strategies to increase returns on fixed income allocation. In the bond bull market triggered by the declining treasury yields over the last two to three decades, the levered fixed income exposure has generally helped the performance of risk parity strategies. In today's record low interest rate environment, the potential for rising interest rates may negatively impact the performance of typical risk parity strategies, as witnessed in the first half of 2013.

The many implementation considerations of risk parity are beyond the scope of this small case study. However, this study does indicate the potential to index risk parity strategy in a transparent and systematic manner. Active management can certainly add value when constructing a risk parity strategy, for instance, by forecasting future economic environments and balancing the exposures of a risk parity portfolio accordingly, or by not relying solely on historical data to forecast future volatilities and correlations. Nevertheless, some of the core principles of risk parity, such as balancing the portfolio's exposure across multiple risk factors and disciplined rebalancing, may be applied systematically to construct a more diversified risk parity portfolio than traditional multi-asset portfolios.

2.2. Income Solution

Income-focused investing has become a compelling strategy in recent years thanks to shifting demographic trends and a prolonged global low interest rate environment. Traditional income investments may consist of fixed income securities and dividend-paying stocks. But the combination of low yields in fixed income and high volatility in equities has prompted investors to search for yields beyond the traditional asset classes and venture into alternative income opportunity sets.

Attractive yields offered by non-traditional income asset classes, such as Master Limited Partnerships (MLPs), bank loans, preferred stocks, emerging market debts and real estate investment trusts (REITs), have made it possible for investors to supplement and enhance the income stream. As different asset classes have different characteristics and risk profiles, generating yield from a diverse array of income sources offer potential portfolio diversification and risk reduction. Exhibit 6 compares the historical yields and risk/return characteristics of different income generating asset classes, including both traditional and alternative income sources.

Exhibit 6: Historical Average Yield and Annualized Risk/Return Profiles of Various Income Assets

	Traditional Sources of Income						Alternative Sources of Income				
	Global Treasury (%)	Global Corp. Bonds (%)	Global High Yield (%)	U.S. Dividend Equities (%)	Global Dividend Equities (%)	EM Dividend Equities (%)	REITs (%)	MLPs (%)	Preferred Stocks (%)	U.S. Sr Loans (%)	EM Bonds (%)
Yield	1.3	2.6	6.6	3.4	6.0	6.2	3.5	6.0	6.7	6.0	4.3
Annual Return (2002-2012)	6.1	6.3	11.6	7.9	11.0	18.7	11.5	15.7	5.6	5.8	11.6
Annual Risk (2002-2012)	7.1	7.5	11.3	14.7	19.6	23	26.7	16.6	19.4	8.7	8.9

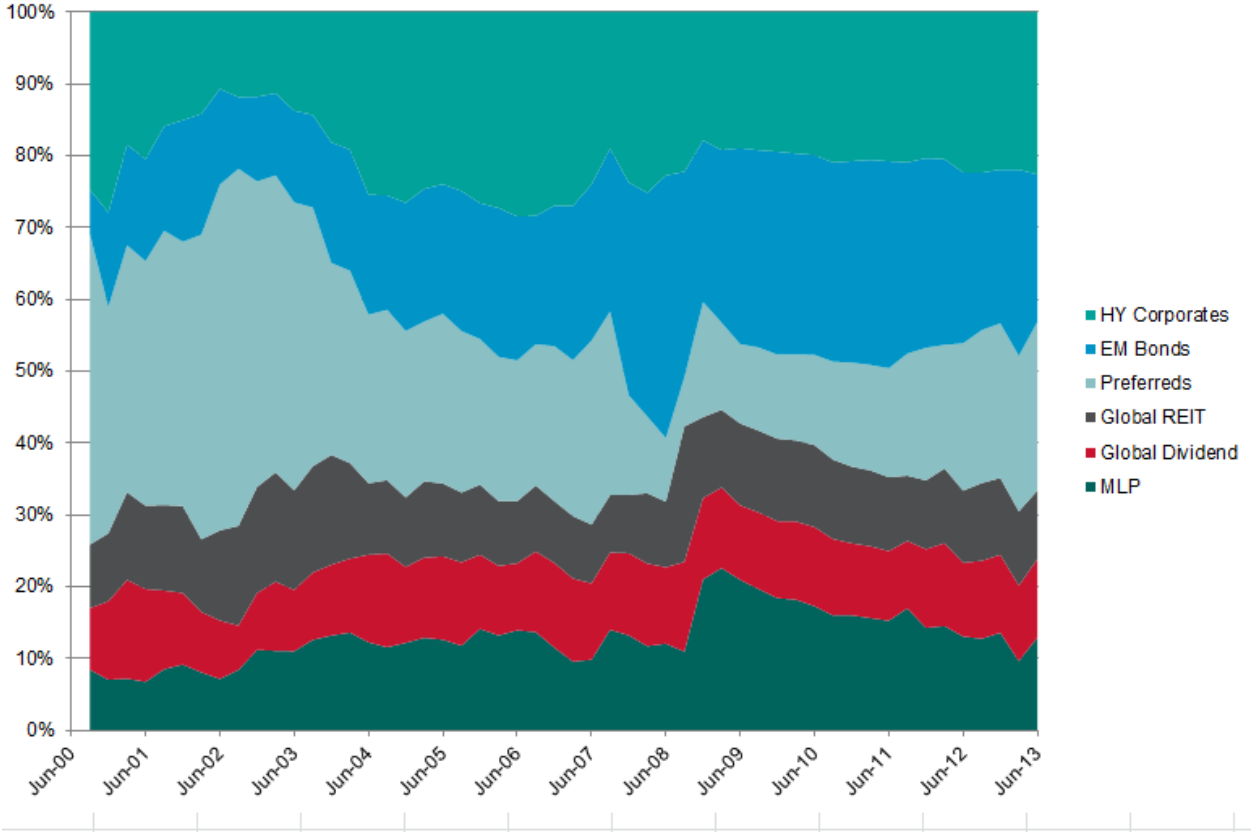
Source: S&P Dow Jones Indices, LLC. Data as of Dec. 31, 2012. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used to create this hypothetical portfolio. Additionally, this chart may reflect hypothetical historical data (back-testing).

As different income generating asset classes may have dramatically different yield and risk/return profiles, and react differently to market cycles, a multi-asset income strategy may potentially deliver more stable income streams and a more balanced risk/return profile across different economic environments. To demonstrate, we constructed multi-asset income portfolios consisting of the traditional income generating fixed income instruments and dividend paying stocks, as well as alternative income asset classes such as master limited partnerships (MLPs), emerging market debt, preferred securities and REITs[3] (the asset classes were selected to represent a diverse range of key risk factors). We compare a number of simple asset allocation frameworks including equal weighted, volatility weighted, risk parity and minimum variance. As we have noted in the previous section, minimum variance and risk parity frameworks require the estimation of correlations and volatilities, while the equal weighted and volatility weighted portfolios do not. We use the 36-month returns to estimate the exponentially weighted volatilities and correlations used in the risk parity and minimum variance approaches.

As noted earlier, an unconstrained minimum variance strategy can yield unstable asset class weights, frequently resulting in concentration in a single asset class (Exhibit 12 in the appendix). As an attempt to alleviate the problem, Exhibit 13 (in the appendix) illustrates a constrained strategy with maximum asset class weight of 35%; however, this strategy can still be frequently dominated by two to three asset classes. The represented asset classes tend to be fixed income categories, such as emerging market bonds and high yield corporates, thereby negating the diversification benefit of a multi-asset strategy. In contrast, the risk parity and volatility weighted multi-asset income strategies exhibit much more balanced and diversified asset class exposures through time. Exhibit 7 shows the historical asset class composition of the risk parity strategy. In addition, the annual turnover of the minimum variance multi-asset strategy is significantly higher than that of the equal weighted, volatility weighted and risk parity portfolios. For example, the average annual turnover of an unconstrained minimum variance multi-asset strategy during the study period amounts to 107.88% while that of a risk parity portfolio is 36.89%.

[3] Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices which were used to represent those asset classes in creating the various hypothetical portfolios.

Exhibit 7: Historical Asset Class Exposure of the Simulated Multi Asset Income Strategy – Risk Parity Framework



Source: S&P Dow Jones Indices. The hypothetical portfolio is rebalanced quarterly. Data from June 30, 2001 – June 30, 2013. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used to create these hypothetical portfolios. Additionally, this graph may reflect hypothetical historical data (back-testing).

Exhibit 8 shows the average historical yield and performance of the various multi-asset income strategies. We note that all the multi-asset income strategies delivered a much higher yield that more than doubled the yield of the 60/40 portfolio. In terms of absolute risk-adjusted performance, the results show that over the longer-term ten and twelve years, the traditional 60/40 portfolio has the lowest Sharpe ratio, with a naive diversification framework such as an equal weighted strategy achieving a higher Sharpe. The unconstrained minimum variance strategy has the highest Sharpe ratio in all the periods studied. However, the instability of asset class weights and significant sector concentration of unconstrained mean variance optimization makes the strategy less viable in practice, despite having the highest Sharpe ratio historically.

Exhibit 8: Historical Performance of Multi-Asset Income Strategies

	Traditional 60/40	Equal Weight	Volatility Weighted	Equal Risk Contribution	Minimum Variance
12 Year					
Annual Return (%)	5.2	10.7	9.8	9.8	8.3
Annual Risk (%)	9.1	12.9	11.7	11.7	9.6
Sharpe Ratio	0.39	0.70	0.70	0.70	0.69
10 Year					
Annual Return (%)	6.6	10.5	9.7	9.7	8.2
Annual Risk (%)	8.8	13.5	12.4	12.5	10.4
Sharpe Ratio	0.57	0.66	0.65	0.65	0.63
5 Year					
Annual Return (%)	7.0	9.8	9.9	9.8	12.0
Annual Risk (%)	11.2	17.4	16.2	16.3	13.4
Sharpe Ratio	0.61	0.55	0.60	0.59	0.89
As of June 30, 2013					
Portfolio Yield (%)	2.18	5.90	5.98	5.99	6.18

Source: S&P Dow Jones Indices. The hypothetical portfolios are rebalanced quarterly. Data as of June 30, 2013. Returns are in USD. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used to create these hypothetical portfolios. Additionally, this chart may reflect hypothetical historical data (back-testing).

Our example of the stylized multi-asset income strategy using various asset allocation frameworks demonstrates that portfolio risk can be mitigated by diversifying across asset classes while meeting the income objective. The study is not meant to be exhaustive in terms of all the systematic asset allocation frameworks that can be employed in a multi-asset income strategy. We also note that our study has not explored all the inter-asset allocation decisions that can be employed within each asset class, such as weighting and security selection processes.

2.3. Inflation Protection Solution

Inflation risk is one of the most significant risk factors that can erode investment returns over the long term. As core equities and conventional bonds tend to deliver below-average returns in rising inflation environments, investors are increasingly using inflation sensitive assets, such as commodities, inflation linked bonds, REITs, natural resources stocks and gold, to protect their portfolios from inflation shocks. In particular, index-linked investment vehicles, such as ETFs, provide access to these asset classes, which can assist in constructing inflation protection or real asset portfolios/solutions that combine multiple inflation sensitive assets. It is worth noting that some institutional investors have recently adopted a real assets category in their strategic asset allocation, and some asset managers have launched pre-packaged inflation protection solution products.

In this case study, we constructed three multi-asset portfolios that consist of TIPs, commodities, natural resources stocks, REITs and gold, and examine their inflation protection characteristics and risk/return profiles. The first hypothetical portfolio targets a static allocation to the underlying assets, in particular, 30% TIPS, 20% commodities, 20% natural resources stocks, 20% REITs and 10% gold.

In general, there are two dimensions to potentially enhance the risk and return profile of a static multi-asset portfolio through systematic, dynamic allocation. The first dimension is to incorporate information about the risk characteristics of the individual assets to build a less risky or more diversified portfolio than static allocation. For illustration, we simulated a risk parity allocation that targets equal risk contributions from the five individual inflation sensitive assets, based on the risk parity principles we described in section 2.1.

The second dimension is to incorporate information about future expected returns of the individual assets,

and tactically overweight and underweight assets based on certain signals or economic environments. Here we simulated a tactical allocation based on a widely followed economic indicator, the Economic Cycle Research Institute (ECRI) Leading Economic Indicator Index[4]. The simulated portfolio tactically over-weights the more cyclical real assets (commodities, natural resources stocks and REITs) and underweights the more defensive real assets (TIPS and gold), relative to the static allocation, when the leading economic indicator is trending upwards, and vice versa. Note that this highly stylized example of tactical allocation is for illustration only.

Exhibit 9 compares the inflation protection characteristics of individual inflation sensitive assets with that of the three multi-asset inflation protection portfolios. It shows that the inflation beta[5] of individual inflation sensitive assets can vary significantly. Among the five examined asset classes commodities are the most sensitive to changes in inflation, while TIPS is the least sensitive. Note that inflation beta is an important element of inflation protection: a relatively high inflation beta means that a relatively small allocation to real assets may offer the level of inflation protection required by the overall portfolio.

However, another important dimension that is not captured by inflation beta is the consistency of inflation protection. Exhibit 10 illustrates that, while commodities and natural resources stocks have the highest inflation beta, their consistency of beating inflation is lower than other inflation sensitive assets. Note that none of the examined asset classes is a pure play on inflation risk; therefore, the consistency of inflation protection partly depends on the volatility of other risk factors that drive the asset class returns. For instance, commodities and natural resources stocks can be dominated by highly volatile risk factors such as commodity specific supply and demand risks and equity risks, which dampen their reliability of inflation protection. On the other end of the spectrum, TIPS has the lowest inflation beta, but the highest consistency of beating inflation, partly due to the relatively lower volatility of its risk drivers beyond inflation (primarily real interest rate risk).

Exhibit 9: Inflation Protection Characteristics of Individual Assets and Multi-Asset Portfolios

	Individual Assets					Multi-Asset Portfolios		
	Commodities	Natural Resources Stocks	REITs	Gold	TIPS	Static Allocation	Risk Parity Allocation	Tactical Allocation
Inflation Beta	14.4	9.8	5.2	3.1	1.1	6.5	5.5	4.3
Frequency of Beating Inflation (%)	61	65	74	77	82	81	88	82

Source: S&P Dow Jones Indices, Barclays, Bloomberg. The hypothetical portfolios are rebalanced monthly. Data from June 30, 1998, to June 30, 2013. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used to create these hypothetical portfolios. Additionally, this chart may reflect hypothetical historical data (back-testing).

This trade-off between inflation beta and consistency of inflation protection indicates the potential benefits of combining multiple inflation sensitive assets. As Exhibit 10 illustrates, the three simulated multi-asset portfolios (namely static, risk parity and tactical allocations) have all achieved better balance between inflation beta and the consistency of beating inflation historically than any individual inflation sensitive assets.

Exhibit 10 shows that over the examined period of June 1998 to June 2013, the multi-asset portfolios also delivered more balanced risk and return characteristics, confirming the diversification benefits of blending multiple inflation sensitive assets. Note that the risk parity allocation achieved significantly lower volatility than the static allocation, which indicates that overlaying simple risk based asset allocation strategies on top of the multi-asset inflation protection portfolio may improve the risk characteristics without distracting from its inflation protection abilities. Similarly, we observe that the tactical allocation improved returns over the static allocation.

[4] Please refer to www.businesscycle.com for more information about the ECRI index.

[5] Inflation beta measures the sensitivity of asset returns to the changes in inflation. For instance, an inflation beta of 5 indicates the tendency of asset return to go up by 5% for 1% rise in inflation. The inflation beta here is calculated by regressing asset returns on inflation changes.

Overall, this case study demonstrates the benefits of a multi-asset approach to implement inflation protection, as well as the potential for developing multi-asset indices to serve as the underlying of pre-packaged inflation protection solution products.

Exhibit 10: Risk and Return Characteristics of Individual Assets and Multi-Asset Portfolios

	Individual Assets					Multi-Asset Portfolios		
	Commodities	Natural Resources Stocks	REITs	Gold	TIPS	Static Allocation	Risk Parity Allocation	Tactical Allocation
Annual Return (%)	7.0	8.2	9.8	9.7	6.7	9.1	9.2	11.0
Annual Risk (%)	21.8	23.9	23.3	17.7	6.2	12.1	10.4	11.2
Sharpe Ratio	0.21	0.25	0.32	0.42	0.71	0.56	0.67	0.78

Source: S&P Dow Jones Indices, Barclays, Bloomberg. The hypothetical portfolios are rebalanced monthly. Data from June 30, 1998, to June 30, 2013. Charts are provided for illustrative purposes. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used to create these hypothetical portfolios. Additionally, this chart may reflect hypothetical historical data (back-testing).

3. Conclusion

The case for index investing traces back to the simple but profound insight that, in aggregate, active management is a zero-sum game before costs and a negative-sum game after costs. Beta can be captured by traditional market benchmarks with very low cost, while alpha is scarce and expensive.

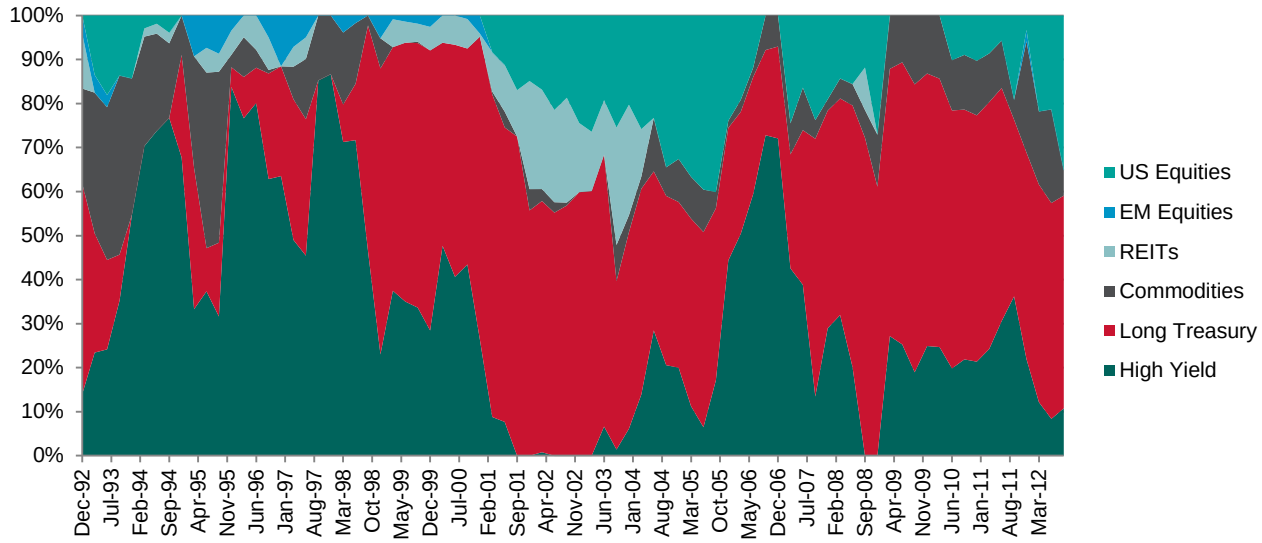
In recent years, the concepts of alpha and beta have been evolving. Investors increasingly recognize that alpha should not be defined as the excess return over the market benchmark. A significant portion of the excess return from active management may come from exposures to systematic risk premia. In such context we have witnessed the development of many alternative beta/smart beta strategies that aim to capture systematic risk premia.

Multi-asset solutions can potentially push the boundary of index investing beyond asset class beta and systematic risk premia. As multi-asset solutions become more mainstream in the asset management industry, the potential role of indices in underlying pre-packaged multi-asset investment products may warrant more discussion. Theoretically, index based multi-asset investment vehicles may have the potential to reduce the cost of constructing multi-asset solutions (e.g., management fees, advisor fees). Many empirical studies have investigated whether mutual fund managers or institutional investors have asset allocation / market timing skills. The results are mixed but overall suggest that only a minority of managers possess significant asset allocation / market timing skills. Nevertheless, it remains one of the significant challenges that investors essentially need to be comfortable with delegating the asset allocation tasks traditionally handled by asset allocators and financial advisors alike to index based multi-asset vehicles.

Our research indicates that, beyond the well-established asset class beta and systematic risk premia, there is potentially value in passive multi-asset index solutions. The field will attract further research and it is likely to be an area of future product development and innovations in the index investment industry.

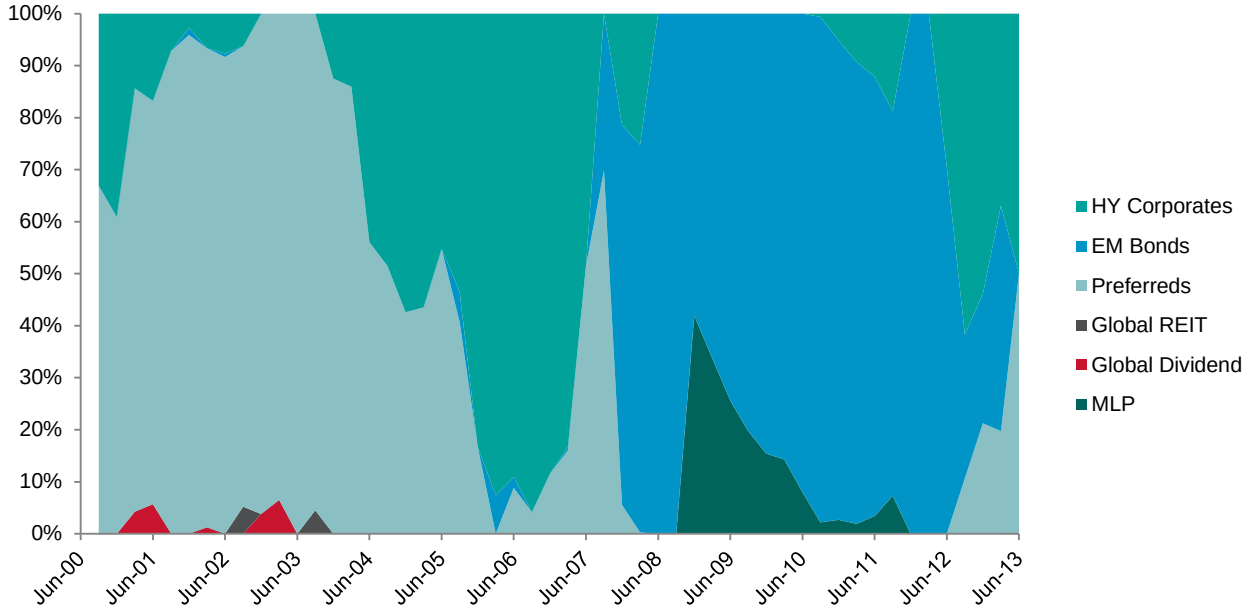
Appendix

Exhibit 11: Historical Asset Class Exposure of the Simulated Minimum Variance Strategy (Section 2.1)



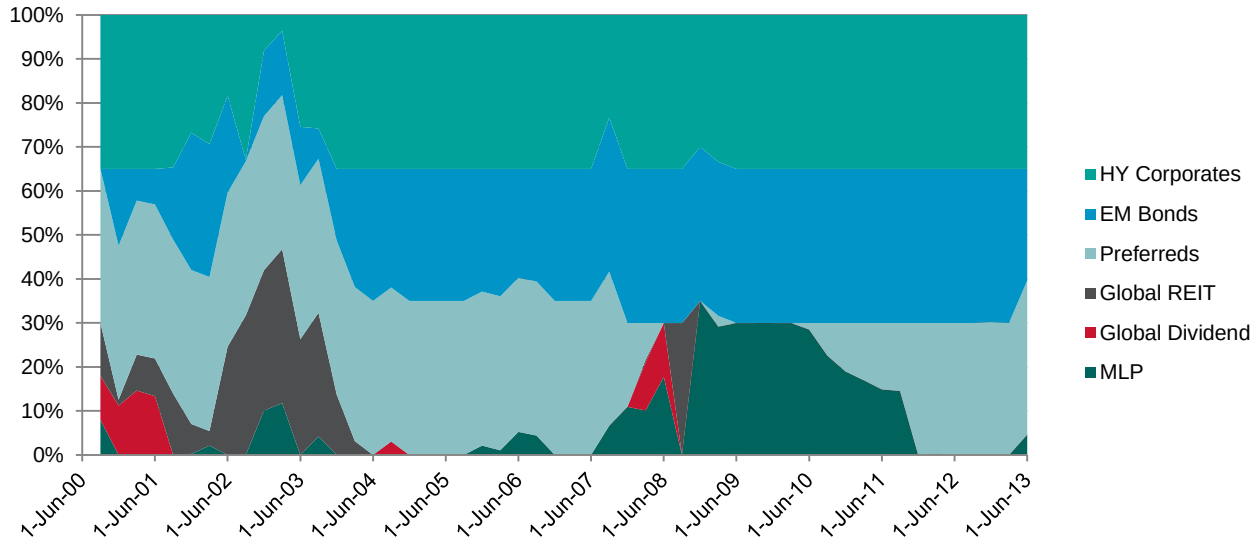
Source: S&P Dow Jones Indices. Charts are provided for illustrative purposes. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used to create these hypothetical portfolios. Additionally, this chart may reflect hypothetical historical data (back-testing).

Exhibit 12: Historical Asset Class Exposure of the Simulated Multi Asset Income Minimum Variance Strategy (Unconstrained)



Source: S&P Dow Jones Indices. Data from June 30, 2001 – June 30, 2013. Charts are provided for illustrative purposes. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used to create these hypothetical portfolios. Additionally, this chart may reflect hypothetical historical data (back-testing).

Exhibit 13: Historical Asset Class Exposure of the Simulated Multi Asset Income Minimum Variance Strategy (Constrained, 35% Capped)



Source: S&P Dow Jones Indices. Data from June 30, 2001 – June 30, 2013. Charts are provided for illustrative purposes. Please see the Performance Disclosure at the end of this document for more information on the asset classes and the indices that were used to create these hypothetical portfolios. Additionally, this chart may reflect hypothetical historical data (back-testing).

References

Ang, Andrew, William N. Goetzmann, and Stephen M. Schaefer. 2009. “Evaluation of Active Management of the Norwegian Government Pension Fund – Global"

AllianceBernstein. 2011. “Enhancing US Target-Date Funds: Addressing Inflation Risk.” AllianceBernstein Whitepaper.

Banerjee, Alka and Vinit Srivastava. 2012. “Limiting Risk Exposure with S&P Risk Control Indices.” S&P Dow Jones Indices Research Paper.

Bhansali, Vineer. "Beyond Risk Parity." The Journal of Investing, Vol.20, No.1 (2011), pp. 137-147

Bhansali, Vineer, John Davis, Graham Rennison, Jason Hsu and Feifei Li. “The Risk in Risk Parity: A Factor-Based Analysis of Asset-Based Risk Parity”. The Journal of Investing. (2012)

Murphy, Phil and Peter Tsui. 2011. “Target Date Benchmarking: The Value of a Consensus Glide Path”. S&P Dow Jones Indices Research Paper.

Rennison, Graham, Arne D. Staal, Kartik Ghia, Anthony Lazanas. “Barclays Capital Risk Premia Family”. Barclays Capital Systematic Strategies.

About S&P Dow Jones Indices

S&P Dow Jones Indices LLC, a part of McGraw Hill Financial, is the world's largest, global resource for index-based concepts, data and research. Home to iconic financial market indicators, such as the S&P 500® and the Dow Jones Industrial Average™, S&P Dow Jones Indices LLC has over 115 years of experience constructing innovative and transparent solutions that fulfill the needs of investors. More assets are invested in products based upon our indices than any other provider in the world. With over 830,000 indices covering a wide range of asset classes across the globe, S&P Dow Jones Indices LLC defines the way investors measure and trade the markets.

For more articles on a broad range of index-related topics or to sign up to receive periodic updates, visit us at **www.spdji.com**.

Performance Disclosure

The various portfolios discussed within this paper are hypothetical and based on different asset classes which were represented by the different indices.

In the Risk Parity case study, the traditional 60/40 portfolio is represented by 60% S&P 500 Index / 40% Barclays US Aggregate Bond Index. U.S. Equities are represented by the S&P 500 Index; Emerging Markets Equities are represented by the MSCI Emerging Markets Index; Long-term Treasuries are represented by the Barclays US Long Treasury Index; High Yield Bonds are represented by the Barclays US Corporate High Yield Index; Commodities are represented by the S&P GSCI, and REITs are represented by the Dow Jones US Select REITs Index.

In the Income Solutions case study, Global Treasuries are represented by the Barclays Global Treasury Index; Global Corporate Bonds are represented by the Barclays Global Corporate Bonds Index; Global High-Yield Bonds are represented by the Barclays Global High Yield Bond Index; US Dividend Equities are represented by the S&P High Yield Dividend Aristocrats Index; Global Dividend Equities are represented by the Dow Jones Global Select Dividend Index; Emerging Market Dividend Equities as represented by the S&P Emerging Market Dividend Opportunities Index; Preferred Stocks are represented by the S&P US Preferred Stock Index; US Senior Loans are represented by the S&P/LSTA U.S. Leveraged Loan 100 Index; Emerging Market Bonds are represented by the JPMorgan EMBI Index; MLPs are represented by the S&P MLP Index; Global REITs are represented by the S&P Global REITs Index; US High Yield Corporates are represented by the Barclays US High Yield Corporate Bond Index.

In the Inflation Protection case study, Commodities, Natural Resources Stocks, REITs, Gold, and TIPS are respectively represented by the S&P GSCI, S&P North America Natural Resources Sector Index, Dow Jones US Select REITs Index, gold bullion price, and Barclays US TIPS Index.

The S&P GSCI was launched on May 1, 1991. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

The S&P High Yield Dividend Aristocrats Index was launched on November 9, 2005. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

The S&P Emerging Market Dividend Opportunities Index was launched on December 2, 2009. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

The S&P US Preferred Stock Index was launched on September 15, 2006. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

The S&P/LSTA U.S. Leveraged Loan 100 Index was launched on October 20, 2008. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

The S&P MLP Index was launched on September 6, 2007. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

Dow Jones US Select REITs was launched on Dec. 31, 1998. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

The Dow Jones Global Select Dividend Index was launched on Oct. 17, 2007. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

The S&P Global REITs Index was launched on Jan. 1, 2007. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

The S&P North America Natural Resources Sector Index was launched on Feb. 1, 2007. All information provided prior to the Launch Date are back-tested. Back-tested performance is not actual performance, but is hypothetical. The back-tested calculations are based on the same methodology that was in effect on the Launch Date. Complete index methodology details are available at www.spindices.com.

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 Web site or its datafeed to external parties. For Dow Jones-branded indices introduced prior to July 31, 2013, the Launch Date (which prior to July 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 Index methodology, available at www.spdji.com or www.spindices.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 generally 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 (or 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.

Additionally, it is not possible to invest directly in an index. The Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices maintains the Index and calculates the Index levels and performance shown or discussed, but does not manage actual assets. Index returns do not reflect the payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. For example, if an index returned 10% on a US $100,000 investment for a 12-month period (or US $10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US $1,650), the net return would be 8.35% (or US $8,350) for the year. Over a three-year period, the annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US $5,375, and a cumulative net return of 27.2% (or US $27,200).

Disclaimer