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Practical Considerations for Factor-Based Asset Allocation

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Much has been written about the shortcomings of the traditional approach to asset allocation. Traditional asset allocation policies can typically be characterized by relatively static asset allocation and by diversification across asset class building blocks. As asset class returns are largely driven by common risk factors such as growth and inflation, traditional balanced portfolios can be poorly diversified, with a pro-cyclical growth bias that may lead to significant drawdowns and losses in the event of market turmoil. Against this backdrop, there has been an emerging shift, especially among institutional investors, toward more dynamic asset allocation, hinged on diversification across risk factors.

This being said, most investment portfolios are still constructed on the basis of direct asset class exposure and, as yet, it may not be feasible for investors to apply a factor-based asset allocation framework to implement their policy-level decisions. For this reason, more practical solutions are needed in order to allow investors to potentially incorporate risk factors in the portfolio construction process while accommodating their constraints and existing investment processes.

Exactly how risk factors should be included in the portfolio construction process is still a nascent area of research and is fiercely debated among practitioners. While there are numerous research papers that explore this topic, they tend to be theoretical, and it is for this reason that this paper has a stronger focus on the practical aspects of implementation. Rather than provide definitive answers here, we aim to share our reflections on this topic, following feedback from practitioners and discussions that took place in client roundtable events S&P Dow Jones Indices organized to promote dialogue with industry experts.

In this paper, we review three approaches of risk-factor-based portfolio construction and, using stylized case studies, discuss the investment rationale of the approach and remark on the issues that should be given consideration. First, this paper analyzes the use of risk parity on the asset class level as an approach to potentially reduce the concentration of equity risks in a traditional, balanced portfolio. Next, we examine how returns may potentially be enhanced or how risk may potentially be reduced by adopting alternate beta strategies—that is, strategies designed to capture both beta exposure from individual asset classes and systematic factors (such as value). Following that, we assess the feasibility of using risk premia portfolios, which involves taking long-short positions, to target systematic factors—a strategy used by some investors as a low-cost alternative to other absolute return strategies. Finally, we summarize our reflections on the trends in this area.

Asset Class-Based Risk Parity Strategy

The old adage that “diversification is the only free lunch in investing” could not be truer. This was exhibited clearly during the financial crisis. Many commentators feel that diversification failed during the financial crisis, as investment portfolios that were considered balanced turned out not to be. This is because conventional diversification approaches rely on spreading capital across several asset classes to achieve

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diversification, without due regard to the composition of the underlying risks,and to the fact that equities, typically being much more volatile than fixed income, tend to dominate and contribute more to overall risk.

To address this high concentration of risk, some practitioners have suggested applying risk parity strategies to asset classes, using either a passive or active approach. Active approaches generally require superior active rebalancing of the portfolio's exposure to key risk factors, such as economic growth and inflation, in order to achieve consistent performance across a variety of economic environments. Passive approaches, in contrast, can be implemented by allocating an equal risk budget to each of the asset classes.

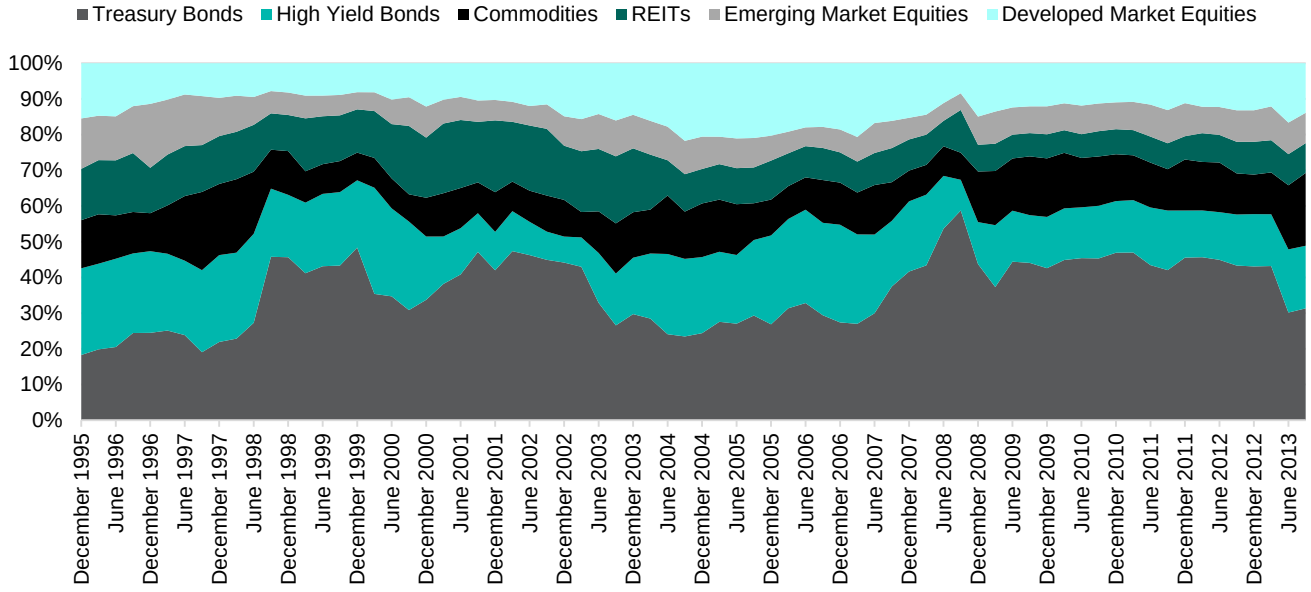
Case Study

To begin, we constructed a risk parity portfolio based on six asset classes (as proxies for some key risk factors) that included U.S. equities, emerging market equities, treasury bonds, high-yield bonds, commodities and real estate. As an illustration, we opted for a naïve approach using backward-looking measures of volatility and correlations because the information could be easily obtained, and also because some of the popular strategies in the marketplace make use of historical data.

Exhibit 1 shows the asset class exposure of this strategy over time. As volatilities and correlations changed, the strategy adjusted its exposure to the different asset classes in question every quarter, in order to balance their respective risk contributions. For example, when volatilities and correlations of risky assets spiked up in 2008, the strategy greatly increased its allocation to treasury bonds, but this trend has since been reversed.

At first sight, the naïve risk parity strategy worked well historically, especially vis-à-vis other risk-based strategies such as equal-weight, volatility-weight and minimum-variance strategies (see Exhibit 2). Over the last 18 years, it delivered higher returns and lower volatility than a hypothetical balanced portfolio, which is made up of 50% equities, 40% fixed income and 10% commodities. Similarly, its maximum drawdown was more modest (17.8%), perhaps implying its potential as a defensive strategy.

Exhibit 1: Historical Asset Class Exposure of a Naïve, Backward-Looking Risk Parity Strategy



Source: S&P Dow Jones Indices LLC. Data from December 1995 to December 2013. The hypothetical portfolio is made up of the Barclays US Long Treasury Index, the Barclays US Corporate High Yield Index, the S&P GSCI Total Return, the Dow Jones US Select REIT index, the MSCI Emerging Markets Index and the S&P 500, and is rebalanced on a quarterly basis. Charts are provided for illustrative purposes. Past performance is no guarantee of futures results. This chart may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information on the asset classes and the indices that were used to create this hypothetical portfolio, as well as for more information regarding the inherent limitations associated with back-tested performance.

Exhibit 2: Historical Performance of Naive Risk Parity Strategy

Metric	50% Equities/40% Fixed Income/10% Commodities	Equal-Weight Strategy	Volatility-Weight Strategy	Equal-Risk-Contribution Strategy	Minimum-Variance Strategy
Total Return (%)	7.2	8.8	9.1	9.0	8.0
Volatility (%)	8.8	11.5	9.2	7.9	7.1
Sharpe Ratio	0.51	0.54	0.70	0.80	0.75
Max. Drawdown (%)	-32.4	-40.7	-28.7	-17.8	-12.5

Source: S&P Dow Jones Indices LLC. Data from December 1995 to December 2013. Charts are provided for illustrative purposes. All the hyothetical investment portfolios above are represented by the Barclays US Long Treasury Index, the Barclays US Corporate High Yield Index, the S&P GSCI Total Return, the Dow Jones US Select REIT index, the MSCI Emerging Markets Index and the S&P 500, and are rebalanced on a quarterly basis. Past performance is no guarantee of future results. This chart may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information on the asset classes and the indices that were used to create this hypothetical portfolio, as well as for more information regarding the inherent limitations associated with back-tested performance.

Implementation Issues to Consider

While the concept of a risk parity strategy is simple, there are practical challenges associated with its implementation. In particular, most institutional investors may find it impractical to implement risk parity on the overall policy level based on asset class building blocks.

- **Misalignment between asset classes and risk factors:** Asset classes are typically poor proxies for true risk factors such as growth and inflation. Thus, risk parity portfolios constructed using asset class building blocks may not achieve true risk parity in terms of underlying risk factors. Many risky assets are exposed to a similar set of common macroeconomic factors, and it is essential to understand what exposure each asset class contributes before including it in the investment portfolio. Once selected, it is equally important to examine the resultant exposure of the portfolio and ascertain whether it meets investment objectives. Clearly, portfolios in which most assets have similar biases are unlikely to reap diversification benefits, especially in crises when return correlations tend to move in tandem.

- **The underlying assumptions and risks:** The design of risk parity strategies is such that assets which contribute lower risk are favored at the expense of those contributing higher risk. This means that, when applied across asset classes where there is a large dispersion of volatility, such strategies will be biased toward the assets with the lowest structural volatility, and this explains why there is a strong tilt toward fixed income in a portfolio with allocations to both equities and fixed income. This may be undesirable for some investors, as it increases the duration risk of the portfolio. It is also worth noting that, due to the overweight or leveraged position in fixed income, the historical performance of many risk parity strategies has been boosted by over two decades of a bond bull market, driven by ever-declining interest rates. However, in a record low interest rate environment, the potential for increasing interest rates may have a negative impact on the performance of these strategies, as witnessed in the first half of 2013.

  In addition, inherent in these strategies is the assumption that investors have no strong view about expected returns. While this assumption may be more reasonable within an efficient asset class, it may not apply as well across asset classes. For this reason, investors with strong views on asset class returns may not be convinced by the perceived sole focus on risk when looking at risk parity strategies.

- **Use of leverage may be unviable:** Typically, risk parity strategies make use of leverage to increase the allocation to fixed income. When these strategies are implemented, it may be impractical for some institutional investors to employ leverage on the overall policy level. We found that allocations to such multi-asset strategies are often made as part of investors' alternative investments bucket.

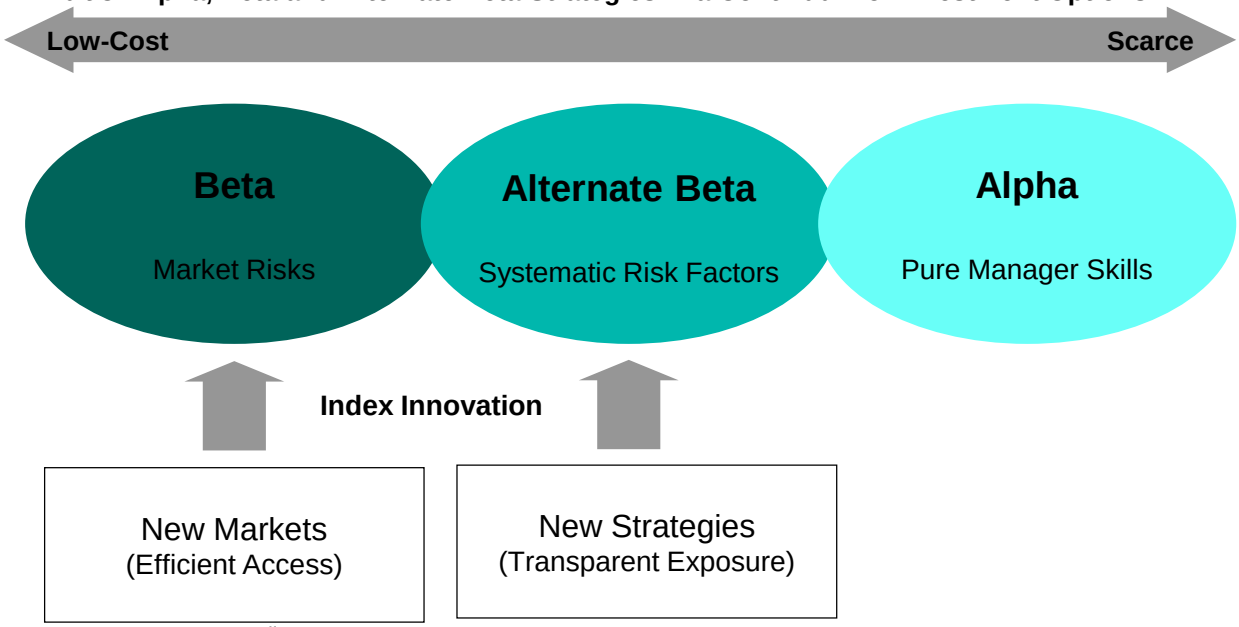
Alternate Beta as Portfolio Building Blocks

Historically, market capitalization index strategies had been used as an efficient means to capture market beta, while active managers had been used to generate alpha. In recent years, however, the boundary between alpha and beta has become much more blurred. Rather than viewing their investment strategy options as belonging to one category or another, investors are considering a continuum of options, from traditional market capitalization weighted strategies on one end to actively managed strategies on the other, with a blend of the two in between.

This partly stems from the recognition that systematic risk factors historically have accounted for the majority of long-term portfolio returns and that a significant portion of the alpha delivered by active managers can be attributed to a handful of risk factors. It is for this reason that there is much interest in so-called "alternate beta" or "smart beta," which is imposing itself as a credible choice that stands between alpha and beta (see Exhibit 3).

This trend is clearly manifested in the recent survey compiled by State Street Global Advisors,[1] in which 42% of the 300 institutional investors surveyed made clear their commitment to allocate part of their portfolios to alternate beta, while a further 24% stated their interest in doing so in the near-term.

Exhibit 3: Alpha, Beta and Alternate Beta Strategies in a Continuum of Investment Options



Source: S&P Dow Jones Indices LLC.

There are many reasons that alternate beta strategies have grown in popularity. One reason is that some investors perceive market capitalization weighted indices as inefficient and feel the way they are constructed conflicts with their investment philosophy. More recent surveys, however, have implied that the more important driver comes from investors who seem to be displeased with the performance and costs of their active managers. These investors have tended to opt for a more economical alternative in an effort to achieve higher risk-adjusted performance without turning to active managers.

Demystifying Alternate Beta Strategies

The surge in interest in alternate beta strategies has also been accompanied by a proliferation of these indices in almost all major asset classes, encompassing equities, fixed income and commodities. In equities and commodities, alternate beta strategies ordinarily capture systematic risks. In equities, these systematic risks include small capitalization, value, low volatility, momentum and quality. Meanwhile, in commodities, the risks include curve, value and momentum. By contrast, the development of fixed income alternate beta strategies is still in its infancy, and developments have so far centered on fundamental-based indices that overweight sovereign issuers with better fiscal strength and corporate issuers with lower credit risk, as opposed to traditional capitalization weighted bond indices, which accord the highest weights to the most indebted issuers.

Broadly speaking, most alternate beta strategies aim to achieve enhanced return or reduced risk (or both) and, in general, the strategy investors select is dependent on their investment objectives. Exhibit 4 classifies well-known alternate beta equity strategies into risk-driven and return-driven categories. On one hand, return-driven strategies typically aim to enhance returns through titling to specific fundamental factors, while risk-driven strategies focus on reducing risk. Looking at risk-driven strategies, low volatility and minimum variance strategies reduce portfolio volatility as they hold lower-beta stocks. However, such portfolios can sometimes be concentrated and incur higher idiosyncratic risks than the overall market. In comparison, strategies such as equal

[1] Please refer to "Advanced Beta Comes of Age," 2014.

weight, equal risk contribution and maximum diversification may lower stock-specific risks and potentially achieve better diversification.

Exhibit 4: Examples of Alternate Equity Beta Strategies

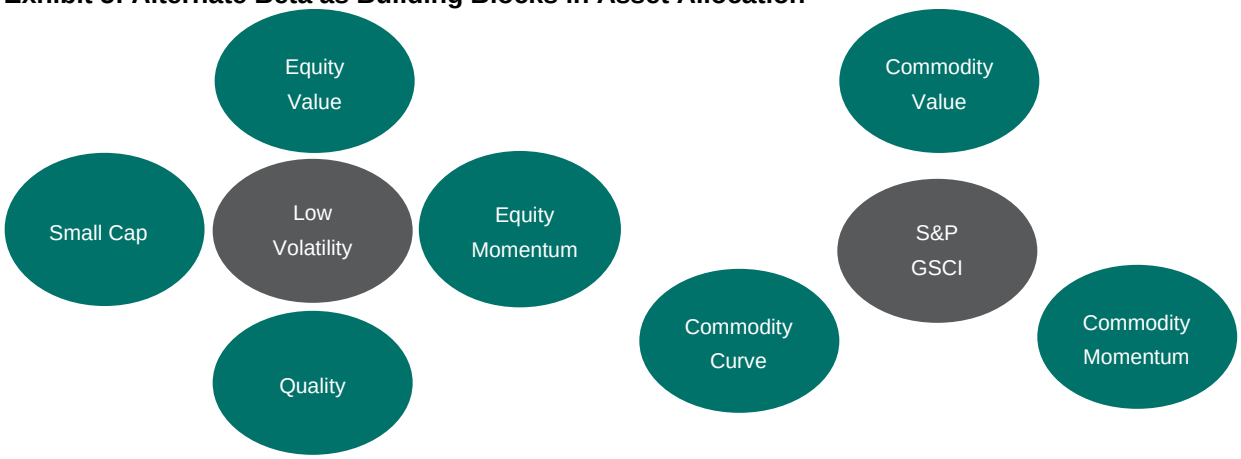
Strategy Motivation	Strategies					Desired Outcome
Risk Driven	Low Volatility	Minimum Variance	Maximum Diversification	Equal Risk Contribution	Equal Weight	Volatility Reduction Diversification
Return Driven	Fundamental Index	Intrinsic Value Index	High Dividend Yield	Momentum Index	Quality Index	Enhanced Return Income Factor Exposures

Source: S&P Dow Jones Indices LLC.

Case Study

To demonstrate the potential benefits of using alternate beta strategies as building blocks in portfolios, we constructed a hypothetical portfolio with a 40% allocation in low volatility equities with the aim of reducing risk, and 60% in small cap, value, momentum and quality indices in order to enhance return. Similarly, we created an alternate commodity beta portfolio with 40% weight in the S&P GSCI Risk Weight, which is an index based on equal risk contribution from five commodity sectors, and 60% weight in commodity curve, value and momentum. All the building blocks here are represented by long-only equity and commodity indices.

Exhibit 5: Alternate Beta as Building Blocks in Asset Allocation



Source: S&P Dow Jones Indices LLC.

Exhibit 6: Alternate Beta as Building Blocks in Asset Allocation

Metric	Equity Beta	Alternate Equity Beta	Commodity Beta	Alternate Commodity Beta	50% Equity Beta/40% Fixed Income Beta/10% Commodities Beta	50% Alt Equity/40% Alt Fixed Income/ 10% Alt Commodities
Total Return (%)	8.1	11.3	3.4	8.5	7.2	9.0
Volatility (%)	15.8	13.2	22.7	14.0	8.8	7.4
Sharpe Ratio (%)	0.35	0.65	0.03	0.41	0.51	0.8
Max. Drawdown (%)	-50.9	-43.4	-67.6	-46.0	-32.4	-25.1

Source: S&P Dow Jones Indices LLC. Data from December 1995 to December 2013. Charts are provided for illustrative purposes. The Equity Beta Portfolio is represented by the Barclays US Long Treasury Index, the Barclays US corporate High Yield Index, the S&P GSCI Total Return Index, the Dow Jones US Select REIT index, the MSCI Emerging Markets Index and the S&P 500. The Alternate Equity Beta Portfolio is represented by the S&P 500 Low Volatility Index, the S&P SmallCap 600, the RAFI US 1000 Index, a momentum strategy based on the S&P 500 and a quality strategy based on the S&P 500. The Commodity Beta Portfolio is represented by the S&P GSCI Total Return. The Alternate Commodity Beta Portfolio is based on the S&P GSCI Risk Weight, the S&P GSCI Dynamic Roll Total Return, a value strategy based on the S&P GSCI and the Barclays Commodity Trend Index, The Fixed Income Beta portfolio is represented by the Barclays US Long Treasury Index. Past performance is no guarantee of future results. These charts and graphs may reflect hypothetical historical performance. Please see the Performance Disclosures at the end of this document for more information on the asset classes and the indices that were used to create this hypothetical portfolio, as well as for more information regarding the inherent limitations associated with back-tested performance.

The findings in Exhibit 6 show that, on average, the alternate equity beta portfolio enhanced return by about 3.2% p.a. and reduced volatility by 2.6% p.a. over the last 18 years. The alternate commodity beta portfolio performed even better with a more significant return uplift and volatility decrease over traditional commodity beta. Overall, the blended portfolio delivered a higher Sharpe ratio than traditional passive portfolios.

We concede that this example may be somewhat simplistic in the way the factors are combined, and the objective here is simply to highlight the potential benefits of the approach. Through discussions with industry professionals, we understand that investors are taking a close look at using these building blocks in active management; for example, they may look at how these factors can be best blended if there is a tactical view concerning which factor is likely to perform well in the medium term.

Implementation Issues to Consider

Overall the development of alternate beta strategies provides additional options as it expands the repertoire of possibilities with which investors can construct their portfolios. This is especially true in North America and Europe, where a diversity of investment styles and strategies can be accessed through ETFs, funds, swaps and segregated mandates in a transparent and inexpensive way.

For institutional investors, the process of investing in alternate beta invariably starts by setting their investment objectives, selecting the target factors, selecting the index strategies and managers to carry out the implementation, and then constructing the portfolio as well as measuring and monitoring performance on an ongoing basis (see Exhibit 7). In each key stage of decision making and implementation there are many issues and challenges that merit consideration for investors wishing to adopt such strategies.

Exhibit 7: Adopting Alternate Beta—Key Stages of Decision Making and Implementation

Source: S&P Dow Jones Indices LLC.

- **Investment objective and beliefs:** The adoption of alternate beta strategies is often related to the investment philosophy of an organization. For instance, consider two distinct institutional investment models: the "Yale Model" and the "Norwegian Model." The Yale Model adopts an endowment model of investing and is particularly well known for making substantial allocations to alternative asset classes such as private equity, real estate and hedge funds. This stems from the viewpoint that active management is effective in generating returns in these less-efficient asset classes. By contrast, the Norwegian Model takes quite a divergent view and hinges on the belief that long-term risk premia can be harvested to achieve long-term returns. Investors who subscribe to this model are often fervent adopters of alternate beta strategies.

  Investment philosophy aside, other investors may decide to adopt alternate beta strategies because of their investment objectives and constraints. For example, these strategies may be appropriate for institutions that aim to better utilize their risk budget, achieve risk diversification or reduce overall portfolio risk. Similarly, investors with a greater risk appetite may wish to employ these strategies as a means to potentially generate higher returns.

  Despite the potential usefulness of these strategies in asset allocation, there are sizeable challenges for institutional investors who wish to adopt alternate beta strategies. In particular, the adoption of these strategies is often a strategic rather than a tactical decision and, as a result, doing so requires a high level of commitment from both the investment committees and the board of directors. In addition, since investing in alternate beta strategies involves taking active investment decisions via passive implementation approaches, the investment and governance process is somewhat different from the traditional active and passive management structure that is common in most institutions.

Moreover, successful implementation rests on being able to manage the risk of these strategies in house because investment decisions are effectively being transferred from active managers to the in-house team.

- **Selection of factors:** In deciding on the right mix of factors for a particular mandate, it is generally essential for institutions to assess thoroughly the role of factor investing, and it usually entails setting investment objectives (such as limiting downside risk), evaluating the internal governance structure and establishing constraints (such as maintaining an adequate funding ratio). Only on completion of this assessment would it be appropriate to assess potential candidate factors. Factors should be chosen on the basis of how they can help achieve investment objectives while remaining within the confines of constraints, such as risk appetite, ESG policies and so on. Because of the enormous disparity in the needs and constraints of different investors, factor allocations should always be tailored to each institution.

  Investors may also benefit from examining the economic and investment rationale underpinning each of the candidate factor premia and ascertain whether their returns are derived from market inefficiencies, investor behavioral biases or from a rebalancing premium that is generated from the systematic selling of winners and purchasing losers. Depending on the source of the risk premia, investors may come to a different conclusion as to whether these risk premia are likely to persist in the future.

  Once the seemingly correct blend of factors is selected, another factor that is likely to determine the success of any factor-based allocation is timing. This is not dissimilar to asset class-based investment approaches and, while timing asset classes is complicated enough, it is even more difficult to accurately time factors. This is because certain factors can undergo periods of underperformance for long periods of time. A case in point is the sustained underperformance of the value and low volatility factors during the momentum-driven technology bubble of the late 1990s. While interest in this subject abounds, it seems that most asset owners do not currently implement factor-timing strategies. This may partly explain why some investors do not include momentum strategies in their portfolio, since these strategies are more reliant on market timing than other strategies.

  Given the difficulty in timing factors, a possible way of attenuating the severity of factor cycles is through blending a variety of factor strategies, as some of them are lowly correlated and do not react to market forces in an identical way. This is why a multi-factor, solution-based approach to factor investing is gaining momentum among both investors and advocates of alternate beta strategies, but exactly how best to blend these factors in different economic regimes and factor cycles is still a burgeoning area of research.

- **Selection of strategies and managers:** Once the right blend of factors has been selected, the next stage is implementation, which involves selecting the right strategies and managers. Broadly speaking, investors can opt for passive implementation that makes use of purely rules-based strategies (such as index strategies), or semiactive implementation, which is systematic but still allows portfolio managers to have some discretion in constructing the actual portfolio.

  In view of the diversity of implementation approaches that institutions can elect, it is unsurprising that the due diligence process is often complex and time-consuming. Very often, the details can be difficult. Investors should be cognizant of the implications associated with different portfolio construction methodologies and evaluate them in the light of their exposure to risk factors.

  Of equal importance is the need to appreciate that a compromise usually has to be struck between investability and exposure. In the implementation phase, investors may opt for strategies that have a high level of exposure. While higher levels of factor exposure may often translate into higher returns, this usually comes at the expense of investability. Furthermore, as alternate beta strategies move away from their market capitalization benchmarks, there may be sector concentration or secondary factor tilts that they had not anticipated. .

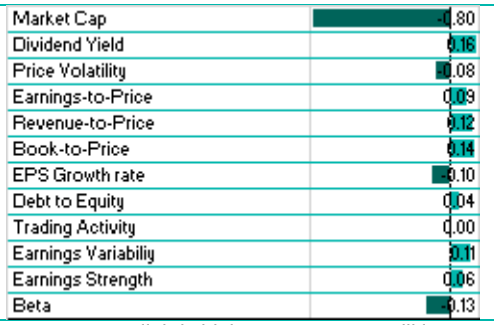
  Understanding the secondary exposures of alternate beta strategies is of critical importance. For instance, some value-based strategies may have a momentum bias during certain periods, while low volatility strategies may inadvertently be exposed to value stocks. Investors may seek to carefully analyze the resultant exposure of their portfolios on an ongoing basis and take measures so that these undesirable exposures are kept to a minimum.

To illustrate the importance of understanding the resultant exposure of investment portfolios, we created a stylized portfolio based on the S&P 500® that blended a 40% low volatility strategy with 60% equally spread across small-cap, value, momentum and quality strategies. With the help of Northfield risk models, we disaggregated the active return of the blended portfolio. The results in Exhibit 8 show that, as compared to the benchmark, the blended alternate beta portfolio has more exposure to small-cap stocks, high dividend yield and lower beta. In terms of sector exposure, it has a slight tilt toward utilities and away from technology companies. In addition, it also has a bias toward credit risk premium widening, meaning that the strategy would have historically performed well in an economy that was underperforming or growing below trend. These exposures might not have been what investors had expected at the outset, and it highlights the necessity of understanding fully the characteristics of their investments—in particular, the factor/industry tilts their portfolios have, the return of the factors/industries over time and the macroeconomic factor to which they are most exposed.

The analysis previously discussed may be extended to all asset classes and conducted on the overall portfolio level as it allows investors to evaluate the efficacy of their overall portfolios over time, with respect to their investment objectives and constraints.

Finally, it is important to understand that there is no optimal frequency at which a portfolio should be rebalanced and its choice is a trade-off between an investor's willingness to assume risk and the expected portfolio return, net of rebalancing costs. Overall, according to Jaconetti et al (2010), the risk-adjusted returns are not meaningfully different whether a portfolio is rebalanced monthly, quarterly, or annually. However, the rebalancing events and the resulting transaction costs rise significantly. In general, investors may want to place emphasis on simplicity, transparency and low implementation costs when selecting alternate beta strategies.

Exhibit 8: Active Return Decomposition of Alternate Beta Strategies

Metric	Benchmark	Stylized Portfolio
Annualized Return (%)	10.9	12.3
Annualized Risk (%)	15.6	12.9
Tracking Error (%)	NA	3.2
Active Exposures (w.r.t. Benchmark)		
Active Industry Exposure		▪ A slightly higher exposure to utilities ▪ A slightly lower exposure to technology
Active Macroeconomic Exposure		Exposure to credit premium widening

Source: S&P Dow Jones Indices LLC and Northfield U.S. Fundamental Equity Model. Figures based on monthly USD total returns between December 1994 and December 2013 of the S&P SmallCap 600, a momentum strategy applied to the S&P 500, a quality strategy applied to the S&P 500, S&P 500 Value Index. Charts and graphs are provided for illustrative purposes. Past performance is no guarantee of future results. These charts and graphs may reflect 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.

- **Portfolio construction:** Implementation costs are key considerations in the portfolio construction stage, and they can vary significantly from investor to investor, as they are dependent on the size of the investment in question and how the strategy is being executed. In general, beyond custody fees, managers' fees and potential index license fees, two types of transaction costs—both direct and indirect—need to be considered. The direct costs may include commissions, duties and taxes, while the indirect costs may include bid/ask spread, market impact and the opportunity cost of trading. Most investors use implementation shortfall to measure the total transaction costs and take into account both direct and indirect costs.

For larger funds, while the direct costs (especially commissions)[2] are not immaterial, they pale in significance when compared with the indirect costs, such as market impact costs that traders can incur as a result of slippage arising from insufficient investment capacity. Unfortunately, these costs are difficult to estimate and are likely to change from month to month. We understand that some market participants have studied these costs to see if they can be estimated in advance, but they have concluded that this is difficult, as the market impact costs of one period are not related to those of another. This may suggest why larger investors in alternate beta strategies tend to prefer weighting schemes that retain some kind of link to the market capitalization of the individual stocks. In general, there is a trade-off between investment capacity and the degree of factor exposure. A weighting scheme that is designed to get as much exposure as possible to a certain factor is unlikely to have a high investment capacity. Precisely what weighting scheme investors should choose should depend on the purpose of the allocation; a tactical allocation involving a small amount of money may call for a different weighting scheme than a strategic/core allocation.

Due to the significance of transaction costs, investors may wish to pay particular attention to the turnover of alternate beta strategies. Simply put, an index-tracking portfolio is likely to incur high transaction costs[3] if its constituents change frequently. Indeed, the annual one-way turnover of a portfolio can be 5 to 10 times higher than its market-cap-weighted counterpart, and this can significantly affect the cost of replicating the index strategies. In a multi-factor portfolio, some of these costs can be reduced through the internal crossing of trades; that is, where some of the buy and sell orders for factor strategies offset each other. In this way, total execution costs may be reduced. To benefit from cost savings associated with internal crossing, it would be necessary to either structure the different investments as one single mandate or synchronize the rebalancing dates of the different strategies.

As the adoption of alternate beta strategies continues to gather momentum, questions are being asked about whether the investment capacity of some strategies may be negatively affected in the future. Some commentators find such a situation to be improbable because alternate beta strategies represent a relatively small portion of the assets under management in the industry. Indeed, Blackrock estimates that assets under management of U.S. alternate-beta ETFs were approximately USD 175 billion.

- **Performance measurement and monitoring:** Ongoing performance monitoring is indispensable in ensuring that the alternate beta strategies chosen meet investor expectations and objectives and, as noted previously, this would involve examining the portfolio's overall factor exposure, sector biases and whether it has any secondary exposures to macroeconomic factors.

Risk Premia as Portfolio Building Blocks

Over the coming years, the adoption of alternate beta strategies should continue to gather pace. In conjunction with this momentum, there also seems to be growing interest in investing in risk premia directly. The difference between alternate beta and risk premia strategies mainly has to do with the exposure to market beta. Essentially, alternate beta are long-only strategies that have both market and factor exposures, but the risk of portfolios based on these strategies still seems to be dominated primarily by market beta. In contrast, the risk premia strategies that we refer to in this paper are long-short strategies that aim to separate the systematic risk factors from overall market risk. According to Bender et al (2010), correlations between many risk premia have been historically low, and a portfolio of risk premia may represent a new approach to portfolio diversification.

Case Study

To demonstrate this, we constructed a portfolio consisting of 10 liquid risk premia by taking long positions on different alternate beta strategies and offsetting them against their corresponding benchmark in order to attempt to isolate the factor as much as possible. Obviously, a long-short portfolio constructed in this manner does not capture beta-neutral[4] exposures, but it could be easier and cheaper to implement. For equities, we took long positions on the small-cap, low volatility, value, momentum and quality indices and, simultaneously, took a short

[2] In the U.S., the average commission incurred was estimated to be 5.5 bps for large-cap stocks and 16.5 bps for small-cap stocks. This is very similar to Europe, where the average commission was roughly 9.4 bps for large-cap stocks and 11.7 bps for small-cap stocks. (Global Cost Review Q3/2013, ITG Peer Analysis).

[3] The direct replication cost depends on the market and strategies in question, and can vary between 10 bps and 50 bps each way.

[4] For the purpose of this discussion, we have opted not to discuss constructing portfolios targeting "pure factors" through the use of optimization techniques because, while investors get a high exposure to the factors, there is unlikely to be enough capacity for any sizeable investments.

position on the benchmark. Similarly, for commodities, we took long positions on three risk premia—curve, value and momentum—through long-short commodity indices. Finally, for fixed income, we proxied the credit risk premium by going long on U.S. corporate high yield bonds and short on the U.S. Treasury bills, and we proxied the term premium by taking a long position in long-duration U.S. Treasury bonds and a short position in U.S. Treasury bills. We selected these particular risk premia as they are well understood and relatively easy to implement.

Exhibit 9: Historical Performance of Selected Risk Premia

Asset Class	Risk Premium	Annual Premium (%)	Volatility (%)	Information Ratio	Max Drawdown (%)
Equities	Small Cap	2.7	11.2	0.24	-42.4
	Low Volatility	1.5	11.0	0.14	-44.8
	Value	2.6	5.7	0.46	-18.4
	Momentum	4.1	9.2	0.45	-23.9
	Quality	4.1	5.5	0.75	-14.5
Commodities	Curve	8.4	7.9	1.06	-18.3
	Value	6.9	12.6	0.55	-29.3
	Momentum	9.0	10.7	0.84	-16.8
Fixed Income	Credit Premium	2.2	11.1	0.20	-43.8
	Term Premium	2.6	11.2	0.24	-22.4

Source: S&P Dow Jones Indices LLC, Barclays. Data from December 1995 to December 2013. The Small Cap Premium is based on a long position in the S&P SmallCap 600 and a short position in the S&P 500, the Low Volatility Premium is based on a long position in the S&P 500 Low Volatility Index and a short position in the S&P 500, the Value Risk Premium is based on a long position in the FTSE RAFI US 1000 Index and a short position in the FTSE USA All Cap Index, the Momentum Risk Premium is based on taking a long position in a momentum strategy based on the S&P 500 and a short position on the S&P 500. The Quality Risk Premium is based on taking a long position in a quality strategy based on the S&P 500 and a short position on the S&P 500. The Commodities Curve Premium is based on taking a long position in the S&P GSCI Dynamic Roll and a short position on the S&P GSCI Total Return. The Commodities Value Premium is based on taking a long position in a value strategy on the S&P GSCI and a short position on the S&P GSCI. The Commodities Momentum Risk Premium is based on taking a long position in the Barclays Commodities Trend Index Total Return and a short position in the S&P GSCI Total Return. The Credit Premium is based on taking a long position in the Barclays US Corporate High Yield Bond Index and a short position in the Barclays US Treasury 1-3 Years Index and the Term Premium is based on a long position in the Barclays US Treasury 20+ Years Index and a short position in the Barclays US Treasury 1-3 Years Index. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Results in Exhibit 9 indicate that, on average, although these risk premia yielded substantial returns historically, their volatilities and maximum drawdown were also remarkably high and they were susceptible to long periods of underperformance. As an example, the maximum drawdowns of the small-cap and low volatility factors were as high as 42.4% and 44.8%, respectively, during the examined period.

On a more positive note, the correlation between risk premia tended to be low historically, as shown in Exhibit 10, and the average pairwise correlation between risk premia was almost zero. More noteworthy still was that it stayed low even during the financial crisis. This is in stark contrast with the average pairwise correlation between asset classes, which was about 0.25 for the whole period, but increased to 0.35 during the financial crisis.

Exhibit 10: Historical Correlation of Selected Risk Premia

	Pairwise Correlation Between Risk Premia	Pairwise Correlation Between Asset Classes
Whole Period	0.02	0.25
June 2007-June 2012	-0.01	0.36
Worst S&P 500 Monthly Losses	0.01	-

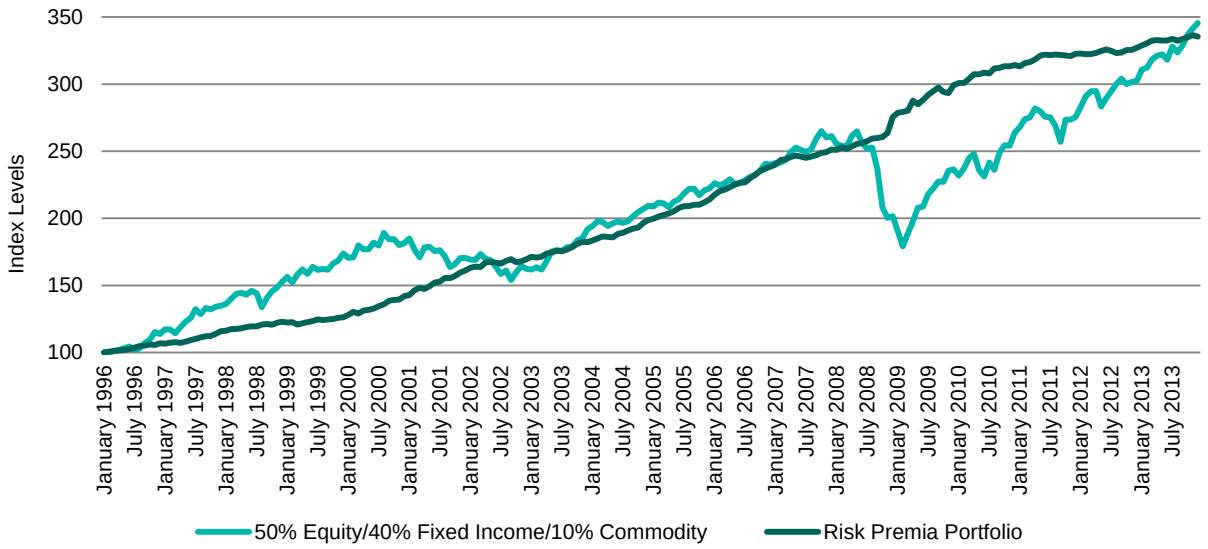
Source: S&P Dow Jones Indices LLC, Barclays. Data from December 1995 to December 2013. Charts are provided for illustrative purposes. Past performance is no guarantee of future results.

It follows from the previous discussion that the concept of a risk premia portfolio is about diversifying low-correlated risk factors. To illustrate this, we put together a hypothetical portfolio consisting of these 10 liquid risk premia based on a risk parity methodology and compared it with a traditional balanced portfolio comprising 50% equities, 40% fixed income and 10% commodities. Findings in Exhibit 12 show that the volatility of the risk premia

portfolio was relatively low during the entire period, with a maximum drawdown of 2.9%. This compares favorably with the balanced portfolio, which was 3.5 times more volatile and had a drawdown of over 32%. If the volatility of the risk premia portfolio were to be scaled to the same level as that of the balanced portfolio, the leveraged risk premia portfolio would have achieved a much higher excess return (15.1% p.a. vs. 4.5% p.a.).

Apart from the return the portfolio generated (see Exhibit 11), it is equally interesting to note that the correlation of the risk premia portfolio with equities was -0.1 over the entire period and this may be the consequence of having a low exposure to traditional market beta risks. Some institutional investors have already started making allocations in risk premia strategies as a low-cost alternative to absolute return strategies.

Exhibit 11: Historical Performance of a Hypothetical Risk Premia Portfolio Created Based on Risk Parity Weight



Source: S&P Dow Jones Indices LLC, Barclays. Data from December 1995 to December 2013. The 50% Equity/40% Fixed Income/10% Commodity Portfolio is represented by the Barclays US Long Treasury Index, the Barclays US corporate High Yield Index, the S&P GSCI Total Return, the Dow Jones US Select REIT index, the MSCI Emerging Markets Index and the S&P 500. The Risk Premia Portfolio is represented by a long position in the S&P SmallCap 600 and a short position in the S&P 500; a long position in the S&P 500 Low Volatility Index and a short position in the S&P 500; a long position on the FTSE RAFI US 1000 Index and a short position in the FTSE USA All Cap Index; a long position in a quality strategy based on the S&P 500 and a short position on the S&P 500, a long position in the S&P GSCI Dynamic Roll and a short position on the S&P GSCI Total Return; a long position in a value strategy on the S&P GSCI and a short position in the S&P GSCI, a long position in the Barclays Commodities Trend Index Total Return and a short position on the S&P GSCI Total Return Index, a long position in the Barclays US Corporate High Yield Bond Index and a short position in the Barclays US Treasury 1-3 Years Index, a long position in the Barclays US Treasury 20+ Years Index and a short position in the Barclays US Treasury 1-3 Years Index. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. These charts and graphs may reflect 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 12: Comparison of Performance and Risk Across Different Strategies

Metric	50% Equities/40% Fixed Income/10% Commodities	Multi-Asset Risk Parity Strategy	50% Alt Equity/40% Alt Fixed Income/10% Alt Commodities	Risk Premia Portfolio
Excess Return (%)	4.5	6.3	6.3	4.2
Volatility (%)	8.8	7.9	7.4	2.5
Sharpe Ratio (%)	0.51	0.80	0.85	1.71
Max Drawdown (%)	-32.4	-17.8	-25.1	-2.9

Source: S&P Dow Jones Indices, Barclays. Data from December 1995 to December 2013. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. These charts and graphs may reflect 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.

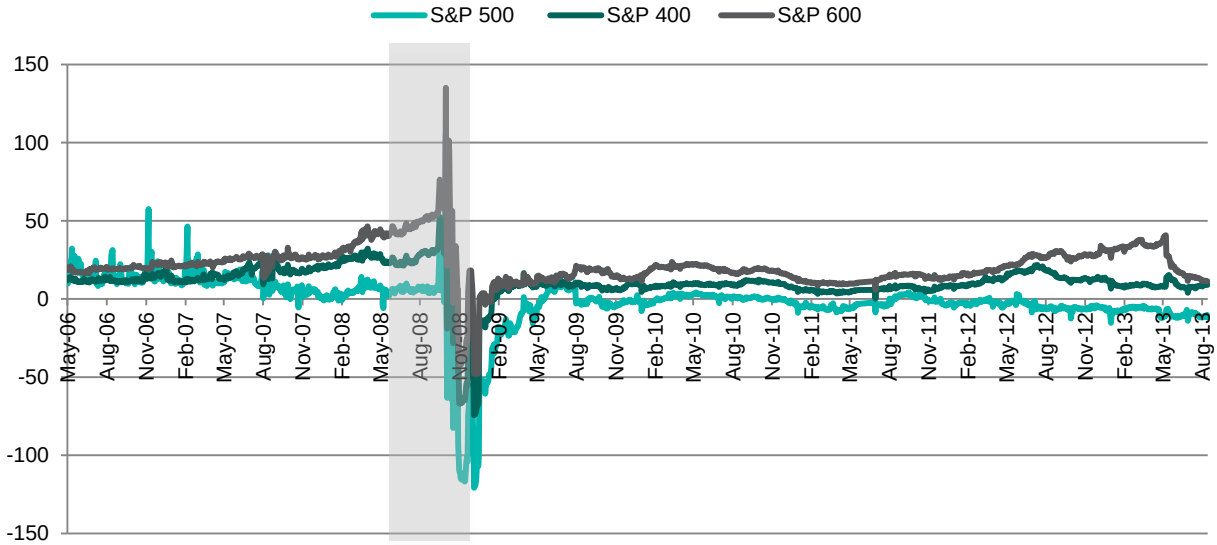
Implementation Issues to Consider

From a theoretical standpoint, the concept may seem appealing, and we have witnessed the launch of absolute return products based on combining risk premia across different asset classes. However, their performance has so far been mixed and may underscore the challenges associated with implementing such strategies in practice.

All the issues previously identified also affect the implementation of risk premia strategies. Additionally, the following matters should be taken into account.

- **Short selling:** Long-short risk premia strategies make extensive use of shorting and leverage. However, it may become prohibitive or even impossible to short securities in times of crisis, as illustrated in the lending spreads of the S&P 500, S&P MidCap 400® and S&P SmallCap 600® as shown in Exhibit 13. In general, the securities' lending spreads aim to reflect the difference between the funding rate and the average securities' lending rate for the reference equity index. They are used to approximate the true cost to borrow. Evidently, the less liquid a stock is, the higher the potential cost of borrowing has been historically. In addition, some investors in certain countries may not be permitted to use derivatives to take short positions. Without derivatives, implementing a short position may be costly and impractical.

Exhibit 13: Security Lending Spreads for the S&P 500, S&P MidCap 400 and S&P SmallCap 600



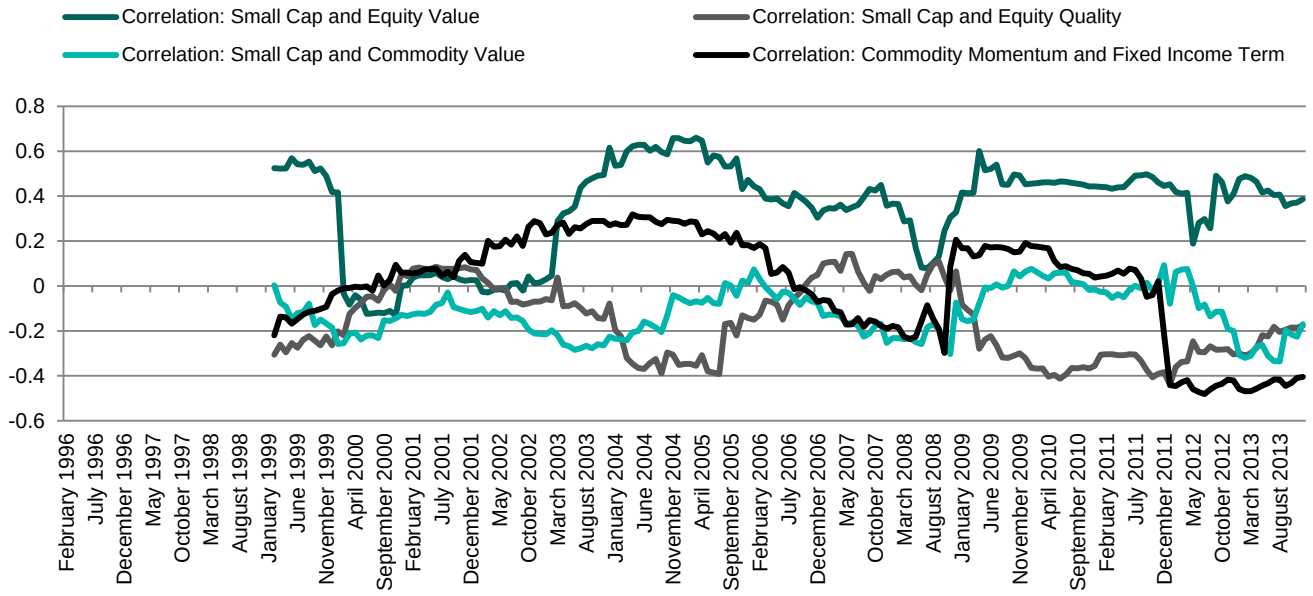
Source: S&P Dow Jones Indices LLC. Data from May 2006 to August 2013 and include the S&P 500 Security Lending Spread, the S&P 600 Security Lending Spread and the S&P 400 Security Lending Spread. Charts and graphs are provided for illustrative purposes and these indices have now been discontinued. Past performance is no guarantee of future results.

- **High transaction costs:** The extensive use of short selling and leverage, together with the need for regular rebalancing given the volatile nature of the factors, and the low capacity of some factors, may lead to high transaction costs that may erode the returns of these risk premia strategies.

- **Unstable correlations between factors:** One of the cornerstones underlying the concept of risk premia strategies is the low correlation between factors. However, factor correlation can be volatile and unstable. Exhibit 14 shows the rolling three-year correlations of four factors. The correlation between small cap and equity value ranged from -0.13 to 0.66. Also, historical return correlations may not be as meaningful in the future because relationships between the different factors change over time. For instance, if investors start to chase the same factors with large amounts of assets, the correlation between factors may change as a result.

- **Designing appropriate weighting schemes:** Some of the systematic risk premia strategies, including our case study, follow simple weighting schemes, such as equal weight, volatility weight or risk parity weight, because they are typically backward-looking and may result in overweighting underperforming factors and underweighting outperforming factors.

Exhibit 14: Three-Year Rolling Correlation of Four Different Factor Combinations



Source: S&P Dow Jones Indices LLC. Data from December 1995 to December 2013. The Small Cap Premium is based on a long position in the S&P SmallCap 600 and a short position in the S&P 500, the Value Risk Premium is based on a long position in the FTSE RAFI US 1000 Index and a short position in the FTSE USA All Cap Index, the Quality Risk Premium is based on taking a long position in a quality strategy based on the S&P 500 and a short position in the S&P 500. The Commodities Value Premium is based on taking a long position in a value strategy on the S&P GSCI and a short position on the S&P GSCI. The Commodity Momentum Premium is based on a long position in the Barclays Commodity Trend Total return Index and a short position in the S&P GSCI and the Term Premium is based on a long position in the Barclays US Treasury 20+ Years Index and a short position in the Barclays US Treasury 1-3 Years Index. Charts are provided for illustrative purposes. Past performance is no guarantee of future results. Please see the Performance Disclosures at the end of this document for more information regarding the inherent limitations associated with back-tested performance.

Conclusion

In this paper, we explored three approaches to incorporating risk factors into asset allocation and portfolio construction. The first approach involved constructing risk parity allocation based on asset classes; the second involved enhancing returns and reducing risk using alternate beta building blocks; and the third looked at constructing an "absolute return" portfolio using risk premia building blocks.

Typical institutional investors may find it unfeasible to implement an asset class-based risk parity strategy on the overall policy level, due to the misalignment between asset classes and risk factors, the underlying assumptions and risks of the strategy, the use of leverage and the requirement for very regular rebalancing, among other issues.

In contrast, alternate beta or factor-based investing is fast becoming a viable way of incorporating factors into institutional portfolios. We illustrated the potential benefits of using alternate beta strategies to enhance return or reduce risk, or both, but we focused our discussion on the challenges institutional investors might face in their decision-making process and implementation.

Finally, we reviewed the concept of long-short risk premia strategies, which some investors used as a low-cost alternative to absolute return strategies. While the concept may be theoretically enticing, its more complex nature and lower capacity mean that implementing it in large, institutional portfolios is a significant challenge. However, industry practitioners expect there to be more interest in this field in the coming years.

In summary, investors are increasingly adopting alternate beta and risk premia as building blocks for asset allocation and portfolio construction, but these tools do not eliminate the need for active management. It is important to bear in mind that, while the implementation of these strategies is passive, selecting the right blend of factors and implementation strategies is an active decision-making process. Nevertheless, the continued development and adoption of these tools may help to increase transparency of investment processes and reduce costs in the asset management industry.

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