SMART BETA GUIDE



SNART BETA GUIDE

"Factors are the language of investing that everyone should be speaking. Smart beta is the vehicle to deliver factor investing."



Andrew Ang, PhD Head of BlackRock's Factor Based Strategies Group, Author of Asset Management: A Systematic Approach to Factor Investing

Foreword

If you are an investor, whether you are the CIO of a large pension fund or an individual saving for retirement, you should care about factors. Why? Because factors are what drive the risk and return in your portfolio. The ability to harness factors appropriately can ensure your investments are working to meet your goals.

In the simplest form, factors are broad, historically persistent drivers of return. These sources of return are intuitive and well-understood by the marketplace. They are expected to endure over the long term because they are rewarded for bearing risk, or they arise through structural impediments or behavioural biases.

Factor investing is a framework that can produce superior diversification, return enhancements relative to traditional market capitalisation benchmarks, and, done at its best, becomes an empowering way to manage an entire asset management firm. I have studied factor investing in academia – as a student and as a professor – for over 20 years, and have worked with many institutional investors to put factor investing into practice. Since my advisory work with the Norwegian sovereign wealth fund in 2009, I have seen an explosion of interest in this space. I believe wide adoption of factor investing will transform the asset management industry and the way we all think about our investments.

Just as runners must understand and rely upon the nutrients in their food to ensure they have the energy to run a marathon, investors can employ specific factors to achieve unique and personal investment objectives, such as reducing the overall risk of a portfolio, or enhancing long-term returns.

Factor investing captures these drivers of returns, taking advantage of investment intuition, diversification and efficient execution. Today, with the introduction of smart beta strategies, all investors can gain access to many of the same time-tested investment ideas that have been present in actively managed portfolios for decades, in a transparent and rules-based vehicle and at a lower cost than traditional active management.

With a growing number of smart beta providers and offerings emerging in the marketplace, where should an investor turn for help?

I joined BlackRock because I believe this firm is the leader in the factor investing space. Backed by decades of investment expertise in systematic strategies, industry-leading research and analytics, and unparalleled execution capabilities, BlackRock is the partner to help you assess which factors you own, which factors you want to own and how best to employ specific strategies like smart beta to achieve your unique goals.

This guide is designed to simplify the key considerations behind the investment concept by providing investors with a deeper look into the what, why and how of smart beta. I hope this desk reference will be a comprehensive resource as you begin to explore the potential of factor investing.

I am a true advocate of factor investing and I believe smart beta is THE way we can empower all investors to access these sources of returns in a simple and affordable way.

Andrews Ung



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SECTION 1: UNDERSTANDING SMART BETA

Defining smart beta

If you open the pages of the *Financial Times* or a *Bloomberg* magazine, chances are that you will come across an article about smart beta. One of the fastest growing segments in the financial industry, smart beta has become a ubiquitous theme in investment management today. But is smart beta just another buzzword or marketing invention?

An overview of smart beta's history

The expression smart beta is new but the concepts behind it are not. Fundamentally, smart beta has its roots in factor investing, itself the subject of long-standing academic research. Its roots go back as far as the 1960s, when William F. Sharpe identified risk factors as the primary drivers of equity returns.

Factor investing seeks to identify and capture broad, persistent drivers of return. It is the formalisation of, for example, the idea of seeking inexpensive companies (value investing) or high quality balance sheets (quality investing) – intuitive investment styles that have long been part of the active management toolkit. Smart beta strategies aim to capture these return drivers through rules-based, transparent strategies. They are benchmark-driven versions of factor strategies, generally long only and usually implemented within an asset class.

The objectives of smart beta

Smart beta strategies aim to improve returns, reduce risks and enhance diversification. Yet, while exposure to certain factors has been historically rewarded over the long term, factors are not immune to changes throughout the market cycle. The return of any individual factor may be positive or negative in a particular month or year. Over a sufficiently long period of time however, long-term investors can be rewarded for their exposure to factors.

What smart beta is	What smart beta is not
Captures well-understood drivers of return	Subjective oversight
Objective rules	Proprietary
Transparent	Novel
High capacity	Nuanced

FIGURE 1: WHAT SMART BETA IS AND WHAT IT IS NOT

Active, passive or something in between

A common question surrounding smart beta is if these strategies are active or passive. The truth lies somewhere in between. Smart beta strategies are active in that they attempt to enhance risk-adjusted returns through exposures to proven drivers of return. At the same time, these strategies resemble traditional passive strategies in that their implementation is transparent, systematic and rules-based. This means that portfolio construction is based upon a set of rules that are widely disclosed and require little or no discretionary input from portfolio managers. These strategies tend to have lower fees and higher capacity than traditional active strategies.

The table below maps smart beta against both traditional capitalisation weighted indices and actively managed strategies across defining characteristics to explain smart beta's similarities to both.

FIGURE 2: COMPARING CHARACTERISTICS ACROSS PASSIVE, ACTIVE AND SMART BETA STRATEGIES

	Long Only			
	Cap-weighted indices	Smart beta	Actively managed	
Exposure to macro factors	High	High	High	
Exposure to style factors	Low	Moderate	Moderate	
Potential for outperformance	None	Moderate	Moderate to high	
Turnover and trading costs	Low	Low	Moderate to high	
Liquidity and capacity	High	High	Low to moderate	
Transparency	High	High	Low	

Source: Smart Beta: Defining the Opportunity and Solutions, BlackRock, 2015.

KEY INSIGHT: Smart beta strategies aim to capture drivers of return through rules-based, transparent strategies. They are benchmark-driven versions of factor strategies, generally long only and usually implemented within an asset class.

۲ INVESTOR INSIGHT:

If you explain smart beta to me, it is the same as if you explain medicines. I'm only interested in what they do, meaning, what's the outcome?

Why investors should explore smart beta

The investment community's interest in smart beta is hard to ignore. The reason lies in the potential benefits to investors:

- Improved portfolio outcomes
- Reduction of portfolio cost
- Increased transparency

Improved portfolio outcomes

Figure 3 illustrates the historical risk and return of several equity factors including value (seeking inexpensive stocks), momentum (following trend), and yield (seeking income) compared to the standard MSCI World Index.

FIGURE 3: RISK AND RETURN OF MSCI FACTOR INDICES



Performance of MSCI World based indices, USD, (28 November 1975 – 30 June 2015). Source: BlackRock and MSCI as of June 2015. Past performance is not a reliable indicator of future performance.

> An individual investment strategy or product may appear attractive in isolation but investments should never be evaluated in a vacuum. Deploying smart beta within a portfolio context allows an investor to understand the full potential of these strategies.

The following table illustrates several iterations of a 60% equity and 40% fixed income portfolio invested in US equity and fixed income assets. The 'Base Line' portfolio is invested in capitalisation weighted indices for equity and fixed income. The 'Lower Volatility' portfolio seeks to reduce total volatility relative to the 'Base Line' market portfolio, while the 'Seek Outperformance' portfolio looks to outperform the 'Base Line' portfolio. Access to minimum volatility equity, multi-factor equity and balanced risk fixed income strategies (which seek an equal contribution to risk from rates and credit) allows investors flexibility to develop portfolios to meet a range of outcomes.

FIGURE 4: THREE PORTFOLIOS FOR US EQUITIES AND US FIXED INCOME

Investment outcome	Base line	Lower volatility	Seek outperformance
Allocation	60% MSCI USA 40% Barclays US Aggregate	% MSCI USA 6 Barclays US Aggregate 60% MSCI USA Minimum Volatility 40% US FI Balanced Risk	
Total annualised return	innualised 5.65%		8.13%
Total annualised 8.87%		7.55%	9.76%
Return to risk ratio	0.64	0.87	0.84
Max drawdown*	-31.29%	-26.46%	-33.52%

Source: BlackRock and MSCI as of June 2015. Past performance is not a reliable indicator of future performance.

* Max drawdown is the peak-to-trough decline during a specific period of an investment. December 1998 – June 2015. Portfolios are rebalanced semi-annually.

FIGURE 5: PORTFOLIO PERFORMANCE COMPARISON



Source: BlackRock and MSCI as of June 2015. Past performance is not a reliable indicator of future performance.

Reduction of portfolio cost

After-fee performance and weighted portfolio cost continue to drive investment decisions. Index based investments have gathered a tremendous volume of assets over the last decade as investors shift portfolios to more cost-effective structures. Smart beta strategies allow investors to seek enhanced risk-adjusted returns at a lower cost than active strategies while retaining many of the benefits of investing in traditional index strategies. Generally speaking, the cost of smart beta strategies lies between traditional index strategies and active strategies.

of the ~800 smart beta ETPs globally have expense ratios below 50bps

Source: BlackRock, as of August 2015.

Increased transparency

Transparency is a defining attribute of smart beta strategies. Like traditional index strategies, smart beta strategies follow pre-set rules to determine the process for security selection, portfolio construction and rebalancing. The rules are not adjusted for changing market conditions. Often those rules are published by a third-party benchmark provider. The level of transparency means investors should have full knowledge of construction rules and portfolio characteristics, thereby enhancing their ability to make informed allocations and build more diversified portfolios. Armed with a clear view of the delivered exposures, investors can be more informed about how a strategy is likely to perform in various market regimes.

KEY INSIGHT: Smart beta allows investors to:

- improve portfolio outcomes
- reduce portfolio costs
- ▶ increase performance transparency

۲ INVESTOR INSIGHT:

Now, our philosophy is all about 'are we exposed to the right factors', whilst previously it was still about stock selection, alpha and these types of things.

The rationale for factor-based investing

Factor investing looks beyond traditional asset class labels to target true economic drivers of return such as economic growth or inflation, as well as proven investment characteristics such as value or momentum. A factor-based lens can help investors better understand their portfolios, can enable better risk management and, ultimately, can increase the probability of achieving defined investment goals.

Understanding drivers of risk and return

Factors are to assets what nutrients are to food – both milk and steak contain fat and protein – just as economic risk is present in public equities, private equities, high yield bonds and most hedge funds. So, while healthy eaters look through the foods they eat to identify the nutrients they contain, factors allow us to cut across asset classes and identify the true sources of risk and return.

Finding the right mix of assets requires an understanding of the economics of these underlying factors. With a better understanding of these return drivers, investors can build more robust and diversified portfolios.



FIGURE 6: FACTOR EXPOSURE MATTERS

For illustrative purposes only. Source: BlackRock, as of September 2015. Equity factor research tends to be much more prevalent than that for other asset classes, although many of these characteristics persist across other asset classes as well. Certain factors have positive expected total returns over the long run, driven by the powerful forces that shape risk preferences, investor behaviour and market structure. Macro-economic risk factors capture non-diversifiable risks that have exhibited positive expected return over longer periods, compensating investors for bearing those risks. For example, holding nominal bonds exposes the investor to the risk of inflation and the risk of real rates rising. Within asset classes, there are also commonalities among securities which we refer to as style factors. Certain (not all) style factors have historically delivered a positive expected return over the long term as a result of a structural impediment or behavioural anomaly that shapes the preferences of investors. Risk factors – both macro and style – can be captured in transparent, rules-based portfolios. Only active managers can successfully deliver true alpha, and alpha is only (persistently) positive for managers with skill.

Behavioural, risk and structural factor categories

Factors can persist due to the following:

- Behavioural biases the psychological aspect of investment decisions
- Risk premia a market-risk based explanation
- Structural impediments obstructions to investors not always addressed in academic research, such as taxes, long-only constraints etc.

FIGURE 7: SOURCES OF PORTFOLIO RISK AND RETURN

Macro risk factors



Source: BlackRock Smart Beta: Defining the Opportunity and Solutions, February 2015.

Investors define factors in a number of ways, meaning that categorisations can differ.

Value is possibly the most recognised and studied equity style factor dating back to when market participants began to evaluate companies' prices relative to their intrinsic value. The most prevalent explanations for the long-term return premium associated with this factor relate to the amount of risk an investor must bear and the compensation that must accompany this risk. Investors allocate to value with less information certainty, which increases their business risk. Bearing this risk has led to long-term excess returns for value investors.

Value investing can be characterised as being a contrarian decision. Can you allocate to cheap stocks, be prepared to endure the difficult times and be compensated in a proportionate manner for the risk taken?

The concepts in equity smart beta can be extended to other asset classes. Certain factors can be applied across a range of assets; there is evidence that momentum works across equities, fixed income, currencies and commodities. Others can be more specific to a specific asset class, such as duration in fixed income. A more detailed overview of smart beta across assets is presented in the section 'Smart beta beyond equities'.

KEY INSIGHT: Factors are to assets what nutrients are to food. Rewarded factors are derived from behavioural, risk and structural considerations.

۲ INVESTOR INSIGHT:

As our expectations for the market beta premium lowered following the financial crisis, we looked for additional sources of alpha. This happened 3 years ago and is the reason why we started risk premium investing.

Asian Sovereign Wealth Fund



Factor index construction essentials

MSCI This chapter explains important considerations in the construction of MSCI factor indices.

Factors in academic models and active management

Equity factor investing was pioneered based on research, data and analytics developed by Barra - today part of MSCI. The most widely recognised multi-factor model was developed in the early 1990s by Eugene Fama and Ken French. It explains US equity market returns with three factors: the market, the size factor (large vs small capitalisation stocks) and the value factor (low vs high book to market). In 1997, Carhart extended the Fama-French model to include a momentum factor.

Systematic factor	What it captures	Common measures
Value	Excess returns from stocks that have low prices relative to their fundamental value.	Book to price, earnings to price, book value, sales earnings, cash earnings, net profit, dividends, cash flow.
Small size (Small cap)	Excess returns of smaller firms (by market capitalisation) relative to their larger counterparts.	Market capitalisation (full or free float).
Low volatility	Excess returns from stocks with lower than average volatility, beta and/or idiosyncratic risk.	Standard deviation (1, 2 and 3 year), downside standard deviation, standard deviation of idiosyncratic returns, beta.
High yield	Excess returns of stocks that have higher-than-average dividend yields.	Dividend yield.
Quality	Excess returns from stocks that are characterised by low debt, stable earnings growth and other 'quality' metrics.	Return on equity, earnings stability, dividend growth stability, strength of balance sheet, financial leverage, accounting policies, strength of management, accruals, cash flows.
Momentum	Excess returns from stocks with strong past performance.	Relative returns (3, 6 and 12 month), historical alpha.
Source: MSCI.		

EXHIBIT 1: BUILDING BLOCKS OF MSCI FACTOR INDICES

Factors used in MSCI indices

MSCI's approach to factor investing is to identify risk factors that have a solid foundation in financial theory and have been shown to provide a systematic risk-adjusted return premium (i.e., more return per unit of risk or less risk per unit of return). We believe that these factors respond to longer-term macroeconomic forces (some pro-cyclical and some defensive) in which they provide historical outperformance over long periods of time versus the broad market, but they also experience periods of underperformance that can discourage short-term investing. Examples of these factors are Value, Small Size, Low Volatility, High Yield, Quality and Momentum.

MSCI factor indices are designed to provide a way for passive investors to capture risk-adjusted return premia that previously have been available only to active managers.

MSCI index construction

An index's ability to capture better risk-adjusted returns than the overall market is tied to the way it is designed and maintained. MSCI indices are strictly rules based – which makes them consistent and highly transparent. We publish details about index methodology and constituents on our website to ensure that investors know what to expect from our indices.

Our factor indices are based on our overall approach to index construction, an approach we have developed and continuously tested over more than four decades. An important consideration in constructing a factor index is the trade-off between exposure and investability. High-exposure factor indices such as MSCI Momentum Indices have higher investability constraints than 'optimised' factor indices such as MSCI Minimum Volatility Indices. Another consideration is a factor index's weighting scheme.

Investability

Because the largest institutional investors in the world use our indices, we have embedded strong controls into our index construction process to ensure that our indices are highly investable and liquid. Investability requirements are applied at the overall company level – such as full company market capitalisation represented by the aggregation of all eligible listed and unlisted securities of a company – and at the individual security level, such as free float-adjusted market capitalisation and liquidity measures.

Our framework for assessing investability has four components: (1) Tradability/ Liquidity, (2) Turnover/Cost of Replication, (3) Capacity and (4) Degree of Active Tilt. The table overleaf defines each component and provides examples of ways we measure it.

Category	What it measures	Metrics
Tradability/ Liquidity	How liquid the stocks are in the portfolio and how tradable the portfolio is.	 Weighted average annualised traded value ratio Days to trade (relative to benchmark, periodic rebalancing) Days to complete 95% of trading (relative to benchmark, periodic rebalancing)
Turnover/ Cost of replication	The turnover of the index at rebalancing. This metric scales with costs: the higher the turnover, the higher the cost of trading.	 Index turnover Performance drag
Capacity	For a given size fund, the percentage of a stock's free float or full market capitalisation the fund would own.	 Stock ownership (percentage of float market cap) Stock ownership (percentage of full market cap)
Degree of active tilt	Degree to which a factor index deviates from the capitalisation-weighted index. In so far as the capitalisation- weighted index represents what is most investable, the degree of active tilt is also a way to assess investability.	 Active share Average weight multiplier Maximum weight multiplier Maximum strategy weight Active target factor exposure

EXHIBIT 2: FRAMEWORK FOR ASSESSING INVESTABILITY

Source: MSCI.

Weighting scheme

The weighting scheme used in constructing an index determines its exposures. The main objectives are to maximise exposure to the target factors, maximise investability and reduce turnover (and hence rebalancing costs).

Factor indices can be classified into high exposure and high capacity. High exposure indices are designed to maximise exposure to the target factor while staying within MSCI's investability guidelines. High capacity indices are designed to allow very large investments into the index and to focus on maximising investability and reducing turnover.

MSCI has high exposure and high capacity versions of each of its six single-factor indices. High exposure indices are constructed by selecting a subset of stocks from the universe, based on a ranking methodology (typically z scores). High capacity indices use the entire universe but tilt the weights toward the target factor.

There are two possible weighting schemes for high capacity indices, and both use the entire universe.

The first is a 'score only' approach, which takes descriptors and calculates the score of each stock based on the descriptors. The stock's weight in the index is then simply the stock score divided by the sum of the score of all stocks. Our risk weighted indices follow this methodology. The second approach is 'score times market cap', where the market cap of each stock is multiplied by its score. A stock's weight is simply the market cap times score divided by the sum of the market cap times the score of all stocks.

The 'score only' approach gives a higher exposure to the target factor but can lead to significant active weights. In the case of the risk weighted index, this would mean an exposure to small cap stocks because the descriptor is variance. Compared to market cap, variance is more stable from stock to stock.

'Score times market cap' naturally takes the factor index closer to market cap, increases exposure to large cap stocks (and hence systematic outperformance) and also increases investability compared to 'score only'.

The chart below illustrates the differences in the high capacity weighting schemes, 'score only' and 'score times market cap'.



EXHIBIT 3: WEIGHTS FOR MSCI WORLD LOW VOLATILITY INDICES

The x axis shows all stocks ranked in ascending order of market cap and the y axis shows the weights in the respective indices. The dark blue line shows the pure market cap index, MSCI World Index. The green line shows the 'score times market cap' approach and the light blue line shows the 'score only' approach.

The difference between the 'score only' and 'score times market cap' is significant and leads to some small cap exposure. It is important to note that other factors will behave differently.

Conclusion

MSCI's factor indices aim to provide a systematic risk-adjusted return premium by achieving a specified high level of exposure to targeted factors. MSCI currently offers factor indices that target six factors: Value, Small Size, Low Volatility, High Yield, Quality and Momentum. Important considerations in constructing these indices are the trade-off between exposure and investability, and the index's weighting scheme.

SMART BETA IN NUMBERS

FIGURE 8: GLOBAL SMART BETA ETP ASSETS: \$230BN AS OF SEPTEMBER 2015



Source: BlackRock as of 30 September 2015. Past performance is not a reliable indicator of future performance.

FIGURE 9: SMART BETA AVERAGE ANNUAL ORGANIC GROWTH RATE*



FIGURE 10: SMART BETA SHARE OF ASSETS BY LISTING REGION AND CATEGORY



* Since 2012 including YTD September 2015 annualised.

Source: BlackRock as of 30 September 2015. Past performance is not a reliable indicator of future performance.

Globally, the ratio is \sim \$1 in \$12 flowing into smart beta ETPs through September 2015

\$20BN 2015 YTD smart beta ETP flows ^{\$230ви}

Total industry ETP flows

 45° of the ~800 smart beta ETPs globally have expense ratios below 50bps

Year-by-year smart beta launches globally out of all ETPs since 2012:



2012: 87 of 545 global launches



2013: 85 of 522 global launches



2014: 184 of 619 global launches



YTD September 2015: 124 of 533 global launches



54 smart beta providers globally at the end of 2012, rising to 59 in 2013, 80 in 2014 and 92 as of September 2015

Source: BlackRock as of September 2015.

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INVESTOR INSIGHT:

I see potential for smart beta. If the media or investors understand that many active exposures can be easily replicated with smart beta ETFs, the potential increases. DD

Credit Suisse



SECTION 2: ASSESSING SMART BETA

۲ INVESTOR INSIGHT:

There is a lot of dialogue and conversation around the importance of knowing your smart beta products. They are not created equal. You have to look past the label on the tin.

Smart beta strategy evaluation and due diligence

The smart beta landscape is a crowded space with many different strategies available to investors. Differentiating between the available products can be a challenging exercise. A systematic and logical way to approach smart beta due diligence can help investors efficiently determine a strategy's characteristics and identify potential challenges.

A framework to evaluate smart beta strategies

BlackRock's suggestion is that following a six step process will enable investors to navigate between and successfully evaluate the different options available to them so that they can achieve their intended outcome:

The steps are:

- 1 Clarify the investment goal
- 2 Verify the merit and investability of the exposure
- 3 Evaluate potential performance in different market regimes
- 4 Understand the strategy's construction rules
- **5** Consider in the context of your existing portfolio
- **6** Compare the costs of a product with its competitors



KEY INSIGHT: By following a systematic, logical framework that utilises the evaluation techniques of traditional index and actively managed strategies, investors can understand the potential impact of a chosen smart beta strategy and are more likely to achieve their investment goals.

Action	What should be considered	Why this is relevant
Clarify the investment goal	 Investors should be clear what their desired outcome is when selecting a smart beta strategy. Are they looking to enhance the returns of their existing portfolio or are they looking to alter the risk profile? 	 If investors have a specific long term performance, risk or style- orientation objective, finding the exposure they are looking for will be more easily achieved.
Verify the merit and investability of the exposure	 Are the factors well-researched and can investment in the strategy lead to value creation? Does the product adequately capture the desired factor exposure? 	Investors must carefully evaluate the economic reasoning driving the factor return and determine whether the exposure is consistent with their investment beliefs.
Evaluate potential performance in different market regimes	 Investors should be aware of how different factors respond to different market scenarios. 	 Factors with economic logic typically reward investors in the long term in exchange for taking risks that can lead to periods of underperformance versus the broad market.
Understand the strategy's construction rules	 What metrics are used to select the index constituents? Check the number and weightings of constituents. What is the rebalance frequency, turnover and liquidity profile of the underlying index used? 	 An in-depth understanding of the methodology enables investors to understand whether the strategy is designed using diversified metrics. There is a positive relationship between turnover and cost.
Consider in the context of your existing portfolio	 How does this strategy fit with the rest of your portfolio? Within your current portfolio, what strategy/assets should you consider replacing with a factor product? Is your selected strategy to take the place of an existing active or passive investment? 	 Factors should be integrated into a portfolio in the context of the overall risk-return objectives. Understanding your existing factor exposure will enable you to identify factors that complement your existing portfolio.
Compare the costs of a product with its competitors	 Cost of the strategy being considered. Cost of other products available to the investor. 	 The cost paid for the product is a key drag on ongoing investment returns. Understanding the relationship between cost and investment returns is an important consideration when investing in a smart beta product.

FIGURE 11: FRAMEWORK FOR EVALUATING SMART BETA STRATEGIES

Source: BlackRock.

۲۵ INVESTOR INSIGHT:

Know your benchmark, make detailed comparisons to standard market-cap

benchmarks and understand the behaviours in various scenarios. \Im

Credit Suisse

රිර INVESTOR INSIGHT:

We take a very conservative approach. We would like to see a thorough history. Understanding it is very important. The critical question is: 'Why should we get paid as an investor and is it sustainable in the future'? SSDutch Private Bank

Smart beta attribution and challenges

Assessing the components of returns through attribution

In a well-known paper, William Sharpe¹ showed that, in aggregate, active managers' returns, net of costs, will underperform as a group. That said, active management remains popular and there are undoubtedly talented managers who have genuine skill in timing market turns or in security selection. For an investor, the challenge is to identify the managers who have these talents. Often investors equate alpha with excess returns over their stated benchmark, but one can argue that this measure of value added is only part of the story.

To see this, consider a simple one factor model of equity returns where a stock's return is proportionate to the market's return. If the benchmark return is represented by the market return, then managers may exceed the average return on the market only because they maintained a tilt to higher beta stocks over a period when the market as a whole rose. Such a static factor tilt could be easily replicated with an ETF, meaning the manager should not receive high compensation for such 'outperformance'. A manager who successfully avoided downturns by moving to cash and conversely held the market in upturns, however, would have genuine or true alpha accruing to their factor timing abilities. The same is true of a manager who selected stocks that outperformed but otherwise maintained a beta of one to the market. That skill set deserves to be rewarded by investors.

An active manager's return in excess of their benchmark can be broken down into three components:

- Returns to static factor premia, such as a tilt to value or momentum stocks
- Manager skill coming from factor timing
- Manager skill coming from security selection

Investors would ideally compensate a manager for timing and security selection, recognising that static tilts can be gained at a low cost. But how can we estimate these components? The decomposition of active returns has traditionally been performed using regression analysis of returns, but regression methods, while attractive in many dimensions, are potentially misleading when factor weightings are dynamically changing. By contrast, our approach here is based on actual holdings, which lets us identify the covariation of changes in holdings with future excess returns – essentially factor timing ability – and excess returns to stock selection.

¹ Sharpe, William F., 1991. "The Arithmetic of Active Management," The Financial Analysts Journal Vol. 47(1), January/February, pages 7-9.

Below is an extensive data set of quarterly equity holdings from 2005-2015 for all active US style box mutual funds (Figure 12). This lets us identify those managers whose portfolio returns derive largely from tilts to known 'smart beta' factors as opposed to genuine insights. One can conclude that there are ways to identify managers with little or no skill (whose turnover and fees may actually detract from returns) but who stay in business because they simply maintain static bets.

FIGURE 12: ACTIVE RETURN ATTRIBUTIONS FOR US MUTUAL FUNDS



Source: BlackRock, Bloomberg, Barra, Morningstar, Thomas Reuters, 30 June 2005 to 30 June 2015. Past performance is not a reliable indicator of future performance.

The diagram shows average active return attributions for the set of 1,267 US active style box mutual funds, with \$3.3 trillion in assets, based on quarterly holdings data for the 10-year period from 30 June 2005 to 30 June 2015. Active returns are calculated with respect to style box benchmarks defined by Morningstar.²

> **KEY INSIGHT:** Investors should pay active managers who generate genuine alpha. Static factor tilts however can be replicated more cost-efficiently with a smart beta strategy.

2 See: "Smart Beta and Mutual Fund Performance Attribution," by A. Madhavan, R. Nestor, S. Shores, and A. Sobczyk.

The potential challenges for smart beta strategies

The transparent nature of smart beta strategies naturally leads to questions about whether or not the strategies' advantages will become arbitraged away by changes in securities' prices over time and about whether the strategies can become overcrowded.

Smart beta strategies, despite their transparent nature, are much less susceptible to overcrowding and dilution by arbitrage than is commonly believed. This is because:

- Smart beta strategies emphasise basic fundamental drivers of risk and return.
- While factors are widely understood, the mix of securities underlying them changes over time.
- Factors can be subtle. Security returns are influenced by a number of forces and are never only one-dimensional.

Smart beta strategies are centred on factors that are thought to be deep, fundamental drivers of risk and return. By fundamental we mean that there are either behavioural or risk compensation drivers of return that are compelling from a logical, economic perspective and the persistence of which is supported by the data over a long time frame and relating to diverse regions.

Smart beta strategies' motivation by fundamental drivers makes them more likely to endure when compared to active strategies, the focus of which is superior information. The best example is value investing, which was well articulated by Graham & Dodd in 1934³, but remains a key component of smart beta strategies today. Value may succeed because investors chase 'hot' stocks or because value drivers are correlated with macro-risks and hence yield compensation for risk over time.

However, deep fundamental drivers are inevitably multi-dimensional and can be somewhat subtle. For example, when asked to think of momentum, investors are likely to think of a handful of high-flying basic materials or technology names, whereas for value they are likely to think about a handful of consumer staples or business services names. The fact is that risk factors are the underlying return drivers of all securities in varying degrees of magnitude.

Therefore, gaining exposure to a factor is not only about owning a handful of securities but rather about the relative weights across broadly-diversified baskets of securities. It can be as much about underweighting or avoiding those securities with low factor exposures as it is about overweighting or emphasising those with high exposure to the particular factor, and about updating those relative weights as prices move and markets evolve. Building portfolios with high exposure to factors, while simultaneously minimising

රිරි INVESTOR INSIGHT:

Our main concern in applying smart beta to our portfolio is the crowding effect. \Im

Asian Sovereign Wealth Fund

³ Graham, Benjamin, David Le Fevre Dodd, and Sidney Cottle. Security analysis. New York: McGraw-Hill, 1934.

unintended bets in a dynamically changing environment, requires refined factor metrics and a thoughtful rebalancing methodology.

So, while generally robust to the impact of arbitrage and crowding, investors nonetheless need to be alert to the possibility of potential pressure on factors and monitor the health of factors, including:

- Tracking relative valuation
- Tracking imputed flows

Monitoring the relative valuation of factors can help quantify the degree to which factor investors may have affected prices. It is important to look at relative valuation measures to control for inherent variation in valuation across factors, and relative to the broad market. Figure 13 shows the price-earnings ratio of several single-factor ETFs relative to their own history and relative to an S&P 500 ETF, based on three years of data ending 31 August 2015.

FIGURE 13: PRICE-EARNINGS RATIO OF SINGLE FACTOR ETFs



P/E: Current valuation relative to a S&P 500 ETF and 3 year history

The securities underlying factors are traded regularly by market participants with a variety of motivations. The transparent nature of ETFs makes it possible to attribute aggregate flows into individual securities which can then be aggregated up into individual factors. We refer to this as 'imputed flows'. Figure 14 shows the cumulative imputed flows over a particular period into the same single-factor ETFs relative to an S&P 500 ETF.



FIGURE 14: CUMULATIVE IMPUTED FLOWS INTO SINGLE-FACTOR ETFs

Source: BlackRock and MSCI, as of 31 August 2015.

۲ INVESTOR INSIGHT:

We are longterm investors. Patience is necessary for implementation. Although we evaluate investments month by month and year by year, we understand you may need 3 years to capture the premium. S(S)Asian Sovereign Wealth Fund

Smart beta strategies are about gaining exposure to basic, fundamental drivers of risk and return that underlie all securities. This sets them apart from strategies that rely on superior information which can often lead managers to take concentrated positions in particular securities. For this reason, smart beta strategies tend to have higher capacity than other types of active strategies.

Over longer time frames, the fundamental drivers of risk and return could change and factors could conceivably become crowded. Therefore, an important component of any smart beta strategy involves monitoring the health of factors which is achieved by tracking their relative valuation and estimating the aggregate flows into and out of representative factor portfolios. These sorts of flow and valuation metrics will become increasingly important as smart beta gains prominence in the market place.



KEY INSIGHT: Smart beta strategies are much less susceptible to overcrowding and dilution by arbitrage than is commonly believed.

Factor behaviour in changing economic environments

MSCI 🌐

As our clients evaluate factor-based investment strategies, they want to understand how they will perform in different market regimes.

In response to this need, we have created a process for designing macroeconomic-sensitive portfolios.

In both a short-term historical analysis and a long-run analysis using the MSCI Macroeconomic and Asset Pricing Models, we found that MSCI factor indices are different from each other with regard to their sensitivity to real economic growth and inflation.

In addition, we found that although all factor returns have historically been highly cyclical, their periods of underperformance have not been identical. Some factors, such as Value, Momentum and Size have historically been pro-cyclical, outperforming when economic growth and volatility are rising. High Dividend, Quality and Minimum Volatility have been more defensive, outperforming in a weak macro environment.

Outperform in strong macro environments	Outperform in weak macro environments
Value	High Dividend
Momentum	Quality
Size	Minimum Volatility

EXHIBIT 1: WHEN FACTORS HAVE HISTORICALLY OUTPERFORMED

Classification based on short-term historical analysis

Equity factors can be classified as either pro-cyclical or defensive. Exhibit 2 below shows the correlation between the year-on-year relative performance of factor indices versus their parent index and year-on-year change of the corresponding OECD economic growth (CLI) Index, which measures the overall state of the economy or point in the business cycle. The analysis is based on returns from 1975 to December 2013, including simulated data.

EXHIBIT 2: MSCI WORLD CORRELATION WITH OECD CLI

Defensive Factors	Correlation	Pro-Cyclical Factor	s Correlation
Minimum Volatility	-0.50	Equal Weighted	0.14
Quality	-0.43	Value Weighted	0.05
High Dividend Yield	-0.25	Momentum	-0.11
Risk Weighted	-0.19		

The correlation value illustrates the relationship between a specific factor and the strength of the economy. For example, a correlation of -0.50 between the Minimum Volatility Index and the CLI Index indicates that returns to Minimum Volatility tend to be strong at times when the economy is weak. The defensive nature of Minimum Volatility, Quality, High Dividend Yield and Risk Weighted factor indices is clear in this analysis. However, the supposedly pro-cyclical factor indices – Equal Weighted, Value Weighted and Momentum – are more of a puzzle, with only the Equal Weighted index showing a meaningful positive correlation to the CLI, and the sensitivity of the Momentum index actually appearing to be negative.

We found that adding a second variable such as inflation (CPI) helps to explain performance in these cyclical indices.

Examining short-term index performance in different periods

The chart below shows the differential performance of factor indices in periods in which economic growth and inflation are rising or falling separately. Higher returns are shown in green and lower returns are in blue.

	Economic Growth (CLI)		Inflation (CPI)	
MSCI World Index	Decreasing Increasing		Decreasing	Increasing
Equal Weighted	0.0%	0.3%	0.2%	0.0%
High Dividend Yield	0.2%	0.1%	0.2%	0.2%
Minimum Volatility*	0.3%	-0.3%	0.0%	0.1%
Momentum	0.2%	0.3%	0.2%	0.3%
Quality	0.3%	-0.1%	0.0%	0.2%
Risk Weighted	0.2%	0.2%	0.2%	0.1%
Value Weighted	0.0%	0.2%	0.1%	0.0%

EXHIBIT 3: MONTHLY GROSS ACTIVE RETURNS

Source: MSCI. Average active returns relative to MSCI World from December 1975 to December 2013. Past performance is not a reliable indicator of future performance.

*Based on official Index Levels from May 1988. Low Volatility Tilt Index prior to that date includes simulated data.

Looking first at the columns for economic growth, results are similar to our previous analysis, except that Momentum is now 'cyclical', with higher active returns when economic growth is increasing than when it is decreasing. In the inflation columns, there is no large differentiation between the factor indices' responses.

Classification based on the long-term MSCI Asset Pricing Model

The MSCI Asset Pricing Model follows the basic principle of modern asset pricing that the competitive equilibrium value of an asset equals the expected discounted value of current and future asset cash flows. The application of this fundamental principle of asset valuation leads to the conclusion that macro risk has an impact on valuation and risk via two channels: cash flows and discount factors.

Our principal finding is that the cash flows earned by different equity portfolios can respond differently to persistent economic shocks, and that these differences can emerge over longer time horizons.

The chart below classifies the MSCI World factor indices according to their positive or negative sensitivity to real GDP growth and inflation over long horizons, relative to the MSCI World Index.

EXHIBIT 4: LONG-RUN SENSITIVITIES TO MACROECONOMIC RISK

Real GDP growth risk	Outperform when economic growth is strong > Equal Weighted > Momentum > Risk Weighted > Value Weighted > Small Cap	Outperform when economic growth is weak > High Dividend Yield > Quality > Minimum Volatility
Inflation risk	Outperform when inflation is rising > Equal Weighted > Momentum > High Dividend Yield > Quality > Risk Weighted > Small Cap	Outperform when inflation is falling Minimum Volatility

Conclusion

The MSCI Asset Pricing Model shows that Equal Weighted, Momentum, Risk Weighted, Value Weighted and Small Cap indices showed real GDP growth risk relative to the capitalisation-weighted index in the long run. Thus, in terms of sensitivity to economic growth, the long-term model-based analysis broadly agrees with our historical short-term analysis.

Our frameworks and models have important implications for asset allocation in developed market portfolios (the basis for this analysis), as shown in Exhibit 4. Deviations away from a market cap portfolio could logically be based on an investor's expectations about macroeconomic growth and tolerance for risk.



SECTION 3: IMPLEMENTING SMART BETA

Implementing smart beta in portfolios

Smart beta strategies can help achieve a variety of portfolio objectives. However, implementing smart beta within a traditional asset allocation framework is often perceived as challenging by investors. Broadly speaking, smart beta can be used in a portfolio to enhance its risk-return profile, reduce risk or to diversify along factor dimensions. It is nevertheless important to consider both investment goals and time horizons.

The implementation of smart beta strategies does not need to be difficult. There are three key applications to consider: tactical, strategic, and risk management. The table below outlines potential smart beta applications, objectives and implementation considerations.

FIGURE 15: APPLICATIONS FOR SMART BETA



Source: BlackRock. September 2015.

For us, one of the most exciting things about smart beta is that it is helping us build the more exact allocation we want. It means you get better risk-adjusted outcomes and you have fewer surprises in terms of how your positions perform. \Im

Credit Suisse

Using smart beta - an outcome-orientated approach

Factors can earn positive returns over the long term as a result of a risk premium, structural impediment or behavioural anomaly within financial markets. They are a source of potential incremental returns in long run portfolio allocations. However, individual factors may be highly cyclical. Although long run returns have historically been positive, the returns to any single factor may be positive or negative in any particular month or year. For long-term allocations, diversification across several factors can help mitigate the potential ups and downs in the short term.

For more tactically-oriented investors, the cyclical nature and distinct behaviour of individual factors provides a new investment toolkit that may be used to express investment views. Individual factor strategies are useful as complements to existing allocations to provide diversification.

How can smart beta fit in a portfolio?

Strategic asset allocation with smart beta

Individual factors have low active correlations with each other, and combining them can provide more diversified portfolios that perform well in a variety of market environments. Depending on the risk/return goal, different combinations may be appealing. For example, as illustrated in the chart below, equity investors can combine value, minimum volatility, size and other factors in various proportions to create bespoke portfolios with desirable expected risk/return profiles.

FIGURE 16: RISK-RETURN PROFILES OF DIFFERENT GLOBAL DEVELOPED SINGLE EQUITY FACTOR COMBINATIONS



Weighting factors in a portfolio - allocation methodology

Certain investors may have strong convictions about the efficacy and appropriateness of each factor and those convictions may lead to bespoke combinations in their portfolios. In the absence of strong views, a straightforward equal-weighted approach is a reasonable starting point for long-term, multi-factor allocations.

The table below highlights two portfolio allocations using MSCI World single factor exposures. The risk parity portfolio weights the exposures such that the marginal contribution of each of the exposures to the total volatility is equal. It therefore makes sense that this portfolio has a higher allocation to World Minimum Volatility and a lower allocation to World Value. In each case the portfolios are rebalanced annually to static weights and are calculated in US dollars.

FIGURE 17: EQUAL AND RISK WEIGHTED FACTOR PORTFOLIOS – ALLOCATIONS

Allocating factors in a portfolio	World Value	World Size	World Momentum	World Minimum Volatility	World Quality
Equal weighted	20.00%	20.00%	20.00%	20.00%	20.00%
Risk weighted	16.83%	19.07%	19.31%	26.07%	18.73%
Source: BlackRock. Risk weighted optimisation conducted 30 September 2005 – 30 September 2015.					

The allocations between these two portfolios differ by up to 6.07%. However, the overall difference in terms of performance and risk over the time horizons is relatively small, as shown in Figure 18.

FIGURE 18: RISK AND EXCESS RETURN PERFORMANCE OF EQUAL AND RISK WEIGHTED PORTFOLIOS



Annualised Standard Deviation (Volatility)



Source: BlackRock, Morningstar, MPI. 30 September 2005 - 30 September 2015.

A simple equal-weighted allocation methodology therefore gives us risk and return characteristics which are similar to a more complicated allocation methodology, meaning that the strategic benefits of factor investing can actually be realised relatively simply.

KEY INSIGHT: Combining factors in a portfolio can provide improved diversification and performance in a variety of market environments.

Implementation case studies

Smart beta can be employed to help meet a variety of objectives. The case studies below explain how smart beta can help to:

- Build simple outcome-oriented portfolios
- > Implement multi-factor exposures in strategic asset allocations
- Express investment views
- Implement tactical factor tilts
- Address unintended factor tilts
- > Add a liquidity sleeve feature to an existing factor allocation

Case Study 1: Building simple outcome-orientated portfolios

In this case study, we have taken the most straightforward approach and have equally-weighted each of the factor exposures in the portfolio. We consider three portfolios:

Defensive portfolio: A basket of three factors – minimum volatility, value and quality – combined in order to minimise risk.

Balanced portfolio: A basket of five factors – size, minimum volatility, momentum, value, quality.

Dynamic portfolio: A basket of three factors – size, momentum and value – combined in order to generate extra performance.

The figure below provides more details on the portfolios' compositions.



Source: BlackRock and MSCI. 30 September 2015.

Portfolio 1 (Defensive Factor Portfolio) uses defensive factor exposures, such as minimum volatility and quality alongside a diversifying factor such as value, with the aim to provide broad market exposures but with a lower volatility than the benchmark MSCI World Index.

Portfolio 2 (Balanced Factor Portfolio) takes a neutral view in that multiple single factor exposures are used in equal weight to achieve diversified exposure across many factors.

Portfolio 3 (Dynamic Factor Portfolio) is at the other end of the spectrum. By including pro-cyclical factors that have historically outperformed the MSCI World Index more significantly, but with a higher volatility, the aim is to create a more aggressive equity portfolio which has the objective of outperforming the MSCI World Index. Portfolio 3 carries more risk. This means that in implementing this strategy, the investor would need to be comfortable taking more risk in order to achieve the outperformance objective. The resulting risk and return profiles of the portfolios over a ten-year period are shown in Figure 20 and behave in line with the initial objectives. Defensive Portfolio 1 enhances the return slightly versus the benchmark but allows risk to be reduced on a rolling basis. Balanced Portfolio 2 takes on a little more risk but performs better than Portfolio 1 on a cumulative basis. Dynamic Portfolio 3, as was aimed for, achieves the strongest outperformance but at times has a higher annualised volatility compared to the benchmark.

FIGURE 20: PERFORMANCE AND RISK OF THE DYNAMIC, BALANCED AND DEFENSIVE PORTFOLIOS



Source: BlackRock, Markov Processes International (MPI), Morningstar, MSCI, Bloomberg. 5 January 2005 – 5 October 2015. Frequency: Day. USD. Past performance is not a reliable indicator of future performance. The flexibility of using single factor exposures to create outcome-orientated combinations is clear from this example. A key feature of such exposures – with geographical and sector diversification being in line with the benchmark – allows for such portfolios to be integrated effectively within asset allocations without drastically changing any tactical over/underweights within the portfolio (Figure 21). This is, of course, a separate and important consideration, and the overall results should be considered and analysed to ensure overall allocations are within tolerance levels.

FIGURE 21: REGIONAL AND SECTOR EXPOSURES OF THE BALANCED, DEFENSIVE AND DYNAMIC FACTOR PORTFOLIOS



Case Study 2: Implementing multi-factor exposures in strategic asset allocations

For investors seeking a 'turnkey' smart beta solution, multi-factor indices provide an easy complement to traditional passive or active strategies. For example, they can combine quality, value, size and momentum to deliver an enhanced return relative to the broad market at a similar level of risk. They can be used within a portfolio to enhance the overall risk return characteristics without the need to make decisions on which factors to use, when to use them and how to combine them.

A multi-factor exposure, such as the MSCI World Diversified Multiple Factor Index, can be used in conjunction with, or in lieu of, broad market capitalisation exposures to enhance returns. Figure 22 demonstrates this effectively by looking at a simple diversified global multi-asset portfolio and integrating multi-factor exposure by replacing the global equity allocation. Annualised return over the 10-year period analysed increases from 4.75% to 6.19% and risk-adjusted return from 0.43 to 0.56.

FIGURE 22: ASSET ALLOCATIONS WITH AND WITHOUT THE MSCI WORLD DIVERSIFIED MULTIPLE FACTOR INDEX



Annualised return (10-year)	4.75%	6.19%	
Annualised standard deviation (10-year)	11.12%	11.16%	
Risk-adjusted return	0.43	0.56	
Max drawdown*	-36.40%	-35.49%	
Max drawdown period	11/2007 – 2/2009	11/2007 – 2/2009	

Source: BlackRock, MPI. 30 September 2005 - 30 September 2015. Analysis assumes quarterly rebalancing. Sample portfolios are for illustrative purposes only, and do not represent a recommendation of any security or asset. * Max drawdown is the peak-to-trough decline during a specific record period of an investment. If portfolio risk is a particular concern/objective for implementing smart beta strategies, multi-factor strategies can be used in conjunction with single factors, such as minimum volatility. Using minimum volatility strategies to reduce the overall portfolio volatility can be an effective tool in managing overall risk, though returns may be reduced in certain market conditions in order to achieve this. Such an implementation strategy is demonstrated in the example in Figure 23.

FIGURE 23: USING MINIMUM VOLATILITY EXPOSURES ALONGSIDE A MULTI-FACTOR APPROACH



	Sample portfolio	Sample portfolio	
	No smart beta indices	With multiple factor index	
Annualised return (10-year)	4.75%	6.07%	
Annualised standard deviation (10-year)	11.12%	9.94%	
Risk-adjusted return	0.43	0.61	
Max drawdown return*	-36.40%	-32.52%	
Max drawdown period	11/2007 – 2/2009	11/2007 – 2/2009	

Source: BlackRock, MPI. 30 September 2005 – 30 September 2015. Analysis assumes quarterly rebalancing. Sample portfolios are for illustrative purposes only, and do not represent a recommendation of any security or asset. * Max drawdown is the peak-to-trough decline during a specific record period of an investment.

SECTION 3

۲ INVESTOR INSIGHT:

Each risk premium has its cycle, meaning we have to balance the factors. SS

Asian Sovereign Wealth Fund

Case Study 3: Targeted smart beta strategies to express investment views

Individual factors are driven by different market phenomena and, therefore, tend to have distinct behaviours in reaction to market events and the global business cycle. Investors have long connected the performance of equity sectors to the business cycle: Consumer cyclicals tend to perform well when economic growth is strong, for example, while more defensive sectors such as utilities often rally in risk-averse environments when investors are seeking safety. The same parallel can be seen in the behaviour of factors. Smaller, more nimble companies (emphasised in small size strategies) often perform well in the early phases of economic recovery. In contrast, stable companies with strong balance sheets (emphasised in quality strategies) tend to perform best in later stages of the economic cycle. Single factor smart beta strategies provide a useful toolkit for investors to express their investment views.



FIGURE 24: MAPPING FACTOR EXPOSURES TO THE ECONOMIC CYCLE

For illustrative purposes only.

Sources: BlackRock, Global Return Premiums on Earnings Quality, Value, and Size, 7 January 2013, Max Kozlov and Antti Petajisto. The opinions expressed are as of 31 March 2015 and are subject to change at any time due to changes in market or economic conditions.

Case Study 4: Implementing tactical factor tilts

Targeted smart beta strategies, such as single factor funds, may be used tactically to seek increased returns or reduced risk in accordance with an investor's current market view.

In this case study, we have created three separate portfolios, compared to a standard MSCI World Index.

Portfolio 1: Adding a size tilt (10%) to emphasise the nimble companies that often perform well in the early stages of the business cycle.

Portfolio 2: Add a minimum volatility tilt (10%) in order to alter the portfolio's risk profile in anticipation of increased market volatility.

Portfolio 3: Add both size and minimum volatility tilts (20%) to seek to improve returns while managing the total level of equity risk.

The results from this implementation can be seen in Figures 25 and 26. The factor allocation between volatility and size is easily discernible from the graphs in Figure 25, while the achieved outcome of single factor exposures is highlighted in Figure 26.

FIGURE 25: FACTOR TILTED PORTFOLIOS AND THEIR FACTOR EXPOSURES



Source: BlackRock, MSCI, data as of September 2015.



FIGURE 26: EXCESS RETURN PERFORMANCE OF FACTOR-TILTED PORTFOLIOS

Source: BlackRock, MPI, Morningstar, MSCI, Bloomberg. 31 March 2004 – 30 September 2015. Frequency: Month. USD. Past performance is not a reliable indicator of future performance.

Risk management and portfolio analysis across factor dimensions

Multi-manager portfolios often result in overlapping exposures and unintended bets. The stock selection process of a successful active manager may result in unintended style biases while multiple managers may layer on similar exposures. Analysing portfolios along style dimensions allows investors to understand and control these risks. Regional factor ETFs can further assist in this process and provide tools for managing regional factor biases (Figures 27 and 28).

Case Study 5: Analysis of portfolio risk factors to address unintended factor tilts

For bottom-up global portfolios, the resulting basket may sometimes have an unintended factor tilt. Factor ETFs can be used to manage this tilt and to neutralise unintended factor exposures within the portfolio. The target portfolio (Portfolio 1) has an exposure to a variety of global developed market companies with a geographical tilt towards Japan. After factor analysis was carried out, an unintended bias towards stocks with higher volatility was identified.

Using factor ETFs with exposure to low volatility stocks allowed us to neutralise the unintended factor tilt (shown in Portfolio 2) and to keep the factor profile of the portfolio in line with the MSCI World Index. From a diversification perspective, Portfolio 2 broadly maintained the desired overweight to Japanese equities but achieved a sector and regional profile which was closer to that of the MSCI World Index.

FIGURE 27 AND 28: USING SINGLE FACTOR EXPOSURES TO ADDRESS UNINTENDED FACTOR TILTS IN A PORTFOLIO



Portfolio 1: Global equity portfolio with 20% Japan overweight vs MSCI World Portfolio 2: Global equity portfolio with 20% Japan overweight – Volatility bias corrected

Source: BlackRock, MSCI, data as of September 2015. This is not a recommendation to invest in any particular financial product. No analysis of their suitability was conducted and no statement of opinion in relation to their suitability is provided.

Case Study 6: Adding a liquidity feature to your existing factor allocation

Factor ETFs can be used as a liquidity 'sleeve' solution for core, non-ETF factor allocation. Many large institutional investors have historically used customised factor mandates to achieve a desired long-term factor(s) exposure. To ensure the factor(s)' weight is in line with the overall strategy, factor ETFs can provide a cost-efficient and flexible liquidity 'sleeve' solution in order to manage the deviation from the original weights within the portfolio which occur over time.

The current portfolio is allocated across three vehicles where two have a global equity factor exposure – an active momentum manager and a global value factor fund. The third one is a low-cost global equity indexed mandate.

Using factor ETFs enables investors to build the liquidity sleeve around the two factor-based core allocations and the traditional mandate while minimising transaction costs during rebalancing.

FIGURE 29: USING SMART BETA ETFs WITHIN AN ASSET ALLOCATION AS A LIQUIDITY SLEEVE



For illustrative purposes only. Source: BlackRock, MSCI, data as of September 2015.

INVESTOR CASE STUDY: The unemotional reliability of smart beta – CLS Investments, LLC

CLS Investments (CLS), a third party investment manager and ETF Strategist, uses risk-managed, globally balanced portfolios to enhance the investor experience. A firm believer in the power of risk budgeting delivered through outcome-based investment options, CLS manages risk and investments for those seeking to accumulate wealth, generate income, protect their assets or manage tax within their portfolios.

Today, CLS manages nearly US\$ 6BN for more than 35,000 investors.

Why invest in smart beta?

CLS believes that smart beta provides a performance edge and a better mechanism to manage risk. Smart beta portfolios are based on factor investing, such as value, momentum, etc., which some CLS portfolio managers have been researching as far back as the 1990s.

Prior to CLS's commitment to ETFs (pre-2001), CLS portfolio managers were generally constrained to a style box approach, which limited investments to active mutual funds. The lack of transparency and style drift from these funds required CLS to perform detailed due diligence on a more regular basis. ETFs, and particularly smart beta ETFs, provide CLS with precision tools to articulate its market views and achieve a set outcome more efficiently. The rules-based construction of smart beta also ensures CLS's portfolio managers remain disciplined and not vulnerable to emotion. Overall, CLS views smart beta as a way to access the essence of active management at a fraction of the cost.

How to invest in smart beta?

CLS performs factor-based analyses and risk budgeting to enhance risk management. Portfolio managers start with a strategic risk allocation and execute a flexible asset allocation approach to respond to changing risk levels in the market. CLS has recently invested in additional tools to actively assess various factors, including their expected returns and risk characteristics. Portfolio managers evaluate the strategies daily, though the typical holding period is still around two to three years with turnover ranging between 30-50%. When it comes to specific factor evaluation, CLS monitors relative valuations, relative momentum and other variables prior to implementation. While the magnitude of smart beta inclusion in portfolios can vary, more strategies are becoming explicitly tied to a factor-based approach.

CLS manages thousands of portfolios, and many have dramatically increased exposure to smart beta since the availability of ETF products and dedicated risk-based evaluations. Its average portfolio has approximately one-third allocated to smart beta, and CLS expects that number to rise. The portfolio and comments below provide a snapshot of the evolution of smart beta implementation within one of many CLS portfolios. This is a global equity portfolio that employs an 'aggressive' strategy that spans all market capitalisations.

FIGURE 30: USAGE OF SMART BETA ETFs: MARCH 2012 VS MARCH 2015



- CLS's smart beta ETF usage has nearly quadrupled since 2012 (as a percentage of holdings).
- Historically, CLS's usage of smart beta ETFs consisted mainly of dividend-focused funds and revenue-weighted products.
- CLS's current smart beta usage expands to factors, equal weighting, dividend weighting, etc. as ETFs that focus on exposure to individual factors become available.

Source: CLS Investments.

KEY INSIGHT: Smart beta strategies can be used in portfolios to implement investment views, get more out of beta, replace and/or complement active strategies or manage factor exposure.

Smart beta beyond equities

The focus on smart beta strategies over the past few years has spurred research and the design of products that seek to improve results in a transparent and rules-based strategy. Most product development and client implementation has been in long only equities, but one can apply this approach to other asset classes as well. While it is likely that equity-based smart beta will continue to grow and advance, other asset classes, including fixed income and commodities, present opportunities for innovation too.

Fixed income smart beta

Throughout the three-decade bull market in bonds, cap-weighted fixed income indices have generally delivered high risk-adjusted returns and provided an important counterbalance to equity market risk. As the bull market appears to be coming to an end, investors are increasingly concerned about managing exposures to the common risk factors that drive returns for bond portfolios.

The risk and return of broad fixed income indices can be largely explained by two risk factors: interest rate risk and credit risk. In addition, there are marketstructure phenomena in fixed income that create potential opportunities; bond market investors often have set preferences regarding credit quality and term structure, resulting in a segmented market.

Building upon this understanding of the nature of risk and return in fixed income markets, this section examines how investors may be able to use smart beta techniques to construct more efficient alternatives. The various construction techniques can be grouped into three specific outcomes:

- better diversification
- improved risk-return profiles
- precision exposure to specific factors or market anomalies

As an illustration, the following demonstrates a way to diversify macro risk factor exposure. Historically, within broad-based indices such as the Barclays US Aggregate Index, interest rate risk has been the dominant factor by a wide margin, while credit spreads have contributed relatively little in terms of either risk or return. (See the left-hand bars of the two charts in Figure 31).

FIGURE 31: RISK AND RETURN OF BARCLAYS US AGGREGATE INDEX VS HYPOTHETICAL RISK-BALANCED STRATEGY



Source: Barclays and BlackRock. Charts based on the monthly returns of the Barclays US Aggregate Index and the 'risk balanced strategy' from January 2010 to March 2015. Past performance is not a reliable indicator of future performance. Left chart: the risk is measured by 24 realised volatility (annualised) averaged over the last five years. Index performance is shown for illustrative purposes only. One cannot invest directly in an index.

One approach to increase diversification would be to balance credit and interest rate risk. This can be achieved by re-weighting the underlying components of the Barclays US Aggregate Index. To test the effectiveness of this approach, we decompose the risk and return of the hypothetical risk-balanced strategy by identifying the contribution coming from interest rate exposure and the contribution coming from credit spread exposure. (See the right-hand bars of the two charts in Figure 31). In Figure 32 we provide the performance comparison of the risk-balanced strategy to the Barclays US Aggregate Index. The returns are very similar, but with less volatility and a higher yield to maturity.

FIGURE 32: PERFORMANCE COMPARISON BETWEEN BARCLAYS US AGGREGATE INDEX AND HYPOTHETICAL RISK-BALANCED STRATEGY

	Return	Volatility	Return over volatility	Yield to maturity
Barclays US Aggregate Index	6.0%	3.6%	1.7	2.1%
Risk Balanced Strategy	5.8%	2.6%	2.2	2.8%

Source: BlackRock and Barclays. Figures calculated over the period from December 1991 to March 2015. Returns and volatility are annualised. Yield to maturity is as of March 2015. Index performance is shown for illustrative purposes only. One cannot invest directly in an index.

Given the current macroeconomic environment, and the prospect for an extended period of rising interest rates, many investors are seeking more diversified and factor-aware approaches to fixed income investing. While smart beta represents a relatively new approach to fixed income investing, this area of research may help investors address many of their most pressing needs.

Commodities

Commodities offer diversification benefits as well as some inflation protection. Commodity exposure is mainly achieved through rolling positions on futures contracts because of various complications of trading them physically. This investment approach has an impact on the total return of the position, which can be broken down into three components:



These are important aspects that should feed into index construction along with various other considerations such as:

- which commodities to include
- weighting methodology
- maturity and contract schedule

The first generation of commodity indices, such as S&P GSCI, as well as the Bloomberg Commodity Index allocate to a broad set of commodities and consider characteristics such as quantity of production as well as liquidity of contracts for selection and weighting. While this approach provides broad exposure to the commodities market, it leaves investors vulnerable to certain important features such as negative roll yield because of the persistent headwind that results from rolling future contracts. Second generation indices include specific features that reduce the impact of negative roll yield, look to capture wider futures curve exposure via investments across multiple maturities, use modified rolling windows and modified contract schedules as well as capture seasonality effects (certain commodities exhibit strong seasonality due to supply and demand dynamics).

FIGURE 33: PERFORMANCE ANALYSIS OF COMMODITY INDICES



	Bloomberg Roll Select Commodity	Bloomberg Commodity Index
Return	6.49%	2.75%
Volatility	13.95%	14.91%
Return over volatility	0.47	0.18
Max drawdown*	-51.93%	-60.19%

Source: Bloomberg. Data as of 31 January 1991 to 31 July 2015. Past performance is not a reliable indicator of future performance. * Max drawdown is the peak-to-trough decline during a specific period of an investment.

> Figure 33 shows an example of a first and second generation commodity index, the Bloomberg Commodity Index and the Bloomberg Roll Select respectively. The risk and return profile of the Roll Select strategy has been superior over the time period considered. This has been achieved by adding a rule in the methodology that considers the roll yield of contracts that are further out on the futures curve and selects the highest yielding one.

As with other asset classes, in commodities it is important to understand the drivers of risk and return. We have highlighted some of the important factors such as roll return, liquidity, and seasonality. More advanced factor strategies may employ a long/short approach to hedge certain risks and capture desired factors in a more targeted manner.

Smart beta research will continue to develop, seeking more dynamic ways to isolate risk factors. While equity smart beta currently captures the majority of assets, smart beta across other asset classes may prove the most ground-breaking developments in years to come.



KEY INSIGHT: Factor investing is not confined to equity factors. Smart beta strategies are being developed across asset classes.

"Understanding a portfolio's drivers of risk and return allows investors to be more informed and to develop more optimal portfolios to seek higher returns. Initially, factor investing was a tool for institutional investors with access to sophisticated investment models. Smart beta strategies now make this investment style affordable and accessible to every investor."

Andrew Ang, PhD Head of BlackRock's Factor Based Strategies Group



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BlackRock would like to thank those who have generously shared their insights for this guide:

MSCI Inc.

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