The Six Sins of Smart Beta

Jason Williams, Senior Vice President, Portfolio Manager/Analyst

Smart-beta funds, often heralded as a new frontier in passive investing, have rapidly grown in popularity over the past several years, with investors seeking to access persistent drivers of returns in an efficient and low-cost way. Smart-beta strategies tend to closely mirror benchmark indices, but seek to generate above-market returns by weighting stock positions differently based on certain factors. Broadly speaking, investors have been attracted by the outperformance of valuation, momentum, quality, and low-risk investment styles (Exhibit 1) that typically arise from investors' behavioural biases. Such strategies tend to employ a long-only, single-factor approach within a single asset class, typically equities, and are systematically implemented and rebalanced to maintain the factor exposure.

Academic studies have shown that consistent anomalies persist in the market owing to how investors price certain stocks. Smart-beta strategies seek to exploit these anomalies in order to outperform the broader market, and have amassed a strong following as investors try to capture this "low hanging fruit".

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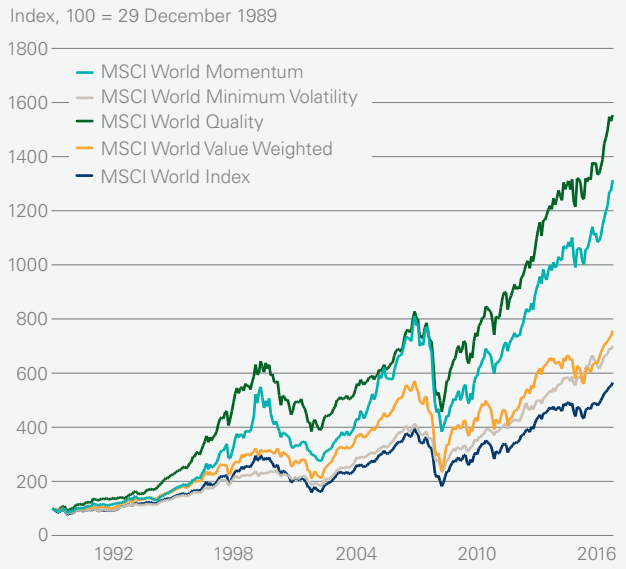
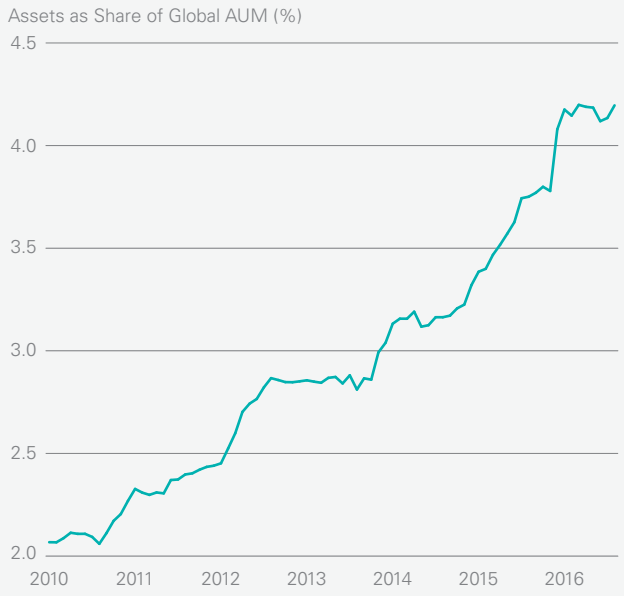
Exhibit 1
Smart-Beta Factors Capture Market Anomalies to Drive Outperformance



As at 31 July 2017
Source: MSCI

Exhibit 2
Smart-Beta Assets Have Proliferated



As at 31 July 2017
Source: Bernstein

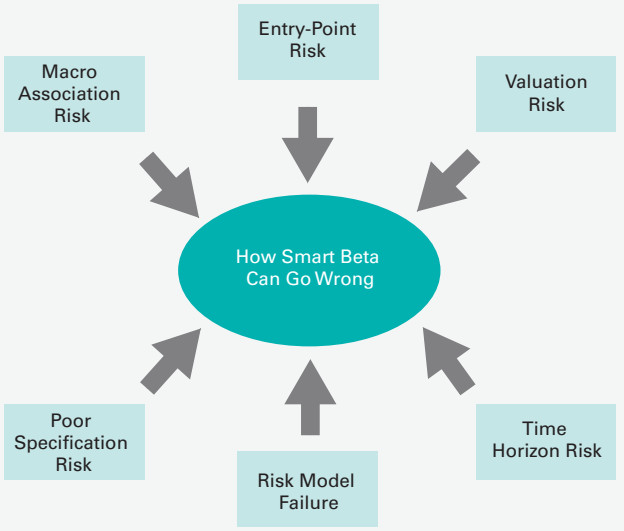
For more than a decade, capital has principally been allocated to value and low-volatility products. More recently, there has been a proliferation of smart-beta products targeting, among others, momentum, quality, income/yield and size exposures. This has led to a sharp rise in assets invested in an expanding universe of smart-beta exchange-traded funds (Exhibit 2).

Concerns about market fragility have arisen from the potential for "mechanical herding" to occur, particularly during periods of financial market stress or excessive market enthusiasm around a particular investment style. Given the abundance of smart-beta products, negative feedback loops could occur that exacerbate market moves and trigger a systematic market selloff that could potentially leave investors exposed to steep losses. In addition, as more capital chases after the same sources of returns, the excess returns available from these sources are likely to be diminished. Some investors currently argue that smart-beta flows are distorting market pricing and leaving subsets of the market trading on extremely rich valuations. Their view is that proven factors such as value, low volatility, and momentum will become riskier or more volatile in the future and offer a smaller risk premium over and above the equity risk premium. In other words, such strategies risk being a victim of their own success, and could potentially leave investors facing huge losses.

In this paper, we focus on six specific risks (Exhibit 3) that could undermine a smart-beta strategy and detail the environments in which particular smart-beta strategies are more likely to underperform.

The common denominator across all six risks is that an investor could ultimately suffer sizeable drawdowns relative to the market. The correction could be quick and sharp or more drawn out, leading an investor to abandon that particular smart-beta strategy.

Exhibit 3
Six Sins of Smart Beta



For illustrative purposes only.
Source: Lazard

Entry-Point Risk

The point at which a smart-beta product is adopted is critical in determining the likelihood an investor realises positive excess returns versus the market. Entry-point risk can have a marked impact on returns when investing in a momentum strategy which, in its simplest form, entails buying companies that have performed well and selling companies that have performed poorly.

Active returns from a momentum factor tend to be above zero for long periods (Exhibit 4). However, episodic "momentum

crashes" that deliver substantial drawdowns do occur. If an investor allocated capital to a momentum strategy just before one of these crashes, they would likely be shocked by the severity of the underperformance. Interestingly, these "crashes" are not entirely random in nature. To illustrate this, we measure the returns to high-risk stocks and assess this against momentum returns.

Momentum crashes tend to occur when the correlation of returns to high-risk stocks and returns to momentum are extreme and negative (Exhibit 5). These are times when investors shun high-risk stocks. At this point, momentum stocks carry an extreme beta discount to the market as investors become highly risk averse, strongly preferring stocks that offer better downside protection. What typically follows is a sharp reversal of risk aversion and a sudden change of leadership in the market, resulting in a market shake-out for momentum investors.

Valuation Risk

Valuation risk can broadly be defined as the risk of an investor buying an expensive portfolio, in effect locking in poor future returns. We have witnessed this with high-quality companies. Since the global financial crisis, there has been a general preference for high-quality companies that are able to grow their earnings in a lower-growth environment. Such companies are often regarded as defensive plays that are better positioned to weather a further deterioration in economic conditions, should they occur, given their strong business models. Over the past two decades, returns from quality—as measured by the MSCI Quality Index—have been extraordinary in relation to other popular factors (Exhibit 1).

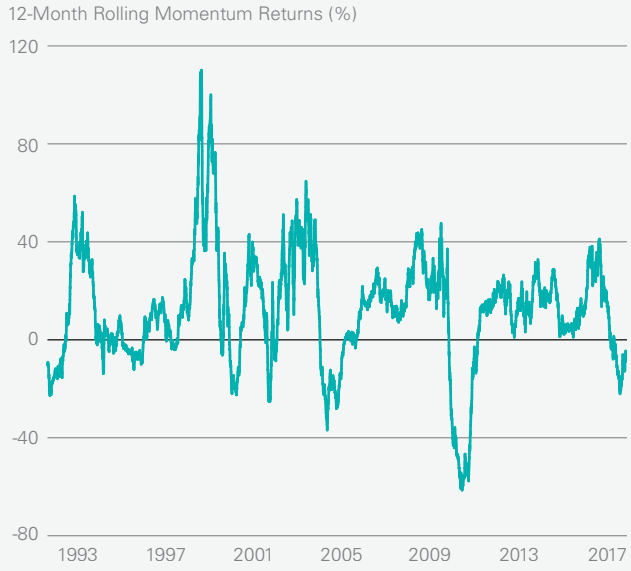
This quality bias has pushed valuations of high-quality companies to levels rarely seen in the past. Rising valuations suggest that expected returns from investing in high-quality companies in general are likely to be significantly eroded (Exhibit 6).

For each month, we compared the median price-to-earnings ratio and price-to-book ratio of the companies in the top 20% of stocks ranked by return on equity (ROE), relative to the broad market. This tells us whether high-ROE companies are trading at a discount or premium to the market in any given month. We then ranked these monthly results from cheapest (discount) to most expensive (premium). Next, we calculated the 12-month factor return for ROE in each instance, sorting the results into five return quintiles and calculating the average 12-month forward factor return within each quintile of returns. We arrived at two important observations:

- The forward factor return for ROE worsens as its valuation increases.
- As of the end of May, ROE traded at an extreme valuation. The premium versus the market as measured by price-to-earnings currently stands at 10%, while for price-to-book the premium is 187%. Our analysis suggests the return from this quality factor is more likely to disappoint over the next 12 months.

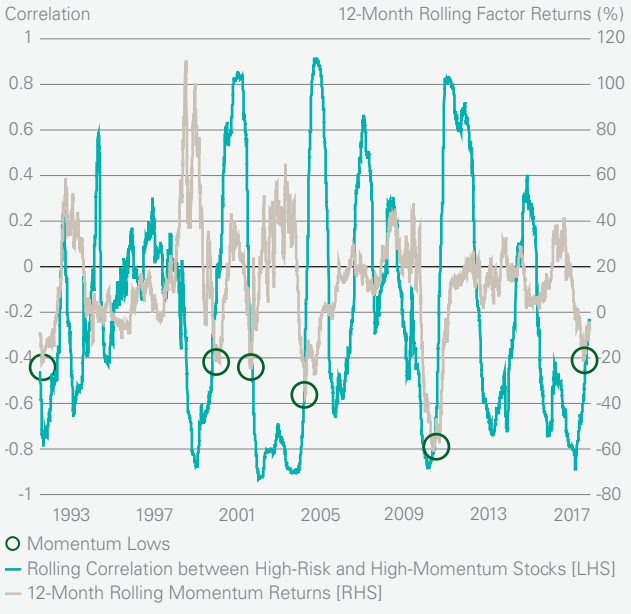
Similar to entry point risk, this raises questions about factor timing. If an investor is making a significant single-factor allocation, they should first examine the valuation of the factor portfolio.

Exhibit 4
Momentum Strategies are Subject to Sudden, Sharp Underperformance



As at 18 April 2017
Momentum returns (as defined as 12-month total stock return) are calculated by cumulating daily quintile spreads over rolling 12-month periods.
Source: Lazard, FactSet

Exhibit 5
Momentum Crashes Are Closely Tied to Risk Aversion



As at 18 April 2017
Source: Lazard, FactSet

Time Horizon Risk

Time horizon risk is the risk of a prolonged drawdown. We examine this in the context of the four most popular factor exposures.

This risk occurs when an investment is made in a smart-beta vehicle at a time when the economic environment is not conducive to that particular style of investment. Consequently, an investor may face the difficult decision of whether to maintain or abandon a single-factor strategy that has, up until then, a history of success.

There is potential to generate strong long-term alpha from these four factors, as illustrated by simplistic MSCI smart-beta tilted indices (Exhibit 7). Furthermore, the table shows the impact of poor entry/market timing when a particular style was out of favour, and how long an investor might have to wait to realise alpha. In some cases, it takes a significant amount of time.

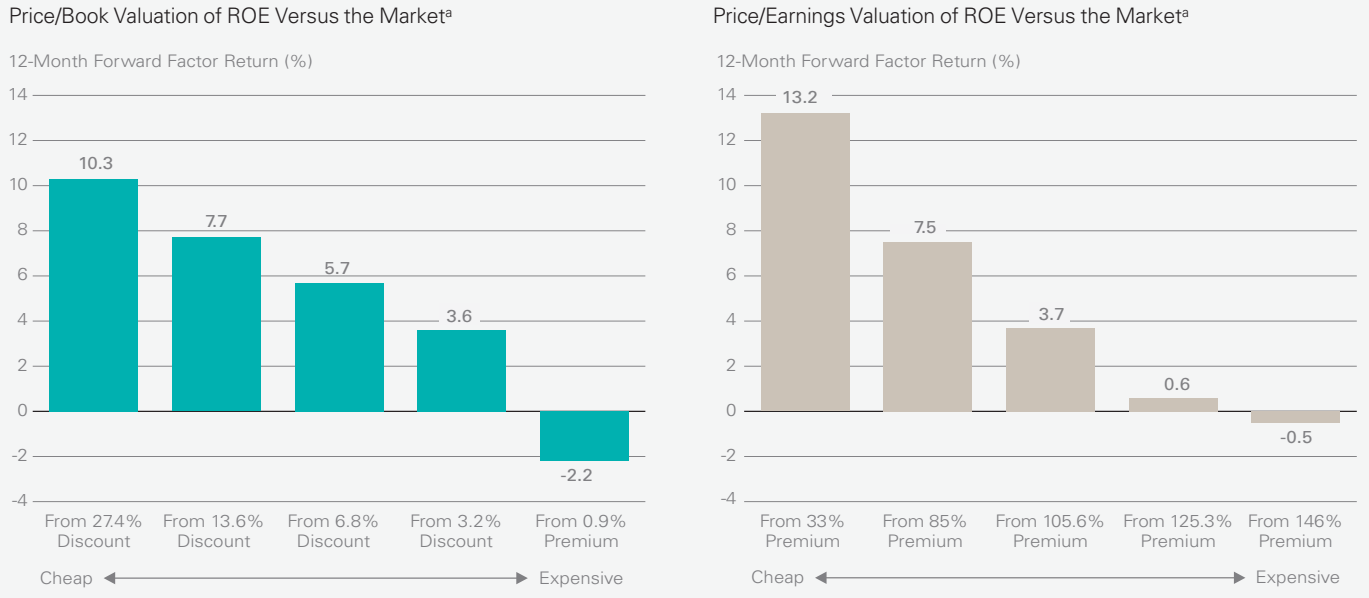
The table also shows the proportion of three-year periods—a typical time horizon against which strategies are evaluated—in which an investor suffered a negative return. Depending on the style of investment, negative three-year returns ranged from 19% to a staggering 47% of the time. At its worst, the longest drawdown in active returns (i.e., returns of the factor versus the market return) was nearly 12 years for a minimum volatility approach and 10 years for value. It is easy to see why investors might choose to throw in the towel.

Risk Model Failure

A frequent criticism of quantitative investment approaches is their use of, and reliance on, risk models. Concerns are usually centred on risk models' reliance on:

- Controlling macro exposures: This often introduces trades that are risk driven rather than return driven, making the portfolio and its construction less transparent and more difficult to understand

Exhibit 6
Forward Factor Returns Diminish as Valuations Become Stretched



As at 31 May 2017

a Valuation of return on equity (ROE) is calculated by taking the median stock as ranked by P/E or P/B within the top 20% of stocks as ranked by ROE. Forward factor return is the average forward monthly quintile spread return over a 12-month period multiplied by 12 within each of the five buckets. Period: Dec 1989–May 2017

Source: Lazard, FactSet, Standard & Poor's

Exhibit 7
Active Return Statistics, MSCI Factor Indices Versus the MSCI World Index

MSCI Factor Index vs. MSCI World	MSCI World Momentum	MSCI World Value Weighted	MSCI World Quality	MSCI World Minimum Volatility
Active Returns (%, annualised)	3.30	1.13	3.96	0.83
Periods of 3-Year Negative Relative Returns (%)	23.60	40.70	18.90	46.80
Longest Drawdown in Active Returns (Years)	7.9	10.1	8.8	11.8
Period	July 08–May 16	July 07–July 17	Nov 02–July 11	Nov 90–Aug 02

As at 31 July 2017

Source: Lazard, FactSet, MSCI

- Backward-looking data to build forward-looking forecasts: The reliance on historic data to calibrate exposure to macro factors, in both fundamental and statistical models, could give incorrect signals and underestimate risk

While the approach employed by risk models to calibrating and measuring stock risk is highly effective in most market environments, there are instances where these models fail. Risk model failure is important to understand as it could result in the underestimation of a portfolio's exposure to a sudden reversal of a particular macro risk factor, or an oversized stock position that does not reflect the stock's inherent risk.

First, we consider the rolling three-month standard deviation of returns for Brent crude oil and the Japanese yen/US dollar (JPY/USD) spot rate (Exhibit 8). In both instances, we highlight periods of benign volatility. During these periods, risk models calibrate stock betas and correlations to these two risk factors. In each instance, the low volatility of each risk factor ended abruptly and a "volatility crash" ensued. For the JPY/USD spot rate, the catalyst was the advent of Abenomics in Japan in 2012. For Brent crude, it was the oil price crash at the end of 2014. Risk models and stock exposures would have been caught on the wrong foot by these new regimes. Meanwhile, the recalibration of risk models to the new environment could potentially span several months.

Our second example is stock specific and seeks to illustrate how unintended risks can occur when risk models attempt to size stock positions in proportion to its expected volatility.

The turquoise line is the beta of a UK-listed company, as predicted by a popular risk model using risk and correlation data and the green and beige lines show the 3-year and 12-month realised beta, respectively (Exhibit 9).

The Axioma model accurately estimated the average beta; however, that average masks some large discrepancies where in the early years the stock had a much lower beta and, after the financial crisis, when it was much higher. Of particular interest is what happens to the beta of this stock during a period of market dislocation, specifically, following the United Kingdom's Brexit vote. The true cyclicality and riskiness of the stock is exposed in a dramatic fashion and sharply diverges from what was predicted by the risk model.

Poor Specification Risk

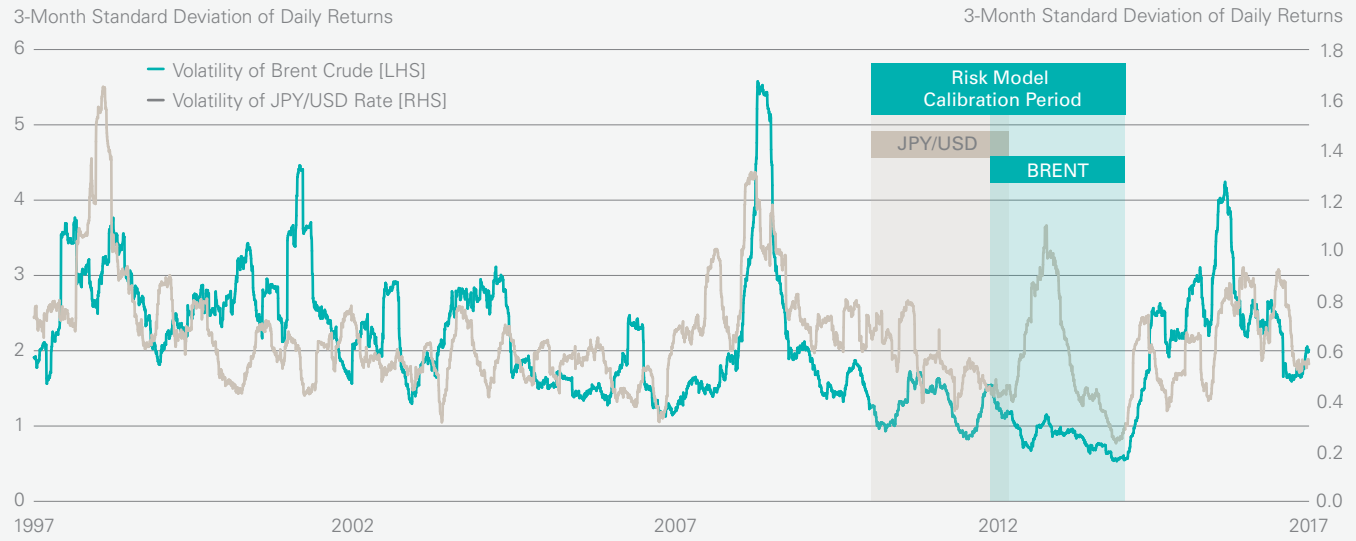
Specification risk captures the importance of the investment metrics an investor uses to represent a factor exposure. Using different investment metrics can lead not only to differing patterns of returns, but also significantly different levels of alpha generation. Choosing just a selection of value metrics that have historically performed the strongest is not necessarily the best route to constructing a robust and desirable value factor.

Defining and combining investment metrics should involve, among a number of important considerations, an in-depth analysis rooted in robust processes that fully appreciates:

- The investment nuances of the ratio or metric
- The reliability and consistency of the pattern of returns it offers
- Its association with macro risk
- Its upside/downside capture

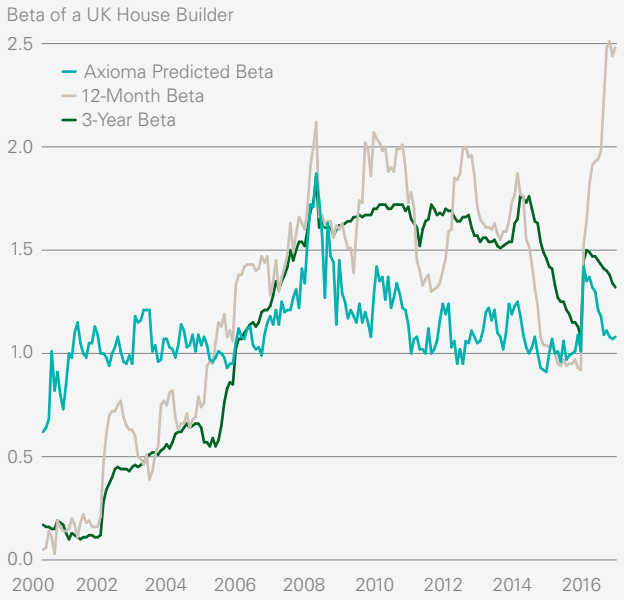
To highlight the importance of this, we show the long-term cumulative factor return of Lazard's proprietary advantage value factor compared to the returns generated by a value factor comprised of an equally weighted combination of four investment metrics. Interestingly, these return series are 84% correlated, but generate significantly different long-term performance (Exhibit 10).

Exhibit 8
Volatility Crashes Can Wrong-Foot Risk Models



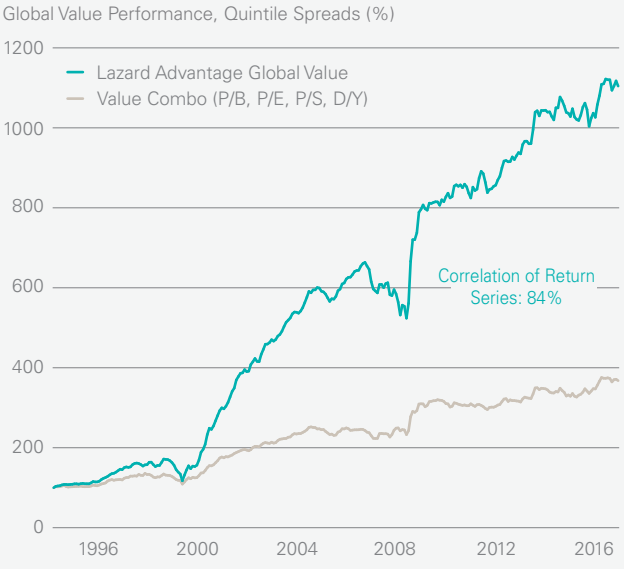
As at 24 July 2017
Source: Lazard, Bloomberg

Exhibit 9
Risk Models' Fallibility when Calculating Stock Beta



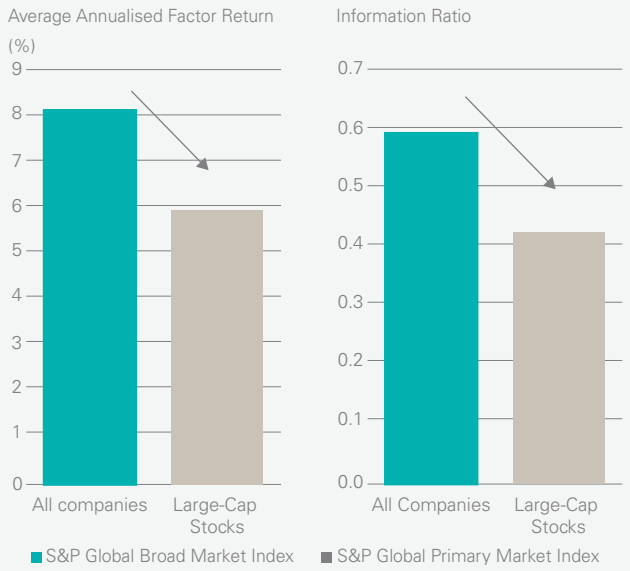
As at 31 May 2017
Source: Lazard, Axioma, FactSet

Exhibit 10
The Importance of Investment Metric Selection



As at 31 July 2017
Source: Lazard, FactSet

Exhibit 11
Large-Cap Stocks Exert Less Influence in Back-Tested Results



As at 31 May 2017
Source: Lazard, FactSet, Standard & Poor's

We also look specifically at the factor performance (calculated as the average returns to momentum, value, quality, and low volatility factors) of large-cap stocks against factor returns of the entire market (Exhibit 11). The chart demonstrates that returns, absolute as well as risk-adjusted returns, fall substantially when liquidity is taken into account.

This highlights a risk that is familiar to many asset owners already—the extent to which performance is dependent on the alpha generated by smaller companies owing to greater market inefficiencies. Institutional investors are often mandated to invest in liquid portfolios. As such, portfolio performance will largely be determined by the alpha generated by large- and mid-capitalisation stocks, and not in the long tail of small-cap stocks which often dominate in simulated back-tests. Research can lead to an improvement in the delivery of alpha in large-cap stocks, but involves a move away from simplistic analysis of investment metrics to determine stock ranking.

Macro Association Risk

Macro association risk has become particularly prominent in the post-financial crisis era and can be defined as the impact of a macro outcome on factor or style performance. The correlation between factor returns and macro risk has risen while the alpha opportunity has often been compressed, perhaps as a rising level of capital has chased after similar factors. Equally, this relationship between factor returns and macro risk could be the result of the current regime of unconventional monetary policy, where economic fragility and stretched central bank balance sheets have conspired to tie stock returns more closely to macro risks. However, we believe that macro association risk can be managed, mitigated, or even neutralised, by adopting a more sophisticated approach to factor investing. The key is to understand where the risks are and how to manage them accordingly. We explore the instances where the post-crisis era has introduced a greater level of macro risk into the return pattern of common investment metrics.

Returns to ROE tend to be negatively correlated to movements in long-term US Treasury yields (Exhibit 12). Historically, falling US Treasury yields have coincided with economic slowdowns. High ROE stocks are often favoured in such an environment, as they tend to defend profits and pricing power better than other companies, even through market downturns.

At times when the correlation between US Treasury yields and returns to ROE—a measure of quality—are strongly positively correlated or strongly negatively correlated, the investor of a high-quality portfolio will be exposed to unintended macro risks. Currently, returns to ROE exhibit a strong negative correlation with movements in the US Treasury yield, and this highlights how vulnerable such strategies would be to a rise in interest rates. Monitoring the change in macro exposures is integral in determining the success of a rules-based strategy.

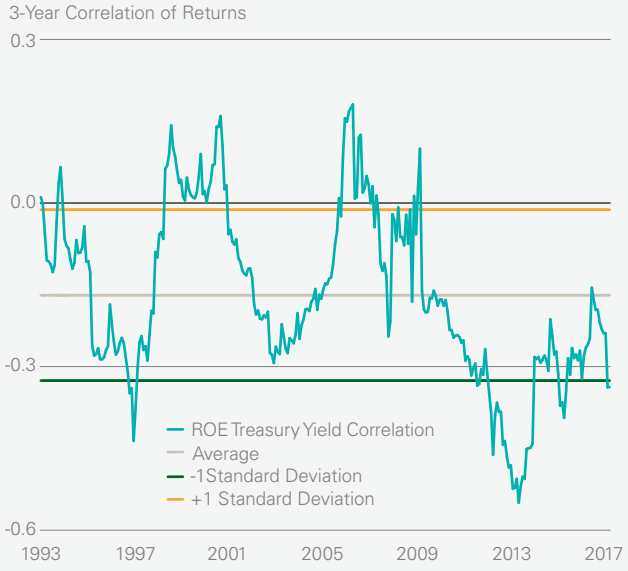
Furthermore, the relationship between macro risk and factor returns can differ substantially depending on the investment metrics used. To highlight this, we consider the relationship between earnings yield and default risk, which differs considerably depending on the valuation measure used to define earnings (Exhibit 13). There is a strong negative correlation between earnings yield and default risk when using historical earnings; however, the correlation becomes positive when calculating earnings yield using forward earnings.

The divergence—depending on whether you use forward or backward earnings to define your earnings yield—is likely rooted in the divergence between what is expected and what is realised. While forward earnings are merely an expectation, backward-looking earnings are a known fact, and therefore offer more certainty.

In the post-crisis era which "E" you use—given you might be thinking it would be more accurate or reflective of market expectations to use forward earnings—has the completely opposite returns profile when compared to returns to default risk. Forward earnings yield has shown a strong positive correlation with default risk, while backward-looking earnings yield has shown a strong negative correlation with default risk. This is borne out by the results to both investment metrics during the two major sell-offs of the last decade: the global financial crisis and the European financial crisis (Exhibit 14).

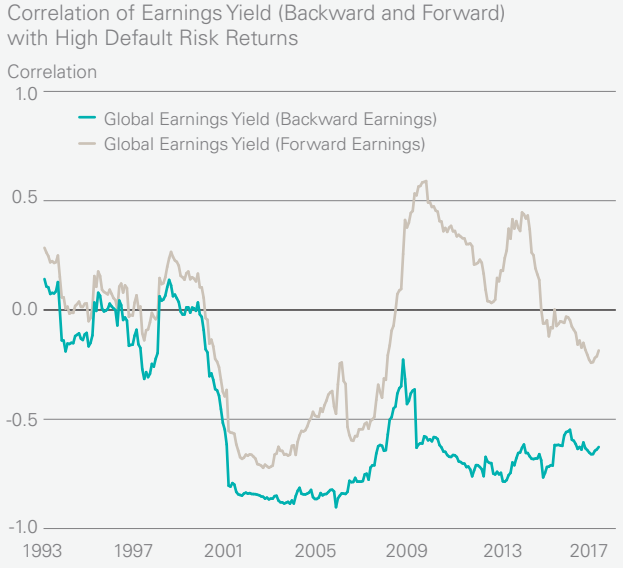
Backward-looking earnings yield outperformed in a falling market while forward-looking earnings yield underperformed in similar conditions. It is a staggering divergence that highlights the need to fully understand the return profiles and return patterns of the investment metrics used to construct a smart-beta portfolio.

Exhibit 12
Investment Factors That Have Implicit Macro Bets



As at 31 March 2017
Source: Lazard, Bloomberg, FactSet

Exhibit 13
Valuation Nuances Matter



Asat 31 March 2017
Default risk as calculated by the Merton Model
Source: Lazard, FactSet

Exhibit 14
Valuation Nuances Are Critical During Major Market Events

Earnings Yield and Default Risk Correlation Profiles during Financial Crises

		Global Earnings Yield (Backward Earnings) (%)	Global Earnings Yield (Forward Earnings) (%)
Global Financial Crisis	Average quintile spread 2008	20.70	-11.32
European Sovereign Crisis	Average quintile spread 9/11–12/11	23.04	-1.80

As at 31 March 2017
Source: Lazard, FactSet

Conclusion

We believe it is important for investors to be aware of the ways that smart-beta allocations could potentially lead to disappointing returns. In our view, smart-beta investing is far from being a small step in the evolution of passive investing, despite that typically being an investor's perception. The pursuit of generating consistent returns from investment anomalies entails significant research, market experience, and risk management expertise. When researching a naïve smart-beta strategy, evaluating the six risks we discuss could help an asset allocator move forward with greater confidence.

While quantitative investors have been exploiting the systematic market inefficiencies highlighted in our paper for years, we believe a deeply analytical approach is required to help asset owners avoid eroding or even erasing their capital wealth through the six sins of smart beta.

We believe it is possible to exploit factors that drive consistent, long-term returns. An overreliance on any one measure of risk and the choice of investment metric in expressing a factor are perhaps the most notable of the smart-beta investing risks we highlight. We believe success is within grasp for systematic investors, sound theoretical frameworks and careful implementation being key requirements. Multi-factor approaches represent a step further in this thinking and can help generate balanced return streams and these too are dependent on much of the same ingredients of success, namely robust research, expert risk management, and experienced perspective.