ESG INSIGHT

white paper

JANUARY 2014

A Responsible Investment Approach to Smart Beta Equity Investing

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A Responsible Investment Approach to Smart Beta Equity Investing

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Special thanks to Luisa Florez and Ben Gum for contributing to this work.

Over the past several years, both smart beta and responsible investment have garnered increasing attention from investors across the globe. Though seemingly unrelated, we believe the two trends signal a move by investors away from unintentional and often uncompensated risks associated with traditional index-tracking strategies. In this paper, we set out to determine to what extent these two approaches—smart beta and responsible investment—are compatible in practice. By constructing a backtested combined ESG SmartBeta™[1] portfolio, we demonstrate that the two approaches appear compatible, as judged by the portfolio's hypothetical risk/return and ESG profiles. The ESG SmartBeta portfolio can potentially offer investors the desired SmartBeta portfolio characteristics—lower total risk and higher return than the index along with improved diversification—and strong ESG performance.

[1] *SmartBeta™ and PowerRank™ are trademarks of AXA Investment Managers. SmartBeta® is a registered European Community trademark of AXA Investment Managers.*

Tandem Rise of Smart Beta and Responsible Investment

Over the past several years, both smart beta and responsible investment have garnered significant attention from investors across the globe. As at July 2013, more than USD 142 billion was invested in smart beta or alternative beta funds. Global SRI assets topped USD 13.6 trillion according to the Global Sustainable Investment Alliance by the end of 2012. We believe these trends, taken together, signal a move by investors away from unintentional risks related to traditional market capitalisation-based index-tracking strategies.

Though it is not the purpose of this discussion to recount the drawbacks of market cap-weighted strategies in great detail, it is our belief that passively invested market cap-weighted strategies fail investors by: 1) clinging to past winners; 2) assuming that the price of a stock is always a fair reflection of its true value; and, 3) not offering real diversification across names, sizes and sectors.

The increasing interest for both smart beta and responsible investment suggests that investors are indeed familiar with the shortcomings of market cap-weighted strategies and that they are more willing to consider a burgeoning set of alternative strategies. Broadly, we see this move by investors as a positive development as it provides investors the opportunity to break free from the herd mentality of benchmark tracking and thus make their own determinations about desired exposures, risks and expected return.

Redefining Smart Beta

Terms such as 'alternative' or 'intelligent' have been used to categorize indices that are not market cap-weighted. We believe that it is important for investors to distinguish—in fact, to completely separate—smart beta from discussions about indices. In this context, we have reinvented the concept of smart beta—defining it in a way that does not rely on blind index-tracking, but rather, uses active monitoring and intelligent construction designed to maximize the harvesting of equity market Beta (market return). It constitutes a grounded, practical philosophy that aims at offering a sensible way of reducing Beta erosion, emphasizing the pragmatism of fulfilling investors' objectives ahead of any other considerations. As such, we believe that a smart beta strategy should, by design, be constructed to overcome risks inherent in index tracking.

A smart beta strategy should incorporate guidelines for long-term equity market Beta harvesting which we initially introduced in our white paper, *Investing in Equity: Smart Beta or Dumb Beta?* as shown in Figure 1. As we have shown in that study, it is clear *ex post* that the returns of some equities fail to fully compensate the investor for the risks inherent in those stocks. Specific examples include stocks with high volatility or low earnings sustainability, which demonstrate higher volatility and offer a lower annualised return than the full equity universe, as shown in Figure 2. To the extent possible, these stocks are best avoided—which is clearly encapsulated by the first guideline for long-term equity market Beta harvesting, namely, avoiding exposure to poorly compensated risks.

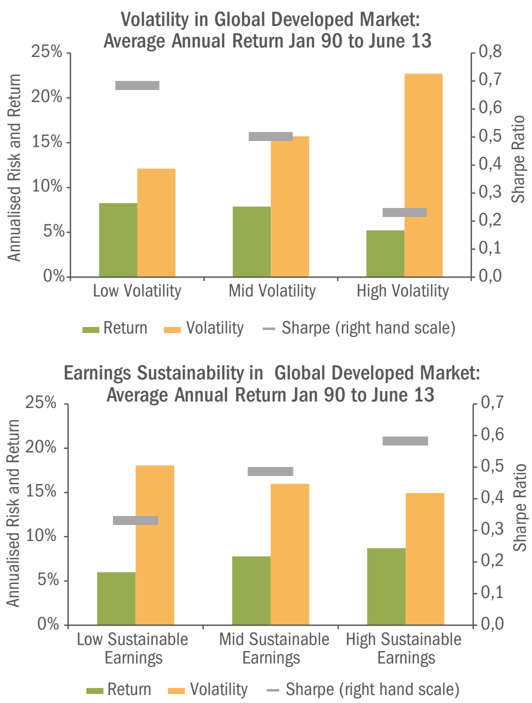
Figure 1: Guidelines for Long-Term Equity Market Beta Harvesting

1. Avoid exposure to poorly compensated risks.
2. Diversify intelligently.
3. Look to the future, not the past.
4. Reduce leakage from costs.

Extracted from "Investing in Equity: Smart Beta or Dumb Beta?" available on axa-im.com.

The surge in interest for both smart beta and responsible investment suggests that investors are indeed familiar with the shortcomings of market cap-weighted strategies

Figure 2: Equity Prices Do Not Always Fully Compensate Investors for Inherent Risk



Source: AXA Rosenberg (Exhibit created September 2013). Volatility is based on a proprietary AXA Rosenberg measure that combines beta and stock specific risk. Earnings Sustainability is based on a proprietary AXA Rosenberg measure of earnings sustainability: Low = bottom 30%, Middle = next 40%, High = top 30% of MSCI World names within each region globally each month. Volatility and Earnings Sustainability data was not captured in real time during the relevant timeframe and was recreated in July 2013. Buckets formed with square-root of market cap weights - not controlled for small cap bias nor investability. Average annualised compound returns and volatility calculated between from January 1990 to June 2013. Returns do not include transactions costs and are gross of fees.*

Responsible Investment and Smart Beta: a natural fit

The bridge between responsible investment and smart beta investing lies in the philosophical aversion to poorly compensated risks. Whereas smart beta takes a direct approach—meaning, it relies on pure financial measures—responsible investment takes into account a broader range of measures regarding a company's activities, in addition to the impacts on stakeholders and surrounding environment. In essence, responsible investment covers a range of investment strategies which integrate environmental, social and corporate governance (ESG) considerations into financial analysis and decision-making.

ESG risks may directly relate to a company's activity or strategy and have the potential to negatively impact a firm's reputation, operating performance or share price performance. Given the nature of ESG risks, the possible negative consequences can prove detrimental to both the company in question and society at large. Looking at the philosophical foundations of smart beta and responsible investment, the ESG approach appears to be a natural fit with the idea that investors should avoid uncompensated risks.

Managing Multiple Objectives

The main challenge in combining smart beta and responsible investment stems from the fact that each approach corresponds to a different objective. To date there is little academic research on the incorporation of ESG considerations into smart beta strategies, which may partially be explained by the speed in which ongoing advances are being made on both fronts. From a practitioner's perspective, we encounter many institutional investors that express interest in smart beta strategies but are mindful of the often explicit requirements to include ESG factors as part of a stated investment policy. In order to address this challenge, we set out to construct an investment strategy that successfully meets the guidelines for long-term equity market Beta harvesting and that explicitly considers ESG factors. Doing so offers a live test meant to demonstrate the extent to which smart beta and responsible investment are compatible in practice.

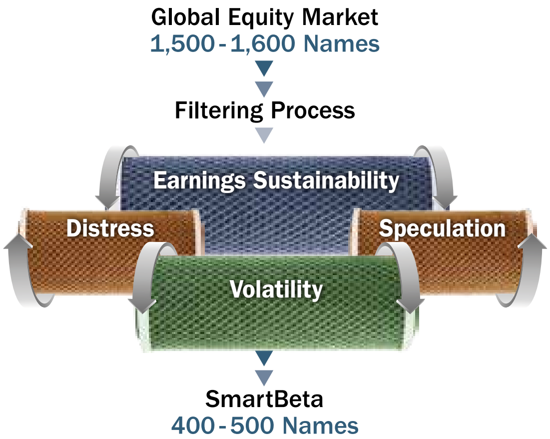
Methodology

The first step in building a combined ESG smart beta strategy is to create an initial 'vanilla' smart beta portfolio in the form of the AXA IM SmartBeta Equity strategy. This strategy aims to capture equity market Beta more efficiently while avoiding full participation in speculative bubbles and exhibit less extreme drawdowns during market shocks. This is achieved via three building blocks: filtering, diversification and implementation.

Filtering

For a global SmartBeta portfolio, all stocks in the global equity universe pass through four filter categories (1) earnings sustainability (2) volatility (3) speculation (4) distress, as shown in Figure 3. The objective of filtering is to reduce exposure to sources of uncompensated risk by reducing exposure to equities with low earnings sustainability and high volatility while also avoiding stocks that may be subject to 'tail risk' events through the speculation and distress filters.
A significant number of stocks in the starting universe are typically filtered out entirely by this process. Some companies 'partially pass' through the filter process, which allows final portfolios to retain a reduced exposure to equities that have some desirable features while also reducing turnover cost. The filtering process is a fundamentally-anchored weighting scheme that aims to reduce exposure to uncompensated risks.

Figure 3: Rules-Based Filters Reduce Exposure to Uncompensated Risks



Source: AXA Rosenberg as at December 2013.

Diversification

Capitalisation-weighted indexes, by definition, have the bulk of their investment in the largest names in a given market. While concentration risk may be more or less significant at different periods in the market cycle, we believe that the capital allocated to the mega cap stocks may be better invested elsewhere in the capitalisation spectrum. We diversify the strategy by applying the AXA Rosenberg PowerRank™ methodology.

This transparent methodology applies a greater level of diversification to the largest stocks (by market capitalisation) that progressively lessens as companies get smaller. The anticipated effect of applying PowerRank is a weighting scheme that aims to deal with the problem of high concentration in larger companies that can be present in traditional market-capitalisation weighted indices, while avoiding the liquidity risk introduced by many alternative weighting schemes.

The final SmartBeta portfolio

The vanilla SmartBeta Equity portfolio is formed by holdings stocks in weights implied by the fundamental filter process and the diversification processes. The resulting backtested portfolio currently exhibits lower Beta and lower total volatility than a cap-weighted index, as well as higher exposure to return on equity (ROE) and net income thanks to the focus on sustainable earnings. The portfolio is also less concentrated than the cap-weighted index by virtue of the PowerRank step.

Looking at the philosophical foundations of smart beta and responsible investment, the ESG approach is a natural fit with the idea that investors should avoid uncompensated risks.

Apply ESG Filter

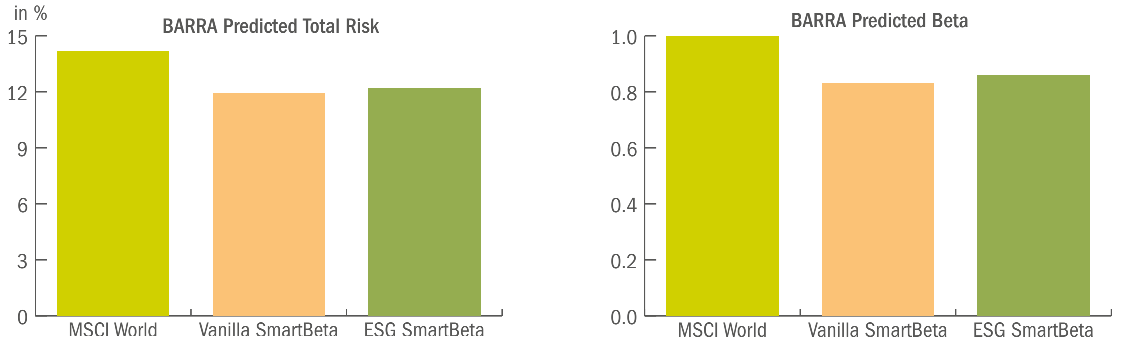
Next, we adjust the weights of the vanilla SmartBeta portfolio to form an ESG SmartBeta portfolio using each stock's ESG score derived (0 to 10 scale) from nearly a dozen data points set out in Figure 4.

Starting with the companies held in the vanilla SmartBeta portfolio, those with low aggregate ESG scores (score below 3) or several low sub-scores (sub-scores below 3) or flagged for controversies are excluded. Firms considered 'worst-in-class'—e.g. those in the lowest ESG score quartile within their sector—are also excluded. The remaining names (80% of the initial SmartBeta holdings) are all `best-in-class' in their respective sectors in terms of ESG score and thus qualify for inclusion into the ESG SmartBeta portfolio. Top ESG score firms are up-weighted in the final ESG SmartBeta portfolio. In this way, the ESG scores are used to adjust the holdings and weights of the vanilla portfolio. The ESG filter determines the final ESG SmartBeta portfolio. In the next section, we examine the impact of the ESG considerations on the portfolio including their effect on performance.

Figure 4: Company ESG Scores Rely on Nearly A Dozen Data Points

Category	Subfactors	Details
Environment	Environmental risks	▪ Pollution prevention and control ▪ Protection of biodiversity ▪ Waste ▪ Management of local pollution ▪ Minimizing of environmental impact from energy use ▪ Management of atmospheric emissions
Social	Health & safety	▪ Health & safety programs, injury rates, auditing procedures, performance, and absenteeism.
	Restructuring	▪ Company's commitment to inform and consult employees, to implement measures to prevent or limit redundancies and conflicts with trade unions.
	Relationships with customers and suppliers	▪ Management of customers information, marketing practices and responsible contracts ▪ Management of integration of social and environmental risks in the supply chain
Governance	Audit, control & financial disclosure	▪ Company commitment to establish effective risk management systems, ensuring the quality of internal reporting and the extent to which this commitment is reflected in financial information provided to the public.
	Controversies factor	▪ Corporate behaviour, business ethics, litigation and regulatory infractions.

Figure 5: Total Risk and Predicted Beta



The information set forth above is based on hypothetical backtesting and is not an actual portfolio reflecting actual past performance or characteristics and does not represent actual, current recommendations. Potential Investors are strongly urged to review the disclaimers presented at the end of this paper. Information presented is only for the use of Institutional Investors. Please note that the information provided herein relates to a timeframe when the strategy was not available for investment. All returns are shown gross, USD. Source: AXA Rosenberg, AXA INVESTMENT MANAGERS, BARRA. Exhibit created December 2013.

Analysis of Portfolio Characteristics

To directly analyze the impact of the ESG considerations, we perform point-in-time analysis on the ESG SmartBeta portfolio and compare it to both the vanilla SmartBeta portfolio and to the MSCI World Index. Our definition of success will be an ESG portfolio that exhibits the desired SmartBeta portfolio characteristics (e.g. lower total risk than the index, improved diversification) while also showing improvement along dimensions of ESG integration. Figure 5 shows the predicted total risk and predicted Beta for the two backtested SmartBeta portfolios and for the index at February 2013.

Relative to the MSCI World Index, both backtested SmartBeta portfolios had lower predicted total risk and lower predicted Betas. These are important

Figure 6: Selected Equity Characteristics

February 2013	MSCI Index	Vanilla SmartBeta	ESG SmartBeta	
Earnings Sustainability	0.52	0.56	0.58	Sustainable Earnings Growth
Historical Beta	1.00	0.74	0.79	Volatility Measures
Historical Sigma	0.23	0.19	0.20	

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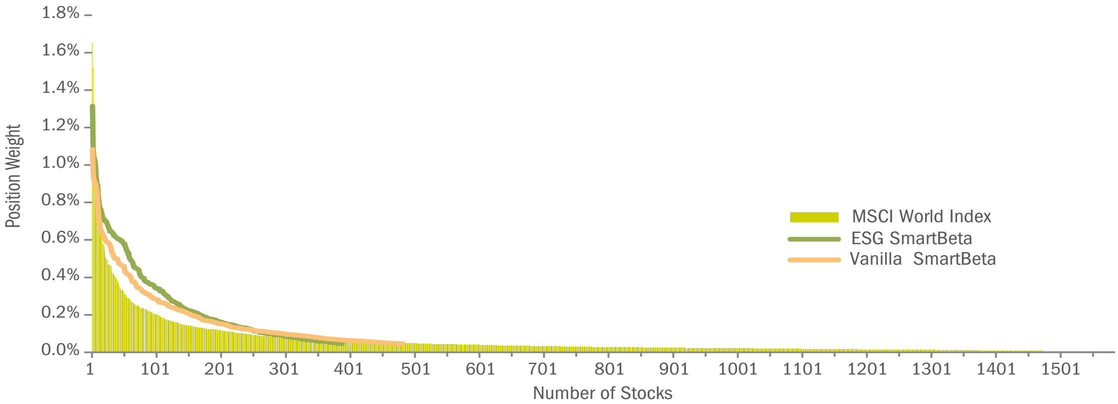
hallmark characteristics for SmartBeta as they are consistent with the observation that investors are not always sufficiently compensated for higher volatility. But what about other measures?

As shown in Figure 6 we see an improved Earnings Sustainability score for each of the SmartBeta portfolios relative to the index, and the additional confirmation that the portfolios would have indeed been lower risk than the index by virtue of lower historical Beta and historical sigma (specific stock variance) statistics.

With respect to concentration risk, Figure 7 above confirms that both of the SmartBeta portfolios are less concentrated in a handful of mega cap names than the MSCI World Index. As mentioned above, this is to be expected as it is a direct result of the PowerRank diversification step. While the ESG scores do push the ESG SmartBeta portfolio back into some additional exposure to the mega cap names, both SmartBeta portfolios effectively diversify away from the largest index names (in whole or in part), shifting portfolio capitalisation into the large and midcap names. Along the summary measures of volatility, Earnings Sustainability, and diversification, the ESG SmartBeta portfolio passes the test. By looking at both economic sector and country exposures, the effects of the ESG integration become more apparent.

Figure 7: Comparison of Portfolio Market Capitalisations



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The tandem rise of smart beta and responsible investment signals a move by investors away from unintentional risks associated with traditional index-tracking strategies—revealing a greater willingness to make their own determinations about desired exposures, risks and expected return.

Sector Exposure

Figure 8 provides an overview of the sector exposure for each of the three portfolios. The top three sectors in terms of portfolio exposure for the ESG SmartBeta portfolio are, in order, Consumer Staples (17%), Healthcare (16%) and Financials (14%). For the vanilla SmartBeta portfolio, the top three sectors include Consumer Staples (18%), Health Care (15%), and Industrials (13%). The top three sectors in the MSCI World Index basket are Financials (21%), Information Technology (12%) and tied for third place, Consumer Discretionary and Industrials (11%).

Relative to the MSCI World, the vanilla SmartBeta portfolio is weighted much more heavily toward Consumer Staples, Healthcare and Utilities. It holds significantly less exposure than the Index to Financials, Energy and Information Technology.

The most significant impact of the additional ESG filters, in terms of sector allocation relative to the vanilla SmartBeta positioning, are further decreases in the Energy holdings as well as reduced exposure to Consumer Staples. The former are driven by ESG concerns often involving controversies, while the latter are often associated with issues around customer relationships and supply chain management. On the flip side, the ESG filter puts weight back into Financials, Healthcare and Information Technology. These sectors are not as strongly exposed to the ESG risks that we examine.

Figure 9 provides a detailed look at the companies screened out by the ESG filter according to sub-score and overall company ESG score. These are firms with low aggregate ESG scores or more than one low sub-score or those that have been flagged for controversies: they 'fail' the ESG filter. Firms considered 'worst-in-class'—e.g. those in the lowest ESG score quartile in their sector—are also excluded from the ESG SmartBeta portfolio.

This chart shows, for example, that the Energy sector makes up 40% of the market capitalisation flagged

Figure 8: Sector Exposures of MSCI World, SmartBeta and ESG SmartBeta portfolios

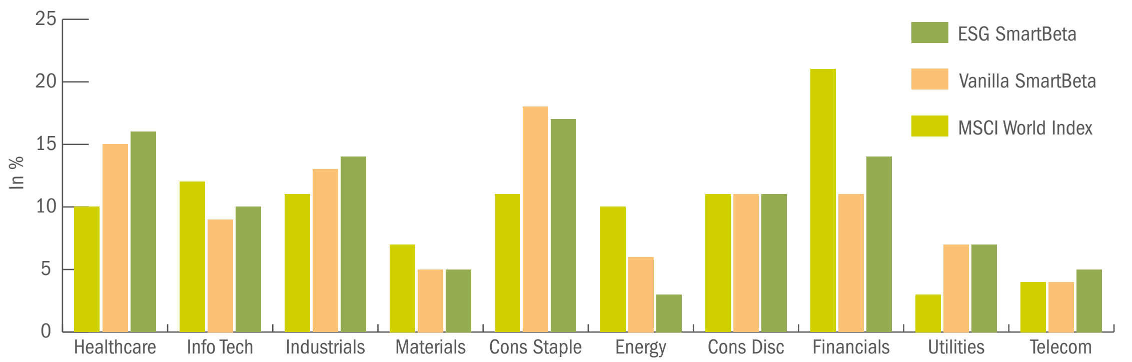

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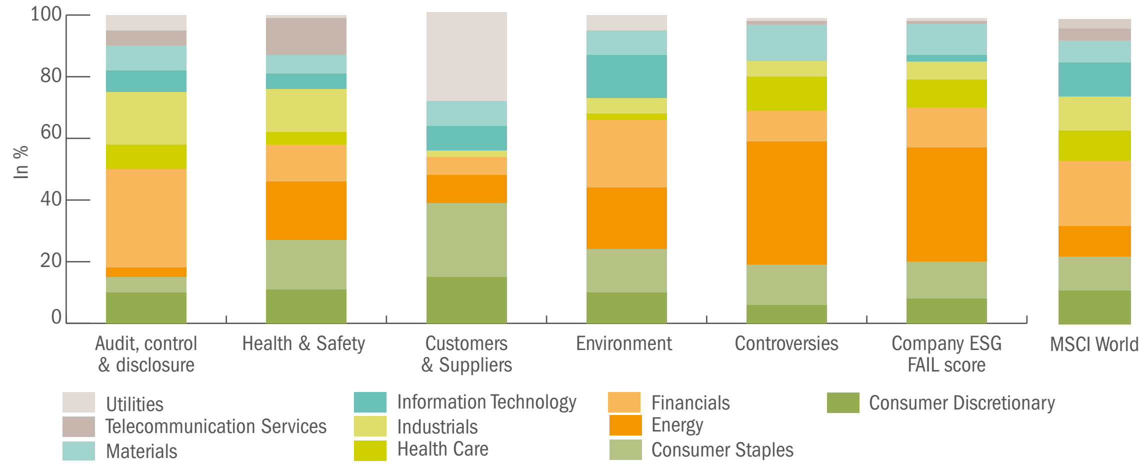
Figure 9: Company Fail/Worst in Class by Sector



Source: AXA Investment Managers as at December 2013.

for controversies, suggesting that the sector is highly represented here, given the fact that the energy sector comprises 10% of the market capitalisation of the MSCI World Index. Similarly, Financials represent 32% of the market capitalisation with audit, control & financial disclosure issues (a governance subfactor)—greater than a 21% weight in the MSCI World Index would otherwise imply.

Geographical exposures

Country exposures of the three portfolios are largely similar, as shown in Figure 10. The top two country holdings for all portfolios are the United States followed by the United Kingdom. Where Japan is the third largest country weight for the MSCI World and vanilla SmartBeta portfolios—

Figure 10: Top Ten Country Exposures of MSCI World, SmartBeta and ESG SmartBeta portfolios

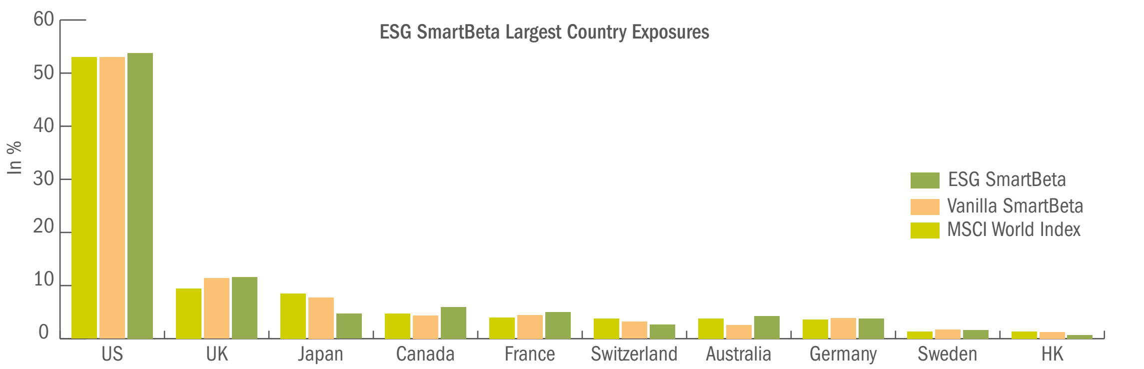


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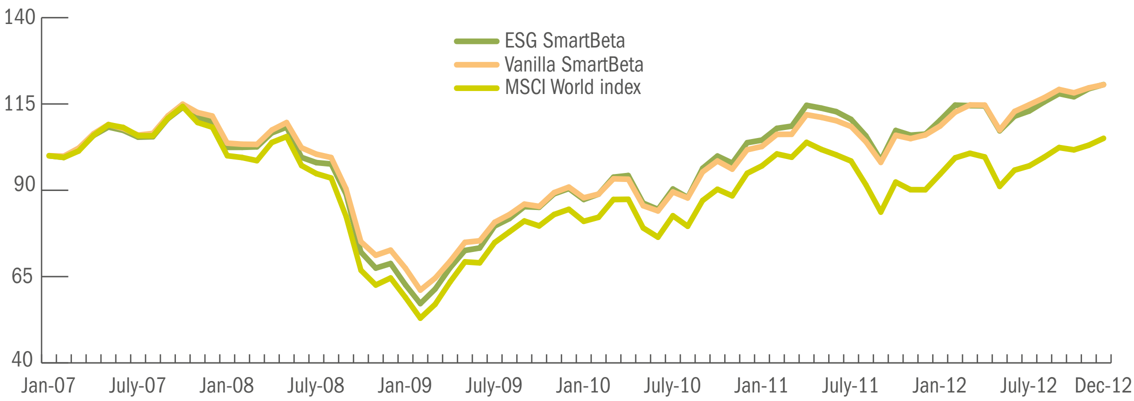
Figure 11: Cumulative Total Return



Source: AXA Rosenberg, MSCI as at July 2013. Exhibit created December 2013. Backtested performance is not a guide to future performance.

Canada holds that place in the ESG SmartBeta portfolio.

The largest impact of the ESG filter on country allocation is on the ESG SmartBeta underweight of Japan for reasons related to corporate structure, governance and known controversies. The United States and Canada are overweight in the ESG SmartBeta against both the vanilla SmartBeta and the MSCI World.

Performance

The above point-in-time analysis of the ESG SmartBeta portfolio proved encouraging. Yet, any review of point-in-time exposures tells only a partial story. With this in mind, we conducted a back test of portfolio performance over a nearly 5-year period. Because of our desire to use robust ESG data with sufficient coverage, the performance period chosen runs from the beginning of February 2007 through the end December 2012. Here, we compare the performance of both the vanilla and ESG SmartBeta portfolios against the broad global equity universe, represented by the MSCI World Index (TR). Simulated performance from AXA Rosenberg's backtest envrironment has suggested encouraging results. The hypothetical performance of the vanilla SmartBeta portfolio and that of the ESG SmartBeta portfolio were nearly identical over the period February 2007 to December 2012 (the period of time for which robust ESG data is available). On an annualised basis, the vanilla SmartBeta portfolio would have returned 3.21%, the ESG SmartBeta portfolio would have returned 3.22% and the MSCI World would have returned 0.84%. Both would have outperformed the MSCI World Index at lower levels of total volatility, resulting in higher Sharpe Ratios during the relevant timeframe. The ESG SmartBeta portfolio would have demonstrated higher annualised volatility (17.47%) than the vanilla SmartBeta portfolio (16.08%) but markedly less than the MSCI Index (19.56%). Some volatility was reintroduced by the ESG SmartBeta approach in return for significant mitigation of ESG risks, as we see later on.

Looking at risk-adjusted returns, the ESG SmartBeta portfolio would have had a Sharpe ratio of 0.184, which closely matches that of the vanilla SmartBeta portfolio at 0.2—both considerably higher than the Index at a mere 0.043. Figure 12 provides an overview of the hypothetical annualised risk and return characteristics over the period.

Figure 12: Summary Statistics for Vanilla SmartBeta, ESG SmartBeta and Full Universe

Feb 07 - Dec 12	MSCI World	Vanilla SmartBeta	ESG SmartBeta
Annualised Return	0.84%	3.21%	3.22%
Annualised Risk	19.56%	16.08%	17.47%
Total Return / Total Risk	0.043	0.200	0.184
Number of Stocks*	1593	465	399

Source: AXA Rosenberg, MSCI as at July 2013. Exhibit created December 2013. Backtested performance is not a guide to future performance.
** Vanilla SB and ESG SmartBeta portfolios limit the smallest position size to 5 basis points.*

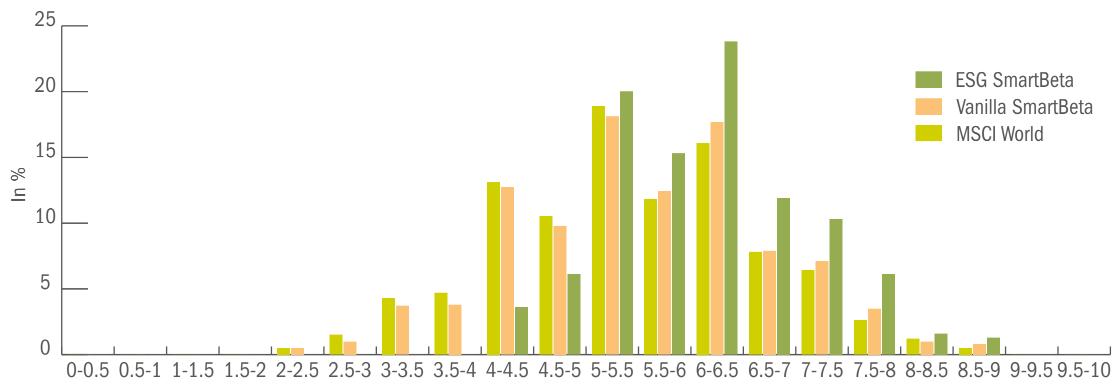
By constructing a combined ESG SmartBeta portfolio, we find that smart beta and responsible investment appear compatible

ESG results

The backtested ESG SmartBeta portfolio would have outperformed the vanilla SmartBeta portfolio and the MSCI World on both the overall portfolio ESG risk score and each of the ESG risk sub factors; e.g. environment, social, and governance.

Figure 13 shows the distribution of companies' ESG scores in each of the three portfolios. Whereas the ESG scores of the MSCI World Index and vanilla SmartBeta are largely aligned, the ESG SmartBeta portfolio's ESG filter clearly shifts the portfolio's ESG score distribution curve to the right. This is confirmed by the aggregate portfolio ESG scores. Overall, on a scale of 0-10, the ESG SmartBeta portfolio has a higher ESG score—the weighted average of portfolio holdings' individual ESG scores—at 6.3, than vanilla SmartBeta at 5.9 and the full MSCI World at 5.8. This represents a significant improvement that puts ESG SmartBeta on par with a peer group of responsible investment equity strategies.

Figure 13: Distribution of company ESG scores



Sources: AXA Investment Managers, December 2013.

When we drill down into the aggregate ESG scores, we can see that the ESG SmartBeta portfolio would have outperformed the other portfolios along 5 key ESG performance indicators, including overall carbon footprint, water intensity, percentage of independent directors on the board, percentage of women on board and percentage of companies facing serious controversies (Figure 14).

Summary of results

Overall, a review of key financial metrics including performance, risk, size, sector and risk exposures is revealing. These findings show a consistency of key SmartBeta fundamental characteristics in both ESG and vanilla portfolios. Application of an ESG filter to the SmartBeta investment process resulted in a backtested ESG SmartBeta portfolio with financial performance that would have closely matched that of the vanilla portfolio along with important gains in terms of ESG performance. Investors considering adopting an ESG SmartBeta strategy should carefully consider both the advantages and drawbacks: this simulation resulted in better ESG performance in exchange for somewhat higher volatility than the vanilla strategy along with portfolio capitalisation, holdings and geographic and sector allocations that differ from the vanilla strategy and the market.

Figure 14: ESG performance of All Portfolios

ESG	ESG KPI	ESG SmartBeta	Vanilla SmartBeta	MSCI World
CO2	Carbon Footprint (in CO2 Tons/$ MM revenue)	204	486	306
	Water Intensity (in m3/Mns $ revenue)	7187	54518	19572
	% of Independent directors on board	74.9	73	73.3
	% Women on board	17.9	16.4	15.3
	% of companies with strong social controversies	0%	9.10%	9.90%

Conclusion

We believe the tandem rise of smart beta and responsible investment signals a move by investors away from unintentional risks associated with traditional index-tracking strategies—revealing a greater willingness to make their own determinations about desired exposures, risks and expected return. Interestingly, investors' motivations span several objectives both financial–an improved risk/return profile, less portfolio sensitivity to market drawdowns—and ESG performance.

By constructing a combined ESG SmartBeta portfolio, we believe that smart beta and responsible investment appear compatible as judged by the backtested portfolio's risk/return and ESG profiles. The ESG SmartBeta strategy can potentially offer investors the desired SmartBeta portfolio characteristics—lower total risk than the index along with improved diversification—and strong ESG performance. Overall, the improvement in risk/return and ESG profiles may make an ESG SmartBeta investment strategy attractive to investors looking to capture both financial and ESG performance over the long-term.

Important Backtest Disclosures
This information is made available for institutional investors only.

This information was derived from a hypothetical backtesting of AXA Investment Management's Equity Smart Beta strategy for the period December 31, 1989 through Sept 30, 2012, and an ESG SmartBeta variant over the period January 31, 2007 - December 31, 2012. Backtesting is conducted by computer program that starts on the first day of the backtest period and estimates the return that the strategy would have achieved if it the output from the SmartBeta screening and portfolio process has been fully implemented. Strategy recommendations are estimated at the end of each quarter during the backtest period. The investment strategy was not available to clients during the performance period referenced herein. The performance data was not verified by an independent calculation agent. The actual strategy that will be made available to investors going forward may use different trading frequencies than was used in the backtest, and the universe of securities that will be used in an actual portfolio may not reflect the universe of securities used in this backtest.

The backtested portfolio was rebalanced quarterly, using a starting universe of the MSCI World Index. ESG opinion data, courtesy of AXA Investment Managers, was used to up- or down-weight individual holdings so as to produce a portfolio ESG SmartBeta Equity that has the objective of improving ESG integration while maintaining hallmark "SmartBeta" characteristics like low portfolio Beta and higher-than-market exposure to AXA Rosenberg's proprietary Sustainable Earnings Growth metric. ESG opinion data used in the backtesting was refreshed once per year. Prior to 2009, ESG data coverage was available for more than 70% of MSCI World Index. As of December 2012, ESG data coverage was available for 98% coverage of the MSCI World Index.

The selection universe used during the strategy backtests was the MSCI World Standard Index. As of December 31, 2012, the MSCI World Standard Index consisted of 1,593 securities and 26 developed market countries. Regional backtests were conducted for the US, Japan, Europe, Canada, and Asia ex Japan components of the MSCI World Index.

Backtested performance and characteristics are hypothetical and ds not represent the results of actual trading (and may fall materially short of actual trading results), and should not be interpreted as an indication of such performance or characteristics because: (1) it was achieved by means of retroactive application of a systematic process constructed on the basis of historical data; (2) it does not factor in any material economic and market factors that might have an effect on an investment adviser's decision-making process if the adviser were actually managing clients' money; (3) simulated performance or characteristics do not factor in any intervention (whether in a positive or negative manner) which may be made by AXA Rosenberg's investment team that may be made with an actual portfolio over time; and (4) performance results from back tests are gross of fees and do not include: transaction costs, custody fees, market impact, security liquidity, trading fill rates and other material factors that may affect actual performance. Backtested data represent output from a research project may differ from actual account performance because the investment strategy may be adjusted at any time, for any reason, and can continue to be changed until desired or better performance results are achieved.

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