

## Smart Beta Performance Report

Scientific Beta

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### Introduction

Recent years have seen the development of numerous smart beta indices whose weighting schemes differ from those of cap-weighted indices. Smart beta indices may be obtained by tilting economic factors, such as book-to-market, size or volatility, or by introducing greater diversification into the index, as illustrated in multi-strategy indices. The positive performance of smart beta indices over the long term has been largely documented in the literature. However, these indices are exposed to risk factors that are different from those of cap-weighted indices and that may cause variations in performance over short periods. As a result, the presentation of long-term performance is not enough for investors, who are also demanding performance figures over recent and shorter periods. The present report gives a complete picture of smart beta index performance with both long-term and short-term figures that illustrate the variations in performance over the different time periods, as well as the variations in performance between the various strategies. As a result, combining the various smart beta strategies makes it possible to obtain more robust performance.

Performance for smart factor indices exposed to risk factors known to be well rewarded over long periods remains strong with annual performance in excess of broad cap-weighted indices ranging from 1.41% to 2.63% since inception for the Developed universe. Over shorter periods, the strategies are exposed to fluctuations depending on variations in market conditions. For investors willing to take tactical bets, ERI Scientific Beta offers twelve smart factor indices.

This month, the best performing index among those smart factor indices is the SciBeta Developed High Volatility Diversified Multi-Strategy index, with a relative return of 0.99% compared to the broad cap-weighted index, while the SciBeta Developed Low Volatility Diversified Multi-Strategy index posts the lowest relative return (-1.79%). However, we note that over the latest one year period, the Low Volatility index was the best performing index among smart factor indices, with a relative return of 4.16% compared to the broad cap-weighted index.

Scientific Beta Multi-Beta Multi-Strategy (MBMS) indices associate an effective choice of weighting scheme, in terms of diversification, with the choice of smart factor, to prevent indices from being too concentrated and to reduce their specific risks. Over the past ten years, the SciBeta Developed Multi-Beta Multi-Strategy EW (Equal Weights) index and the SciBeta Developed Multi-Beta Multi-Strategy ERC (Equal Risk Contribution) index post strong annual relative returns of 1.94% and 1.84%, respectively, compared to cap-weighted indices. This month, the SciBeta Developed Multi-Beta Multi-Strategy EW index and the SciBeta Developed Multi-Beta Multi-Strategy ERC index post relative returns of -0.96% and -0.99%, respectively, compared to cap-weighted indices. Looking at MBMS indices for various regions, we note that this month the best performing indices are the SciBeta Developed Asia Pacific ex Japan Multi-Strategy indices, with a relative return of -0.19% for the EW scheme and -0.23% for the ERC scheme compared to the broad cap-weighted index.

However, year-to-date, all MBMS indices, except the SciBeta Developed Asia Pacific ex Japan Multi-Strategy indices, post positive relative returns compared to cap-weighted indices.

This month, the value factor performed better than the regional broad cap-weighted indices in the UK, Developed Europe ex UK, Developed ex USA and the Developed regions, and contributed positively to the relative performances of the corresponding MBMS indices, while in the same regions, the low-volatility factor underperformed the regional broad cap-weighted indices, and thus contributed negatively to the relative performances of the corresponding MBMS indices. In the Developed Asia Pacific ex Japan region, relative MBMS performance was positively driven by the relative performance of the high momentum factor and negatively driven by the relative performance of the value factor. In Japan and the USA, none of the four factors, namely value, high momentum, volatility and mid cap, outperformed the regional broad cap weighted indices this month. The relative performance of the USA MBMS indices was especially negatively driven by the relative performance of the value and low volatility factors, while the relative performance of the Japan MBMS indices was especially negatively driven by the relative performance of the high momentum and low volatility factors.

## 1. Performance Overview for Smart Factor Indices for the Scientific Beta Developed Equity Universe and Long-Term US Data Series

Tables 1a and 1b display the performance of SciBeta Developed Diversified Multi-Strategy indices. The six tilts selected – book-to-market, dividend yield, size, liquidity, volatility and momentum – are the common tilts documented in the literature as liable to produce outperformance compared to cap-weighted indices. The table presents performance statistics for both high and low stock selections by factor tilt. All these indices serve to create a diversified portfolio of the relevant stocks. In particular, they draw on different smart beta weighting schemes<sup>1</sup>, which we refer to as a diversified multi-strategy index. In addition, these indices offer investable proxies for smart beta factor indices. These indices allow investors to be both exposed to a specific risk factor (beta) and to have good diversification of other risk factors, leading to an attractive Sharpe ratio associated with the factor tilt. Table 1c displays the performance of long-term US data series based on the same factor selection and weighting scheme, the initial reference universe of these long-term US data series being the 500 largest market-cap US stocks.

Table 1a: Short-Term Performance Overview for Smart Factor Indices for the Scientific Beta Developed Equity Universe

Diversified Multi-Strategy Index for	Past month (as of 28/02/2015)						Year-to-date (as of 28/02/2015)			
	Absolute Return		Relative Return compared to tilted cap-weighted		Relative Return compared to broad cap-weighted		Absolute Return		Relative Return compared to broad cap-weighted	
High/low stock selections by	High	Low	High	Low	High	Low	High	Low	High	Low
Book-to-market	4.94%	5.49%	-1.03%	0.01%	-0.76%	-0.21%	4.10%	5.10%	0.03%	1.03%
Dividend Yield	4.22%	6.31%	-1.19%	0.13%	-1.49%	0.60%	3.79%	5.74%	-0.28%	1.67%
Size	4.97%	5.43%	-0.67%	-0.67%	-0.74%	-0.28%	4.31%	4.69%	0.24%	0.61%
Liquidity	5.38%	4.91%	-0.41%	-0.42%	-0.33%	-0.79%	4.30%	4.66%	0.23%	0.59%
Volatility	6.70%	3.92%	-0.75%	-0.72%	0.99%	-1.79%	5.13%	4.03%	1.06%	-0.04%
Momentum	4.68%	5.95%	-0.50%	-0.35%	-1.02%	0.24%	4.80%	4.41%	0.73%	0.34%

The history of Scientific Beta Index returns begins on 21/06/2002. The statistics are based on daily total returns (with dividend reinvested). All statistics are annualised and performance ratios that involve the average returns are based on the geometric average, which reliably reflects multiple holding period returns for investors. ERI Scientific Beta uses the yield on Secondary Market US Treasury Bills (3M) as a proxy for the risk-free rate in US Dollars. All results are in USD.

<sup>1</sup> Maximum Deconcentration, Diversified Risk Weighted, Maximum Decorrelation, Efficient Max Sharpe, Efficient Minimum Volatility.

Table 1b: Long-Term Performance Overview for Smart Factor Indices for the Scientific Beta Developed Equity Universe

Diversified Multi-Strategy Index for	Since Inception: from 21/06/2002 to 28/02/2015															
	Absolute Return		Relative Return compared to tilted cap-weighted		Relative Return compared to broad cap-weighted		Volatility		Sharpe Ratio		Maximum Relative Drawdown		Outperformance Probability (1Y)*		Outperformance Probability (3Y)*	
High/low stock selections by	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low
Book-to-market	11.02%	9.98%	2.31%	1.56%	2.63%	1.59%	16.34%	14.71%	0.59	0.58	5.79%	6.08%	72.6%	70.2%	80.9%	96.4%
Dividend Yield	10.66%	10.27%	2.18%	1.99%	2.27%	1.88%	14.85%	16.01%	0.62	0.56	5.22%	8.32%	69.1%	67.7%	93.7%	94.0%
Size	9.98%	11.20%	2.01%	0.29%	1.59%	2.81%	15.54%	15.43%	0.55	0.64	3.58%	6.77%	80.6%	78.3%	92.3%	87.4%
Liquidity	10.05%	11.10%	2.17%	0.60%	1.66%	2.71%	16.41%	14.61%	0.53	0.66	4.37%	6.67%	74.5%	72.1%	89.6%	92.3%
Volatility	9.80%	11.01%	2.09%	2.26%	1.41%	2.62%	18.70%	13.19%	0.45	0.73	16.94%	9.20%	57.2%	61.9%	33.9%	95.1%
Momentum	10.85%	10.11%	1.80%	2.00%	2.46%	1.72%	15.15%	16.25%	0.62	0.54	12.00%	8.82%	73.4%	54.7%	77.6%	54.1%

\* Outperformance Probability 1Y and 3Y are computed over the latest 10-year period.

The history of Scientific Beta Index returns begins on 21/06/2002. The statistics are based on daily total returns (with dividend reinvested). All statistics are annualised and performance ratios that involve the average returns are based on the geometric average, which reliably reflects multiple holding period returns for investors. ERI Scientific Beta uses the yield on Secondary Market US Treasury Bills (3M) as a proxy for the risk-free rate in US Dollars. The tilted cap-weighted indices are obtained based on the same selection of assets as each of the smart factor indices. All results are in USD.

Table 1c: Performance Overview for Long-Term US Data Series

Diversified Multi-Strategy Index for	Long-Term US Track Records since 01/01/1974 (as of 31/12/2013): 40 years					
	Relative Return compared to cap-weighted		Volatility		Sharpe Ratio	
High/low stock selections by	High	Low	High	Low	High	Low
Book-to-market	4.75%	1.11%	16.51%	16.38%	0.63	0.41
Dividend Yield	3.82%	1.51%	15.06%	18.04%	0.63	0.40
Size	1.55%	4.72%	16.18%	16.69%	0.44	0.62
Liquidity	1.65%	4.37%	17.13%	15.58%	0.42	0.64
Volatility	2.70%	2.95%	19.46%	14.34%	0.43	0.60
Momentum	3.62%	1.85%	16.26%	17.07%	0.57	0.44

Long-Term US data series are style factor data series constructed from the 500 largest market cap US stocks. The statistics are based on daily total returns (with dividend reinvested). All statistics are annualised and performance ratios that involve the average returns are based on the geometric average, which reliably reflects multiple holding period returns for investors. The yield on Secondary Market US Treasury Bills (3M) is used as a proxy for the risk-free rate in US Dollars. All results are in USD.

Over the long term all diversified multi-strategy indices exhibit a positive relative return compared to cap-weighted indices, whether broad or tilted cap-weighted indices. The best performance relative to the broad cap-weighted index is posted by the SciBeta Developed Mid-Cap Diversified Multi-Strategy index (2.81%), closely followed by the SciBeta Developed Low Liquidity Diversified Multi-Strategy index (2.71%). Tilted cap-weighted indices are factor indices that use the same universe of assets as each smart factor index. The outperformance of smart factor indices compared to those indices is due to the difference in weighting scheme, which results in better diversification for smart factor indices compared to cap-weighted indices. We observe that half of

the smart beta indices (size, liquidity and volatility) exhibit a higher gain in performance for the high stock selection compared to tilted cap-weighted indices than the gain in performance compared to broad cap-weighted indices, with the reverse relationship for the corresponding low stock selection, while the other half of the smart beta indices (book-to-market, dividend yield and momentum) exhibit the opposite relationship.

Looking at year-to-date relative returns, we observe that all strategies except two (High Dividend Yield and Low Volatility) post positive returns relative to cap-weighted. The best performing index among smart factor indices is the SciBeta Developed Low Dividend Yield Diversified Multi-Strategy index with a relative return of 1.67%. In addition, the spread in relative return between the two smart factor indices, respectively resulting from high and low stock selections, greatly differs between the strategies, with some of them presenting a moderate spread, such as liquidity, size or momentum strategies, which exhibit the lowest ones, with a relative return of 0.23% for the SciBeta Developed High Liquidity Diversified Multi-Strategy index, compared to 0.59% for the SciBeta Developed Mid-Liquidity Diversified Multi-Strategy index, a relative return of 0.24% for the SciBeta Developed Large-Cap Diversified Multi-Strategy index, compared to 0.61% for the SciBeta Developed Mid-Cap Diversified Multi-Strategy index and a relative return of 0.73% for the SciBeta Developed High Momentum Diversified Multi-Strategy index, compared to 0.34% for the SciBeta Developed Low Momentum Diversified Multi-Strategy index. Other indices exhibit larger spreads in relative return between high and low selection stocks, like the dividend yield indices, with a relative return of -0.28% for the SciBeta Developed High Dividend Yield Diversified Multi-Strategy index, compared to 1.67% for the SciBeta Developed Low Dividend Yield Diversified Multi-Strategy index, since the start of 2015. We also note that there is no systematic correlation between the size of the spread and the similarity of high and low index declinations' market betas<sup>2</sup>.

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<sup>2</sup> Beta values are available on [www.scificbeta.com](http://www.scificbeta.com).

## 2. Performance Overview of Scientific Beta Multi-Beta Multi-Strategy Indices and Long-Term US Data Series

Scientific Beta Multi-Beta Multi-Strategy (MBMS) indices are a combination of smart factor indices. Multi-Beta Multi-Strategy indices provide allocations to several well-documented risk premia in equity markets (Value, Momentum, Size and Low Volatility) which follow different cycles, corresponding to well-rewarded factors as documented in the literature. Combining factor tilts in a multi-beta benchmark allows risk-adjusted performance to be improved and outperformance across market regimes to be smoothed, compared to the average result of component indices. Investors can choose from two allocation methods: Equal Weights (EW), which targets an improvement in Sharpe ratio, or Equal Risk Contribution (ERC), which provides a pronounced decrease in relative risk and a higher information ratio.

Table 2 displays an overview of the relative and absolute performances of Scientific Beta Multi-Beta Multi Strategy indices for various regions and different time periods. Over the long term, all MBMS indices post positive excess return compared to broad cap-weighted indices. If we consider the ERC allocation, the annualised excess return over the past ten years ranges from 1.58%, for the SciBeta Developed Europe ex UK Multi-Beta Multi-Strategy ERC index, to 2.81%, for the SciBeta United-Kingdom Multi-Beta Multi-Strategy ERC index.

Over the past year, all MBMS indices, except the Developed Europe ex UK indices, post positive excess return compared to broad cap-weighted indices. If we consider the ERC allocation, the annualised excess return over the past year ranges from -0.16%, for the SciBeta Developed Europe ex UK Multi-Beta Multi-Strategy ERC index, to 4.97%, for the SciBeta Japan Multi-Beta Multi-Strategy ERC index. During this period, the performance of all indices was essentially driven by the performance of the low volatility factor. In addition, the performance of the high momentum factor also greatly contributes to the performance of the SciBeta UK Multi-Beta Multi-Strategy and SciBeta Japan Multi-Beta Multi-Strategy indices. Over the past year, the relative performance of the SciBeta Developed Europe ex UK Multi-Beta Multi-Strategy indices was negatively driven by the relative performance of the value and mid cap factors, which underperformed the regional broad cap-weighted index.

Year-to-date, all indices except the SciBeta Developed Asia Pacific ex Japan Multi-Beta Multi-Strategy indices delivered positive returns compared to broad cap-weighted indices. If we consider the ERC allocation, the best performance is obtained by the SciBeta Japan Multi-Beta Multi-Strategy ERC index with a relative return of 1.17%, while the worst performance is obtained by the SciBeta Developed Asia Pacific ex Japan Multi-Beta Multi-Strategy ERC index, with a relative return of -0.28%.

From table 2, it also appears that the volatility of the MBMS indices is significantly lower compared to the volatility of broad-cap weighted indices for all regions, with the highest differences being observed for the Developed Asia Pacific ex Japan and Japan indices, with volatilities of 23.69% and 22.86%, respectively, for the broad cap-weighted indices, and volatilities of 20.04% and 19.33% respectively for the MBMS (ERC allocation) indices. As a result, we observe a considerable improvement in the Sharpe ratios for the MBMS indices over the past ten years compared to the broad cap-weighted indices. Sharpe ratios range from 0.27 (Developed Europe ex UK), to 0.53 (Developed Asia Pacific ex Japan) for the MBMS (ERC allocation) indices, compared to 0.19 (Japan) to 0.34 (United States) for the broad cap-weighted indices.

Table 2a: Relative and Absolute Performance of Scientific Beta Multi-Beta Multi Strategy Indices across Regions as of 28/02/2015

Index	Multi-Beta Multi-Strategy	N° of Constituents	Relative Return compared to cap-weighted				Information Ratio		Absolute Return		Volatility		Sharpe Ratio	
			1M	YTD	1Y	10Y	1Y	10Y	1Y	10Y	1Y	10Y	1Y	10Y
Global Developed	EW	1908	-0.96%	0.33%	1.17%	1.94%	0.69	0.75	9.41%	8.96%	8.44%	15.64%	1.11	0.48
	ERC	1908	-0.99%	0.31%	0.94%	1.84%	0.57	0.79	9.18%	8.86%	8.52%	15.93%	1.07	0.47
SciBeta Global Developed CW		2000							8.24%	7.02%	9.00%	17.07%	0.91	0.33
Developed ex US	EW	1423	-0.51%	0.11%	1.97%	2.04%	0.91	0.59	2.42%	7.76%	8.76%	16.64%	0.27	0.38
	ERC	1423	-0.46%	0.19%	1.47%	1.94%	0.72	0.61	1.92%	7.66%	8.94%	17.05%	0.21	0.37
SciBeta Developed ex US CW		1500							0.45%	5.72%	9.53%	18.88%	0.04	0.23
United States	EW	485	-1.36%	0.48%	0.28%	1.86%	0.13	0.59	15.90%	10.08%	11.16%	19.31%	1.42	0.45
	ERC	485	-1.42%	0.41%	0.16%	1.87%	0.07	0.61	15.77%	10.09%	11.25%	19.27%	1.40	0.45
SciBeta United States CW		500							15.62%	8.22%	11.60%	20.29%	1.34	0.34
Developed Europe ex UK	EW	378	-0.25%	0.01%	-0.25%	1.63%	-0.07	0.35	-3.48%	7.61%	12.79%	21.88%	-0.27	0.28
	ERC	378	-0.31%	0.05%	-0.16%	1.58%	-0.05	0.38	-3.39%	7.55%	12.89%	22.50%	-0.27	0.27
SciBeta Europe ex UK CW		400							-3.22%	5.97%	13.78%	24.37%	-0.24	0.19
United Kingdom	EW	98	-0.49%	0.73%	3.67%	2.93%	0.87	0.53	9.72%	10.52%	12.03%	17.49%	0.78	0.48
	ERC	98	-0.52%	0.65%	2.99%	2.81%	0.74	0.53	9.05%	10.40%	12.02%	17.58%	0.72	0.47
SciBeta United Kingdom CW		100							6.06%	7.59%	11.87%	19.30%	0.48	0.28
Dev. Asia Pacific ex Jp	EW	381	-0.19%	-0.24%	2.58%	2.69%	0.68	0.43	3.23%	12.02%	8.34%	20.06%	0.38	0.53
	ERC	381	-0.23%	-0.28%	2.63%	2.69%	0.70	0.43	3.28%	12.01%	8.36%	20.04%	0.39	0.53
SciBeta Dev. Asia Pacific ex JP CW		400							0.65%	9.32%	10.43%	23.69%	0.06	0.33
Japan	EW	473	-1.03%	1.25%	5.31%	2.05%	1.42	0.29	33.66%	6.68%	14.91%	19.22%	2.26	0.34
	ERC	473	-1.03%	1.17%	4.97%	1.93%	1.37	0.28	33.31%	6.56%	15.03%	19.33%	2.21	0.33
SciBeta Japan CW		500							28.35%	4.64%	16.78%	22.86%	1.69	0.19

Based on daily total returns in USD for Global Developed, Developed ex US, US, and Asia Pacific ex Japan, and Dev. Europe ex UK and in GBP for UK and JPY for Japan. Inception date is 21/06/2002 for Multi-Beta Multi-Strategy EW indices and 19/12/2003 for Multi-Beta Multi-Strategy ERC indices and CW indices. All statistics are annualised and performance ratios that involve the average returns are based on the geometric average, which reliably reflects multiple holding period returns for investors. The US universe is based on the top 500 stocks by free-float-adjusted market cap. The risk-free rates used are defined according to the regional universe of the index.

Table 2b: Performance Overview for US Long-Term Data Series (40 years)

	Long-Term US Track Records since 01/01/1974 (as of 31/12/2013): 40 years					
	Relative Return compared to cap-weighted		Volatility		Sharpe Ratio	
	EW	ERC	EW	ERC	EW	ERC
United States	4.09%	3.88%	15.71%	15.66%	0.62	0.61

Long-Term US data series are style factor data series constructed from the 500 largest market-cap US stocks. The statistics are based on daily total returns (with dividend reinvested). All statistics are annualised and performance ratios that involve the average returns are based on the geometric average, which reliably reflects multiple holding period returns for investors. The yield on Secondary Market US Treasury Bills (3M) is used as a proxy for the risk-free rate in US Dollars. All results are in USD.



## About ERI Scientific Beta

ERI Scientific Beta aims to be the first provider of a smart beta platform to help investors understand and invest in advanced beta equity strategies. It has three principles:

**Choice:** A multitude of strategies are available allowing users to build their own benchmark, choosing the risks to which they wish, or do not wish, to be exposed. This approach, which makes investors responsible for their own risk choices, referred to as Smart Beta 2.0, is the core component of the index offerings proposed by ERI Scientific Beta.

**Transparency:** The rules for all of the Scientific Beta series are replicable and transparent.

**Clarity:** Exhaustive explanations of construction methodologies are provided, as well as detailed performance and risk analytics.

Established by EDHEC-Risk Institute, one of the very top academic institutions in the field of fundamental and applied research for the investment industry, ERI Scientific Beta shares the same concern for scientific rigour and veracity, which it applies to all the services that it offers investors and asset managers.

Part of EDHEC Business School, a not-for-profit organisation, EDHEC-Risk Institute has sought to provide the ERI Scientific Beta services in the best possible economic conditions.

The ERI Scientific Beta offering covers three major services:

**Scientific Beta Indices:** Scientific Beta Indices are smart beta indices that aim to be the reference for the investment and analysis of alternative beta strategies. Scientific Beta Indices reflect the state-of-the-art in the construction of different alternative beta strategies and allow for a flexible choice among a wide range of options at each stage of their construction process. This choice enables users of the platform to construct their own benchmark, thus controlling the risks of investing in this new type of beta (Smart Beta 2.0). The Scientific Beta platform offers 2,916 smart beta indices.

**Scientific Beta Analytics:** Scientific Beta Analytics are detailed analytics and exhaustive information on smart beta indices to allow investors to evaluate the advanced beta strategies in terms of risk and performance. The analytics capabilities include risk and performance assessments, factor and sector attribution, and relative risk assessment. We believe that it is important for investors to be able to conduct their own analyses, select their preferred time period and choose among a wide range of analytics in order to produce their own picture of strategy performance and risk.

**Scientific Beta Fully-Customised Benchmarks:** The Scientific Beta Fully-Customised Benchmarks service enables investors and asset managers to benefit from its expertise and the ability to determine and implement their choice of stocks, weighting schemes, and absolute and relative risk constraints in keeping with their objectives.

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