

# FACTOR INVESTING: EVALUATING THE EFFICIENCY OF SMART BETA INDICES

## THE FACTOR EFFICIENCY RATIO

The number of “smart beta” strategies has significantly increased in recent years as investors seek to capture excess returns from well-defined compensated risk factors such as size, value, and low volatility. These strategies often produce markedly different returns while nominally targeting the same factor. We show that this is the result of unintended exposures to uncompensated risk factors (e.g., sector concentration, leverage, etc.) that contribute to risk but not returns. To measure the ratio of these exposures, we created a new metric called the Factor Efficiency Ratio (FER):

$$FER = \frac{\textit{Intended Factor Exposure}}{\textit{Unintended Factor Exposure}}$$

For a strategy to have a high FER ratio, it must have a combination of high intended factor exposure and low unintended factor exposure<sup>1</sup>. We confirmed this concept by analyzing popular smart beta strategies through the prism of FER and Sharpe ratios and demonstrating that maximizing the FER ratio produces higher risk-adjusted returns.

### SMALL SIZE FACTOR

One approach to capturing excess returns from the small size risk factor is known as “alternative weighting” and uses fundamental measures such as sales or assets to build portfolios. The intent is to deviate from cap-weighting and garner exposure to size and value factors. However, alternatively weighted strategies such as FTSE RAFI have no mechanism to control unintended factor exposures, making them relatively inefficient from a FER perspective (see Exhibit 1). Consequently, as of December 31, 2014, the FTSE RAFI strategy actually had a slight large-cap bias, leading to a negative FER.

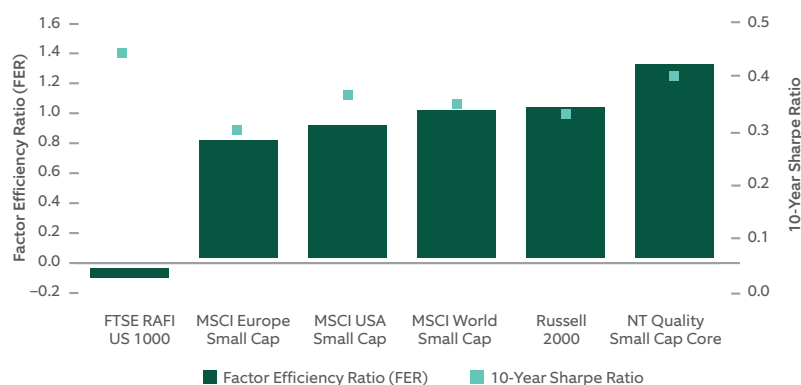
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The second approach targets a factor explicitly through the stock selection process by defining the product universe based on capitalization. The Northern Trust Quality Small-Cap Core strategy actively concentrates holdings at the smaller end of the capitalization spectrum, achieving a higher small-size exposure than the other strategies shown in Exhibit 2. In doing so, it maintains unintended exposures at a level significantly below other strategies and therefore achieves a high FER.

For a strategy to have a high FER ratio, it must have a combination of high intended factor exposure and low unintended factor exposure.

EXHIBIT 1: FER ANALYSIS – SMALL-SIZE FACTOR



Source: Northern Trust Quantitative Research and Barra Portfolio Manager, FTSE, MSCI and Russell

EXHIBIT 2: COMPARISON OF FER – SMALL-SIZE FACTOR

	FTSE RAFI US 1000	MSCI Europe Small Cap	MSCI USA Small Cap	MSCI World Small Cap	Russell 2000	NT Quality Small Cap Core
<b>Intended Exposure (Small Size)</b>	-0.22	2.58	2.76	2.70	3.35	3.32
<b>Unintended Exposure</b>	2.18	3.16	2.98	2.65	3.21	2.49
<b>Factor Efficiency Ratio (FER)</b>	-0.10	0.82	0.92	1.02	1.04	1.33

Source: Northern Trust Quantitative Research and Barra Portfolio Manager. Data as of 12/31/2014 from the Barra GEM2 risk model. Exposure figures are risk-weighted and were multiplied by 100 to facilitate comparison.

### LOW VOLATILITY FACTOR

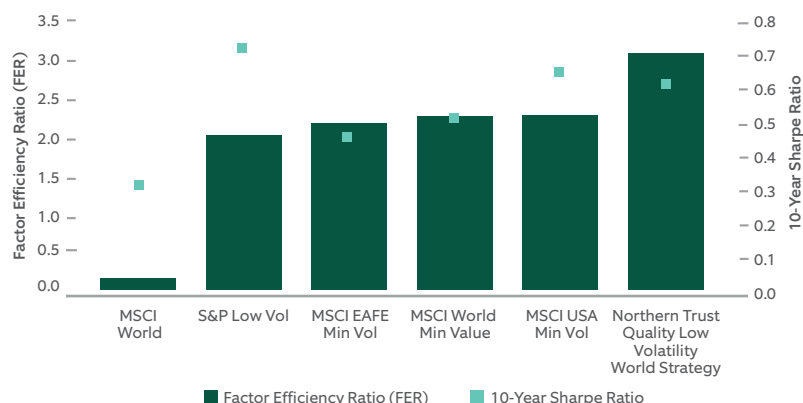
Our analysis of this factor shows (in Exhibits 3 and 4) that the degree of unintended exposure can speak volumes about product design. While the S&P Minimum Volatility Index maintains a volatility exposure consistent with products like the MSCI USA Minimum Volatility Index, the S&P approach has almost 20% more unintended exposure to factors including leverage, growth and size than its MSCI counterpart.

In contrast, the Northern Trust World Quality Low Volatility strategy achieves the largest intended exposure with the smallest unintended factor exposures of all low volatility products. This is achieved through tight controls on unintended risks, thereby delivering a pure and concentrated exposure to the low-volatility factor.

# 20%

**THE NORTHERN TRUST QUALITY LOW VOLATILITY WORLD STRATEGY HAS OVER 20% HIGHER EXPOSURE TO THE INTENDED LOW VOLATILITY FACTOR THAN THE MSCI WORLD MINIMUM VOLATILITY INDEX.**

EXHIBIT 3: FER ANALYSIS – LOW VOLATILITY FACTOR



Source: Northern Trust Quantitative Research and Barra Portfolio Manager, S&P Dow Jones and MSCI

EXHIBIT 4: COMPARISON OF FER – LOW-VOLATILITY FACTOR

	MSCI World	S&P Low Vol	MSCI EAFE Min Vol	MSCI World Min Vol	MSCI USA Min Vol	Northern Trust Quality Low Volatility World Strategy
<b>Intended Exposure (Low Vol.)</b>	0.21	3.17	2.53	3.14	3.00	3.94
<b>Unintended Exposure</b>	0.79	1.53	1.14	1.35	1.29	1.26
<b>Factor Efficiency Ratio (FER)</b>	0.26	2.08	2.23	2.32	2.33	3.12

Source: Northern Trust Quantitative Research and Barra Portfolio Manager. Data as of 12/31/2014 from the Barra GEM2 risk model. Exposure figures are risk-weighted and were multiplied by 100 to facilitate comparison.

## DESIGN MATTERS – REDUCE THE RISKS THAT DON'T PRODUCE RETURNS

In essence, strategies with higher FER ratios should deliver higher risk-adjusted returns. This is because the numerator of the FER ratio is a measure of the exposure to compensated factors while the denominator is a measure of all unintended exposures, including uncompensated and negatively compensated risks. By minimizing the denominator, we reduce risk exposures that do not necessarily produce returns.

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## IMPLEMENTING THE IDEA

All Northern Trust Engineered Equity™ strategies are designed to offer efficient exposure to their intended equity risk factors. Whether you are looking for income with a dividend strategy, stability through a low volatility strategy, exposure to small caps or a tilt towards high quality, all of our strategies benefit

from our thoughtful construction which means you get a more targeted exposure to the factor you desire. If you would like to find out more about incorporating equity risk factors within your portfolio, contact your Northern Trust Relationship Manager or email [EngineeredEquity@ntrs.com](mailto:EngineeredEquity@ntrs.com).

<sup>1</sup>Factor exposures are calculated using established risk models such as Barra or Axioma.

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