

# Achieving Controlled and Meaningful Factor Exposure via Factor Indexes

Asset owners and asset managers are increasingly interested in so-called “smart beta” indexes, a category that includes factor and alternatively weighted indexes. In a series of four FTSE Russell *Insights*, we explore the concept of factors in depth. We examine the differences between factor indexes and other types of smart beta index, illustrate how factor exposure is embedded in an index and suggest how factors can be combined most effectively.

In this *Insights*, the third of the series, we illustrate how an index can be designed to provide controlled exposure to a factor.

## **Achieving controlled and meaningful factor exposure in an index**

A factor index has the objective of providing controlled and meaningful exposure to the factor (or factors) of interest using a transparent and consistent methodology.

Factor indexes can serve both as benchmarks and as the basis for index-replicating financial products. As a result, index designers also need to consider levels of index capacity, diversification and turnover.

There is a trade-off between some of these characteristics: for example, maximising the factor exposure of the index would likely lead to excessive concentration in a few stocks; and maintaining high levels of factor exposure through more frequent index reviews has implications for index turnover.

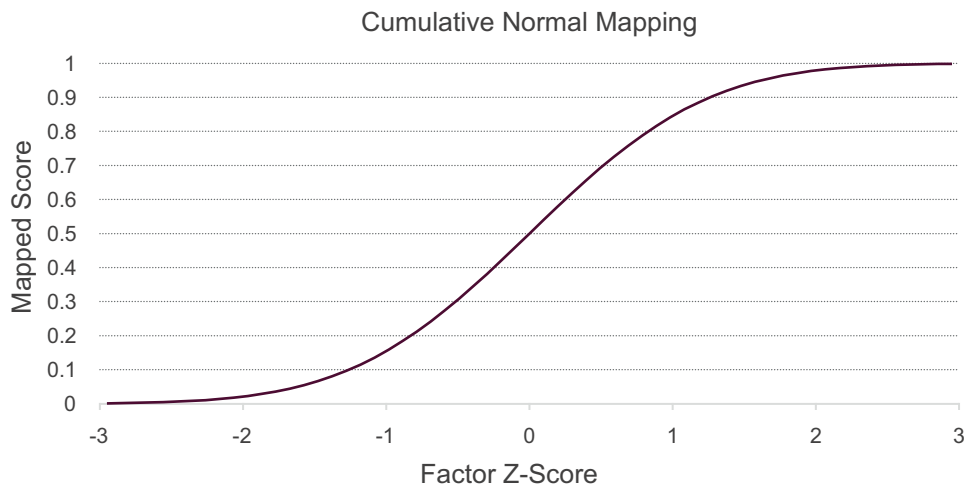
## Design steps

The starting point for a factor index is a universe of stocks, typically chosen by region or individual market. A factor score is calculated for each of the stocks within the universe and factor scores are then standardised.<sup>1</sup>

There are different methods for converting these standardised factor scores (or “Z-Scores”), which have both negative and positive values, into a set of positive scores that can be used to calculate index weights.

In the FTSE Global Factor Index Series, FTSE Russell’s approach is to use the cumulative normal distribution function for this purpose (see the Figure 1 below for an illustration).

**Figure 1: Mapping standardized factor scores to scores**



Source: FTSE Russell

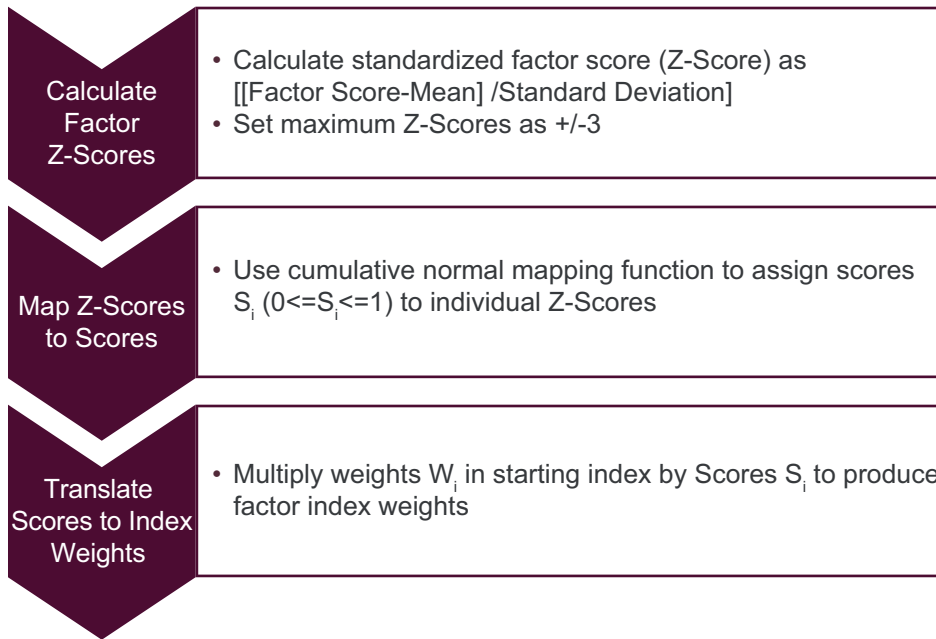
This approach limits the effect of the smallest and largest factor scores within the sample and avoids a potentially problematic concentration of the index in stocks with high factor scores.

The mapped scores are then multiplied by the weight of each stock in the starting index to produce the factor index weights.

The following diagram illustrates the design steps involved in the construction of a factor index.

<sup>1</sup> By subtracting the mean score and dividing the result by the standard deviation of the factor scores.

**Figure 2: Constructing a factor index**



## Narrowing the factor index

Once the initial broad factor index is created, additional measures such as narrowing can be applied to enhance a factor index's exposure. A factor index is "narrowed" by removing stocks that contribute only marginally to the index's factor exposure objective. Stocks are removed sequentially while satisfying capacity, exposure and diversification constraints at the index level in order to increase levels of exposure to the desired factor(s).

During the narrowing process the index's levels of factor exposure, diversification and capacity are calculated each time a stock is removed until a specific constraint is violated.<sup>2</sup>

## Target and non-target exposures

These mapping and narrowing procedures create factor indexes which have concentrated exposure to the (target) factors of interest. In Figure 3, we show the average historical exposure of five FTSE Developed Factor Indexes to both target and non-target factors. For each factor index, the exposure to the target factor is highlighted.

The factor indexes' exposure to non-target factors is frequently small or zero. However, in certain cases factor indexes may exhibit non-zero exposures to other factors as a result of correlations between factors.

For example, small stocks tend to be more volatile and less liquid. Consequently, in addition to the positive exposure to its target factor (size), the size factor index also exhibits negative exposure to the (low) volatility factor and positive exposure to the illiquidity factor.

<sup>2</sup> See the Index Ground Rules ([http://www.ftse.com/products/downloads/FTSE\\_Global\\_Factor\\_Index\\_Series\\_Ground\\_Rules.pdf?305](http://www.ftse.com/products/downloads/FTSE_Global_Factor_Index_Series_Ground_Rules.pdf?305)), Section 6, for further details of this procedure.

Quality stocks tend to be expensive and, as a result, the value factor index has historically displayed a negative exposure to quality. Quality and (low) volatility also tend to have a positive correlation, resulting in a positive past exposure of the quality factor index towards the (low) volatility factor.

**Figure 3: Factor Exposure – FTSE Developed Factor Indexes**

Index name	Average factor exposure				
	Illiquidity	Quality	Size	Value	(Low) volatility
Illiquidity Factor Index	1.45	0.00	1.55	0.01	-0.23
Quality Factor Index	-0.07	0.76	-0.09	-0.04	0.18
Size Factor Index	1.33	-0.01	1.68	0.04	-0.30
Value Factor Index	0.19	-0.12	0.25	0.70	-0.02
Volatility Factor Index	-0.19	0.12	-0.28	0.04	0.58

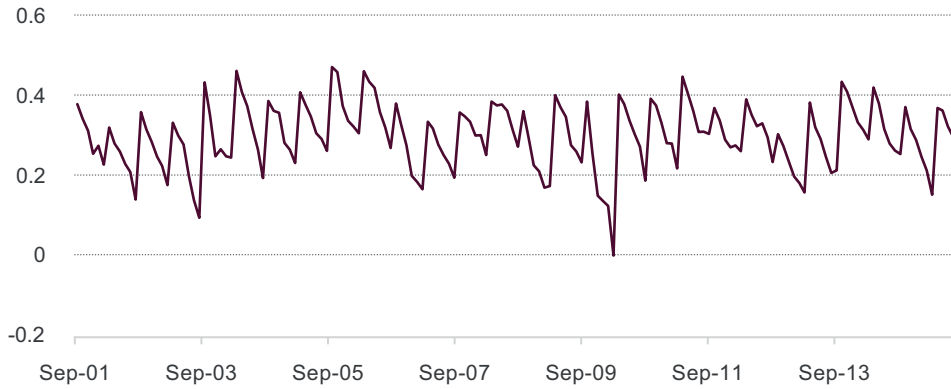
Source: FTSE Russell, data as at December 31 2014. Factor exposure relative to the FTSE Developed Index, September 2001 – December 2014. Factor exposure is the monthly average exposure. *Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see end for important legal disclosures.*

## Managing factor decay

Over time, the factor exposure of a factor index may be decay or lessen. This is evident in Figure 4, which shows the momentum exposure of the FTSE Developed Momentum Factor Index between 2001 and 2014. The saw-tooth pattern of the factor exposure chart reflects the decay in the exposure between index rebalancings, followed by a jump in the exposure each time the index is rebalanced (in this case, semi-annually).

The speed of the decay of the index's factor signal also depends on the factor itself: some factors (for example, size, liquidity and quality) exhibit less pronounced factor decay. In turn, this impacts the rebalancing frequency chosen by the index provider. Within FTSE's Global Factor Index Series, rebalancing frequencies are either annual or semi-annual.

**Figure 4: Momentum Exposure – FTSE Developed Momentum Factor Index**



Source: FTSE Russell, data as at July 31 2015. September 2001–2014. *Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. Please see end for important legal disclosures.*

## Combining factors

Factor indexes aim to provide controlled and meaningful levels of exposure to their target factors over time, whereas the factor exposures of other smart beta indexes are often variable through time and a consequence of some other index objective. Given the rising interest in factor investing, a natural question is how to combine factors efficiently. We examine this topic in the fourth *Insight* of this series.

**For more information about our Factor and Smart Beta indexes, please visit [ftserussell.com](http://ftserussell.com).**

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FTSE Russell is a leading global provider of benchmarking, analytics and data solutions for investors, giving them a precise view of the market relevant to their investment process. A comprehensive range of reliable and accurate indexes provides investors worldwide with the tools they require to measure and benchmark markets across asset classes, styles or strategies.

FTSE Russell index expertise and products are used extensively by institutional and retail investors globally. For over 30 years, leading asset owners, asset managers, ETF providers and investment banks have chosen FTSE Russell indexes to benchmark their investment performance and create ETFs, structured products and index-based derivatives.

FTSE Russell is focused on applying the highest industry standards in index design and governance, employing transparent rules-based methodology informed by independent committees of leading market participants. FTSE Russell fully embraces the IOSCO Principles and its Statement of Compliance has received independent assurance. Index innovation is driven by client needs and customer partnerships, allowing FTSE Russell to continually enhance the breadth, depth and reach of its offering.

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