

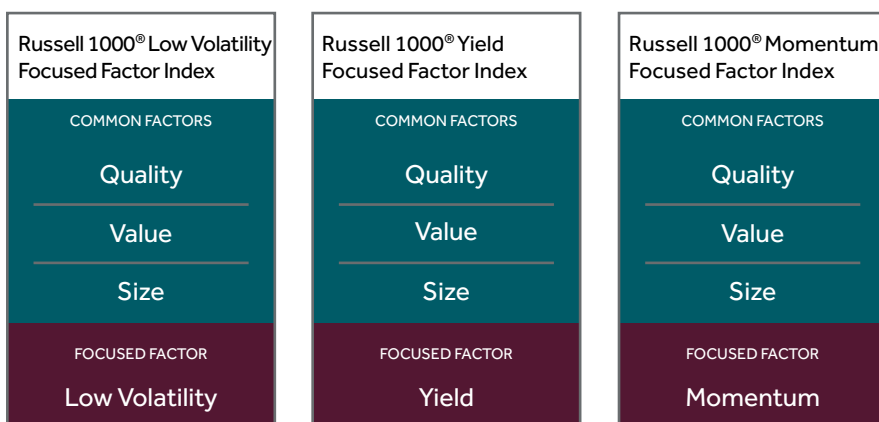
Focused Factor Indexes

Part of the FTSE Global Factor Index Series

Overview

The Russell 1000 Focused Factor Indexes are outcome-oriented tools that can be used by investors looking to target specific factor objectives. Benchmarked to the Russell 1000® Index, they are designed to apply a consistent and transparent methodology to target controlled exposure to performance of both 'common' factors and 'focus' factors. Tilting towards three common factors; **quality, value and size**, facilitates diversification within the index while further tilting to three focus factors; **low volatility, yield or momentum**, is designed to achieve more concentrated exposure to each of these factors.

Indexes at a glance



Features

- Eligible securities of each Russell 1000 Focused Factor Index are the constituents of the Russell 1000 Index.
- The indexes are designed to target specific factor return premia in a rules-based and investable format. The indexes are also customizable – any underlying universe can be used, and a range of different factor tilt combinations and other screens can be applied.
- The Russell 1000 Focused Factor Indexes are reviewed annually in June, with the exception of the momentum indexes, which are reviewed semi-annually (June and December).

Results

- Tilt-Tilt methodology provides greater index factor exposure in a more controlled manner, while balancing concerns about liquidity, capacity, diversification, turnover.
- Mitigate investment cyclicalities by diversifying across multiple factors.
- Potential improvement in risk-adjusted index outcomes.
- Ability to target specific investment objectives while removing factor timing decisions.

The factors

A factor is a stock characteristic that is important in explaining a security’s risk and return. The Russell 1000 Focused Factor Indexes reference six equity factors, each of which is supported by academic research, with strong theoretical explanations as to why the factor historically has provided a premium.

- Factor-based investing is premised on the ability to identify factors that are expected to earn a positive premium in the future (i.e. factor exposures which are compensated).
- Not all factors are equal - some factors are uncorrelated, which means they may perform differently in different parts in the cycle.
- FTSE Russell’s factors represent common factor characteristics supported by a body of empirical evidence across different geographies and time periods.

The common base: Why Value + Size + Quality

Investors have sought to capture the size and value premiums ever since Fama & French wrote one of the most cited and influential papers on expected stock returns.¹ An index that tilts towards size and value has academic and practitioner support as a source of excess index return when compared to the market capitalization weighted index.

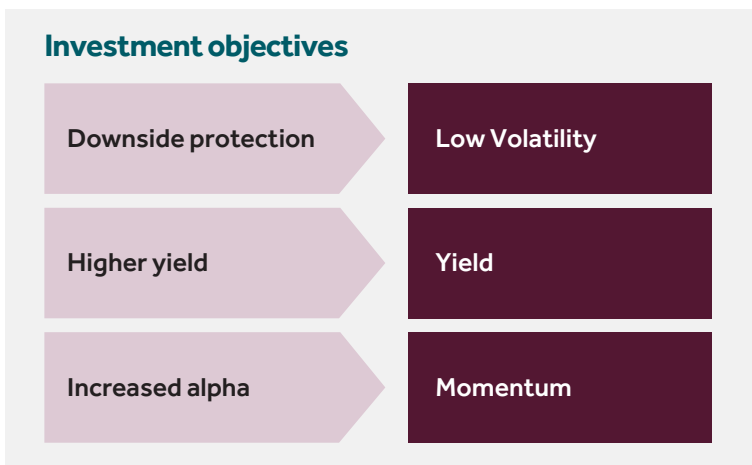
However, each equity factor shows strengths and weaknesses during various economic cycles, and therefore the factor can underperform the benchmark over periods of time. For example, a value factor can occasionally select stocks that appear to be bargains, but are in fact, cheap for a reason. Similarly, the size factor sometimes selects “junk” stocks that are typically distressed and exhibit below average returns. Finally, the quality factor, which favors stocks that are expected to generate strong future cash flows, has often been associated with expensive valuations.

The combination of the three common factors has the potential to diversify the index across various market cycles. Firstly, since size and value are positively correlated, the addition of an uncorrelated factor such as quality may result in diversified index returns. Further, the stock selection characteristics of the quality factor can enhance the well documented size and value premia, tempering some of the unfavorable index performance drivers mentioned above. Likewise, the inclusion of value can be used to select stocks for index inclusion which are perceived to attain “quality at a reasonable price”.



The focused factor

After formulating the diversified base, a focused factor is specifically targeted to harness the expected risk premia. These focused factors have been selected based on commonly expressed motivations for using Smart Beta strategies.



¹ Fama, E., French, K. (1993) ‘Common risk factors in the returns on stocks and bonds’, Journal of Financial Economics 33, 3-56

Common factors

Value

The Value Premium: Stocks that appear cheap tend to perform better than stocks that appear expensive.

Value tilts: Can help capture exposures at a reasonable price relative to their fundamentals.

Definition: Composite of cash flow yield, earnings yield and country relative Sales: Price Ratio.

Size

The Size Premium: Smaller companies tend to demonstrate higher performance than larger companies.

Size tilts: Can help capture excess returns of smaller companies relative to their larger counterparts.

Definition: Log of full market cap.

Quality

The Quality Premium: Higher quality companies tend to demonstrate higher performance than lower quality companies.

Quality tilts: Can help capture companies with the ability to consistently generate strong future cash flows, while limiting exposures to stocks that are unprofitable or highly leveraged.

Definition: Composite of profitability, efficiency, earnings quality and leverage.

Focus factors

Low Volatility

The Low Volatility Premium: Stocks that exhibit low volatility tend to perform better than stocks with higher volatility.

Low volatility tilts: Can help capture companies with a historically lower risk (and higher return) profile relative to higher risk counterparts. However, at times of heightened market volatility, these stocks may become expensive. The value factor helps to mitigate the risk of overpaying for stocks.

Definition: Standard deviation of 5 years of weekly local total returns.

Yield

The Yield Premium: Higher yielding stocks (dividends) tend to demonstrate higher performance than stocks with lower yields.

Yield tilts: Can help identify companies that have recently delivered strong dividends to shareholders. Careful consideration must be given to avoid potential "yield traps", or the selection of stocks with unsustainably high yields as a result of financing activities rather than strong operating activities. The quality factor helps to mitigate this stock selection risk.

Definition: Log of each company's 12 month trailing dividend yield.

Momentum

The Momentum Premium: Stock performance tends to persist, either continuing to rise or fall.

Momentum tilts: Can lead to the selection of companies with strong recent performance, with the expectation that this will continue to produce short term excess returns in the future. However, trend reversals can mean any positive returns may be swiftly wiped out. The low or even negatively correlated factors (e.g. value and momentum) included in the Russell 1000 Focused Factor Indexes can address this cyclicity in index returns. In addition, semi-annual rebalancing helps the index to react more quickly to changes in momentum.

Definition: Cumulative 11 month return.

The factor index construction process

Steps 1-3 explain the high level process for a single factor index construction process. There are a number of ways that multiple factors can be targeted in an index. FTSE Russell employs a 'Tilt-Tilt' approach, which is briefly described in Step 4, and over the page.

Step 1

Calculate factor scores

Assign a 'raw' value for a given factor to each stock in the underlying index. Remove outliers and normalize results (Z Score)². Assign each of the Z-Scores to a score in the range 0 to 1 by mapping to the cumulative normal distribution. Stocks which exhibit the highest factor characteristics will have a score closer to 1.

Step 1 Step 2

Translate scores into index weights

Combine scores with weights in the underlying index to form a broad factor index (unadjusted weights are normalized to ensure they total 100%).

- Underlying weights may be of any type (Market cap, Risk weight etc) or geographical region. The resulting factor index can be understood as a 'Factor Tilt' on the underlying index, by tilting the underlying weights according to factor score. The index weights are then rescaled to ensure final weights sum to 100%.

$$\text{Underlying Weight} \times \text{Factor Score} = \text{Unadjusted Weight} \rightarrow \text{Final Weight}$$

Step 1 Step 2 Step 3

Narrow index and constrain final weights

Remove stocks which do not contribute to the overall factor objective, while ensuring that diversification constraints are not breached.

The following constraints are applied during this process:

- Country and Industry weight constraints
- Maximum stock level capacity ratio
- Minimum stock weight

Step 1 Step 2 Step 3 Step 4

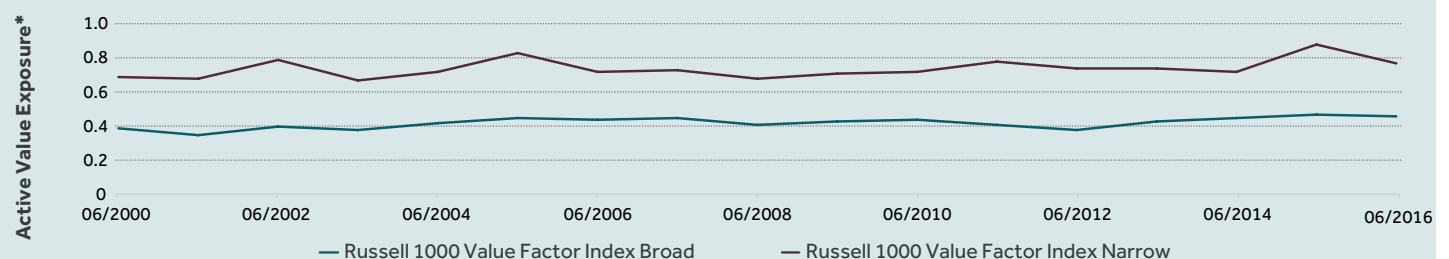
Combining factors

The application of consecutive 'factor tilts' (or, a tilt of one factor on another) towards multiple factors through the repeated application of the above steps results in a set of broad multi-factor index weights. This can be understood as a modified Step 2, in which several factor scores are combined with the underlying index weight, as below.

$$\text{Underlying Weight} \times \text{Factor Score 1} \times \text{Factor Score 2} \times \text{Factor Score 3} \dots = \text{Unadjusted Weight} \rightarrow \text{Final Weight}$$

Why do we narrow?

Narrowing ensures greater Factor exposure in the final index



* Active Value Exposure of the Russell 1000 Value Factor Indexes (Broad & Narrow) relative to the Russell 1000 Index.

Source: FTSE Russell. Data as of June 2016 (Russell 2016 Annual Reconstitution). Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. See disclaimer page for important legal disclosures.

² A 'Z-Score' is a statistical measurement of a score's relationship to the mean (that is, the average) in a group of scores. A Z-Score of 0 means the score is the same as the mean. A Z-Score can be positive or negative, indicating whether it is above or below the mean.

The factor combination process

Gaining exposure to multiple factors becomes increasingly challenging using allocations to multiple individual single factor indexes. Targeting multiple factors can be achieved in several ways:

Composite index ('Top down' portfolio construction)

- Combine the weightings of individual factor indexes (e.g. 33.3% value, 33.3% quality, 33.3% size).
- However, at times, this may result in reduced exposure to the target factors.

Composite factor

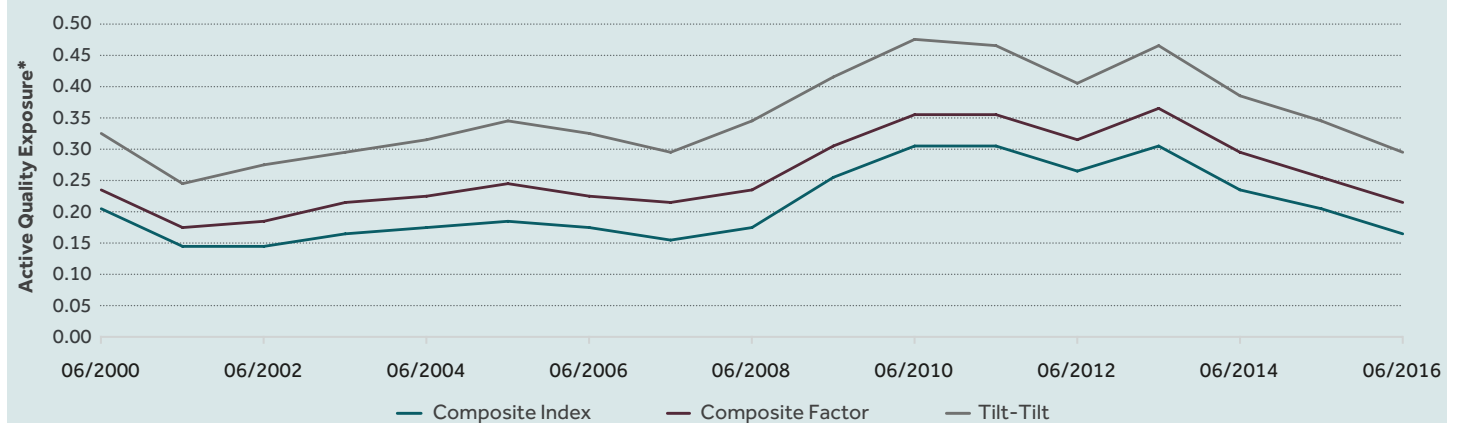
- Combine individual factor 'Z-Scores' to create a composite 'Z-Score'.
- Works for positively correlated factors (e.g. quality and low volatility) but is less effective for negatively correlated factors (e.g. quality and value).

The FTSE Russell preferred approach: Tilt-Tilt ('bottom up' portfolio construction)

- Sequential, or 'multiplicative' tilts on each factor – outcome is independent of ordering.
- Approximately the same exposures of single factor indexes, without the dilutive effects of other methods.
- The magnitude of tilt determined by implementation concerns such as liquidity, capacity, diversification and turnover.

Tilt-Tilt improves factor exposure for positively correlated factors

Russell 1000: Quality Exposure



*Active Quality Exposure of the Russell 1000 Quality Factor Index relative to the Russell 1000 Index.

Source: FTSE Russell. Data as at June 2016 (Russell 2016 Annual Reconstitution). Past performance is no guarantee of future results. Returns shown may reflect hypothetical historical performance. See disclaimer page for important legal disclosures.

Multiple tilting: A trade off between factor strength and practical implementation

When adopting a ‘multiplicative’ approach to tilting, it is possible to tilt as many times as you like. Theoretically, the more tilts applied, the greater the factor strength. Practically, too many tilts can result in unintended index consequences. For example, too many tilts to value could result in the index becoming overly concentrated and exposing the index performance to stock specific risk. Similarly, this could lead to increased index turnover to maintain the factor strength, which in turn increases trading costs in index replicating products.

Based on our research, it is possible to magnify the factor exposures in the low volatility and yield focused factors indexes by ‘double tilting’. This further harnesses the desired index objective without compromising implementation aspects. Conversely, momentum’s unique behavioral characteristics (namely, its ‘speed of decay’, otherwise known as its ability to hold factor strength over a given period), mean that multiple tilting should be cautioned. As the momentum effect relies on a continuation of past patterns of stock returns, this approach can be vulnerable to short term stock performance reversals. To maintain factor strength, momentum indexes tend to be rebalanced more frequently (semi-annually versus annually) and incur much higher levels of turnover.

FTSE Russell research has determined that a double-tilt to a momentum factor would result in high levels of constituent turnover (and therefore transaction costs in index replicating products) and was therefore not implemented in the Russell 1000 Focused Factor Indexes. Rather, a single-tilt to momentum with semi-annual rebalancing ensured the necessary factor exposure while addressing practical implementation needs.

Efficient exposure to multiple factors

FTSE Russell’s Tilt-Tilt methodology results in a multi-factor index with approximately the same magnitude of factor loading as those targeted in the relevant single factor indexes.

Active factor exposures of single factor and focused factor indexes*

		Single	Tilt-Tilt	Single	Tilt-Tilt	Single	Tilt-Tilt
		Low Vol Index	Low Vol Focused Factor	Momentum Index	Momentum Focused Factor	Yield Index	Yield Focused Factor
Common	Value	0.04	0.47	-0.09	0.38	0.19	0.58
	Quality	0.12	0.26	0.02	0.30	-0.02	0.12
	Size	-0.40	1.66	0.02	1.51	-0.24	1.63
Focused	Low Vol	0.45	0.30				
	Momentum			0.31	0.30		
	Yield					1.21	1.19

* Active factor exposure = Index factor exposure (Single or Tilt-Tilt) – underlying benchmark (Russell 1000) Factor Exposure

where: Factor exposure = Weighted average factor Z-Score

Source: FTSE Russell data represents average monthly values from June 2000 - December 2016. Past performance is no guarantee of future results. Results shown reflect back-tested index data. See disclaimer page for important legal disclosures.

A case study: The Tilt-Tilt methodology in the Russell 1000 Focused Factor Indexes

Stock example: Macy's

	Russell 1000 Low Volatility Focused Factor Index	Russell 1000 Yield Focused Factor Index	Russell 1000 Momentum Focused Factor Index
Starting Weight (Russell 1000 Index market cap)	0.05%	0.05%	0.05%
<i>Multiplied by</i>	X	X	X
Tilt market cap exposures by multiplying by common factor scores	<p>Quality 0.47</p> <p>X</p> <p>Value 1.0</p> <p>X</p> <p>Size 0.48</p>	<p>Quality 0.47</p> <p>X</p> <p>Value 1.0</p> <p>X</p> <p>Size 0.48</p>	<p>Quality 0.47</p> <p>X</p> <p>Value 1.0</p> <p>X</p> <p>Size 0.48</p>
Magnify factor exposure by tilting towards focused factor	<p>Low Vol 0.51</p> <p>X</p> <p>Low Vol 0.51</p>	<p>Yield 0.86</p> <p>X</p> <p>Yield 0.86</p>	<p>Momentum 0.01</p>
	<i>Rescale Weights</i>		
Adjusted Weight	0.21%	0.83%	0.01%
Narrow the Index ³	✓	✓	✗
Apply Constraints ⁴	✓	✓	✓
Final Weight	0.30%	1.03%	0.01%

Information provided is for illustrative purposes only.

³ Narrowed indexes incorporate diversification, capacity and exposure constraints. Low volatility and yield indexes are narrowed, but momentum is not given turnover implications.

⁴ These include constraints related to Country, Industry and Stock level positions.

In summary

Russell 1000 Low Volatility Focused Factor Index

Academic research⁵ and market observations suggest that during times of heightened volatility, stocks exhibiting low volatility characteristics can become expensive. The Russell 1000 Low Volatility Focused Factor Index, by targeting multiple factors, one of which is value, helps capture the low volatility factor while selecting constituents that also score well on valuation metrics.

Russell 1000 Yield Focused Factor Index

Singular searches for yield may result in a “yield trap”, or the selection of stocks with unsustainable high yields being maintained by financing rather than the operating activities of a company. The Russell 1000 Yield Focused Factor Index is designed to minimize the effects of the yield trap on the index returns through targeting stocks with high scores on quality metrics as part of the diversified common base.

Russell 1000 Momentum Focused Factor Index

Studies⁶ suggest that a stock’s pattern of past returns is likely to be repeated in the future (the momentum effect). However, positive returns may be swiftly wiped out by trend reversals. The Russell 1000 Momentum Focused Factor Index targets multiple factors with low or even negative correlations (i.e. value and momentum) to encourage index return diversification during these periods. Semi-annual rebalancing also allows the index to react more quickly to changes in momentum.

⁵ Haugen, RA and N.L. Baker “The Efficient Market Inefficiency of Capitalization-Weighted Stock Portfolios.” *Journal of Portfolio Management*

⁶ Levy, R., 1967, “Relative Strength as a Criterion for Investment Selection”, *Journal of Finance*, Grinblatt, M. and Titman, S. 1989, “Mutual Fund Performance: An Analysis of Quarterly Portfolio Holdings”, *Journal of Business*. Jegadeesh, N and Titman, S., 1993, “Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency”, *Journal of Finance*. Chan, L., Jegadeesh, N. and Lakonishok, J., 1996, “Momentum Strategies”, *Journal of Finance*

For more information about our indexes, please visit ftserussell.com.

© 2017 London Stock Exchange Group plc and its applicable group undertakings (the "LSE Group"). The LSE Group includes (1) FTSE International Limited ("FTSE"), (2) Frank Russell Company ("Russell"), (3) FTSE TMX Global Debt Capital Markets Inc. and FTSE TMX Global Debt Capital Markets Limited (together, "FTSE TMX") and (4) MTSNext Limited ("MTSNext"). All rights reserved.

FTSE Russell® is a trading name of FTSE, Russell, FTSE TMX and MTS Next Limited. "FTSE®", "Russell®", "FTSE Russell®" "MTS®", "FTSE TMX®", "FTSE4Good®" and "ICB®" and all other trademarks and service marks used herein (whether registered or unregistered) are trade marks and/or service marks owned or licensed by the applicable member of the LSE Group or their respective licensors and are owned, or used under licence, by FTSE, Russell, MTSNext, or FTSE TMX.

All information is provided for information purposes only. Every effort is made to ensure that all information given in this publication is accurate, but no responsibility or liability can be accepted by any member of the LSE Group nor their respective directors, officers, employees, partners or licensors for any errors or for any loss from use of this publication or any of the information or data contained herein.

No member of the LSE Group nor their respective directors, officers, employees, partners or licensors make any claim, prediction, warranty or representation whatsoever, expressly or impliedly, either as to the results to be obtained from the use of the FTSE Russell Indexes or the fitness or suitability of the Indexes for any particular purpose to which they might be put.

No member of the LSE Group nor their respective directors, officers, employees, partners or licensors provide investment advice and nothing in this document should be taken as constituting financial or investment advice. No member of the LSE Group nor their respective directors, officers, employees, partners or licensors make any representation regarding the advisability of investing in any asset. A decision to invest in any such asset should not be made in reliance on any information herein. Indexes cannot be invested in directly. Inclusion of an asset in an index is not a recommendation to buy, sell or hold that asset. The general information contained in this publication should not be acted upon without obtaining specific legal, tax, and investment advice from a licensed professional.

No part of this information may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the applicable member of the LSE Group. Use and distribution of the LSE Group index data and the use of their data to create financial products require a licence from FTSE, Russell, FTSE TMX, MTSNext and/or their respective licensors.

Past performance is no guarantee of future results. Charts and graphs are provided for illustrative purposes only. Index returns shown may not represent the results of the actual trading of investable assets. Certain returns shown may reflect back-tested performance. All performance presented prior to the index inception date is back-tested performance. Back-tested performance is not actual performance, but is hypothetical. The back-test calculations are based on the same methodology that was in effect when the index was officially launched. However, back-tested data may reflect the application of the index methodology with the benefit of hindsight, and the historic calculations of an index may change from month to month based on revisions to the underlying economic data used in the calculation of the index.

This publication may contain forward-looking statements. These are based upon a number of assumptions concerning future conditions that ultimately may prove to be inaccurate. Such forward-looking statements are subject to risks and uncertainties and may be affected by various factors that may cause actual results to differ materially from those in the forward-looking statements. Any forward-looking statements speak only as of the date they are made and no member of the LSE Group nor their licensors assume any duty to and do not undertake to update forward-looking statements.

About FTSE Russell

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.

FTSE Russell is wholly owned by London Stock Exchange Group.

For more information, visit ftserussell.com.

To learn more, visit ftserussell.com; email info@ftserussell.com; or call your regional Client Service Team office:

EMEA

+44 (0) 20 7866 1810

North America

+1 877 503 6437

Asia-Pacific

Hong Kong +852 2164 3333

Tokyo +81 3 3581 2764

Sydney +61 (0) 2 8823 3521