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FTSE Global Factor Index Series

v8.8

FTSE RUSSELL
An LSEG Business

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Section 1

Introduction

1. Introduction

1.1 This document sets out the Ground Rules for the construction and management of the FTSE Global Factor Index Series. Copies of the Ground Rules are available from www.lseg.com/en/ftse-russell/.

1.2 The FTSE Global Factor Index Series is designed to reflect the performance of stocks representing a specific set of factor characteristics.

1.3 These Ground Rules should be read in conjunction with the FTSE Global Equity Index Series Ground Rules, FTSE China A All Cap Index Series, FTSE UK Index Series Ground Rules, FTSE/JSE Africa Index Series Ground Rules, the Corporate Actions and Events Guide for Non Market Cap Weighted Indices and the Russell US Equity Indices Construction and Methodology, which are available at www.lseg.com/en/ftse-russell/. Unless stated in these Ground Rules, the FTSE Global Factor Index Series will follow the same process as the FTSE Global Equity Index Series.

1.4 The FTSE All-World ex CW Balanced Factor Index takes account of ESG factors in its index design.[1]

The remaining benchmarks within the FTSE Global Factor Index Series do not take account of ESG factors in their index design and do not pursue any ESG objectives.

1.5 Price and total return indices will be calculated on an end-of-day basis.

Total return indices include income based on ex-dividend adjustments. All dividends are applied as declared in FTSE total return indices.

1.6 The base currency is US Dollars for global or regional indices and local currency for single country indices. Index values may also be published in other currencies.

1.7 The indices may be calculated in real time (see Appendix A).

1.8 FTSE Russell

1.8.1 FTSE Russell hereby notifies users of the index series that it is possible that circumstances, including external events beyond the control of FTSE Russell, may necessitate changes to, or the cessation of, the index series and therefore, any financial contracts or other financial instruments that reference the index series or investment funds which use the index series to measure their performance should be able to withstand, or otherwise address the possibility of changes to, or cessation of, the index series.

1.8.2 Index users who choose to follow this index series or to buy products that claim to follow this index series should assess the merits of the index series rules-based methodology and take independent investment advice before investing their own or client funds. No liability whether as a result of negligence or otherwise is accepted by FTSE Russell (or any person concerned with the preparation or publication of these Ground Rules) for any losses, damages, claims and expenses suffered by any person as a result of:

- any reliance on these Ground Rules;
- any inaccuracies in these Ground Rules;

[1] See ESG data inputs section

- any non-application or misapplication of the policies or procedures described in these Ground Rules; and/or
- any inaccuracies in the compilation of the index series or any constituent data.

Section 2

Management responsibilities

2. Management responsibilities

2.1 FTSE International Limited (FTSE)

2.1.1 FTSE is the benchmark administrator of the index series[2].

2.1.2 FTSE is responsible for the daily calculation, production and operation of the index series, and will:

- maintain records of the index weightings of all constituents;
- make changes to the constituents and their weightings in accordance with the Ground Rules;
- carry out periodic index reviews of the index series and apply the changes resulting from the reviews as required by the Ground Rules;
- publish changes to the constituent weightings resulting from their ongoing maintenance and the periodic reviews; and
- disseminate the indices.

2.2 Amendments to these Ground Rules

2.2.1 These Ground Rules shall be subject to regular review (at least once a year) by FTSE Russell to ensure that they continue to best reflect the aims of the index series. Any proposals for significant amendments to these Ground Rules will be subject to consultation with FTSE Russell advisory committees and other stakeholders if appropriate. The feedback from these consultations will be considered by the FTSE Russell Index Governance Board before approval is granted.

2.2.2 As provided for in the Statement of Principles for FTSE Russell Equity Indices, where FTSE Russell determines that the Ground Rules are silent or do not specifically and unambiguously apply to the subject matter of any decision, any decision shall be based as far as practical on the Statement of Principles. After making any such determination, FTSE Russell shall advise the market of its decision at the earliest opportunity. Any such treatment will not be considered as an exception or change to the Ground Rules, or to set a precedent for future action, but FTSE Russell will consider whether the Ground Rules should subsequently be updated to provide greater clarity.

[2] The term administrator is used in this document in the same sense as it is defined in Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds (the European Benchmark Regulation) and The Benchmarks (Amendment and Transitional Provision) (EU Exit) Regulations 2019 (the UK Benchmark Regulation).

Section 3

FTSE Russell index policies

3. FTSE Russell index policies

These Ground Rules should be read in conjunction with the following policy documents, which can be accessed using the links below:

3.1 Corporate Actions and Events Guide

3.2 Full details of changes to constituent companies due to corporate actions and events can be accessed in the Corporate Actions and Events Guide for Non Market Cap Weighted Indices using the following link:

Corporate_Actions_and_Events_Guide_for_Non_Market_Cap_Weighted_Indices.pdfStatement of Principles for FTSE Russell Equity Indices (the Statement of Principles)

Indices need to keep abreast of changing markets and the Ground Rules cannot anticipate every eventuality. Where the Ground Rules do not fully cover a specific event or development, FTSE Russell will determine the appropriate treatment by reference to the Statement of Principles, which summarises the ethos underlying FTSE Russell's approach to index construction. The Statement of Principles is reviewed annually and any changes proposed by FTSE Russell are presented to the FTSE Russell Policy Advisory Board for discussion before approval by FTSE Russell's Index Governance Board.

The Statement of Principles can be accessed using the following link:

Statement_of_Principles.pdf

3.3 Queries and Complaints

FTSE Russell's complaints procedure can be accessed using the following link:

Benchmark_Determination_Complaints_Handling_Policy.pdfIndex Policy for Trading Halts and Market Closures

3.3.1 Guidance for the treatment of index changes in the event of trading halts or market closures can be found using the following link:

Index_Policy_for_Trading_Halts_and_Market_Closures.pdf

3.4 Index Policy in the Event Clients are Unable to Trade a Market or a Security

3.4.1 Details of FTSE Russell's treatment can be accessed using the following link:

Index_Policy_in_the_Event_Clients_are_Unable_to_Trade_a_Market_or_a_Security.pdf

3.5 Recalculation Policy and Guidelines

3.5.1 Where an inaccuracy is identified, FTSE Russell will follow the steps set out in the FTSE Russell Index Recalculation Guidelines when determining whether an index or index series should be recalculated and/or associated data products reissued. Users of the FTSE Global Factor Index Series will be notified through appropriate media.

For further information, refer to the FTSE Russell Recalculation Policy and Guidelines document, which is available from the FTSE Russell website using the link below or by contacting info@ftserussell.com.

Recalculation_Policy_and_Guidelines_Equity_Indices.pdf

3.6 Policy for Benchmark Methodology Changes

3.6.1 Details of FTSE Russell's policy for making benchmark methodology changes can be accessed using the following link:

Policy_for_Benchmark_Methodology_Changes.pdf

3.7 FTSE Russell Governance Framework

3.7.1 To oversee its indices, FTSE Russell employs a governance framework that encompasses product, service and technology governance. The framework incorporates the London Stock Exchange Group's three lines of defence risk management framework and is designed to meet the requirements of the IOSCO Principles for Financial Benchmarks[3], the European benchmark regulation[4] and the UK benchmark regulation[5]. The FTSE Russell Governance Framework can be accessed using the following link:

FTSE_Russell_Governance_Framework.pdf

3.8 Real Time Status Definitions

3.8.1 For indices that are calculated in real time, please refer to the following guide for details of real-time status definitions:

Real_Time_Status_Definitions.pdf

[3] IOSCO Principles for Financial Benchmarks Final Report, FR07/13 July 2013.
[4] Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds.
[5] The Benchmarks (Amendment and Transitional Provision) (EU Exit) Regulations 2019.

Section 4

Eligible securities

4. Eligible securities

4.1 The eligible securities of each factor index are the constituents of indices defined by the FTSE Global Equity Index Series, FTSE China A All Cap Index Series, FTSE UK Index Series, FTSE/JSE Africa Index Series, Russell US Equity Indices and the FTSE EPRA Nareit Global Real Estate Index Series.

4.1.1 The eligible universe of the FTSE All-World ex CW Balanced Factor Index, including the March and September annually reviewed indices, will consist of constituent securities of the FTSE All-World Index excluding companies involved in anti-personnel mines, cluster munitions, and biological and chemical weapons through direct involvement in the core weapon system, or components or services of the core weapon system that are considered tailor-made and essential for the lethal use of the weapon, or through direct involvement in the provision of components or services for the core weapon system that are considered not tailor-made or not essential for the lethal use of the weapon. The Controversial Weapons exclusion list will be reviewed quarterly in March, June, September and December.

4.2 Multiple lines

4.2.1 All lines of the same company that are eligible securities are eligible for inclusion in the relevant factor indices.

Section 5

Factor construction

5. Factor construction

For non- Russell US based indices, the data cut-off date for the calculation of all factor data is the close of business on the last business day of the month prior to the review monthFor Russell US based indices, March, June, and September will use the last business day of the month prior to the review month. For the December review, for factors with the exception of Momentum, the data cut-off is the close of business on the last business day of October.

5.1 Suspended China A stocks

5.1.1 If a stock is suspended on a particular day, its price and daily return for that day are not used.

5.1.2 The market cap for suspended stocks is computed by multiplying their market cap one day prior to the suspension period by 1+x%, where x% is the stock's ICB industry index return over the suspension period (see Rule 5.2.4).

5.1.3 Dividend yield for suspended stocks is computed by dividing their dividend yield on the data-cut-off date by 1+x%, where x% is the stock's ICB industry index return over the suspension period (see Rule 5.2.4).

5.1.4 A stock's industry return is defined as the price return of the FTSE China A All Cap Industry Indices of which that stock is a constituent. Please see the FTSE China A All Cap Index Series Ground Rules for more information on the FTSE China A All Cap Indices.

5.2 Z-scores and missing data treatment

5.2.1 Individual stock factor values are normalised cross-sectionally to create Z-scores within each eligible universe according to:

$$Z_{F,i} = \frac{F_i - \mu_F}{\sigma_F} \quad \text{where} \quad F \in \{V, Q, M, LV, S, Y, C, \beta\} \tag{1}$$

where F_i is the F-factor value of the i^{th} stock and μ_F and σ_F are its cross-sectional factor mean and standard deviation respectively. See 5.4 to 5.11 for factor definitions.

Z-scores that are greater (less) than three (minus three) are truncated to a value of three (minus three). Post-truncation, individual Z-scores are renormalised by the reapplication of equation (1). All Z-scores, including truncated ones, are included in this reapplication. This process is repeated until all Z-scores lie in a range between plus and minus three.

5.2.2 If a factor consists of multiple sub-factors, e.g. profitability which has three components, a stock's initial factor Z-score is formed by taking the average of its individual sub-factor Z-scores. This average is taken across non missing sub-factor Z-scores. The normalisation procedure is then reapplied to this average to form the final factor Z-score.

5.2.3 For all factors with the exception of yield, stocks with missing factor data are allocated a neutral Z-score of zero after the application of the normalisation procedure. For yield missing (or zero) values are assigned a Z-score of minus three.

5.3 Momentum (M)

Momentum is defined as the cumulative total local return, calculated over the period that starts on the Monday following the third Friday 12 months prior to the effective date, and ends on the third Friday of the previous month. A full history is required to calculate momentum. Country relative momentum is calculated in excess of the country median stock level of momentum. A Z-score for momentum and country relative momentum is created following the procedure detailed in rules 5.2.

5.4 Quality (Q)

Quality is defined as a composite of profitability and leverage. Indices derived from each eligible universe consider three individual measures of profitability and a single measure of leverage. The profitability and leverage Z-scores are combined to create a single Z-score for quality, following the procedure described in rules 5.2. Annual reported financial statement items are sourced from a third-party data provider.

5.4.1 Profitability

Profitability is defined for indices derived from each eligible universe by a combination of the Z-scores of the following three measures:

Return on assets (ROA)

$$\mathrm{ROA} = \frac{\text{Net Income}}{\text{Average Total Assets}} \tag{2}$$

Change in asset turnover

$$\Delta \text{ Asset Turnover} = \frac{\text{Sales}_t}{\text{Total Assets}_t} - \frac{\text{Sales}_{t-1}}{\text{Total Assets}_{t-1}} \tag{3}$$

Accruals

$$\text{Accruals} = - \frac{\Delta\text{WC} + \Delta\text{NCO} + \Delta\text{FIN}}{\text{Average Total Assets}} \tag{4}$$

where:

- Average Total Assets $= (\text{Total Assets}_t + \text{Total Assets}_{t-1})/2$
- WC (Working Capital) = (Current Assets - Cash & Short-term Investments)
  - (Current Liability - Short-term Debt)
- Non-current Net Operating Assets (NCO) = (Total Assets - Current Assets - Investments and Advances)
  - (Total Liability - Current Liabilities - Long-term Debt)
- Net Financial Assets (FIN) = (Short-term Investments + Long-term Investments)
  - (Long-term Debt + Short-term Debt + Preferred Stock)

Note, a high level of accruals is considered an indicator of lower levels of future profitability. We therefore reverse the sign by multiplying by minus 1 in equation (4). All the above measures are calculated relative to the relevant regional median stock level.

Negative total or average assets are assigned a neutral Z-score of zero.

5.4.2 Leverage ratio

Leverage for indices derived from each eligible universe is the ratio of operating cash flow to total debt measured relative to the regional industry (ICB) median stock level. In case there are fewer than three securities in this region and industry no median normalisation is applied.

$$\text{Leverage Ratio} = \frac{\text{Operating Cash Flow}}{\text{Total Debt}} \quad (5)$$

The leverage measure is normalised following the procedure described in rule 5.2.

A company whose net operating cash flow is greater than total debt or has no debt is assigned a maximum leverage ratio of one.

5.4.3 Financials and real estate

Securities within each eligible universe that are classified as financials and real estate (old ICB industry code 8000/new ICB industry code 30 and 35), utilise ROA as the sole measure of quality. Certain quality measures such as operating cash flow and accruals cannot meaningfully be calculated or are not applicable to financial and real estate companies.

5.5 Size (S)

Size is calculated as -1 x the natural logarithm of each company's full market capitalisation in USD. Shares in issue as of the review effective date and price and foreign exchange rates as of the data cut-off date are used to calculate each company's full market capitalisation. A Z-score for size is created following the procedure detailed in rules 5.2.

5.6 Value (V)

For indices derived from each eligible universe, value is represented by a composite of three common valuation measures:

- Cash-flow yield = Latest Annual Cash-Flow/Full Market Capitalisation
- Earnings yield = Latest Annual Net Income/Full Market Capitalisation
- Sales to price = Latest Annual Sales/Full Market Capitalisation

Sales to price is calculated in excess of the country median stock level. Annual measures of cash flow, net income and sales are sourced from a third-party data provider. Individual value Z-scores are combined to create a single Z-score for value following the procedure described in rules 5.2.

5.7 Volatility (LV)

Volatility is defined as the standard deviation of weekly (Thursday to Wednesday) total local returns starting Thursday 5 years prior to the effective date and ending on the Wednesday before the cutoff date. A minimum of 52 weekly return observations are required to calculate volatility. Country relative volatility is calculated in excess of the country median stock level of volatility. -1 x volatility is used for calculating Z-score. A Z-score for volatility and country relative volatility is created following the procedure detailed in rules 5.2.

5.8 Yield (Y)

Yield is calculated as the natural logarithm of each company's 12-month trailing dividend yield. Companies whose trailing dividend yield is zero are assigned a Z-score of minus three. A Z-score for yield is created following the procedure detailed in rules 5.2.

5.9 Beta (β)

Beta is calculated as the covariance between stock total return and the underlying (market) index total return divided by the variance of the underlying index total return using two years of daily data. Betas are calculated using stock returns in USD for global and regional indices, and in local currency for single country indices.

Section 6

Index construction

6. Index construction

6.1 Tilt indices

6.1.1 All factor indices in the Global Factor Index Series are constructed using the following multiple tilt methodology. The general expression for index weights W_{F_i} is:

$$W_{F_i} = \frac{1}{\Lambda} \times S_{V,i}^{n} \times S_{Q,i}^{p} \times S_{M,i}^{q} \times S_{LV,i}^{r} \times S_{S,i}^{s} \times S_{Y,i}^{t} \times S_{C,i}^{u} \times S_{\beta,i}^{v} \times C_i \times I_i \times \Phi_i \times \Psi_i \times W_{M_i} \quad (6)$$

where, for each stock $\boldsymbol{i}$ in a subset $\boldsymbol{\mathcal{N}}$ of the entire stock universe $\boldsymbol{\mathcal{U}}$, the tilts are defined by:

- $\boldsymbol{S_{F,i}^{n}}$ is a factor tilt to factor $\boldsymbol{F}$ of strength $\boldsymbol{n}$, $\boldsymbol{S_{F,i}} = \boldsymbol{S}(\boldsymbol{Z_{F,i}})$ and $\boldsymbol{S}(\boldsymbol{Z})$ is a monotonic mapping of Z-scores to positive real numbers.
- $\boldsymbol{C_i}$ and $\boldsymbol{I_i}$ are defined by:

$$C_i = \begin{cases} c_1 & if \quad i \in \mathcal{C}_1 \\ \vdots & \\ c_K & if \quad i \in \mathcal{C}_K \end{cases} \quad \text{and} \quad I_i = \begin{cases} \iota_1 & if \quad i \in \mathcal{I}_1 \\ \vdots & \\ \iota_J & if \quad i \in \mathcal{I}_J \end{cases} \quad (7)$$

where $\mathcal{C}_H$ and $\mathcal{I}_H$ are the H^{th} country and industrial ICB groupings respectively.

- $\boldsymbol{\Phi_i}$ is the maximum stock capacity/maximum weight tilt.
- $\boldsymbol{\Psi_i}$ is the maximum turnover tilt.
- $\boldsymbol{W_{M_i}}$ is the market capitalisation weight.
- Λ is the normalisation factor defined by:

$$\Lambda = \sum_{i \in \mathcal{N}} S_{V,i}^{n} \times S_{Q,i}^{p} \times S_{M,i}^{q} \times S_{LV,i}^{r} \times S_{S,i}^{s} \times S_{Y,i}^{t} \times S_{C,i}^{u} \times S_{\beta,i}^{v} \times C_i \times I_i \times \Phi_i \times \Psi_i \times W_{M_i} \quad (8)$$

This ensures that the tilt weights sum to one, i.e. $\sum_{\boldsymbol{i} \in \boldsymbol{\mathcal{N}}} \boldsymbol{W_{F_i}} = \boldsymbol{1}$.

6.1.2 Fixed Tilt Indices: the strength of the factor tilt is a fixed number for all rebalances.

6.1.3 Target Exposure Indices: variable tilt strengths are chosen to satisfy fixed exposure targets.

6.1.4 The general tilt expression (6) can be broken up into several sequential tilts consisting of factor tilts, country and industry tilts, a capacity and maximum weight tilt and a turnover tilt.

6.2 Factor tilts

6.2.1 The factor tilt is given by:

$$W_{1_i} = \frac{1}{\Pi} \times S_{V,i}^{n} \times S_{Q,i}^{p} \times S_{M,i}^{q} \times S_{LV,i}^{r} \times S_{S,i}^{s} \times S_{Y,i}^{t} \times S_{C,i}^{u} \times S_{\beta,i}^{v} \times W_{M_i} \tag{9}$$

where Π is the normalisation factor defined by:

$$\Pi = \sum_{i \in \mathcal{N}} S_{V,i}^{n} \times S_{Q,i}^{p} \times S_{M,i}^{q} \times S_{LV,i}^{r} \times S_{S,i}^{s} \times S_{Y,i}^{t} \times S_{C,i}^{u} \times S_{\beta,i}^{v} \times W_{M_i} \tag{10}$$

Factors that are not targeted are assigned zero tilt strength.

6.2.2 Fixed Tilt Indices:

- For broad indices: $\mathcal{N} = \mathcal{U}$.
- For narrow indices: $\mathcal{N}$ is a subset of $\mathcal{U}$ defined in Appendix A.
- $S(Z) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{Z} e^{-x^2/2}\, dx$; $S^n \stackrel{\text{def}}{=} S(-Z)^{-n}$ when n is negative.
- Tilts are of a fixed strength and do not vary from rebalance to rebalance.

6.2.3 Target Exposure Indices:

- $\mathcal{N} = \mathcal{U}$.
- $S(Z) = \text{Exp}(Z)$.
- Tilts strengths vary from rebalance to rebalance and result from the solution of the following set of equations for active factor exposure:

$$\sum_{i \in \mathcal{U}} \left(W_{1_i} - W_{M_i}\right) Z_{F,i} = T_F \quad \text{for each targeted} \quad F \in \{V, Q, M, LV, S, Y, C\} \tag{11}$$

and for weighted beta:

$$\sum_{i \in \mathcal{U}} W_{1_i}\, \beta_i = T_\beta \qquad \text{where} \qquad T_\beta \in [\beta_L, \beta_U] \tag{12}$$

where β_i is the beta factor, T_F is the active exposure target for factor F and β_L and β_U are lower and upper bounds for the index level beta.

We begin by solving system of equations (11) for the factor tilt strengths. If equation (12) is satisfied using the solution for W_{1_i} from (11), a tilt strength of 0 is assigned to the beta tilt. If the weighted beta is lower than β_L we set $T_\beta = \beta_L$, if it is higher than β_U we set $T_\beta = \beta_U$ and then solve the system of equations (11) and (12) simultaneously.

6.3 Country and industry tilts

6.3.1 Country and industry tilts are applied to the weights resulting from the factor tilt in 6.2:

$$W_{2_i} = C_i \times I_i \times W_{1_i} \tag{13}$$

The quantities C_i and I_i are defined in equation (7) and are chosen to satisfy:

$$\sum_{i \in \mathcal{C}_H} W_{2_i} = T_{\mathcal{C}_H} \qquad \text{where} \qquad H = 1, \ldots, K \tag{14}$$

where $T_{\mathcal{C}_H} \in [\mathcal{C}_{H_L},\ \mathcal{C}_{H_U}]$ is the target country weight for the H^{th} country, and

$$\sum_{i \in \mathcal{I}_H} W_{2_i} = T_{\mathcal{I}_H} \quad \text{where} \quad H = 1, \ldots, J \tag{15}$$

where $T_{\mathcal{I}_H} \in [\mathcal{I}_{H_L},\ \mathcal{I}_{H_U}]$ is the target industry weight for the H^{th} industry.

The country lower and upper bounds are defined by:

$$\mathcal{C}_{H_L} = \text{Max}\left[(1 - P_{\mathcal{C}}) \sum_{i \in \mathcal{C}_H} W_{M_i} - Q_{\mathcal{C}}, 0\right] \text{ and } \mathcal{C}_{H_U} = \text{Min}\left[(1 + P_{\mathcal{C}}) \sum_{i \in \mathcal{C}_H} W_{M_i} + Q_{\mathcal{C}}, 1\right] \tag{16}$$

and the industry lower and upper bounds by:

$$\mathcal{I}_{H_L} = \text{Max}\left[(1 - P_{\mathcal{I}}) \sum_{i \in \mathcal{I}_H} W_{M_i} - Q_{\mathcal{I}}, 0\right] \text{ and } \mathcal{I}_{H_U} = \text{Min}\left[(1 + P_{\mathcal{I}}) \sum_{i \in \mathcal{I}_H} W_{M_i} + Q_{\mathcal{I}}, 1\right] \tag{17}$$

where the P and Q parameters in (16) and (17) are in the range 0 to 1. Values for particular indices are given in tables one and three of rules 6.10 and 6.11.

The method to obtain the target country $T_{\mathcal{C}_H}$ and industry $T_{\mathcal{I}_H}$ weights that are consistent with the constraints set out in (16) and (17) is as follows.

Starting with the country and industry weights of the factor tilt weights defined by (9) one sets the weight of industries and countries that breach the relevant constraint to the nearest of their upper and lower bounds. For Fixed Tilt Indices, the lower bound is modified to be the minimum of twice the country or industry weighting of the factor tilt weights defined by (9) and the lower bounds defined in (16) and (17).

Weight is then reassigned proportionately to countries/industries that are not in breach of their upper or lower bounds.

6.3.2 Fixed Tilt Indices:

Where such a reallocation causes breaches in previously “good” industries or countries, then all original constraints are marginally and repeatedly relaxed until no such breaches occur.

6.3.3 Target Exposure Indices:

Where such a reallocation causes breaches in previously “good” industries or countries, the process is repeated iteratively until no such breaches occur. If the iteration does not converge to a solution that satisfies the original constraints, then those constraints are marginally relaxed and the iteration repeated. This relaxation/iteration process continues until a consistent solution with no breaches is found.

6.3.4 The country and industry weightings determined in rules 6.3.2 or 6.3.3 are the target country $T_{\mathcal{C}_H}$ and industry $T_{\mathcal{I}_H}$ weights to be used in (14) and (15).

6.4 Capacity, maximum and minimum weight tilt

6.4.1 A capacity and maximum weight tilt is applied to the weights resulting from the country and industry tilt described in 6.3:

$$W_{3_i} = \Phi_i \times W_{2_i} \tag{18}$$

Let X_i and Y_i be the maximum and minimum weights for the i^{th} stock**.** Y_i is initially set to zero but will later be set to a positive minimum weight in 6.7.2**.** Let C be the maximum stock capacity ratio, which is set to 20 unless otherwise explicitly stated*. The weight W_{3_i} is then found by iterating:

$$\widehat{W}_i = \text{Max}\left[\text{Min}\left[W_{3_i}, C * W_{M_i}, X_i\right], Y_i\right]; \qquad W_{3_i} = \widehat{W}_i / \sum_{i \in \mathcal{N}} \widehat{W}_i \tag{19}$$

with a starting value $W_{3_i} = W_{2_i}$ to convergence. The value for the tilt is then defined by:

$$\Phi_i = \frac{W_{3_i}}{W_{2_i}} \tag{20}$$

*Maximum stock capacity ratio is set to 10 for FTSE Emerging Size/2Val/0.5Qual/0.5Mom/0.5Vol 7.5% Capped Factor Index, FTSE Emerging 2Mom/0.5Size/Val/0.5Qual/0.5Vol 7.5% Capped Factor Index, FTSE Emerging 1.5Qual/1.5Vol/0.5Val/0.5Mom/0.5Size 7.5% Capped Factor Index, FTSE Emerging Mom/2Qual/2Vol 7.5% Capped Factor Index.

6.5 Turnover tilt

6.5.1 A turnover tilt is applied to the weights resulting from the capacity and maximum weight tilt in 6.4.1:

$$W_{4_i} = \Psi_i \times W_{3_i} \tag{21}$$

Ψ_i is calculated as follows. Let W_{0_i} be the current set of weights evaluated at the price cut-off date then the two-way turnover between this set of weights and W_{3_i} is given by:

$$\text{T} = \sum_{i \in \mathcal{N} \cup \mathcal{P}} |W_{3_i} - W_{0_i}| \tag{22}$$

where $\mathcal{P}$ is the stock universe associated with the current set of weights. Let T_{TO} represent the maximum allowable turnover for the rebalance. Define the following parameter:

$$\alpha = \text{Min}\left[1, \frac{T_{TO}}{T}\right] \tag{23}$$

Then we have the following equation for a partial rebalance of the index:

$$W_{4_i} = \alpha * W_{3_i} + (1 - \alpha) * W_{0_i} \tag{24}$$

If $T \leq T_{TO}$ or equivalently we have no turnover constraint (i.e. T_{TO} is arbitrarily large) then $\alpha = 1$ and we have a full rebalance. The turnover tilt is thus defined by:

$$\Psi_i = \left[\alpha + (1 - \alpha)\frac{W_{0_i}}{W_{3_i}}\right] \tag{25}$$

6.6 Final index

6.6.1 Fixed Tilt Indices:

The final index is thus given by the following sequential tilt from market capitalisation weights:

$$W_{F_i} = \Psi_i \times \Phi_i \times C_i \times I_i \times \frac{1}{\Pi} \times S_{V,i}^{n} \times S_{Q,i}^{p} \times S_{M,i}^{q} \times S_{LV,i}^{r} \times S_{S,i}^{s} \times S_{Y,i}^{t} \times S_{C,i}^{u} \times S_{\beta,i}^{v} \times W_{M_i} \tag{26}$$

This is equivalent to equation (6) where all tilts are applied simultaneously.

6.6.2 Target Exposure Indices:

If all he following set of conditions are satisfied:

- Absolute weight difference between W_{1_i} and W_{4_i} is less than or equal to 25 basis points:

$$\sum_{i \in \mathcal{U}} |W_{4_i} - W_{1_i}| \leq 25 \text{ b.p.} \quad (27)$$

- Factor exposure targets T_F are less than 0.01 different than the factor exposures of W_{4_i}:

$$\left| \sum_{i \in \mathcal{U}} \left(W_{4_i} - W_{M_i}\right) Z_{F,i} - T_F \right| \leq 0.01 \quad \text{for each targeted} \quad F \in \{V, Q, M, LV, S, Y\} \quad (28)$$

- Effective N of W_{4_i} is greater than 25% of the effective N of market capitalisation weights W_{M_i}:

$$1/\sum_{i \in \mathcal{U}} {W_{4_i}}^2 \geq 0.25/\sum_{i \in \mathcal{U}} {W_{M_i}}^2 \quad (29)$$

then the final index weights are given by $W_{F_i} = W_{4_i}$.

Otherwise the operations in 6.2, 6.3, 6.4 and 6.5 are repeated but with W_{4_i} replacing W_{M_i} in equations (9) and (10). This loop is continued until each of the conditions (27), (28) and (29) are satisfied.

This is essentially the solution method by which the set of tilts are chosen in equation (6) so as to satisfy all exposure targets and constraints simultaneously.

Relaxation of exposure and turnover targets:

If after 100 iterations any of equations (27), (28) and (29) are not satisfied, all targeted active exposures are reduced by 2.5% and the whole process is attempted again. If this continues to be the case after 10 reductions (i.e. after the exposure targets have been reduced by 25%), then the turnover target is increased by 50% and the whole process is repeated using the original active exposure targets.

Finally, if no solution is reached by this point the turnover target is relaxed completely and a solution with the original exposure targets is attempted. In the event that a solution remains infeasible the active exposure targets are reduced by 2.5% up to a maximum of 40 times.

6.7 Minimum stock weight

6.7.1 A minimum-security level weight threshold is applied to each final factor index. Any security level factor index weight that is less than the minimum weight threshold is treated as having a zero weight in the relevant FTSE Global Factor Index. Any resulting excess weight will be redistributed amongst the remaining constituents and may cause small changes in the active weights and exposures of the final index.

6.7.2 Target Exposure Indices:

The weights resulting from 6.7.1 are used as starting weights, replacing W_{M_i} in equations (9) and (10). Operations in 6.2, 6.3, 6.4 and 6.5 are repeated but with the parameter Y_i in equation (19) changed to the minimum security weight only for those stocks with non-zero weights. The iteration is continued until each of the conditions (27), (28) and (29) are satisfied. This process ensures that the targeted active exposures and constraints are consistent with the minimum-security weight. If the solution is infeasible then the weights obtained in 6.7.1 are retained as the final index weights.

6.8 Fixed Tilt Indices

6.8.1 Table one displays the parameters used in the Fixed Tilt Indices.

Table one: Fixed Tilt Index parameters

	Tilt strengths							Constraints						
Index	V	Q	M	LV	S	Y	C	Narrow	P	Q	Min stock weight (b.p.)	Max company weight (%)	Max two-way T/O (%)	Review
FTSE All-World Comprehensive Factor Index	1	1	1	1	1	0	0	N	0.2	0.05	0.5	–	–	MS
FTSE All-World ex US Comprehensive Factor Index	1	1	1	1	1	0	0	N	0.2	0.05	2	–	–	MS
FTSE All-World ex CW Balanced Factor Index@	1	1	0	1	0.25	0	0	N	0.2	0.05	0.5	–	–	MS
FTSE Developed Comprehensive Factor Index	1	1	1	1	1	0	0	N	0.2	0.05	0.5	–	–	MS
FTSE Developed ex US Comprehensive Factor Index	1	1	1	1	1	0	0	N	0.2	0.05	0.5	–	–	MS
FTSE Developed ex US Qual/Vol/Yield Factor Index	0	1	0	1	0	1	0	Y	0.2	0.05	0.5	–	–	S
FTSE Developed ex US Qual/Vol/Yield 5% Capped Factor Index	0	1	0	1	0	1	0	Y	0.2	0.05	0.5	5*	–	S
FTSE Developed ex Korea Qual/Vol Factor Index	0	1	0	1	0	0	0	Y	0.2	0.05	0.5	–	–	S
FTSE Developed ex Korea Qual/2Vol Factor Index	0	1	0	2	0	0	0	Y	0.2	0.05	0.5	–	–	S
FTSE Developed Europe Comprehensive Factor Index	1	1	1	1	1	0	0	N	0.2	0.05	2	–	–	MS
FTSE Emerging Comprehensive Factor Index	1	1	1	1	1	0	0	N	0.2	0.05	0.5	–	–	MS
FTSE Emerging Qual/Vol/Yield Factor Index	0	1	0	1	0	1	0	Y	0.2	0.05	0.5	–	–	S
FTSE Emerging Qual/Vol/Yield 5% Capped Factor Index	0	1	0	1	0	1	0	Y	0.2	0.05	0.5	5*	–	S
FTSE/JSE All Share Comprehensive Factor Index^	1	1	1	1	1	0	0	N	0.2	0.05	2	–	–	MS
FTSE/JSE All Share Low Volatility Focused Factor Index^	1	1	0	2	1	0	0	N	0.2	0.05	2	–	–	S

	Tilt strengths							Constraints						
Index	V	Q	M	LV	S	Y	C	Narrow	P	Q	Min stock weight (b.p.)	Max company weight (%)	Max two-way T/O (%)	Review
Russell 1000 Comprehensive Factor Index	1	1	1	1	1	0	0	N	0.2	0.05	0.5	–	–	JD
Russell 1000 Low Volatility Focused ex Tobacco Factor Index	1	1	0	2	1	0	0	Y	0.2	0.05	0.5	–	–	J
Russell 1000 Low Volatility Focused Factor Index	1	1	0	2	1	0	0	Y	0.2	0.05	0.5	–	–	J
Russell 1000 Yield Focused Factor Index	1	1	0	0	1	2	0	Y	0.2	0.05	0.5	–	–	J
Russell 1000 Momentum Focused Factor Index	1	1	1	0	1	0	0	N	0.2	0.05	0.5	–	–	JD
Russell 1000 Mom/2Val Factor Index	2	0	1	0	0	0	0	Y	0.2	0.05	0.5	–	–	MJSD
Russell 1000 Recovery Factor Index*** !	Target			Target****	Target	0	0	N	0.2	0.05	0.5	+/-2 # &	–	JD
Russell 1000 Expansion Factor Index*** !	Target		Target		Target	0	0	N	0.2	0.05	0.5	+/-2 # &	–	JD
Russell 1000 Slowdown Factor Index*** !		Target		Target		0	0	N	0.2	0.05	0.5	+/-2 # &	–	JD
Russell 1000 Contraction Factor Index*** !		Target	Target	Target		0	0	N	0.2	0.05	0.5	+/-2 # &	–	JD
Russell 1000 2Qual/Val 5% Capped Factor Index	1	2	0	0	0	0	0	Y	0.2	0.05	2	5	50	J
Russell 2000 Comprehensive Factor Index	1	1	1	1	1	0	0	N	0.2	0.05	0.5	–	–	JD
Russell 2000 Recovery Factor Index*** !	Target				Target	0	0	N	0.2	0.05	0.5	+/-2 # &	–	JD
Russell 2000 Expansion Factor Index*** !	Target		Target		Target	0	0	N	0.2	0.05	0.5	+/-2 # &	–	JD
Russell 2000 Slowdown Factor Index*** !		Target		Target		0	0	N	0.2	0.05	0.5	+/-2 # &	–	JD
Russell 2000 Contraction Factor Index*** !		Target	Target	Target		0	0	N	0.2	0.05	0.5	+/-2 # &	–	JD
FTSE USA Qual/Vol/Yield Factor Index	0	1	0	1	0	1	0	Y	0.2	0.05	0.5	–	–	S
FTSE USA Qual/Vol/Yield 5% Capped Factor Index	0	1	0	1	0	1	0	Y	0.2	0.05	0.5	5*	–	S
FTSE Japan Comprehensive Factor Index	1	1	1	1	1	0	0	N	0.2	0.05	2	–	–	MS
FTSE All-World ex CW Balanced Factor (Mar) Index	1	1	0	1	0.25	0	0	N	0.2	0.05	0.5	–	–	M

	Tilt strengths							Constraints						
Index	V	Q	M	LV	S	Y	C	Narrow	P	Q	Min stock weight (b.p.)	Max company weight (%)	Max two-way T/O (%)	Review
FTSE All-World ex CW Balanced Factor (Sep) Index	1	1	0	1	0.25	0	0	N	0.2	0.05	0.5	–	–	S
Russell 1000 Value Factor Index	1	0	0	0	0	0	0	Y	0.2	0.05	2	–	–	J
Russell 1000 Volatility Factor Index	0	0	0	1	0	0	0	Y	0.2	0.05	2	–	–	J
Russell 1000 Quality Factor Index	0	1	0	0	0	0	0	Y	0.2	0.05	2	–	–	J
Russell 1000 Momentum Factor Index	0	0	1	0	0	0	0	N	0.2	0.05	2	–	–	JD
Russell 1000 Size Factor Index	0	0	0	0	1	0	0	Y	0.2	0.05	2	–	–	J
Russell 1000 Yield Factor Index	0	0	0	0	0	1	0	Y	0.2	0.05	2	–	–	J
Russell 2000 Value Factor Index	1	0	0	0	0	0	0	Y	0.2	0.05	0.5	–	–	J
Russell 2000 Quality Factor Index	0	1	0	0	0	0	0	Y	0.2	0.05	0.5	–	–	J
Russell 2000 Momentum Factor Index	0	0	1	0	0	0	0	N	0.2	0.05	0.5	–	–	JD
Russell 2000 Volatility Factor Index	0	0	0	1	0	0	0	Y	0.2	0.05	0.5	–	–	J
Russell 2000 Size Factor Index	0	0	0	0	1	0	0	Y	0.2	0.05	0.5	–	–	J
Russell 2000 Yield Factor Index	0	0	0	0	0	1	0	Y	0.2	0.05	0.5	–	–	J
FTSE Developed ex US Country Relative Momentum Factor Index	0	0	1**	0	0	0	0	N	0.2	0.05	2	–	–	MS
FTSE Developed ex US Country Relative Volatility Factor Index	0	0	0	1**	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE Emerging Country Relative Momentum Factor Index	0	0	1**	0	0	0	0	N	0.2	0.05	2	–	–	MS
FTSE Emerging Country Relative Volatility Factor Index	0	0	0	1**	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE Indonesia Volatility Factor Index	0	0	0	1	0	0	0	N	0.2	0.05	0.5	–	–	S
FTSE/JSE All Share Value Factor Index ^	1	0	0	0	0	0	0	N	0.2	0.05	2	–	–	S

	Tilt strengths							Constraints						
Index	V	Q	M	LV	S	Y	C	Narrow	P	Q	Min stock weight (b.p.)	Max company weight (%)	Max two-way T/O (%)	Review
FTSE/JSE All Share Quality Factor Index ^	0	1	0	0	0	0	0	N	0.2	0.05	2	–	–	S
FTSE/JSE All Share Momentum Factor Index ^	0	0	1	0	0	0	0	N	0.2	0.05	2	–	–	MS
FTSE/JSE All Share Volatility Factor Index ^	0	0	0	1	0	0	0	N	0.2	0.05	2	–	–	S
FTSE/JSE All Share Size Factor Index ^	0	0	0	0	1	0	0	N	0.2	0.05	2	–	–	S
FTSE/JSE All Share Yield Factor Index ^	0	0	0	0	0	1	0	N	0.2	0.05	2	–	–	S
FTSE Total China Connect Value Factor Index	1	0	0	0	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE Total China Connect Quality Factor Index	0	1	0	0	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE Total China Connect Momentum Factor Index	0	0	1	0	0	0	0	N	0.2	0.05	2	–	–	MS
FTSE Total China Connect Volatility Factor Index	0	0	0	1	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE Total China Connect Size Factor Index	0	0	0	0	1	0	0	Y	0.2	0.05	2	–	–	S
FTSE Japan All Cap Value Factor Index	1	0	0	0	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE Japan All Cap Quality Factor Index	0	1	0	0	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE Japan All Cap Momentum Factor Index	0	0	1	0	0	0	0	N	0.2	0.05	2	–	–	MS
FTSE Japan All Cap Volatility Factor Index	0	0	0	1	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE Japan All Cap Size Factor Index	0	0	0	0	1	0	0	Y	0.2	0.05	2	–	–	S
FTSE North America Value Factor Index	1	0	0	0	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE North America Quality Factor Index	0	1	0	0	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE North America Momentum Factor Index	0	0	1	0	0	0	0	N	0.2	0.05	2	–	–	MS
FTSE North America Volatility Factor Index	0	0	0	1	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE North America Size Factor Index	0	0	0	0	1	0	0	Y	0.2	0.05	2	–	–	S

	Tilt strengths							Constraints						
Index	V	Q	M	LV	S	Y	C	Narrow	P	Q	Min stock weight (b.p.)	Max company weight (%)	Max two-way T/O (%)	Review
FTSE APAC ex Japan Value Factor Index	1	0	0	0	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE APAC ex Japan Quality Factor Index	0	1	0	0	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE APAC ex Japan Momentum Factor Index	0	0	1	0	0	0	0	N	0.2	0.05	2	–	–	MS
FTSE APAC ex Japan Volatility Factor Index	0	0	0	1	0	0	0	Y	0.2	0.05	2	–	–	S
FTSE APAC ex Japan Size Factor Index	0	0	0	0	1	0	0	Y	0.2	0.05	2	–	–	S
FTSE Developed ex US Recovery Factor Index *** !	Target			Target****	Target	0	0	N	0.2	0.05	0.5	+/-2 #&	–	MS
FTSE Developed ex US Expansion Factor Index *** !	Target		Target**		Target	0	0	N	0.2	0.05	0.5	+/-2 #&	–	MS
FTSE Developed ex US Slowdown Factor Index *** !	0	Target	0	Target**	0	0	0	N	0.2	0.05	0.5	+/-2 #&	–	MS
FTSE Developed ex US Contraction Factor Index *** !	0	Target	Target**	Target**	0	0	0	N	0.2	0.05	0.5	+/-2 #&	–	MS
FTSE Emerging Size/2Val/0.5Qual/0.5Mom/0.5Vol 7.5% Capped Factor Index	2	0.5	0.5**	0.5**	1	0	0	N	0.2	0.05	2	7.5	–	MS
FTSE Emerging 2Mom/0.5Size/Val/0.5Qual/0.5Vol 7.5% Capped Factor Index	1	0.5	2**	0.5**	0.5	0	0	N	0.2	0.05	2	7.5	–	MS
FTSE Emerging 1.5Qual/1.5Vol/0.5Val/0.5Mom/0.5Size 7.5% Capped Factor Index	0.5	1.5	0.5**	1.5**	0.5	0	0	N	0.2	0.05	2	7.5	–	MS
FTSE Emerging Mom/2Qual/2Vol 7.5% Capped Factor Index	0	2	1**	2**	0	0	0	N	0.2	0.05	2	7.5	–	MS
FTSE Developed ex Korea ex Japan 2Size/2Val Capped Factor Index	2	0	0	0	2	0	0	Y	Industry: 0.2 Country: 0	0.05	2	+/-1#	–	S

	Tilt strengths							Constraints						
Index	V	Q	M	LV	S	Y	C	Narrow	P	Q	Min stock weight (b.p.)	Max company weight (%)	Max two-way T/O (%)	Review
FTSE Developed ex Korea ex Japan 2Mom/Size/Val Capped Factor Index	1	0	2**	0	1	0	0	N	Industry: 0.2 Country: 0	0.05	2	+/-1#	–	MS
FTSE Developed ex Korea ex Japan 2Qual/2Vol Capped Factor Index	0	2	0	2**	0	0	0	Y	Industry: 0.2 Country: 0	0.05	2	+/-1#	–	S
FTSE Developed ex Korea ex Japan 2Mom/2Qual/2Vol Capped Factor Index	0	2	2**	2**	0	0	0	N	Industry: 0.2 Country: 0	0.05	2	+/-1#	–	MS
FTSE Developed ex Korea ex Japan Value Factor Index	1	0	0	0	0	0	0	Y	Industry: 0.2 Country: 0	0.05	2	5	–	S
FTSE Developed ex Korea ex Japan Country Relative Volatility Factor Index	0	0	0	1**	0	0	0	Y	Industry: 0.2 Country: 0	0.05	2	5	–	S
FTSE Developed ex Korea ex Japan Quality Factor Index	0	1	0	0	0	0	0	Y	Industry: 0.2 Country: 0	0.05	2	5	–	S

	Tilt strengths							Constraints						
Index	V	Q	M	LV	S	Y	C	Narrow	P	Q	Min stock weight (b.p.)	Max company weight (%)	Max two-way T/O (%)	Review
FTSE Developed ex Korea ex Japan Country Relative Momentum Factor Index	0	0	1**	0	0	0	0	N	Industry: 0.2 Country: 0	0.05	2	5	–	MS
FTSE Developed ex Korea ex Japan Size Factor Index	0	0	0	0	1	0	0	Y	Industry: 0.2 Country: 0	0.05	2	5	–	S

Notes:

@FTSE All-World ex CW Balanced Factor Index results from phased reviews (see rule 6.9).
^Company level capping of 5% is applied to the underlying at review.
^^Company level capping of 2% is applied to the underlying at review.
#Relative weight of company level capping applied relative to the underlying at review
*Company level capping is applied quarterly using prices as at the close of business on the second Friday in March, June, September and December as per rule 7.2.
**Country relative.
*** Variable tilt strengths based on an active risk target of 4% and equal factor risk contribution from target factors, and target 0% risk contribution from non-target factors. Factor returns are derived based on factor exposures excluding the industry and market beta factors. Please refer to 6.9.2.
**** Targets negative exposure to Volatility
Review: M = March, J = June, S = September and D = December.

! Index name pending per FTSE Russell Index Name Change notice
& The sum of weights in companies representing 5% or more of the index weight cannot exceed 25% of the index weight

Previous names

Russell 1000 Component Indices

Invesco signal	Component index
Recovery	Russell 1000 2Size/2Val 5% Capped Factor Index
Expansion	Russell 1000 2Mom/Size/Val 5% Capped Factor Index
Slowdown	Russell 1000 2Qual/2Vol 5% Capped Factor Index
Contraction	Russell 1000 2Mom/2Qual/2Vol 5% Capped Factor Index

Russell 2000 Component Indices

Invesco signal	Component index
Recovery	Russell 2000 2Size/2Val 5% Capped Factor Index
Expansion	Russell 2000 2Mom/Size/Val 5% Capped Factor Index
Slowdown	Russell 2000 2Qual/2Vol 5% Capped Factor Index
Contraction	Russell 2000 2Mom/2Qual/2Vol 5% Capped Factor Index

Table two: Fixed Tilt Index parameters for the FTSE All-World, Developed, Developed ex US, Emerging, USA and Japan Indices

	Tilt strengths							Constraints						
Index	V	Q	M	LV	S	Y	C	Narrow	P	Q	Min stock weight (b.p.)	Max company weight (%)	Max two-way T/O (%)	Review
FTSE Value Factor Index	1	0	0	0	0	0	0	Y	0.2	0.05	0.5	–	–	S
FTSE Quality Factor Index	0	1	0	0	0	0	0	Y	0.2	0.05	0.5	–	–	S
FTSE Momentum Factor Index	0	0	1	0	0	0	0	N	0.2	0.05	0.5	–	–	MS
FTSE Volatility Factor Index	0	0	0	1	0	0	0	Y	0.2	0.05	0.5	–	–	S
FTSE Size Factor Index	0	0	0	0	1	0	0	Y	0.2	0.05	0.5	–	–	S
FTSE Yield Factor Index	0	0	0	0	0	1	0	Y	0.2	0.05	0.5	–	–	S

6.8.2 The FTSE All-World ex CW Balanced Factor Index (see table one of rule 6.8.1) consists of a combination of two annually reviewed indices – the FTSE All-World ex CW Balanced Factor (Mar) Index and the FTSE All-World ex CW Balanced Factor (Sep) Index. The two indices are reviewed annually in March and September respectively, and a set of constituent review weights for each index determined following rules 6.2 to 6.7. The effective weight of each constituent in the FTSE All-World ex CW Balanced Factor Index is calculated as an equal combination of each annually reviewed index:

$$W_{i,t}^{*} = 0.5 \times W_{i,t}^{Mar} + 0.5 \times W_{i,t}^{Sep} \quad (30)$$

where:

- $W_{i,t}^{Mar}$ is the weight of stock i in the FTSE All-World ex CW Balanced Factor (Mar) Index.
- $W_{i,t}^{Sep}$ is the weight of stock i in the FTSE All-World ex CW Balanced Factor (Sep) Index.
- $W_{i,t}^{*}$ is the effective weight of stock i in the FTSE All-World ex CW Balanced Factor Index.

6.8.3 A constituent will be removed from the FTSE All-World ex CW Balanced Factor Indices if it is also removed from the underlying FTSE All-World Index.

6.9 Target Exposure Indices

6.9.1 Fixed Exposure Indices: active exposure targets are expressed in units derived from equally weighted Z-scores defined by equation (1). Such targets may also be expressed in units of market capitalisation weighted standard deviation $\hat{\sigma}_F$, given by:

$$\hat{\sigma}_F{}^2 = \sum_{i \in \mathcal{U}} W_{M_i} * (Z_{F,i} - \hat{\mu}_F)^2 \quad (31)$$

where $\hat{\mu}_F = \sum_{i \in \mathcal{U}} W_{M_i} * Z_{F,i}$ is the market capitalisation weighted mean. An active exposure of $\hat{\sigma}_F * X$ in equally weighted exposure units is therefore equivalent to X units of capitalisation weighted exposure, where capitalisation weighted Z-scores are defined by:

$$\hat{Z}_{F,i} = \frac{Z_{F,i} - \hat{\mu}_F}{\hat{\sigma}_F} \quad (32)$$

6.9.2 Equal Factor Risk Contribution Indices: the factor exposure targets are set such that:

- the index ex-ante active risk is equal to an index active risk target; and
- a given set of factors contribute equally to ex-ante active risk.

Ex-ante active risk is calculated using a factor covariance matrix formed using the daily factor returns from the two years preceding the price cut-off date of the review.

Factor returns are derived from cross-sectional market capitalisation weighted regressions of total daily USD stock returns on prior month end factor exposures with industry and country effects. This is illustrated by the following equation:

$$R_i = \alpha + \sum_{H} \delta_{i \in \mathcal{C}_H} r_{\mathcal{C}_H} + \sum_{J} \delta_{i \in \mathcal{I}_J} r_{\mathcal{I}_J} + \sum_{F} \hat{Z}_{F,i}\, r_F + \varepsilon_i \quad (33)$$

where for stock i:

- R_i is the stock return
- $\delta_{i \in \mathcal{C}_H} = \begin{cases} 1 \; if \; i \in \mathcal{C}_H \\ 0 \; if \; i \notin \mathcal{C}_H \end{cases}$ is a dummy variable representing membership of country (or industry)
- $\hat{Z}_{F,i}$ is the capitalisation-weighted Z-score for factor $F \in \{V, Q, M, LV, S, \beta\}$
- ε_i is the residual return
- α is the return of the capitalisation-weighted benchmark, $r_{\mathcal{C}_H}$ and $r_{\mathcal{I}_J}$ are the pure country and industry returns respectively and r_F are the pure factor returns of interest.

For country and industry neutral indices, the model of ex-ante tracking error is related to levels of active factor exposure E_F by:

$$[\text{Ex-Ante Tracking Error}]^2 = \sum_F \sum_G E_F E_G C_{FG} \tag{34}$$

where C_{FG} is the covariance of factor returns to factors F and G.

Factors chosen to contribute equally to ex-ante risk satisfy:

$$E_F * \sum_G E_G C_{FG} = k \tag{35}$$

where the scalar k is set to achieve a specified level of ex-ante tracking error. Active exposures of factors that are used in the estimation of factor returns but are not chosen to contribute to ex-ante risk are set to zero.

Table three displays the selected factors and active risk targets for the equal factor risk contribution indices.

Table three: equal factor risk contribution parameters

Index	ERC factors	Annualised ex-ante target
Russell 1000 Comprehensive Equal Factor Risk Contribution Target Exposure Index	Momentum, quality, size, value, volatility	2.5%
FTSE Developed ex US Comprehensive Equal Factor Risk Contribution Target Exposure Index	Momentum, quality, size, value, volatility	2.5%

6.9.3 Table four displays the parameters used in the Target Exposure Indices.

Table four: Target Exposure Index parameters

	Active factor exposure targets						Constraints						
Index	**V**	**Q**	**S**	**M**	**LV**	**Y**	**Beta banding**	**Country**	**Industry**	**Max two-way T/O (%)***	**Max company weight (%)**	**Min stock weight (b.p.)**	**Review**
FTSE All-World 0.4 Target Exposure Comprehensive Factor Index	0.4	0.4	0.4	0.4	0.4	–	0.95-1.05	Neutral	Neutral	50	5	0.5	MS
FTSE All-World Target Exposure Qual Vol Factor Index	0	0.5	0	0	0.5	–	0.7-1.3	Neutral	Neutral	50	5	0.5	MS
FTSE All-World Target Exposure Comprehensive Factor Index	0.4σ	0.4σ	0.4σ	0.4σ	0.4σ	–	Neutral	Neutral	Neutral	40	5	0.5	MS
FTSE Developed 0.4 Target Exposure Comprehensive Factor Index	0.4	0.4	0.4	0.4	0.4	–	0.95-1.05	Neutral	Neutral	50	5	0.5	MS
FTSE Developed Target Exposure Comprehensive Factor Index	0.4σ	0.4σ	0.4σ	0.4σ	0.4σ	–	Neutral	Neutral	Neutral	40	5	0.5	MS
Russell 1000 0.4 Target Exposure Comprehensive Factor Index	0.4	0.4	0.4	0.4	0.4	–	0.95-1.05	–	Neutral	50	5	0.5	JD
Russell 1000 Comprehensive Target Exposure Factor Index	0.4σ	0.4σ	0.4σ	0.4σ	0.4σ	–	Neutral	–	Neutral	40	5	0.5	JD
Russell 1000 Comprehensive High Target Exposure Factor Index	0.6σ	0.6σ	0.6σ	0.6σ	0.6σ	–	0.7-1.3	–	Banded	50	5	0.5	JD
FTSE All-World Comprehensive High Target Exposure Factor	0.6σ	0.6σ	0.6σ	0.6σ	0.6σ	–	0.7-1.3	Banded	Banded	50	5	0.5	MS
FTSE Developed Comprehensive High Target Exposure Factor	0.6σ	0.6σ	0.6σ	0.6σ	0.6σ	–	0.7-1.3	Banded	Banded	50	5	0.5	MS
FTSE Emerging Comprehensive Target Exposure Factor Index	0.4σ	0.4σ	0.4σ	0.4σ	0.4σ	–	Neutral	Neutral	Neutral	50	10	0.5	MS
FTSE All Share ex Investment Trusts Comprehensive Target Exposure Factor Index	0.3σ	0.3σ	0.3σ	0.3σ	0.3σ	–	Neutral	–	Neutral	40	10	0.5	MS
FTSE China A Free Pure Value Target Exposure Factor Index	1σ	0	0	0	0	–	Neutral	–	Neutral	40	5	2	MS
FTSE China A Free Pure Quality Target Exposure Factor Index	0	1σ	0	0	0	–	Neutral	–	Neutral	40	5	2	MS

Table four: Target Exposure Index parameters

	Active factor exposure targets						Constraints						
Index	V	Q	S	M	LV	Y	Beta banding	Country	Industry	Max two-way T/O (%)*	Max company weight (%)	Min stock weight (b.p.)	Review
FTSE China A Free Pure Size Target Exposure Factor Index	0	0	1σ	0	0	–	Neutral	–	Neutral	40	5	2	MS
FTSE China A Free Pure Momentum Target Exposure Factor Index	0	0	0	1σ	0	–	Neutral	–	Neutral	50	5	2	MS
FTSE China A Free Pure Low Volatility Target Exposure Factor Index	0	0	0	0	1σ	–	Neutral	–	Neutral	50	5	2	MS
FTSE China A Free Comprehensive High Target Exposure Factor Index	0.6σ	0.6σ	0.6σ	0.6σ	0.6σ	–	0.7-1.3	–	Banded	50	5	2	MS
Russell 1000 Target Exposure Pure Value Factor Index	1σ	0	0	0	0	–	Neutral	–	Neutral	37.5	5	0.5	JD
Russell 1000 Target Exposure Pure Quality Factor Index	0	1σ	0	0	0	–	Neutral	–	Neutral	37.5	5	0.5	JD
Russell 1000 Target Exposure Pure Size Factor Index	0	0	1σ	0	0	–	Neutral	–	Neutral	37.5	5	0.5	JD
Russell 1000 Target Exposure Pure Momentum Factor Index	0	0	0	1σ	0	–	Neutral	–	Neutral	50	5	0.5	JD
Russell 1000 Target Exposure Pure Low Volatility Factor Index	0	0	0	0	0.6σ	–	Neutral	–	Neutral	50	5	0.5	JD
FTSE UK 350 ex Investment Trusts Pure Value Target Exposure Factor Index	0.8σ	0	0	0	0	–	Neutral^1	–	Neutral	37.5	10	0.5	MS
FTSE UK 350 ex Investment Trusts Pure Quality Target Exposure Factor Index	0	0.8σ	0	0	0	–	Neutral^1	–	Neutral	37.5	10	0.5	MS
FTSE UK 350 ex Investment Trusts Pure Size Target Exposure Factor Index	0	0	0.8σ	0	0	–	Neutral^1	–	Neutral	37.5	10	0.5	MS

	Active factor exposure targets						Constraints						
Index	V	Q	S	M	LV	Y	Beta banding	Country	Industry	Max two-way T/O (%)*	Max company weight (%)	Min stock weight (b.p.)	Review
FTSE UK 350 ex Investment Trusts Pure Momentum Target Exposure Factor Index	0	0	0	0.8σ	0	–	Neutral^1	–	Neutral	50	10	0.5	MS
FTSE UK 350 ex Investment Trusts Pure Low Volatility Target Exposure Factor Index	0	0	0	0	0.5σ	–	Neutral^1	–	Neutral	50	10	0.5	MS
FTSE UK 350 ex Investment Trusts Pure Yield Target Exposure Factor Index	–	0	0	0	0	0.8σ	Neutral^1	–	Neutral	37.5	10	0.5	MS
Russell 2000 0.4 Target Exposure Quality Factor Index	-	0.4	-	-	-	–	–	–	Neutral	–	1	2	J
FTSE Developed ex US Pure Value Target Exposure Factor Index	1σ	0	0	0	0	–	Neutral^2	Neutral	Neutral	40	5	0.5	MS
FTSE Developed ex US Pure Quality Target Exposure Factor Index	0	1σ	0	0	0	–	Neutral^2	Neutral	Neutral	40	5	0.5	MS
FTSE Developed ex US Pure Size Target Exposure Factor Index	0	0	1σ	0	0	–	Neutral^2	Neutral	Neutral	40	5	0.5	MS
FTSE Developed ex US Pure Momentum Target Exposure Factor Index	0	0	0	1σ	0	–	Neutral^2	Neutral	Neutral	50	5	0.5	MS
FTSE Developed ex US Pure Low Volatility Target Exposure Factor Index	0	0	0	0	0.6σ	–	Neutral^2	Neutral	Neutral	50	5	0.5	MS
FTSE Emerging Pure Value Target Exposure Factor Index	1σ	0	0	0	0	–	Neutral	Neutral	Neutral	40	5	0.5	MS
FTSE Emerging Pure Quality Target Exposure Factor Index	0	1σ	0	0	0	–	Neutral	Neutral	Neutral	40	5	0.5	MS
FTSE Emerging Pure Size Target Exposure Factor Index	0	0	1σ	0	0	–	Neutral	Neutral	Neutral	40	5	0.5	MS
FTSE Emerging Pure Momentum Target Exposure Factor Index	0	0	0	1σ	0	–	Neutral	Neutral	Neutral	50	5	0.5	MS

	Active factor exposure targets						Constraints						
Index	V	Q	S	M	LV	Y	Beta banding	Country	Industry	Max two-way T/O (%)*	Max company weight (%)	Min stock weight (b.p.)	Review
FTSE Emerging Pure Low Volatility Target Exposure Factor Index	0	0	0	0	0.6σ	–	Neutral	Neutral	Neutral	50	5	0.5	MS
Russell 1000 Comprehensive Equal Factor Risk Contribution Target Exposure Index	See table three of 6.9.2					–	Neutral	–	Neutral	40	5	0.5	JD
FTSE Developed ex US Comprehensive Equal Factor Risk Contribution Target Exposure Index	See table three of 6.9.2					–	Neutral[^2]	Neutral	Neutral	40	5	0.5	MS
FTSE All-World Pure Value Target Exposure Factor Index	1σ	0	0	0	0	–	Neutral	Neutral	Neutral	40	5	0.5	MS
FTSE All-World Pure Quality Target Exposure Factor Index	0	1σ	0	0	0	–	Neutral	Neutral	Neutral	40	5	0.5	MS
FTSE All-World Pure Size Target Exposure Factor Index	0	0	1σ	0	0	–	Neutral	Neutral	Neutral	40	5	0.5	MS
FTSE All-World Pure Momentum Target Exposure Factor Index	0	0	0	1σ	0	–	Neutral	Neutral	Neutral	50	5	0.5	MS
FTSE All-World Pure Low Volatility Target Exposure Factor Index	0	0	0	0	0.6σ	–	Neutral	Neutral	Neutral	50	5	0.5	MS

Table four: Target Exposure Index parameters

	Active factor exposure targets						Constraints						
Index	V	Q	S	M	LV	Y	Beta banding	Country	Industry	Max two-way T/O (%)*	Max company weight (%)	Min stock weight (b.p.)	Review
FTSE Developed ex US Comprehensive High Target Exposure Factor Index	0.6σ	0.6σ	0.6σ	0.6σ	0.6σ	–	0.7-1.3[^2]	Banded	Banded	50	5	0.5	MS
FTSE Developed ex US Comprehensive Target Exposure Factor Index	0.4σ	0.4σ	0.4σ	0.4σ	0.4σ	–	Neutral[^2]	Neutral	Neutral	40	5	0.5	MS

	Active factor exposure targets						Constraints						
Index	V	Q	S	M	LV	Y	Beta banding	Country	Industry	Max two-way T/O (%)*	Max company weight (%)	Min stock weight (b.p.)	Review
FTSE EPRA Nareit Developed Comprehensive Target Exposure Factor Index	0.2σ	0.4σ	0.4σ	0.4σ	0.4σ	–	–	Neutral	–	–	5	0.5	MJSD

Notes:

σ is the market capitalisation weighted standard deviation of factor Z-scores.

Country/industry neutral: $P = 0$ and $Q = 0$.

Country/industry banded: $P = 0.2$ and $Q = 0.05$.

Beta neutral: beta = 1.

^1: Beta is neutral to the broader underlying benchmark: FTSE 350 Index

^2: Beta is neutral to the broader underlying benchmark: FTSE Developed Index

Review: M = March, J = June, S = September and D = December.

*Per review.

6.9.4 Treatment of suspensions during reviews on the FTSE China A Free Index universe

For a target exposure index built upon the FTSE China A Free Index, existing suspended constituents of the target exposure index at the time of the index review remain members of the index and take part in the index review with their weights constrained to be unchanged pre and post the index review.

Suspended stocks that are not constituents of the target exposure index at the index review are ineligible and do not form part of the review process and consequently will not be constituents of the target exposure index following the index review.

6.10 Index back-histories

6.10.1 The availability of factor data prior to the launch date of each index is simulated through the application of six-month lag on fundamental data. All index reviews prior to the launch date that utilise realised fundamental data incorporate a lag of six months. For example, each component of the value factor detailed in rule 5.4 incorporates annual cash flow, net income and sales measures that were announced six months prior to the data cut-off date.

Section 7

Periodic review of constituents

7. Periodic review of constituents

7.1 Review and price dates

7.1.1 For FTSE- Non Russell US based, Indices are reviewed periodically based on the stock prices available at the close of Wednesday before first Friday of the review month (price cut-off date) incorporating underlying index constituent changes according to the implementation dates shown in rules 7.1.2 and 7.1.3.

Factor indices derived from a Russell US Indices are reviewed periodically based on the stock prices available at close of Wednesday before second Friday in June (price cut-off date) incorporating underlying index constituent changes according to the Russell implementation dates shown in rule 7.1.3. The December review is periodically based on the stock prices available at close of Wednesday 3 weeks prior to the effective date, incorporating underlying index constituent changes, according to the Russell implementation dates shown in rule 7.1.3.

7.1.2 For factor indices derived from a FTSE underlying index the review will be implemented after the close of business on the third Friday of the review month.

7.1.3 For factor indices derived from a Russell US Index, the review will be implemented on the same date as the Russell annual reconstitution. For details of the implementation dates, please refer to the Russell US Equity Indices Construction and Methodology available at Russell-US.

7.2 Review capping

7.2.1 Company level capping is applied at the reviews of corresponding indices specified in rule 7.1.2 using stock prices available at the price cut off date as specified in rule 7.1.

Section 8

Changes to constituent companies

8. Changes to constituent companies

8.1 Intra-review additions

8.2 Additions to each FTSE Russell underlying index will be considered for inclusion at the next review of the relevant FTSE Global Factor Index, respectively.

8.3 Intra-review deletions

8.3.1 A constituent will be removed from a FTSE Global Factor Index if it is also removed from its corresponding underlying index. The deletion will be concurrent with the deletion from the underlying index and its weight will be distributed pro-rata amongst the remaining constituents in their respective FTSE Global Factor Index.

Section 9

ESG data inputs

9. ESG data inputs

9.1.1 The following ESG datasets are used in the construction of the indices.

ESG data inputs	Details	Used for selection, weighting or exclusion[6]
Product related data – Sustainalytics	Sustainalytics Product Involvement data identifies the nature and extent of a company's involvement in a range of product and business activities. More information can be found here: https://connect.sustainalytics.com/controversial-weapon-radar	Exclusion

9.1.2 Further information on ESG data provided by FTSE Russell and third parties used in this index (index series) can be found in the following guide:

Guide_to_FTSE_and_Third_Party_Sustainable_Investment_Data_used_in_FTSE_Russell_Indices

This includes information on the data and standards used for these ESG data inputs. These data sets may include estimated data.

9.2 ESG metrics

9.2.1 Please see the FTSE Russell ESG Metrics website for the scores and values of the environmental, social and governance (ESG) factors listed in Annex II to Delegated Regulation (EU) 2020/1816.

Further details on the metrics methodology and calculation are available using the following link:

ESG Disclosures Methodology and Calculation Guide

[6] Definitions Selection-
ESG data is used to select or rank constituents, or calculate minimum scores or thresholds Weighting-
ESG data is used to calculate the weight of a constituent in an index Exclusion-
ESG data is used to exclude companies from the index

Section 10

Corporate actions and events

10. Corporate actions and events

10.1 If a constituent in the underlying index has a stock split, stock consolidation, rights issue, bonus issue, a change in the number of shares in issue or a change in free float (with the exception of tender offers), the constituent's weighting in the corresponding FTSE Global Factor Index will remain unchanged pre and post such an event.

10.2 Full details of changes to constituent companies due to corporate actions and events can be accessed in the Corporate Actions and Events Guide for Non Market Cap Weighted Indices using the following link:

Corporate_Actions_and_Events_Guide_for_Non_Market_Cap_Weighted_Indices.pdf

A corporate action is an action on shareholders with a prescribed ex-date. The share price will be subject to an adjustment on the ex-date. The index will be adjusted in line with the ex-date.

These include the following:

- capital repayments;
- rights issues/entitlement offers;
- stock conversion;
- splits (sub-division)/reverse splits (consolidation); and
- scrip issues (capitalisation or bonus issue).

A corporate event is a reaction to company news (event) that may impact the index depending on the index rules. For example, a company announces a strategic shareholder is offering to sell their shares (secondary share offer) – this could result in a free float weighting change in the index. Where an index adjustment is required, FTSE Russell will provide notice advising of the timing of the change.

10.3 Suspension of dealing

Suspension of Dealing rules can be found within the Corporate Actions and Events Guide for Non Market Cap Weighted Indices.

10.4 Takeovers, mergers and demergers

The treatment of takeovers, mergers and demergers can be found within the Corporate Actions and Events Guide for Non Market Cap Weighted Indices.

Section 11

Indices algorithm and calculation method

11. Indices algorithm and calculation method

11.1 Prices

11.1.1 The FTSE Global Factor Index Series use actual closing mid-market or last trade prices, where available, for securities with local market quotations. Further details can be accessed using the following link:

Closing_Prices_Used_For_Index_Calculation.pdf

11.2 Calculation frequency

11.2.1 The FTSE Global Factor Index Series will be calculated on an end-of-day basis and displayed to eight decimal points.

11.3 Index calculation

11.3.1 The FTSE Global Factor Indices are calculated using the algorithm described below:

$$\sum_{i=1}^{N} \frac{(p_i \times e_i \times s_i \times f_i \times c_i)}{d} \quad (36)$$

Where:

- $i = 1,2, \ldots, N$
- N is the number of securities in the index.
- p_i is the latest trade price of the component security (or the price at the close of the index on the previous day).
- e_i is the exchange rate required to convert the security's currency into the index's base currency.
- s_i is the number of shares in issue used by FTSE Russell for the security, as defined in these Ground Rules.
- f_i is the investability weighting factor to be applied to a security to allow amendments to its weighting, expressed as a number between 0 and 1, where 1 represents a 100% free float. This factor is published by FTSE Russell for each security in the underlying index.
- c_i is the weighting factor to be applied to a security to correctly weight that security in the index. This factor maps the investable market capitalisation of each stock to a notional market capitalisation for inclusion in the index.
- d is the divisor, a figure that represents the total issued share capital of the index at the base date. The divisor can be adjusted to allow changes in the issued share capital of individual securities to be made without distorting the index.

Appendix A
Narrow index

A.1 Single-factor narrowing

Our aim is to obtain the narrow universe $\mathcal{N} \subset \mathcal{U}$. Let the number of stocks in $\mathcal{U}$ be given by R. Rank stocks in order of their contribution to factor exposure: $W_{1_i} Z_{F,i}$. The highest value is assigned rank 1 and lowest rank is assigned the value of R.

Let $\mathcal{N}_p$ be the set of stocks whose rank less than or equal to p. So, in particular, $\mathcal{N}_R = \mathcal{U}$.

Define the set of weights by:

$$\Omega_{p_i} = \frac{\omega_{p_i}}{\sum_{i \in \mathcal{U}} \omega_{p_i}} \qquad \text{where} \qquad \omega_{p_i} = \begin{cases} W_{1_i} & if \quad i \in \mathcal{N}_p \\ 0 & if \quad i \notin \mathcal{N}_p \end{cases} \tag{37}$$

and three conditions:

1. Active Exposure Condition:

$$\sum_{i \in \mathcal{U}} \left(\Omega_{p_i} - W_{M_i}\right) Z_{F,i} < 2 * \sum_{i \in \mathcal{U}} \left(W_{1_i} - W_{M_i}\right) Z_{F,i} \tag{38}$$

2. Weighted Capacity Ratio Condition:

$$\sum_{i \in \mathcal{U}} \Omega_{p_i} * \frac{\Omega_{p_i}}{W_{M_i}} < 2.5 * \sum_{i \in \mathcal{U}} W_{1_i} * \frac{W_{1_i}}{W_{M_i}} \tag{39}$$

3. Effective N Condition:

$$\frac{1}{\sum_{i \in \mathcal{U}} {\Omega_{p_i}}^2} > 0.67 * \frac{1}{\sum_{i \in \mathcal{U}} {W_{1_i}}^2} \tag{40}$$

Moving down from $p = R$ to $p = 1$ in steps of minus one, we find the first value of p for which any one of these conditions is violated. Our narrow universe is then given by: $\mathcal{N} = \mathcal{N}_{p \mp 1}$.

A.2 Multi-factor narrowing

Rank stocks in order of their multi-factor score: W_{1_i}/W_{M_i}. Let R be the number of stocks in the universe $\mathcal{U}$. The highest value is assigned rank 1 and lowest rank is assigned R. Repeat the process outlined section A.1 but without the Active Exposure Condition.

Appendix B

Index opening and closing hours

Index	Open	Close
Monday to Friday		
FTSE Developed ex US Comprehensive Factor Net Tax (US RIC) Index	00:30	21:10
FTSE Developed ex US Qual/Vol /Yield Factor 5% Capped Index	23:30	20:10
FTSE Emerging Comprehensive Factor Net Tax (US RIC) Index	00:30	21:10
FTSE China A Free Pure Value Target Exposure Factor Index	01:30	07:00
FTSE China A Free Pure Quality Target Exposure Factor Index	01:30	07:00
FTSE China A Free Pure Size Target Exposure Factor Index	01:30	07:00
FTSE China A Free Pure Momentum Target Exposure Factor Index	01:30	07:00
FTSE China A Free Pure Low Volatility Target Exposure Factor Index	01:30	07:00
FTSE China A Free Comprehensive High Target Exposure Factor Index	01:30	07:00
FTSE Indonesia Low Volatility Factor Index	02:00	10:00
FTSE USA Qual/Vol/Yield Factor 5% Capped Index	13:30	20:10
FTSE USA Small Cap Qual/Vol/Yield Factor 3% Capped Index	14:30	21:10
FTSE USA Small Cap ex Real Estate 2Qual/Vol/Yield 3% Capped Factor Index	13:30	21:10
Russell 1000 Comprehensive Factor Index	14:30	21:10
Russell 1000 Low Volatility Factor Index	13:30	20:10
Russell 1000 Low Volatility Focused Factor Index	14:30	21:10
Russell 1000 Momentum Factor Index	13:30	20:10
Russell 1000 Momentum Focused Factor Index	14:30	21:10
Russell 1000 Quality Factor Index	13:30	20:10
Russell 1000 Size Factor Index	13:30	20:10
Russell 1000 Value Factor Index	13:30	20:10
Russell 1000 Yield Factor Index	13:30	20:10
Russell 1000 Yield Focused Factor Index	14:30	21:10
Russell 1000 2Size/2Val 5% Capped Factor Index	14:30	21:10
Russell 1000 2Mom/Size/Val 5% Capped Factor Index	14:30	21:10
Russell 1000 2Qual/2Vol 5% Capped Factor Index	14:30	21:10
Russell 1000 2Mom/2Qual/2Vol 5% Capped Factor Index	14:30	21:10
Russell 1000 2Qual/Val 5% Capped Factor Index	14:30	21:10
Russell 2000 Comprehensive Factor Index	14:30	21:00
Russell 2000 2Size/2Val 3% Capped Factor Index	14:30	21:10

Index	Open	Close
Russell 2000 2Mom/Size/Val 3% Capped Factor Index	14:30	21:10
Russell 2000 2Qual/2Vol 3% Capped Factor Index	14:30	21:10
Russell 2000 2Mom/2Qual/2Vol 3% Capped Factor Index	14:30	21:10

Notes:

1. All times are UK hours.
2. Reuters real-time exchange rates are used in the real-time index calculations.
3. Except for the target exposure factor indices on the FTSE China A Free Index universe, exchange rates used in the end-of-day calculations are WM/Reuters Closing Spot Rates™, collected at 16:00 UK time.
4. For the target exposure factor indices on the FTSE China A Free Index universe, exchange rates used in the end-of-day calculations are the foreign exchange rates received from Reuters at the closing time of the index.

Appendix C

Status of index

The FTSE Global Factor Index Series may be calculated in real time.

For further details of real time definitions please refer to the following guide:

Real_Time_Status_Definitions.pdf

The official opening and closing hours of the indices are set out in appendix A. Variations to the official hours of the indices will be published by FTSE Russell.

The FTSE Global Factor Index Series is calculated on public holidays whenever at least one market is trading. The index series will not be calculated on 1 January.

Appendix D

Further information

A Glossary of Terms used in FTSE Russell's ground rule documents can be found using the following link:

Glossary.pdf

Further information on the FTSE Global Factor Index Series is available from FTSE Russell.

For contact details, please visit the FTSE Russell website or contact FTSE Russell client services at info@ftserussell.com.

Website: www.lseg.com/en/ftse-russell/

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