



FTSE Custom All-World Target Exposure Qual Vol Factor Index

V1.0



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Section 1

Introduction

1.0 Introduction

- 1.1 This document sets out the Ground Rules for the construction and management of the FTSE Custom All-World Target Exposure Qual Vol Factor Index. Copies of the Ground Rules are available from www.ftserussell.com.
- 1.2 The FTSE Custom All-World Target Exposure Qual Vol Factor Index 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, the Corporate Actions and Events Guide for Non Market Cap Weighted Indices and the Russell U.S. Equity Indices Construction and Methodology which are available at www.ftserussell.com. Unless stated in these Ground Rules, the FTSE Custom All-World Target Exposure Qual Vol Factor Index will follow the same methodology as the FTSE Global Equity Index Series.
 - 1.3.1 The FTSE Custom All-World Target Exposure Qual Vol Factor Index takes account of ESG factors in its index design.
- 1.4 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.
- 1.5 The base currency is US Dollars (USD). Index values may also be published in other currencies.
- 1.6 **FTSE Russell**

FTSE Russell is a trading name of FTSE International Limited, Frank Russell Company, FTSE Global Debt Capital Markets Limited (and its subsidiaries FTSE Global Debt Capital Markets Inc. and FTSE Fixed Income Europe Limited), FTSE Fixed Income LLC, The Yield Book Inc and Beyond Ratings.
- 1.7 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 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, and/or
- any inaccuracies in these Ground Rules, and/or
- 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

2.0 Management Responsibilities

2.1 FTSE International Limited (FTSE)

2.1.1 FTSE is the benchmark administrator of the index series.¹

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;
- 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.

¹ 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

3.0 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.pdf](#)

3.3 Statement 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](#)

3.4 Queries and Complaints

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

[Benchmark Determination Complaints Handling Policy.pdf](#)

3.5 Index Policy for Trading Halts and Market Closures

- 3.5.1 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](#)

3.6 Index Policy in the Event Clients are Unable to Trade a Market

- 3.6.1 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.pdf](#)

3.7 Recalculation Policy and Guidelines

- 3.7.1 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 Custom All-World Target Exposure Qual Vol Factor Index 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](#)

3.8 Policy for Benchmark Methodology Changes

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

[Policy for Benchmark Methodology Changes.pdf](#)

3.9 FTSE Russell Governance Framework

- 3.9.1 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 Benchmarks², the European benchmark regulation³ and the UK benchmark regulation⁴. The FTSE Russell Governance Framework can be accessed using the following link:

[FTSE Russell Governance Framework.pdf](#)

3.10 Sustainable Investment Metrics

- 3.10.1 Please see the FTSE Russell [Sustainable Investment Metrics](#) website for the ratings, scores and values of the environmental, social and governance (ESG) factors listed in Annex II to Delegated Regulation (EU) 2020/1816 which are taken into account in the benchmark methodology for the benchmarks within this index series.

² IOSCO Principles for Financial Benchmarks Final Report, FR07/13 July 2013

³ 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

⁴ The Benchmarks (Amendment and Transitional Provision) (EU Exit) Regulations 2019



Section 4

Eligible Securities

4.0 Eligible Securities

4.1.1 The eligible universe of the FTSE Custom All-World Target Exposure Qual Vol Factor Index, reviewed semi-annually in March and September will consist of constituent securities of the FTSE All-World Index excluding companies that are engaged in thermal coal extraction or production (see Appendix A), and excluding National Grid (UK). The exclusions will be reviewed annually in September (see Rule 8.1).

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

Sustainable Investment Data Inputs

5.0 Sustainable Investment Data Inputs

5.1 SI Data Inputs

5.1.1 This section outlines the Sustainable Investment datasets used in the construction of the FTSE Custom All-World Target Exposure Qual Vol Factor Index.

5.1.2 Please see the Guide to FTSE and Third Party Sustainable Investment Data at the following link for more information on SI datasets and the processes around these:

[Guide to FTSE and Third Party Sustainable Investment Data used in FTSE Russell Indices](#)

5.2 Product involvement exclusion data sources

Product involvement data indicates eligible securities' involvement in excluded products or activities.

Product involvement data are sourced from a third party provider, Sustainalytics. This data is subject to regular quality checks to identify discrepancies and ensure accuracy; these checks include trend analysis to assess data quality and detailed review of underlying data for significant score changes. Further details of the use of Sustainalytics data can be found in the [Guide to FTSE and Third Party Sustainable Investment Data](#).

Section 6

Factor Construction

6.0 Factor Construction

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 month.

6.1 Z-Scores and Missing Data Treatment

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

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

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 6.2 – 6.9 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 renormalized by the re-application of equation (1). All Z-Scores, including truncated ones are included in this re-application. This process is repeated until all Z-Scores lie in a range between plus and minus three.

- 6.1.2 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 calculated via Rule 6.1.1. This average is taken across non missing sub-factor Z-Scores. The normalisation procedure detailed in Rule 6.1.1 is then re-applied to this average to form the final factor Z-Score.
- 6.1.3 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 detailed in Rules 6.1.1 and 6.1.2. For Yield missing (or zero) values are assigned a Z-Score of minus three.

6.2 Momentum (M)

Momentum is defined as the cumulative total local return, calculated over the period that starts twelve months prior to the effective date, and ends the Monday following 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 6.1.1 and 6.1.3.

6.3 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 6.1.2 and 6.1.3. Annual reported financial statement items are sourced from a third party data provider.

6.3.1 Profitability

Profitability is defined for indices derived from each eligible universe by a combination of the Z-Scores of the following three measures according to Rule 6.1.2:

Return on Assets (ROA):

$$ROA = \frac{\text{Net Income}}{\text{Average Total Assets}} \quad (2)$$

Change in Asset Turnover:

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

Accruals:

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

where:

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

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 (6). 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.

6.3.2 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.

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

The Leverage measure is normalised following the procedure described in Rule 6.1.1 and Rule 6.1.3.

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

6.3.3 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 & 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.

6.4 Size (S)

Size is calculated as 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 6.1.1 and 6.1.3.

6.5 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 6.1.2 and 6.1.3.

6.6 Volatility (LV)

Volatility is defined as the standard deviation of five years of weekly (Wednesday to Wednesday) total local returns prior to the rebalance month. 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. A Z-Score for Volatility and Country Relative Volatility is created following the procedure detailed in Rules 6.1.1 and 6.1.3.

6.7 Yield (Y)

Yield is calculated as the natural logarithm of each company's twelve 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 6.1.1 and 6.1.3.

6.8 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 or global and regional indices and in local currency for single country indices.

6.9 **Composite (C)**

Z-Scores of Quality and Volatility are combined to create a single Z-Score following the procedure described in Rules 6.1.2 and 6.1.3. We refer to this as the Composite factor.

Section 7

Index Construction

7.0 Index Construction

7.1 Tilt Indices

- 7.1.1 All factor indices in the Global Factor index Series, including Target Exposure Indices, 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 i in a subset \mathcal{N} of the entire stock universe \mathcal{U} , the tilts are defined by:

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

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

where \mathcal{C}_H and \mathcal{I}_H are the H^{th} Country and Industrial ICB groupings respectively.

- Φ_i is the maximum stock capacity/maximum weight tilt.
- Ψ_i is the maximum turnover tilt.
- W_{M_i} is the Market Capitalization weight.
- Λ is the normalization 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. $\sum_{i \in \mathcal{N}} W_{F_i} = 1$.

7.1.2 For Target Exposure Indices, variable tilt strengths are chosen to satisfy fixed exposure targets.

7.1.3 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.

7.2 Factor Tilts

7.2.1 The factor tilt is given by:

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

where Π is the normalization factor defined by:

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

Factors that are not targeted are assigned zero tilt strength.

7.2.2 For 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:

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

and for weighted beta:

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

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.

7.3 Country and Industry Tilts

7.3.1 Country and industry tilts are applied to the weights resulting from the factor tilt in 7.2:

$$W_{2i} = C_i \times I_i \times W_{1i} \quad (13)$$

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

$$\sum_{i \in \mathcal{C}_H} W_{2i} = T_{\mathcal{C}_H} \quad \text{where} \quad H = 1, \dots, K \quad (14)$$

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

$$\sum_{i \in \mathcal{J}_H} W_{2i} = T_{\mathcal{J}_H} \quad \text{where} \quad H = 1, \dots, J \quad (15)$$

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

The country lower and upper bounds are defined by:

$$\begin{aligned} \mathcal{C}_{H_L} &= \text{Max} \left[(1 - P_C) \sum_{i \in \mathcal{C}_H} W_{M_i} - Q_C, 0 \right] \quad \text{and} \quad \mathcal{C}_{H_U} \\ &= \text{Min} \left[(1 + P_C) \sum_{i \in \mathcal{C}_H} W_{M_i} + Q_C, 1 \right] \end{aligned} \quad (16)$$

and the industry lower and upper bounds by:

$$\mathcal{J}_{H_L} = \text{Max} \left[(1 - P_J) \sum_{i \in \mathcal{J}_H} W_{M_i} - Q_J, 0 \right] \quad \text{and} \quad \mathcal{J}_{H_U} = \text{Min} \left[(1 + P_J) \sum_{i \in \mathcal{J}_H} W_{M_i} + Q_J, 1 \right] \quad (17)$$

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 1 and 3 of Rules 7.10 and 7.11.

The method to obtain the target country $T_{\mathcal{C}_H}$ and industry $T_{\mathcal{J}_H}$ 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.

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

7.3.2 For 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.

7.3.3 The country and industry weightings determined in Rules 7.3.2 or 7.3.3 are the target country T_{C_H} and industry T_{J_H} weights to be used in (14) and (15).

7.4 Capacity, Maximum and Minimum Weight Tilt

7.4.1 A capacity and maximum weight tilt is applied to the weights resulting from the country and industry tilt described in 7.3:

$$W_{3i} = \Phi_i \times W_{2i} \quad (18)$$

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 7.7.2. Let C be the maximum stock capacity ratio which is set to 20 unless otherwise explicitly stated*. The weight W_{3i} is then found by iterating:

$$\hat{W}_i = \text{Max}[\text{Min}[W_{3i}, C * W_{M_i}, X_i], Y_i]; \quad W_{3i} = \hat{W}_i / \sum_{i \in \mathcal{N}} \hat{W}_i \quad (19)$$

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

$$\Phi_i = \frac{W_{3i}}{W_{2i}} \quad (20)$$

7.5 Turnover Tilt

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

$$W_{4i} = \Psi_i \times W_{3i} \quad (21)$$

Ψ_i is calculated as follows. Let W_{0i} 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_{3i} is given by:

$$T = \sum_{i \in \mathcal{N} \cup \mathcal{P}} |W_{3i} - W_{0i}| \quad (22)$$

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:

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

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

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

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:

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

7.6 Final Index

7.6.1 For Target Exposure Indices, if all of the following set of conditions are satisfied:

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

$$\sum_{i \in \mathcal{U}} |W_{4i} - W_{1i}| \leq 25 \text{ b.p.} \quad (26)$$

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

$$\left| \sum_{i \in \mathcal{U}} (W_{4i} - W_{Mi}) Z_{F,i} - T_F \right| \leq 0.01 \quad \text{for each targeted } F \in \{V, Q, M, LV, S, Y\} \quad (27)$$

- Effective N of W_{4i} is greater than 25% of the Effective N of Market Capitalization weights W_{Mi} :

$$1/\sum_{i \in \mathcal{U}} W_{4i}^2 \geq 0.25/\sum_{i \in \mathcal{U}} W_{Mi}^2 \quad (28)$$

then the final index weights are given by $W_{Fi} = W_{4i}$.

Otherwise the operations in 7.2, 7.3, 7.4 and 7.5 are repeated but with W_{4i} replacing W_{Mi} 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.

7.7 Minimum Stock Weight

- 7.7.1 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 FTSE Custom All-World Target Exposure Qual Vol 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.

For Target Exposure Indices, the weights resulting from Rule 7.7.1 are used as starting weights, replacing W_{Mi} in equations (9) and (10). Operations in Rules 7.2, 7.3, 7.4 and 7.5 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 Rule 7.7.1 are retained as the final index weights.

7.8 Target Exposure Indices

7.8.1 For 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 capitalization weighted standard deviation $\hat{\sigma}_F$, given by:

$$\hat{\sigma}_F^2 = \sum_{i \in \mathcal{U}} W_{M_i} * (Z_{F,i} - \hat{\mu}_F)^2 \quad (29)$$

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

$$\hat{Z}_{F,i} = \frac{Z_{F,i} - \hat{\mu}_F}{\hat{\sigma}_F} \quad (30)$$

7.9 FTSE Custom All-World Target Exposure Qual Vol Factor Index: Parameters

Table 4: Index Parameters

Index	Active Factor Exposure Targets						Constraints						Review
	V	Q	S	M	LV	Y	Beta Banding	Country	Industry	Max 2-Way T/O (%) [*]	Max Stock Weight (%)	Min Stock Weight (b.p.)	
FTSE Custom 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

Notes:

Country/Industry Neutral: $P = 0$ and $Q = 0$.

Review: M=March, S=September.

7.10 Index Back-Histories

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 utilize realized fundamental data incorporate a lag of six months.



Section 8

Periodic Review of Constituents

8.0 Periodic Review of Constituents

8.1 Review and Price Dates

- 8.1.1 FTSE Custom All-World Target Exposure Qual Vol Factor Index is reviewed semi-annually in March September 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 8.1.2.
- 8.1.2 The review will be implemented after the close of business on the third Friday of the review month.



Section 9

Changes to Constituent Companies

9.0 Changes to Constituent Companies

9.1 Intra-review Additions

9.2 Additions to each FTSE Russell underlying index will be considered for inclusion at the next semi-annual review of the FTSE Custom All-World Target Exposure Qual Vol Factor Index, respectively.

9.3 Intra-review Deletions

9.3.1 A constituent will be removed from the FTSE Custom All-World Target Exposure Qual Vol 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 the FTSE Custom All-World Target Exposure Qual Vol Factor Index.

Section 10

Corporate Actions and Events

10.0 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 FTSE Custom All-World Target Exposure Qual Vol 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)
- 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

11.0 Indices Algorithm and Calculation Method

11.1 Prices

- 11.1.1 The FTSE Custom All-World Target Exposure Qual Vol Factor Index uses 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 Custom All-World Target Exposure Qual Vol Factor Index will be calculated on an end of day basis and displayed to eight decimal points.

11.3 Index Calculation

- 11.3.1 The FTSE Custom All-World Target Exposure Qual Vol Factor Index is calculated using the algorithm described below:

$$\sum_{i=1}^N \frac{(p_i \times e_i \times s_i \times f_i \times c_i)}{d} \quad (31)$$

Where:

- $i = 1, 2, \dots, N$
- 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: Exclusions

Product involvement	
Thermal Coal	
Thermal Coal	<p>Companies involved in the following activities relating to Thermal Coal:</p> <ul style="list-style-type: none">• Extraction – the company extracts Thermal Coal.• Generation - The company generates electricity from thermal coal.

The constituent National Grid (UK) shall also be excluded from the index at rebalance.



Appendix B: 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 Custom All-World Target Exposure Qual Vol Factor Index Series is available from FTSE Russell.

The FTSE Russell Sustainable Investment Metrics website can be found using the following link: [Sustainable Investment Metrics](#)

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

Website: www.ftserussell.com

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