

FTSE Global Equal Risk Contribution Index Series

v3.1



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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 Equal Risk Contribution Index Series calculated by FTSE International Limited (FTSE). Copies of these Ground Rules are available from FTSE Russell.
- 1.2 The FTSE Global Equal Risk Contribution Index Series has been designed to monitor the performance of an index consisting of securities that are weighted such that each security contributes equally to overall portfolio risk.
- 1.3 The FTSE Global Equal Risk Contribution Index Series does not take account of ESG factors in its index design.
- 1.4 These Ground Rules should be read in conjunction with the FTSE Global Equity Index Series Ground Rules and the Corporate Actions and Events Guide for Non Market Cap Weighted Indexes which are available at www.lseg.com/en/ftse-russell/.
- 1.5 **The FTSE Global Equal Risk Contribution Index Series consists of the following indexes:**
 - FTSE All-World Equal Risk Contribution Index
 - FTSE Developed Equal Risk Contribution Index
 - FTSE Developed ex Japan Equal Risk Contribution Index
 - FTSE Developed Asia Pacific Equal Risk Contribution Index
 - FTSE Developed Asia Pacific ex Japan Equal Risk Contribution Index
 - FTSE Developed Asia Pacific ex Japan ex Korea Equal Risk Contribution Index
 - FTSE Developed Asia Pacific ex Korea Equal Risk Contribution Index
 - FTSE Developed ex Korea ex Israel Equal Risk Contribution Index
 - FTSE Developed Europe Equal Risk Contribution Index
 - FTSE Developed Europe ex UK Equal Risk Contribution Index
 - FTSE Developed Eurozone Equal Risk Contribution Index
 - FTSE North America Equal Risk Contribution Index
 - FTSE Emerging Equal Risk Contribution Index
 - FTSE Japan Equal Risk Contribution Index
 - FTSE USA Equal Risk Contribution Index
- 1.6 Price, Total Return and Net of Tax Indexes will be calculated on an end of day basis. The Total Return Indexes include income based on ex dividend adjustments.

1.7 The base currency of the index series is US Dollars. Index values may also be published in other currencies.

1.8 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, FTSE (Beijing) Consulting Limited, Refinitiv Benchmark Services (UK) Limited, Refinitiv Limited and Beyond Ratings.

1.9 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.

1.10 Index users who choose to follow this index or to buy products that claim to follow this index should assess the merits of the index's 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 or any constituent data in the Index Series.

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.¹

2.1.2 FTSE is responsible for the daily calculation, production and operation of the FTSE Global Equal Risk Contribution 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 the 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 indexes.

2.1.3 These Ground Rules set out the methodology and provide information about the publication of the FTSE Global Equal Risk Contribution Index Series.

2.2 Amendments to these Ground Rules

2.2.1 These Ground Rules shall be subject to regular review 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 Indexes, 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. 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 Indexes 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 Indexes (the Statement of Principles)

3.3.1 Indexes 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 the FTSE Russell Index Governance Board.

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

[Statement of Principles.pdf](#)

3.4 Queries, Complaints and Appeals

3.4.1 A constituent or prospective constituent company (or professional advisor acting on behalf of the company), a national organisation or a group of no fewer than ten users of the Indexes from different organisations acting in their professional capacity may appeal against decisions taken by FTSE Russell.

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

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

FTSE Russell's Appeal Process can be accessed using the following link:

[Appeals Against Decisions.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 or a Security

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 or a Security.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 Global Equal Risk 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 Indexes.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 indexes, 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 Real Time Status Definitions

- 3.10.1 Please refer to the following guide for details of real time status definitions for indices which are calculated in real time.

[Real Time Status Definitions.pdf](#)

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. Eligible securities

- 4.1 The indexes comprising the FTSE Global Equal Risk Contribution Index Series will consist of the constituents of the corresponding underlying universe of the FTSE All-World Index Series at the time of the semi-annual review⁵.
- 4.2 Unless stated in these rules, all aspects of the management of the index calculation, underlying index constituent review and company classification of the FTSE Global Equal Risk Contribution Index Series are as described in the FTSE Global Equity Index Series Ground Rules.

⁵ Saudi Arabia was assigned Secondary Emerging market status in March 2019. Securities will be eligible for inclusion in the FTSE Global Equal Risk Contribution Index Series from September 2019.
China A Shares (available under the Northbound China Stock Connect Scheme) were assigned Secondary Emerging market status beginning in June 2019. Securities will be eligible for inclusion in the FTSE Global Equal Risk Contribution Index Series from September 2019.

Section 5

Periodic review of constituent companies

5. Periodic review of constituent companies

5.1 Review dates

- 5.1.1 The semi-annual review will be implemented in line with the review of the underlying FTSE All-World Index Series after the close of business on the third Friday of March and September.

5.2 Review procedure

- 5.2.1 For each index comprising the FTSE Global Equal Risk Contribution Index Series, an optimisation algorithm is used to determine the weighting scheme applied to Large Cap constituents of the corresponding underlying universe. Large Cap constituents are defined in the FTSE Global Equity Index Series Ground Rules. The algorithm will be applied at the security level.

Mid Cap constituents, are defined in the FTSE Global Equity Index Series Ground Rules or stocks with an insufficient trading history (see Rule 6.2) are included at their investable market capitalisation weight.

Closing price data as of the Wednesday before the first Friday of the review month are used to determine the weightings that are applied in the FTSE Global Equal Risk Contribution Index Series, based on the underlying constituents effective from the next business day following the third Friday of the same month.

Section 6

Weighting methodology

6. Weighting methodology

6.1 Base currency and calculations of total returns

Daily arithmetic business day total returns denominated in USD, EUR or JPY are used to derive the covariance matrix. These are defined by:

$$r_{i,t} = \frac{e_{i,t} \times (p_{i,t} + d_{i,t})}{e_{i,t-1} \times p_{i,t-1}} - 1$$

where $e_{i,t}$ is the USD/EUR/JPY exchange rate, $p_{i,t}$ is the adjusted price and $d_{i,t}$ is the adjusted dividend in local currency for the i^{th} stock at time t .

The following currency base applies to the determination of the covariance matrix for each index:

FTSE Index	Base Currency
FTSE All-World Equal Risk Contribution Index	USD
FTSE Developed Equal Risk Contribution Index	USD
FTSE Developed ex Japan Equal Risk Contribution Index	JPY
FTSE Developed ex Korea ex Israel Equal Risk Contribution Index	USD
FTSE Developed Asia Pacific Equal Risk Contribution Index	USD
FTSE Developed Asia Pacific ex Japan Equal Risk Contribution Index	USD
FTSE Developed Asia Pacific ex Japan ex Korea Equal Risk Contribution Index	USD
FTSE Developed Asia Pacific ex Korea Equal Risk Contribution Index	USD
FTSE Developed Europe Equal Risk Contribution Index	EUR
FTSE Developed Europe ex UK Equal Risk Contribution Index	GBP
FTSE Developed Eurozone Equal Risk Contribution Index	EUR
FTSE North America Equal Risk Contribution Index	USD
FTSE Emerging Equal Risk Contribution Index	USD
FTSE Japan Equal Risk Contribution Index	JPY
FTSE USA Equal Risk Contribution Index	USD

6.2 Sufficient trading history

Minimum Number of Observations: The minimum number of daily returns contained in the two year period prior to a review date is 360. Stocks not meeting this threshold have their weights set to the investable market capitalisation weight.

Minimum Number of Coincident Observations: Correlations are calculated using at least 300 coincident observations. If this is not achieved, the stock that has 300 coincident observations with the fewest other stocks in the covariance matrix is removed. If this yields more than one stock, the stock with highest volatility is removed. The removal of stocks continues until the correlation between any two remaining stocks can be calculated using least 300 coincident returns. Stocks that are removed have their weights set to the investable market capitalisation weight.

Stocks forming part of the optimisation must meet both the threshold number of observations and coincident observations.

6.3 PCA covariance matrix

The volatility and correlation estimation period is defined by the number of business days in the two years prior to a review date.

$$\text{Volatility: } \delta_{i,T} = \sqrt{\frac{1}{T_\delta - 1} \sum_{t=T-T_\delta+1}^T (r_{i,t} - \bar{r}_i)^2}$$

where T_δ = volatility estimation period (approx 500 to 520 days).

$$\text{Correlation: } \rho_{ij,T} = \frac{\left[\frac{1}{(T_\rho - 1)} \sum_{t=T-T_\rho+1}^T (r_{i,t} - \bar{r}_i)(r_{j,t} - \bar{r}_j) \right]}{\delta_{i,T} \delta_{j,T}}$$

where T_ρ = correlation estimation period (approx 500 to 520 days).

$$\text{Empirical Covariance Matrix: } \Omega_{ij,T} = \delta_{i,T} \delta_{j,T} \rho_{ij,T}$$

A covariance matrix based on a Principal Component Analysis (PCA) of the $N \times N$ empirical covariance matrix is used.

Let $\lambda_1, \dots, \lambda_K$ be the K eigenvalues of the empirical correlation matrix $\rho_{ij,T}$ that are bigger than $1 + \frac{N}{T_\delta} + 2\sqrt{\frac{N}{T_\delta}}$ and let $\bar{\lambda}_1, \dots, \bar{\lambda}_K$ be their associated eigenvectors each with N elements.

Let D_{nn} be the $K \times K$ diagonal matrix with $D_{nn} = \lambda_n$ and P_{nj} be the $K \times N$ matrix whose n^{th} row is given by $\bar{\lambda}_n$.

One then constructs the $N \times N$ PCA correlation matrix as $\phi = P^T D P$. The diagonal elements of ϕ are additionally constrained to be equal to one.

The PCA covariance matrix is then defined by: $C_{ij,T} = \delta_{i,T} \delta_{j,T} \phi_{ij,T}$

6.4 Objective Function

$$\text{Objective: Minimise portfolio volatility } \sigma = \sqrt{\sum_{i=1}^N \sum_{j=1}^N w_i C_{ij,T} w_j}$$

Where w_i is the weight of the i^{th} stock and N is the number of Large Cap constituents with sufficient trading history.

6.5 Constraints

Weights are determined in order to minimise the objective function, subject to the following constraints:

Long Only Constraint: $w_i \geq 0 \quad \forall_i$

$$\text{Log Constraint: } \sum_{i=1}^N \log(w_i) \geq \left(\frac{1}{N} \right)$$

The objective function together with the two constraints ensures the equal risk contribution property holds across Large Cap stocks. The weights from the optimisation are normalised such that the weights sum to one:

$$w_i^* = w_i / \sum_{i=1}^N w_i$$

The risk contribution of each stock is equal to the product of its marginal risk contribution and weight. The algorithm is mathematically equivalent⁶ to minimising the sum $f(w)$ of all squared differences between the risk contributions of the i^{th} and j^{th} stocks, that is:

$$\text{Minimise } f(w) = \sum_{i=1}^N \sum_{j=1}^N \left(w_i (C_{ij,T} w)_i - w_j (C_{ij,T} w)_j \right)^2$$

subject to: $\sum_{i=1}^N w_i = 1$ and $w_i \geq 0 \forall_i$

6.6 Maximum weight multiple

Within the optimised Large Cap segment of each Equal Risk Contribution Index, the weight multiple relative to the investable market capitalisation weight in the underlying FTSE Global Large Cap Index is not explicitly bound. Post optimisation this multiple is set to 20. Excess weight arising from the application of this Maximum Weight Multiple will be redistributed pro rata across the remaining large capitalisation stocks.

6.7 Normalisation of weights to mimic size representation

The weightings that result from the optimisation are normalised, such that in aggregate the Large Cap and Mid Cap component of each Equal Risk Contribution Index is identical to the investable market capitalisation weight of the Large Cap and Mid Cap segments of the relevant underlying index.

Let L be the total investable market capitalisation of the N large cap stocks with sufficient trading history and M be that of the remaining other stocks in the underlying. The weight of the i^{th} Large Cap stock in the Equal Risk Contribution Index is then given by:

$$w'_i = w_i^* \times L / (L + M)$$

All Mid Cap stocks and any stock with a price history of insufficient length are included at the investable market capitalisation weight.

⁶ Maillard S., Poncilli T. and Teiletche J. (2010), The Properties of Equally Weighted Risk Contributions Portfolios, Journal of Portfolio Management, 36(4), pp.60-70.

Section 7

Changes to constituent companies

7. Changes to constituent companies

7.1 Intra-review additions

- 7.1.1 Additions to the FTSE Global Equity Index Series will be considered for inclusion in the relevant FTSE Global Equal Risk Contribution Index at the next semi-annual review of the relevant FTSE Global Equal Risk Contribution Index.

7.2 Intra-review deletions

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

Section 8

Corporate actions and events

8. Corporate actions and events

8.1 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 Equal Risk Contribution Index Series will remain unchanged pre and post such an event.

8.2 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 Indexes 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. 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.

8.3 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 Indexes.

Section 9

Index calculation

9. Index calculation

9.1 Calculation frequency

9.1.1 The FTSE Global Equal Risk Contribution Index Series will be calculated on an end of day basis only.

9.2 Index calculation

9.2.1 The FTSE Global Equal Risk Contribution Index Series will be displayed to two decimal points.

9.2.2 The FTSE Global Equal Risk Contribution Index Series is calculated using the following formula:

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

Where,

- $i=1,2,\dots,N$
- N is the number of securities in the Equal Risk Contribution.
- 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 weight m_i of a stock i to its notional market capitalisation for inclusion in the Index according to the formula $c_i = \frac{w_i}{\hat{m}_i}$ where $\hat{m}_i = \frac{m_i}{(\sum_{j=1}^N m_j)}$. This factor is published by FTSE Russell for each security 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

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 Equal Risk Contribution 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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