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Russell US Factors Style Index Series

v1.8

FTSE RUSSELL
An LSEG Business

lseg.com/en/ftse-russell

Contents

Section 1

Introduction

1. Introduction

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

1.2 The Russell US Factors Style Index Series is designed to reflect the performance of securities exhibiting particular style factor characteristics.

1.3 The Russell US Factors Style 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 Russell US Equity Indices Construction and Methodology, The FTSE Global Factor Series Ground Rules and the Corporate Actions and Events Guide for Non Market Cap Weighted Indices which are available at www.lseg.com/en/ftse-russell/. Unless stated in these Ground Rules, the Russell US Factors Style Indices will follow the same process as the Russell US Equity Indices Construction and Methodology.

1.5 Price Return and Total Return will be calculated on an end of day basis.

1.6 The base currency of the benchmark is US Dollars. Index values may also be published in other currencies.

1.7 The indices may be calculated in real time.

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, The Yield Book Inc 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 series or to buy products that claim to follow this index series should assess the merits of the index 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. 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 index series.

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. 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

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 Russell US Factors Style 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

3.8 Policy for Benchmark Methodology Changes

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 Benchmarks[2], the European benchmark regulation[3] and the UK benchmark regulation[4]. 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 eligible securities of each index are the constituents of the relevant underlying Index:

Factors Style Index Series	Underlying Index
Russell US Large Cap Factors Value Style Index	Russell 1000 Value Index
Russell US Large Cap Factors Growth Style Index	Russell 1000 Growth Index

Section 5

Factor construction

5. 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.

5.1 Cross-sectional normalization

5.1.1 Individual stock metrics are normalized cross-sectionally to create Z-scores within each eligible universe according to:

$$Z_{J,i} = \left(F_{J,i} - \mu_J\right) / \sigma_J$$

where $F_{J,i}$is the J^{th} metric of the i^{th}stock and μ_J and σ_J are the cross-sectional mean and standard deviation, respectively. Z-Scores that are greater (less) than three (minus three) are truncated to a value of three (minus three).

5.2 Time series normalization

5.2.1 Individual stock time series Z-scores are normalized as:

$$Z_{J,t} = \left(F_{J,t} - \mu_{J,t}\right) / \sigma_{J,t}$$

where $F_{J,t}$ is the J^{th} metric at time t and $\mu_{J,t}$ and $\sigma_{J,t}$ are the time series exponentially weighted moving average and standard deviation respectively, calculated following the procedures detailed in Rules 5.2.2 and 5.2.3.

5.2.2 The exponentially weighted moving average is calculated as:

$$\mu_{J,t} = \frac{\sum_{\tau=t}^{t-W+1} F_{J,\tau} \left(\exp\left(\frac{\ln 0.5}{HL}\right)\right)^{t-\tau}}{\sum_{\tau=t}^{t-W+1} \left(\exp\left(\frac{\ln 0.5}{HL}\right)\right)^{t-\tau}}$$

where $F_{J,\tau}$ is the J^{th} metric at time τ, W is the time window length, and HL is the half-life of the decay.

5.2.3 The exponentially weighted moving standard deviation is calculated as:

$$\sigma_{J,t} = \sqrt{\frac{\sum_{\tau=t}^{t-W+1} \left(F_{J,\tau} - \mu_{J,t-1}\right)^2 \left(\exp\left(\frac{\ln 0.5}{HL}\right)\right)^{t-\tau}}{\sum_{\tau=t}^{t-W+1} \left(\exp\left(\frac{\ln 0.5}{HL}\right)\right)^{t-\tau}}}$$

where $F_{J,\tau}$ is the J^{th} signal value at time τ, W is the time window length, $\mu_{J,t-1}$ is the time series exponentially weighted moving average of the J^{th} signal value at time $t-1$ calculated following the procedure detailed in Rule 5.2.2, and HL is the half-life of the decay.

5.3 Value

Value is defined as a composite of the following five metrics.

5.3.1 Book-to-Price is defined as:

$$\frac{Latest\ Book\ Value}{Full\ Market\ Capitalization}$$

5.3.2 Dividend Yield is defined as:

$$\frac{Lastest\ 12\ month\ Trailing\ Dividend}{Full\ Market\ Capitalizatoin}$$

5.3.3 Earnings Yield is defined as:

$$\frac{Latest\ 12\ month\ Net\ Income}{Full\ Market\ Capitalization}$$

5.3.4 Cash-flow Yield is defined as:

$$\frac{Latest\ 12\ month\ Cashflow}{Full\ Market\ Capitalization}$$

Value metrics that are greater (less) than 0.35 (-0.35) are truncated to a value of 0.35 (-0.35).

5.3.5 Cash-flow Yield Time Series Normalized Signal

The Cash-flow yield signal is defined as the time-series normalized Cash-flow yield resulting from procedure detailed in Rule 5.2 with a half-life of 36 months with expanding window.

Cash-flow yield and Cash-flow-to-Price Time Series Signal are smoothed using an exponentially weighted moving average with expanding window and half-lives of 3 months and 1 month respectively.

5.3.6 Overall Value Score

Each of the five Value metrics is normalized cross-sectionally to form Z-scores capped at [-3, 3] (see Rule 5.1). The equal weighed average of the five Value metric Z-scores forms the overall Value score.

5.4 Momentum

Momentum is defined as a composite of the following three metrics.

5.4.1 Price Momentum is defined as:

$$\sum_{\tau=t-1}^{t-11} monthly\ price\ return_{\tau}$$

calculated over the 12 months prior to the data cut-off date, excluding the latest month. A full price history is required to calculate Price Momentum.

5.4.2 Earnings Momentum is defined as:

$$\frac{\left(up_{fy1} + up_{fy2}\right) - \left(dn_{fy1} + dn_{fy2}\right)}{tot_{fy1} + tot_{fy2}}$$

Where:

up_{fy1} is the number of EPS upgrades for the current fiscal year

up_{fy2} is the number of EPS upgrades for the following fiscal year

dn_{fy1} is the number of EPS downgrades for the current fiscal year

dn_{fy1} is the number of EPS downgrades for the following fiscal year

tot_{fy1} is the number of EPS estimates for the current fiscal year

tot_{fy1} is the number of EPS estimates for the following fiscal year

Stocks with Earnings Momentum that is greater than one are treated as missing values in the calculation of the overall Momentum score.

5.4.3 Earnings announcement drift is calculated as:

$$r_t + r_{t+1}$$

where

r_t is total return in USD on most recent earnings announcement date
r_{t+1} is total return in USD on next business day after most recent earnings announcement date
With quarterly announcement date, the Earnings Announcement Drift incorporates a lag of 3 months.
With semi-annual announcement date, the Earnings Announcement Drift does not incorporate a lag.

Values that are greater (less) than 0.15 (-0.15) are truncated to a value of 0.15 (-0.15).

5.4.4 Overall momentum score

Momentum metrics are first smoothed using an exponentially weighted average with expanding window and half-lives specified in the table below. All metrics are then normalized cross-sectionally to form Z-scores truncated at [-3, 3] (see Rule 5.1). The weighted average of the component Z-scores for each stock forms the overall Momentum score, using the weightings listed below. Weightings are re-normalized to reflect missing values for individual Momentum components.

Metric	Exponential Smoothing: Half-life	Weighting in Overall Momentum Score
Price Momentum	1 month	0.25
Earnings Momentum	6 months	0.50
Earnings Announcement Drift	6 months	0.25

5.5 Quality

Quality is defined as a composite of the following four metrics.

5.5.1 Accruals are calculated as:

$$\frac{\Delta Operating\ Assets - \Delta Total\ Liabilities}{Rolling\ 36\ month\ average\ Total\ Assets}$$

where:

$\Delta Operating\ Assets$ is monthly change in Total Assets minus Cash

$\Delta Total\ Liabilities$ is monthly change in Total Liabilities

A full history is required to calculate latest 36 month average total assets.

Values that are greater (less) than 0.2 (-0.12) are truncated to a value of 0.2 (-0.12).

5.5.2 Dilution is calculated as:

$$-\frac{shares_t - shares_{t-1}}{shares_{t-1}}$$

where shares are outstanding shares. Values that are greater (less) than 0.5 (-0.5) are truncated to a value of 0.5 (-0.5).

5.5.3 Gross profitability is calculated as:

$$\frac{revenue - cost\ of\ goods\ sold}{total\ assets}$$

where revenue, cost of goods sold, and total assets are all greater than 0.

Values that are greater (less) than 98% (2%) are truncated to 98% (2%). A cross-sectionally normalized Z-score is then created following the procedure detailed in Rule 5.1.

5.5.4 Change in Net Operating Assets (NOA) is calculated as:

$$-\frac{\Delta NOA}{Rolling\ 36\ month\ average\ Total\ Assets}$$

where

$$\Delta NOA = \Delta Operating\ Assets - \Delta Operating\ Liabilities$$

where:

$\Delta Operating\ Assets$ is monthly change in (Total Assets minus Cash)

$\Delta Operating\ Liabilities$ is monthly change in (Total Liabilities minus Debt)

A full history is required to calculate latest 36 month average total assets. Values that are greater (less) than 0.1 (-0.05) are truncated to 0.1 (-0.05).

5.5.5 Overall quality score

Quality components with the exception of Gross Profitability are first smoothed using an exponentially weighted average with expanding window with half-lives specified in the table below. All Quality components are then converted to cross-sectionally normalized Z-scores truncated at [-3, 3] (see Rule 5.1). The weighted average of the component Z-scores for each stock forms the overall Quality Score using the weightings listed below. Weightings are re-normalized to reflect missing values for individual Quality components.

Metric	Exponential Smoothing: Half-life	Weighting in Overall Quality Score
Accruals*	24 months	0.25
Dilution	24 months	0.25
Gross Profitability	Not applicable	0.25
NOA Change*	60 months	0.25

*Zero values are excluded from the exponential smoothing.

5.6 Low volatility

Volatility is calculated as the standard deviation of monthly total return in USD, calculated over the 12 months prior to cut-off date. A complete 12-month history is required to calculate Volatility. Stock level volatilities are exponentially smoothed twice with expanding window and a half-life of 1 month and subsequently 2 months following the procedure detailed in Rule 5.2.3. Values are multiplied by -1 and are converted to percentage rank within eligible universe where percentage ranks that are greater (less) than 99.9 (0.1) percent are truncated to 99.9 (0.1) percent. The percentage ranks are then transformed using inverse of cumulative normal distribution. Values that are greater (less) than three (minus three) are then truncated to a value of three (minus three). The resulting value is the Low Volatility Score.

5.7 Size

Size is calculated as:

$$-\ln(full\ market\ capitalization\ in\ USD)$$

Size is cross-sectionally normalized to form Z-scores following the procedure detailed in Rule 5.1.

5.8 Composite factor score

A composite factor score is calculated for each eligible stock as the weighted average of the overall factor scores with weightings shown in the table below. Missing overall factor scores are excluded from the aggregation, with weightings re-normalized to reflect the missing overall factor scores.

Overall Scores	Weight for Growth Indices	Weight for Value Indices
Momentum Score	0.25	0.20
Value Score	0.20	0.25
Quality Score	0.45	0.45
Low Volatility Score	0.05	0.05
Size Score	0.05	0.05

The composite factor score is smoothed using a time series exponentially weighted moving average of the composite factor scores with an expanding window and a half-life of 12 months following the procedure detailed in Rule 5.2.2.

Section 6

Risk model

6. Risk model

6.1 The data cut-off date is the close of business on the last business day of the month prior to the review month.

6.2 Exponential weights are used in the regression and in calculating the factor covariance matrix:

$$w = \exp\left(\frac{\ln 0.5}{HL}\right)^{t}$$

where HL is the half-life of the decay and t is the age of the observation.

6.3 The risk model is a time series structural risk model based on Kimura (April 2019).

6.4 The ranking universe is the Russell 1000® Index for the Russell 1000 risk model, and the Russell 2000® Index for the Russell 2000 risk model, as of the review effective date.

6.5 Factor covariance matrix

6.5.1 Factor returns are estimated using the following monthly index monthly returns:

Index Returns	
Russell 1000 Risk Model	Russell 2000 Risk Model
Style Factors	
Russell 1000 Momentum Factor Index	Russell 2000 Momentum Factor Index
Russell 1000 Quality Factor Index	Russell 2000 Quality Factor Index
Russell 1000 Size Factor Index	Russell 2000 Size Factor Index
Russell 1000 Value Index	Russell 2000 Value Index
Russell 1000 Volatility Factor Index	Russell 2000 Volatility Factor Index
Russell 1000 Yield Factor Index	Russell 2000 Yield Factor Index
Russell 1000 Growth Index	Russell 2000 Growth Index
Industry Factors	
Russell 1000 Energy Index	Russell 2000 Energy Index
Russell 1000 Basic Materials Index	Russell 2000 Basic Materials Index
Russell 1000 Industrials Index	Russell 2000 Industrials Index
Russell 1000 Consumer Staples Index	Russell 2000 Consumer Staples Index
Russell 1000 Health Care Index	Russell 2000 Health Care Index
Russell 1000 Consumer Discretionary Index	Russell 2000 Consumer Discretionary Index
Russell 1000 Telecommunications Index	Russell 2000 Telecommunications Index
Russell 1000 Utilities Index	Russell 2000 Utilities Index
Russell 1000 Financials Index	Russell 2000 Financials Index
Russell 1000 Real Estate Index	Russell 2000 Real Estate Index
Russell 1000 Technology Index	Russell 2000 Technology Index

6.5.2 The market factor is represented by the market index returns.

6.5.3 Residual style factor returns are calculated using the following time series regression:

$$i_s = \beta_{s,market} f_{market} + f_s$$

where i_s is style factor s, f_{market} is the market factor, and the residual return f_s is the factor return to style factor s.

The inputs to regression are smoothed using exponential decay weights following the procedure detailed in Rule 6.2 with a half-life of 36 months. The regression window is 60 months.

6.5.4 Residual industry factor returns are calculated using the following time series regression:

$$i_{ind} = \beta_{ind,market} f_{market} + \sum_{s=1}^{7} \beta_{ind,s} i_s + f_{ind}$$

where i_{ind} is industry factor ind, f_{market} the market factor,i_s the style index returns for style factor s, and f_{ind} is the residual industry factor returns for industry ind.

The inputs to the regression are smoothed using exponential decay weights following the procedure detailed in Rule 6.2 with a half-life of 36 months. The regression window is 60 months.

6.5.5 The factor covariance matrix is calculated using the residual style and industry factor returns.

6.6 Stock beta

6.6.1 Raw stock beta

The raw stock betas are calculated using:

$$r_j = \alpha_j + \beta_{j,market} f_{market} + \sum_{s=1}^{7} \beta_{j,s} f_s + \beta_{j,ind} f_{ind} + u_j$$

where $r_j$is the stock j's time series of monthly total returns, f are the market, residual style, and residual industry factor returns from Rule 6.5.

The inputs to regression are smoothed using exponential decay weights following the procedure detailed in Rule 6.2 with a half-life of 36 months. The regression window is 60 months.

6.6.2 Capped stock beta

Values more than five standard deviation from the mean are capped at five standard deviation from the mean.

6.6.3 Country beta

Country beta is calculated as the simple cross-sectional average of capped beta.

6.6.4 Industry beta

Industry beta is calculated as the cross-sectional average of the capped betas within each industry.

6.6.5 Historical beta

Historical beta is calculated as the time series average of monthly capped betas up to the previous month with expanding window:

$$\bar{\beta}_{j,t} = \frac{1}{t-1} \sum_{s=1}^{t-1} \beta_{j,s}$$

6.6.6 Prior beta

Prior beta is calculated as the weighted average of country, industry, and historical betas:

$$\tilde{\beta}_{j,t} = w_{country} \beta_{country,t} + w_{industry} \beta_{industry,t} + w_{historical} \bar{\beta}_{j,t}$$

where $w_{country}$= 0.25, $w_{industry}$ = 0.25, and $w_{historical}$ = 0.5.

Where the historical beta is missing, it is excluded from the calculation and the weights are re-normalized.

6.6.7 Stock beta

Stock beta is calculated as the average of capped beta and prior beta:

$$\beta_{j,t}^{*} = \rho\beta_{j,t} + (1-\rho)\tilde{\beta}_{j,t}$$

where ρ = 0.7.

Where a capped beta is missing, the stock beta is set to the prior beta.

6.7 Stock specific risk

6.7.1 Stock residuals

Stock residual u_j is calculated as:

$$r_j = \beta_{j,market}^{*} f_{market} + \sum_{k=1}^{7} \beta_{j,k}^{*} f_k + \beta_{j,industry}^{*} f_{industry} + u_j$$

6.7.2 Average Absolute Specific Returns

Cross sectional average absolute specific returns are calculated as:

$$S_t = \sum_{j}^{n} \sqrt{w_{j,t-1}}\,|u_{j,t}|$$

where $w_{j,t-1}$ is the market cap weight of stock j at beginning of month t, $|u_{j,t}|$ is the absolute stock residuals (6.7.1). $\widehat{S_t}$ is subsequently calculated as the time series exponentially weighted moving average of S_t with a half-life of 4 months and 8 months window up to previous month following procedure detailed in Rule 5.2.2.

A missing market capitalisation of a stock at the beginning of the month is replaced with market capitalisation at the end of the month discounted by the corresponding industry factor return.

6.7.3 Relative to Market Specific Returns

A. Relative to market specific returns are calculated as:

$$V_{j,t} = \frac{|u_{j,t}|}{S_t} - 1$$

for stock j at time t.

B. Definition of factors to estimate relative to market specific returns

i. Time series averages of relative market specific returns are calculated as $vt6_{j,t}$, $vt12_{j,t}$, $vt60_{j,t}$ using 6, 12, and 60 months of data respectively.

6,12, 60-month time series averages of relative to market specific returns are calculated as:

$$\widetilde{vt}_{j,t} = \frac{\sum_{\tau=t-N}^{t-1} V_{j,\tau}}{n_{j,t}}$$

where $n_{j,t}$ is number of non-missing $V_{j,\tau}$ and is required to be >= 4,8, 40 respectively.

A cross-sectionally equal weighted industry average is calculated as ivt_t.

A refined 6,12, 60-month time series averages of relative to market specific returns are calculated as:

$$vt_{j,t} = \frac{\sum_{\tau=t-N}^{t-1} V_{j,\tau} + \left(N - n_{j,t}\right) ivt_{j,t}}{N}$$

where $n_{j,t}$ is number of non-missing $V_{j,\tau}$ and N = 6,12, 60 respectively.

Cross-sectionally normalized score of the refined $vt_{j,t}$ is calculated following the procedure detailed in 5.1.1 as $vt6_{j,t}$, $vt12_{j,t}$, $vt60_{j,t}$.

ii. High and low size scores

A cross-sectionally normalized score of market weights is calculated following the procedure detailed in Rule 5.1.1.

lo and hi size scores are calculated as:

$$lo = \begin{cases} size_{score}, & size_{score} < 0 \\ 0, & size_{score} \geq 0 \end{cases}$$

$$hi = \begin{cases} 0, & size\_score < 0 \\ size\_score, & size\_score \geq 0 \end{cases}$$

iii. Return volatility

Return volatility is calculated as 18 months volatility using total monthly returns. A minimum of 12 months is required to calculate return volatility. Cross-sectionally normalized score is calculated following the procedure detailed in Rule 5.1.

iv. Dividend Yield Dummy Variable

Dividend yield dummy variable is calculated as:

$$dmyl = \begin{cases} 0, & Dividend\ yield\ is\ missing \\ 0, & Dividend\ yield \geq 0.5\% \\ 1, & Dividend\ yield < 0.5\% \end{cases}$$

where dividend yield is defined in Rule 5.3.2.

v. Price momentum

Price momentum is defined in Rule 5.4.1.

A cross-sectionally normalized score is calculated following the procedure detailed in Rule 5.1.

vi. Industry Membership

A dummy variable indicating the industry the stock belongs to.

C. Estimate cross-sectional specific risk parameter estimates

$V_{j,t}$ is capped at 3 standard deviation from the cross sectional mean as $V_{j,t}^{trim}$.

A pooled *regression* incorporating the latest 60 months (t-1 to t-60) of observations is used to estimate betas:
$V_{j,t-0to59}^{trim} = \hat{\beta}_{vt6,j} vt6_{j,t-1to60} + \hat{\beta}_{vt12,j} vt12_{j,t-1to60} + \hat{\beta}_{vt60,j} vt60_{j,t-1to60} + \hat{\beta}_{lo,j} lo_{j,t-1to60} + \hat{\beta}_{hi,j} hi_{j,t-1to60} + \hat{\beta}_{retvol,j} retvol_{j,t-1to60} + \hat{\beta}_{dmyl,j} dmyl_{j,t-1to60} + \hat{\beta}_{pmom,j} pmom_{j,t-1to60} + \sum_{ind} \hat{\beta}_{ind,j} ind_{j,t-1to60}$

where $retvol$ is the Return Volatility, $pmom$ is the Price Momentum and ind is the Industry Membership.

The betas are then used to forecast $\hat{V}_{j,t}$:

$\hat{V}_{j,t} = \hat{\beta}_{vt6,j} vt6_{j,t} + \hat{\beta}_{vt12,j} vt12_{j,t} + \hat{\beta}_{vt60,j} vt60_{j,t} + \hat{\beta}_{lo,j} lo_{j,t} + \hat{\beta}_{hi,j} hi_{j,t} + \hat{\beta}_{retvol,j} retvol_{j,t} + \hat{\beta}_{dmyl,j} dmyl_{j,t} + \hat{\beta}_{pmom,j} pmom_{j,t} + \sum_{ind} \hat{\beta}_{ind,j} ind_{j,t}$

Missing return volatility and price momentum are replaced with industry averages to estimate $\hat{V}_{j,t}$.

6.7.4 Kappa

Size decile is defined cross-sectionally by market weight.

For each decile k, average cross-sectional absolute specific returns are calculated as:

$$S_{k,t} = \frac{\sum_i \sqrt{w_{i,t-1}} |u_{i,t}|}{\sum_i \sqrt{w_{i,t-1}}}$$

where $w_{i,t}$ is the free float adjusted market capitalisation weight at beginning of month t.

For each decile k, average cross-sectional squared specific returns are calculated as:

$$SQ_{k,t} = \frac{\sum_i \sqrt{w_{i,t-1}} {u_{i,t}}^2}{\sum_i \sqrt{w_{i,t-1}}}$$

where $w_{i,t}$ is the free float adjusted market capitalisation weight at beginning of month t.

Kappa is calculated as:

$$\widehat{K}_{k,t} = \frac{1}{\frac{1}{60}\sum_{i=t-59}^{t} \frac{S_{k,t}}{\sqrt{SQ_{k,t}}}}$$

A missing market capitalisation of a stock at the beginning of the month is replaced with the market capitalisation at the end of the month discounted by the corresponding industry factor return.

6.7.5 Stock specific risk is calculated as:

$$\hat{\sigma}_{j,t} = \left(1 + \hat{V}_{j,t}\right)\hat{S}_t \widehat{K}_{k,t}$$

Section 7

Index construction

7. Index construction

7.1 Risk model

A corresponding risk model is used according to the following table:

Factors Style Index Series	Risk Model
Russell US Large Cap Factors Value Style Index	Russell 1000
Russell US Large Cap Factors Growth Style Index	Russell 1000

7.2 Optimization

7.2.1 Index stock weights are calculated using optimization below:

$$\max_{w} w'\alpha$$

s.t.

- $\Delta w_k \in [-0.02, +0.02], \forall k$ in ICB industry (industry weight constraint)[5]
- $\hat{\beta} \in [0.98, 1.02]$ (beta constraint)
- $\Delta w' \Omega \Delta w \leq \frac{0.02^2}{12}$ for growth and value indices (tracking error constraint)
- $\Delta w_i \in [-w_{mkt,i}, 0.02], \forall i$ (stock weight constraint)
- $\sum_i \Delta w_i = 0$ (leverage constraint)
- $\Delta w' f_q \geq 0.2$ (active quality exposure constraint)
- $\Delta w' f_v \geq 0$ for growth indices and $\Delta w' f_v \geq 0.2$ for value index (active value exposure constraint)
- $\Delta w' f_m \geq 0$ for value index and $\Delta w' f_m \geq 0.2$ for growth (active momentum exposure constraint)
- $w \geq 0.5bps$ (minimum stock weight constraint)

where

- w is the index stock weight
- F is factor covariance matrix from Rule 6.5.5
- $\hat{\beta} = w' \left[\frac{\beta F \beta'_{mkt} + w^2_{mkt} \circ \hat{\sigma}^2}{\beta_{mkt} F \beta'_{mkt} + \left(w^2_{mkt}\right)' \hat{\sigma}^2} \right]$
- β is the vector of stock beta from Rule 6.6.7

[5] Russell US related indices migrated to the new ICB classification system in September 2020.

- $\hat{\sigma}$ is the vector of stock residual risk from Rule 6.7.5 Missing stock residual risk is set to 0 and stocks with missing residual risk are not included in the factors style index.
- ° is the matrix elementwise product
- $\alpha = 0.05 \times score \circ \sqrt{diag(\beta F \beta') + \hat{\sigma}^2}$ where $score$ is composite factor score from Rule 5.8. Missing $score$ is set to 0 and stocks with missing $score$ are not included in the factors style index.
- w_{mkt} is the market index stock weight
- $\beta_{mkt} = w'_{mkt}\beta$
- $\Delta w = w - w_{mkt}$
- $\Omega = \beta F \beta' + diag(\hat{\sigma}^2)$
- $f_q$is quality score, $f_v$is value score, $f_m$is momentum score from Rules 5.5.5, 5.3.6, 5.4.4.

7.3 Index back-histories

The availability of data prior to the launch date of each index is simulated through the application of a lag on fundamental data. All index reviews prior to the launch date that utilize realized fundamental data incorporate a lag. Components of the Value factor detailed in Rule 5.3 incorporate annual Cash-flow, Net Income and Book measures that were announced 3 months prior to the data cut-off date. Components of the Quality factor detailed in Rule 5.5 incorporate Revenue, Cost of Goods Sold, Total Assets, Cash, Liabilities, and Debt measures that were announced 2 months prior to the data cut-off date, and Shares that was 1 month prior to the data cut-off date Component of the Momentum factor detailed in Rule 5.4 incorporates earnings announcement drift that was 1 month prior to the data cut-off date.

Section 8

Periodic review of constituents

8. Periodic review of constituents

8.1 Review and price dates

8.1.1 The Russell US Factors Style Index Series will be reviewed monthly based on the stock prices available at close of business on the last business day of the month prior to the review month.

8.1.2 The review will be implemented after the close of the 9th business day of the month.

8.1.3 Changes arising from review are announced after the close of the 4th business day of the month.

Section 9

Changes to constituent companies

9. Changes to constituent companies

9.1 Intra-review additions

Additions to the parent index will be considered for inclusion in the Russell US Factors Style Index Series at the next review.

9.2 Intra-review deletions

A constituent will be removed from the Russell US Factors Style Index Series if it is also removed from the corresponding parent index. The deletion will be effective concurrent with the removal from the parent index provided a minimum of two days' notice can be provided. Otherwise, the deletion will be effective with two days' notice and its weight will be distributed pro-rata amongst the remaining constituents.

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 Russell US Factors Style Index Series 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. Indices algorithm and calculation method

11.1 Prices

The Russell US Factors Style Index Series 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

The Russell US Factors Style Index Series will be calculated on an end of day basis and displayed to eight decimal points.

11.3 Index calculation

The Russell US Factors Style Index Series is calculated using the algorithm described below:

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

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 Weight Adjustment 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

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 Russell US Factors Style 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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