August 2023

JP Morgan US Single Factor Index Series

v2.0

FTSE RUSSELL
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Contents

Section 1

Introduction

1. Introduction

1.1 This document sets out the ground rules for the construction and management of the JP Morgan US Single Factor Index Series. Copies of the ground rules are available from www.ftserussell.com.

1.2 The JP Morgan US Single Index Series is designed to reflect the performance of US stocks representing different factor characteristics.

1.3 These ground rules should be read in conjunction with the FTSE Global Equity Index Series ground rules, which are available at www.ftserussell.com, Russell US Equity Indices Construction and Methodology, which is available at Russell-US and Corporate Actions and Events Guide for Non Market Cap Weighted Indices (see Section 9). Unless stated in these ground rules, the JP Morgan Single Factor Index Series will follow the same process as the FTSE Global Equity Index Series.

1.4 A price index and total return index will be calculated in real time and published in US Dollars for the JP Morgan US Single Factor Index Series. The total return and net of tax indices include income based on ex-dividend adjustments.

1.5 The net of tax total return index is calculated based on the maximum withholding tax rates applicable to dividends received by institutional investors who are not resident in the same country as the remitting company and who do not benefit from double taxation treaties.

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'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;
- any inaccuracies in these ground rules;
- 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; and
- disseminate the indices.

2.1.3 FTSE is responsible for monitoring the performance of the JP Morgan US Single Factor Index Series throughout the day and will determine whether the status of the index should be firm, closed, indicative or held (see Appendix B).

2.1.4 These ground rules set out the methodology and provide information about the publication of the JP Morgan US Single Factor 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 meet the current and future requirements of investors and other index users. 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 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

3.2 Queries and Complaints

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

Queries_and_Complaints_Policy.pdf

3.3 Index Policy for Trading Halts and Market Closures

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

Index_Policy_for_Trading_Halts_and_Market_Closures.pdf

3.4 Recalculation Policy and Guidelines

3.4.1 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 JP Morgan US Single Factor index Series will be notified through appropriate media.

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

Recalculation_Policy_and_Guidelines_Equity_Indices.pdf

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

3.5.1 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

3.6 Policy for Benchmark Methodology Changes

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

Policy_for_Benchmark_Methodology_Changes.pdf

3.7 FTSE Russell Governance Framework

3.7.1 To oversee its indices, FTSE Russell employs a governance framework that encompasses product, service and technology governance. The framework incorporates the London Stock Exchange Group's three lines of defence risk management framework and is designed to meet the requirements of the IOSCO Principles for Financial Benchmarks[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

3.8 Real Time Status Definitions

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

Real_Time_Status_Definitions.pdf

[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 Single-factor indices

The eligible universe of each index in the JP Morgan US Single Factor Index Series consists of all securities from the relevant underlying index excluding all lines of the JP Morgan stock.

4.2 Underlying indices

The underlying index of each index in the JP Morgan US Single Factor Index Series is shown below.

JP Morgan US Single Factor Index Series	Underlying index
JP Morgan US Minimum Volatility Index	Russell 1000 Index
JP Morgan US Dividend Index	Russell 1000 Index
JP Morgan US Value Factor Index	Russell 1000 Index
JP Morgan US Momentum Factor Index	Russell 1000 Index
JP Morgan US Quality Factor Index	Russell 1000 Index

Section 5

Factor construction

5. Factor construction

5.1 Data cut-off date

The data cut-off date for the determination of factor data is the close of business on the last trading day of the month before the review month.

5.2 Liquidity

5.2.1 Liquidity is defined as the median daily trading volume over the 22 business days prior to the data cut-off date (rule 5.1) adjusted for corporate actions multiplied by the price as of the data cut-off date.

5.3 Multiple lines

5.3.1 If a company consists of multiple lines, only one eligible line is included in the ranking procedure.

If the line is an existing security in a JP Morgan Developed Multi Factor Index, it remains the eligible line, otherwise the eligible line is the most liquid line (see rule 5.2).

5.4 Factor ranks

5.4.1 The factor rank of each stock is defined as the percentile rank within the relevant ICB[5] industry of the eligible universe, where factor values are available. The percentile rank for constituent i in industry k is calculated as:

$$p_i = 100 \times \frac{1 + c_i + 0.5f_i}{1 + N}, \forall i \in k$$

where c_i is the number of constituents in industry k with factor values more attractive than the factor value of the i^{th} constituent, f_i is the number of constituents with an identical factor value to constituent i (excluding itself) and N is the total number of eligible constituents in industry k.

5.4.2 Constituents with missing factor values are assigned a factor rank of 50.5 and are not included in the percentile ranking calculation detailed in rule 5.4.2.

5.4.3 Stocks with lower percentile rank are more attractive than stocks with a higher percentile rank. Where two or more constituents have identical ranks, they are ordered by liquidity (rule 5.2) and then free float adjusted market capitalisation as at the price date (rule 6.1), such that the least liquid and smaller constituent is considered the least attractive.

5.5 Dividend yield

Dividend yield is defined as the latest 12-month trailing dividend (ordinary and extraordinary but excluding special dividends) from third-party data providers as of the data cut-off date (rule 5.1), divided by full market capitalisation as of the data cut-off date.

$$\text{Dividend yield} = \frac{Latest\ 12\ month\ Trailing\ Dividend}{Market\ Capitalisation}$$

[5] FTSE indices migrated to the new ICB classification system in March 2021.

5.6 Value

Value is comprised of the following four metrics:

1. Earnings yield = $\frac{\text{Latest 12 month Net Income}}{\text{Market Capitalisation}}$
2. Book to price = $\frac{\text{Latest reported Book Value}}{\text{Market Capitalisation}}$
3. Free cash flow = $\frac{\text{Latest 12 month Net Operating Cash Flow less Capital Expenditure}}{\text{Market Capitalisation}}$
4. Dividend yield, as defined in rule 5.5.

Free cash flow, 12-month net income and latest book value are sourced from third-party data providers as of the data cut-off date (rule 5.1). Market capitalisation is the full market capitalisation as of the data cut-off date.

Securities are ranked independently on each value metric within each ICB industry according to rule 5.4, such that higher value characteristics (or relatively cheaper stocks) are more attractive. An overall value score is assigned to each security by taking the average of the individual value metric rankings. The overall value score is re-ranked according to rule 5.4, such that a lower overall score is more attractive.

Securities classified as financials (ICB financials 30)) are assigned a factor rank of 50.5 for free cash flow.

5.7 Volatility

Volatility is defined as the inverse of the standard deviation of local daily total returns over a two-year period. The volatility score is determined by ranking the securities according to rule 5.4, such that lower volatility stocks are more attractive.

A minimum of 400 daily price observations is required. A security with fewer than 400 daily price observations is awarded a neutral score of 50.5.

5.8 Momentum

Momentum is calculated as the one-year total return in local currency divided by the standard deviation of daily local returns over one year.

Momentum = $\frac{\text{12 Month Local Return}}{\text{Standard Deviation of 1 Year of Daily Local Returns}}$

The momentum score is determined by ranking momentum values according to rule 5.4, where higher momentum stocks are more attractive.

5.9 A minimum of 200 daily price observations is required. A security with fewer than 200 daily price observations is awarded a neutral score of 50.5.

Quality

Quality is comprised of 10 i metrics spanning three themes: profitability, solvency and risk, and earnings quality.

Theme	Metric	Definition
Profitability	ROE	$\frac{\text{Net Income}}{\text{Average Total Shareholders' Equity}}$
Profitability	Cash flow ROI	$\frac{\text{Cash Flow} + \text{Interest Expenditure} \times (1 - \text{Tax Rate})}{\text{Average Total Equity} + \text{Average Total Debt}}$
Profitability	Free cash flow/sales	$\frac{\text{Cash Flow} - \text{Capital Expenditure}}{\text{Sales}}$
Solvency and financial risk	Cash flow interest cover	$\frac{\text{Cash Flow} + \text{Cash Interest Paid} + \text{Cash Taxes Paid}}{\text{Cash Interest Paid}}$

Theme	Metric	Definition
Solvency and financial risk	Free cash flow/ current liabilities	$\frac{\text{Cash Flow} - \text{Capital Expenditure}}{\text{Average Current Liabilities}}$
Solvency and financial risk	Cash flow/total debt	$\frac{\text{Cash Flow}}{\text{Average Total Debt}}$
Solvency and financial risk	Low volatility	Two-year standard deviation of daily local total returns
Earnings quality	Change in accruals	$\frac{\text{Accruals}}{\text{Previous Accruals}} - 1$, where Accruals= $(\text{Total Assets} - \text{Cash}) - (\text{Total Liability} - \text{Total Debt})$
Earnings quality	Balance sheet based operating accruals	$\frac{\Delta(\text{Total Assets} - \text{Cash}) - \Delta(\text{Total Liab.} - \text{Short Term Debt} - \text{Long Term Debt})}{\text{Average Total Assets}}$
Earnings quality	Cash flow based operating accruals	$\frac{\text{Net Income} - \text{Cash Flow} - \text{Csh Flow from Investing}}{\text{Average Net Operating Assets}}$

The averages of total shareholders' equity, total equity, total debt, current liabilities total assets and net operating assets are the average of the latest annual or interim value and value from the corresponding period 12 months previously.

Net income, cash flow and capital expenditure are the latest reported 12-month values. Cash, debt, liabilities and assets are the latest reported values. All data is sourced from the third-party data providers as of the data cut-off date (rule 5.1).

Securities are ranked independently on each quality metric within each ICB industry according to rule 5.4. Higher values of the following characteristics are more attractive: ROE, cash flow ROI, free cash flow/sales, cash flow interest cover, free cash flow/current liabilities and cash flow/total debt. Lower values of the following measures are more attractive: volatility, change in accruals, balance sheet based operating accruals and cash flow based operating accruals. An overall quality score is assigned to each security by taking the average of the individual quality metric rankings. The overall quality score re-ranked according to rule 5.4, such that a lower overall score is more attractive.

Securities classified as financials (ICB financials 30)) are assigned a factor rank of 50.5 for cash flow ROI, free cash flow/sales, cash flow interest coverage, free cash flow/current liabilities, cash flow/total debt, change in accruals, balance sheet based operating accruals and cash flow based operating accruals.

5.10 Index back-histories

In order to simulate the availability of factor data prior to the November 2017 launch date of the JP Morgan Single Factor Index Series, index reviews prior to this date, with the exception of the September 2017 review, utilise fundamental data that is lagged by a period of three months. For example, the value factor detailed in rule 5.6 incorporates 12-month net income and book value measures that were available three months prior to the data cut-off date.

Section 6

Periodic review of constituents

6. Periodic review

6.1 JP Morgan Single Factor Indices derived from the Russell 1000 Index will be reviewed quarterly in March, June, September and December, based on fundamental data at the close of business on the last trading day of the month prior to review and price data at the close of the first Friday of the review month in March, September, December and at the close of business on the second Friday of the review month in June. Constituents as of the Monday following the third Friday of the review month will be used except in June when constituents of the Russell 1000 Index reconstitution date will be used.

6.2 The review will be implemented after the close of business on the third Friday of March, September and December. In June, the review will be implemented on the same date as the Russell 1000 annual reconstitution.

6.3 For details of the implementation dates of the Russell 1000 Index, please refer to the Russell US Equity Indices Construction and Methodology, available at Russell-US.

Section 7

Industry allocation

7. Industry allocation

7.1 The JP Morgan US Single Factor Index Series aims to achieve a set of industry target weights.

7.1.1 Industry target weights are derived from either a single-factor reference index or from the underlying index.

JP Morgan US Single Factor Index	Determination of industry target weights	Rule
JP Morgan US Minimum Volatility Index	JP Morgan US Minimum Factor Volatility Reference Index	7.3
JP Morgan US Dividend Index	JP Morgan US Dividend Factor Reference Index	7.4
JP Morgan US Value Factor Index	Russell 1000 Index	7.3
JP Morgan US Momentum Factor Index	Russell 1000 Index	7.2
JP Morgan US Quality Factor Index	Russell 1000 Index	7.2

7.2 Industry target weights – JP Morgan US Value Factor, JP Morgan US Momentum Factor and JP Morgan US Quality Indices

7.2.1 The industry target weights of the JP Morgan US quality factor, momentum factor and value factor indices are the free float adjusted market capitalisation of ICB industry weight of the underlying index based on the as at the price date defined in rule 6.1 adjusted for corporate actions and changes to the index effective day (rules 6.1 and 6.2).

7.3 Industry target weights – JP Morgan US Minimum Volatility Index

7.3.1 Industry target weights for the JP Morgan US Minimum Volatility Index are derived using the 11 JP Morgan US Minimum Volatility Reference ICB Industry Indices.

7.3.2 Each JP Morgan US Minimum Volatility Reference ICB Industry Index consists of the equally weighted set of constituents with a low volatility factor rank (rule 5.7) that is less than or equal to 50 within each ICB Industry.

7.3.3 The constituents of each JP Morgan US Minimum Volatility Reference ICB Industry Index are reviewed and reweighted concurrently with the JP Morgan US Minimum Volatility Index.

7.3.4 The industry target weights for JP Morgan US Minimum Volatility Index are determined using the following optimisation:

$$\boldsymbol{w_s} = \underset{\boldsymbol{s}}{\operatorname{argmin}}\ \boldsymbol{s}^T \Omega\, \boldsymbol{s} + \lambda \sum_{i=1}^{K} \left| s_i - s_{i,0} \right|$$

Subject to: $0.05 \leq s_i \leq 0.2, \forall i$ and $\sum_i s_i = 1$

where $K = 11$ is the total number of ICB industries, $\lambda = 11^{-4}$ is a constant, $\boldsymbol{w_s}$ is the vector of target industry weights, i denotes individual ICB industry, $\boldsymbol{s}$ is the vector of industry target weights and Ω is the shrunk industry covariance matrix such that the element at row i and column j is:

$$\omega_{i,j} = \begin{cases} \sigma_i \sigma_j \left[\frac{1}{2} \rho_{i,j} + \frac{1}{2K(K-1)} \sum_{k=1}^{K} \sum_{l=1, l \neq k}^{K} \rho_{k,l} \right] & , i \neq j \\ \sigma_i^2 & , i = j \end{cases}$$

where σ_i is the volatility of the JP Morgan US Minimum Volatility Reference ICB Industry Index of industry i and $\rho_{i,j}$ is the correlation between the JP Morgan US Minimum Volatility Reference ICB Industry Indices i and j. Both the volatilities and the correlations are based on three years of weekly (Wednesday to Wednesday) total return in USD.

7.4 Industry target weights – JP Morgan US Dividend Index

7.4.1 Industry target weights for the JP Morgan US Dividend Index are derived from the 11 JP Morgan US Dividend Reference ICB Industry Indices.

7.4.2 The JP Morgan US Dividend Reference ICB Industry Indices consist of the equally weighted set of constituents with a dividend yield factor rank (rule 5.5) that is less than or equal to 50 within each ICB industry.

7.4.3 For each JP Morgan US Dividend Reference ICB Industry Index i the median yield, based on the eligible constituents, is calculated.

7.4.4 The Z-scores, z_i, of the median yields are determined and Z-scores greater than two or less than - two are capped at ± two respectively.

7.4.5 The capped z-scores are subsequently rescaled such that the highest score equals s_{max} and the lowest score equals s_{min}:

$$z_i' = s_{min} + (s_{max} - s_{min}) \times \frac{z_i + 2}{4}$$

7.4.6 The re-scaled score z_i' is then scaled by the inverse of the volatility of the JP Morgan US Dividend Reference ICB Industry Index, σ_i, are based on three years of weekly (Wednesday to Wednesday) total return in USD and re-normalised to obtain the uncapped industry target weights.

7.4.7 The industry target weights for the JP Morgan US Dividend Index are capped to ensure all industry target weights are between 0.05 and 0.2. Industry target weights < 0.05 are set to 0.05 and industry target weights > 0.2 are set to 0.2. To ensure the sum of target industry weights is one, the remaining weight difference is distributed in proportion to target industry weight to those industries with weights > 0.05 and < 0.2 in an iterative process until the constraints are met.

Section 8

Weighting methodology

8. Weighting methodology

8.1 Common parameters

8.1.1 The following parameters are used throughout the weighting methodology:

	Parameter									
JP Morgan Diversified Index	τ (bps)	l_{max}	δ_{max}	x_1 (bps)	x_2 (bps)	z_{turn}	z_{max}	w_{min} (bps)	w_{max} (bps)	γ_{min}
JP Morgan US Minimum Volatility Index	10	4	1	60	50	50	80	5	75	0.03
JP Morgan US Dividend Index	10	4	1	60	50	50	80	5	75	0.05
JP Morgan US Value Index	10	4	1	$f_1(w_{cap})$	$f_2(w_{cap})$	50	80	5	$f_3(w_{cap})$	0.05
JP Morgan US Momentum Index	10	4	1	$f_1(w_{cap})$	$f_2(w_{cap})$	50	80	5	$f_3(w_{cap})$	0.10
JP Morgan US Quality Index	10	4	1	$f_1(w_{cap})$	$f_2(w_{cap})$	50	80	5	$f_3(w_{cap})$	0.05

where:

τ is the proportion of underlying index free float adjusted market capitalisation that determines the notional index size.

l_{max} is the liquidity in days that determines maximum unlimited constituent weight.

δ_{max} is the liquidity in days that determines the maximum permitted weight change.

x_1 and x_2 are intermediate constituent weight limits. For the JP Morgan US Value Factor, momentum factor and quality factor indices, these are a function of the free float adjusted market capitalisation weights of each constituent i, $w_{cap,i}$:

$$x_{1,i} = f_1(w_{cap,i}) = \min(0.2\% + 1.8 \times w_{cap,i}, 2\%)$$

and

$$x_{2,i} = f_2(w_{cap,i}) = \min(0.1\% + 1.65 \times w_{cap,i}, 1.75\%)$$

z_{turn} and z_{max} are maximum ranks which determine constituent eligibility.

w_{min} is the minimum permitted weight of a new constituent.

w_{max} is the maximum permitted (limited) weight of a constituent. For the JP Morgan US Value Factor, momentum factor and quality factor indices these are a function of market capitalisation weights of each constituent i, $w_{cap,i}$:

$$f_3(w_{cap,i}) = \min(0.3\% + 1.95 \times w_{cap,i}, 2.25\%)$$

$\gamma_{min}$is the one-way turnover threshold.

8.2 Liquidity constraints

8.2.1 The weighting of the JP Morgan US Single Factor Index Series employs two liquidity constraints.

8.2.2 The maximum weight of a constituent is limited to:

$$w_{L,i} = \frac{l_{max}}{\tau V} l_i$$

where l_i is the value of the liquidity (rule 5.2) of constituent i, V is the free float adjusted market capitalisation of the underlying index on the price date defined in rule 6.1, and l_{max},and τ are defined in rule 8.1.

8.2.3 The maximum possible weight change of a constituent is limited to:

$$\Delta_{L,i} = \frac{\delta_{max}}{\tau V} l_i$$

where l_i is the value of the liquidity factor of constituent i, V is the free float adjusted market capitalisation of the underlying index on the price date defined in rule 6.1, and δ_{max},and τ are defined in rule 8.1.

8.2.4 The industry target weights are capped by a liquidity limit. The liquidity limit for an industry i is defined as a sum of constituent liquidity weighting limits:

$$S_{cap,i} = \sum_{k \in S_i} \min(w_{L,k}, x_2)$$

where $\boldsymbol{w_{L,k}}$ is a liquidity based limit for of stock $\mathbf{k}$ (see rule 8.2.2) and $\mathbf{x_2}$ is a predefined constituent weight limit (see rule 8.1.1). Capped industry targets weights that are above the liquidity limit have their weight set to the liquidity limit and the excess weight is redistributed to the rest of the uncapped industries in proportion to their weights. This process is repeated until all industry target weights satisfy their liquidity limit or a maximum of 10 iterations has been reached.

8.3 Initial review

8.3.1 The JP Morgan US Single Factor Index Series is initialised at the June 1999 review.

8.3.2 The initial input weights for all eligible constituents prior to the initial review are zero.

8.3.3 The initial review uses a relaxed liquidity constraint (rule 8.2.3):

$$\delta_{max} = 4\delta_{max}$$

8.4 Constituent reweighting

8.4.1 Current constituent weights $w_{cut,i}$ at the close on the data cut-off date (rule 5.1) are the review starting weights. The data cut-off date weights for eligible constituents not in the current index are zero.

8.4.2 Constituents that are not eligible for inclusion (Section 4) are deleted.

8.4.3 Remaining constituents' weights that exceed the upper weight limit x_1 defined in rule 8.1, are reduced:

$$w_{0,i} = \max(w_{cut,i} - \Delta_{L,i}, x_{1,i})$$

where $\Delta_{L,i}$ is the maximum permitted weight change of constituent i (rule 8.2.3), $w_{0,i}$ is the weight of constituent i after adjustment and $x_{1,i}$ is defined in rule 8.1.

8.4.4 Within each ICB industry, if after the application of rules 8.4.1 to 8.4.3, the combined weight of current constituents in the ICB industry is less than the than the corresponding industry target weight (rule 7.2 to 7.4), the weight of constituents in this ICB industry are increased to achieve the target weights (with the stocks to increase determined by rule 8.4.5), subject to weight and liquidity constraints (rule 8.2).

8.4.5 Sequentially, starting with the most attractively ranked stock in the ICB industry increase the weight of each stock subject to:

$$w_{1,i} = min\left(w_{0,i} + w_{s,k} - \sum_{j \in ICB_k} w_j, w_{L,i}, w_{cut,i} + \Delta_{L,i}, x_{2,i}\right), i \in ICB_k$$

where $w_{1,i}$ is the weight of constituent i after adjustment, $w_{s,k}$ is the target industry weight, ICB_k denotes the constituents in the current industry k, $\sum_{j \in ICB_k} w_j$ is the current weight in the ICB industry and $x_{2,i}$ is an upper weight limit defined in rule 8.1, p_i is the percentile rank of constituent i (rule 5.4), z_{max} (rule 8.1) is the least attractive rank which can be invested into and $w_{L,i}$ (rule 8.1) is a maximum weight limit.

New constituents ($w_{0,i} = 0$) are subject to an additional constraint, $w_{1,i} \geq w_{min}$, where w_{min} (rule 8.1) is the minimum permitted weight for a new constituent.

The reweighting sequence in the current ICB industry stops when the target industry weight has been achieved, all constituents in the industry has been reweighted or all constituents with their factor percentile rank (rule 5.4) more attractive than z_{max} (rule 8.1) has been reweighted, permitted by the weight adjustment constraints.

8.4.6 Within each ICB industry, if after the application of rules 8.4.1 to 8.4.3, the combined weight of current constituents in the ICB industry is greater than the than the corresponding industry target weight (rules 7.2 to 7.4), the weight of the constituents in this ICB industry is decreased to achieve the target weight (with the stocks to increase determined by rule 8.4.7), subject to the weight and liquidity constraints (rule 8.2).

8.4.7 Sequentially, starting with the least attractively ranked stock in the ICB industry decrease the weight of each stock subject to:

$$w_{1,i} = \max\left(w_{0,i} + w_{s,k} - \sum_{j \in ICB_k} w_j, w_{cut,i} - \Delta_{L,i}, 0\right)$$

where $w_{1,i}$ is the weight of constituent i after adjustment, $w_{0,i}$ is the weight before adjustment, $w_{s,k}$ is the target industry weight, $\sum_{j \in ICB_k} w_j$ is the current weight in industry k.

8.5 Achieving full investment

8.5.1 Following the application of rules 8.4.1 to 8.4.7 if the constituent weights do not sum to one, the constituent weights are adjusted, subject to the weight and liquidity constraints (rule 8.2).

8.5.2 If the sum of the constituent weights is less than one, the remaining weight is redistributed in proportion to free float adjusted market capitalisation according to the following iterative procedure:

$$w_{2,i} = \min\left(w'_{2,i} + \left(1 - \sum_j w_{2,j}\right) \times \frac{c_i}{\sum_j c_j}, w_{L,i}, w_{cut,i} + \Delta_{L,i}, w_{max}\right) \forall\, w'_{2,i} > 0$$

where $w'_{2,i}$ is the weight of constituent i before the adjustment, $\sum_j w_{2,j}$ is the current weight of the index (after previous iteration), c_i is the free float adjusted market capitalisation of constituent i and w_{max} and $w_{L,i}$ are maximum weight limits defined in rule 8.1. For the first iteration, the weights $w'_{2,i} = w_{1,i}$.

8.5.3 If the sum of the constituent weights is greater than one, the excess weight is removed in proportion to index weight according to the following iterative procedure:

$$w_{2,i} = \max\left(w'_{2,i} - \left(\sum_j w_{2,j} - 1 \right) \times \frac{w'_{2,i}}{\sum_j w'_{2,j}}, w_{cut,i} - \Delta_{L,i}, 0 \right) \forall\, w'_{2,i} > 0$$

where $w'_{2,i}$ is the weight of constituent i before this adjustment, $\sum_j w_{2,j}$ is the current weight of the index (after previous iteration). For the first iteration, the weights $w'_{2,i} = w_{1,i}$.

8.5.4 Rules 8.5.1 to 8.5.3 are repeated until the sum of constituent weights is one. If the application of these rules fails to achieve full investment (i.e. sum of weights equal to 100%), the liquidity and weight constraints are relaxed and the review is reinitiated using the new constraints starting from rule 7.5.1. The relaxed constraints are:

$\delta_{\max} = 1.2 \times \delta_{\max}$
$l_{\max} = 1.2 \times l_{\max}$
$w_{\max} = 1.1 \times w_{\max}$

8.6 Achieving further increases in factor exposure

8.6.1 Following the application of rules 8.4 and 8.5, if the one-way turnover is less than γ_{min} (rule 8.1), then attempt to divest from unattractively ranked current constituents and reinvest into attractively ranked eligible constituents. One way turnover, γ, is calculated as half the aggregate change in constituent weightings (including additions and deletions):

$$\gamma = \frac{1}{2} \sum_i \left| w_i - w_{cut,i} \right|$$

8.6.2 Eligible and current constituents are ranked at the index level from least attractive to most attractive. In the case where two or more constituents have identical ranks, they are reverse ordered by liquidity (rule 5.2) and then free float adjusted market capitalisation, such that the most liquid and largest constituent is considered least attractive.

8.6.3 Sequentially, starting with the least attractive current constituent i, transfer weight Δ from constituent i to the most attractive eligible (or current) constituent j that have its factor percentile rank (rule 5.4) no less attractive than z_{turn} (rule 8.1) in the same ICB industry. The reinvested weight Δ, must not exceed the remaining available weight for investment in the ICB industry, that is the total weight change within the ICB industry must be zero:

$$\Delta = \min\left(\Delta_{L,i} + w_{3,i} - w_{cut,i}, \Delta_{L,j} - w_{3,j} + w_{cut,j}, w_{3,i}, \min\left(x_{1,j} - w_{3,j}, 0\right), \min\left(w_{L,j} - w_{3,j}, 0\right) \right)$$

the weights of the stocks i and j are adjusted using:

$w_{3,i} = w_{3,i} - \Delta$

$w_{3,j} = w_{3,j} + \Delta$

8.6.4 New constituents ($w_{2,j} = 0$) are subject to an additional constraint, $w_{3,j} \geq w_{min}$, where w_{min} (rule 8.1) is the minimum permitted weight for a new constituent.

8.6.5 The iterative procedure described in rules 8.6.2 to 8.6.4 is continued until the one-way turnover target is achieved, $\gamma = \gamma_{min}$, or insufficient liquidity remains to affect any further reweighting. For the first iteration, the weights $w_{3,i} = w_{2,i}$.

Section 9

Changes to constituent companies

9. Changes to constituent companies

9.1 Intra-review additions

9.1.1 Additions into the Russell 1000 Indices will be considered for inclusion in the relevant JP Morgan US Single Factor Index Series at the next review.

9.2 Intra-review deletions

A constituent will be removed from the JP Morgan US Single Factor Index Series if it is also removed from its corresponding underlying index. A minimum of two days' notice will be provided and its weight will be distributed pro-rata amongst the remaining constituents in the relevant index.

Section 10

Corporate actions and events

10. Corporate actions and events

10.1 If a constituent of a JP Morgan US Single Factor Index Series 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 relevant index remains 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 Capitalisation 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. These include the following:

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

A corporate event is a reaction to company news (event) that may impact the index depending on the index rules. For example, if 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 Takeovers, mergers and demergers

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

Section 11

Index calculation method

11. Index calculation method

11.1 Prices

11.1.1 The JP Morgan Single Factor 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

11.2.1 The index series will be calculated on an end-of-day basis.

11.3 Index calculation

11.3.1 The index series is calculated using the algorithm described below:

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

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 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:

$$c_i = \frac{\hat{W}_i}{W_i}$$

where $\hat{W}_i$ are the constituent index weights as calculated in Section 5 and W_i are the underlying eligible universe investable market capitalisation index weights as at the most recent review date; and

– *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

Index opening and closing hours

Index	Open	Close
JP Morgan US Minimum Volatility Index		
JP Morgan US Dividend Index		
JP Morgan US Value Factor Index		
JP Morgan US Momentum Factor Index		
JP Morgan US Quality Factor Index		
Monday to Friday	9:30	16:30

Notes

1. The indices will be calculated during normal trading hours of the New York Stock Exchange, NYSE Arca and NASDAQ will be closed on US holidays.
2. Timings are based on Eastern Standard Time (EST).

Appendix B

Status of index

A price index, total return index and net of tax index will be calculated on a real-time basis in US Dollars.

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

Real_Time_Status_Definitions.pdf

The official opening and closing hours of the JP Morgan US Single Factor Index Series are set out in Appendix A. Variations to the official hours of the index will be published by FTSE Russell.

Appendix C

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 JP Morgan US Single Factor Index Series is available from FTSE Russell.

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

Website: www.ftserussell.com

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