R Risk-Based European Equity Index

Methodology

03 October 2014

ROTHSCHILD

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1. Overview

The **R Risk-Based European Equity Index** is an index designed to provide a broad and liquid representation of large capitalization companies in Europe. R Risk-Based European Equity Index focuses on the large-cap sector of the market, reflecting a significant proportion of the total value of the market. The Index is based on a transparent construction process with monthly rebalancing so that the portfolio as at the beginning of each month is weighted to lead to an Equally-weighted Risk Contribution (ERC) from every invested asset in the Index. Following every rebalancing date the weightings will respect the UCITS rules on issuer-level concentrations, such that the sum of exposures that are individually greater than 5% will not exceed 40%, and no individual issuer exposure will exceed 10% of the portfolio. The index will not be leveraged (i.e. the sum of exposures will at no point exceed 100%).

R Risk-Based European Equity Index	
Base value and date	1,000 on [date]
Price and Gross Return (EUR)	Closing price of every business day
Index type and currency	Price, net return and gross return in EUR
Weighting	Risk-Based Weighting
Global universe	Approx.1,000
Selected Components	Approx. 250
Invested Components	Approx. 125
Review Frequency	Quarterly
Rebalanced	Monthly
Index Calculation Agent	Markit Group Ltd
Weighting Calculation Agent	Risk Based Investment Solutions Ltd (RBIS), a wholly-owned subsidiary of the Rothschild Group.

The R Risk-Based European Equity Index is composed of securities which meet the eligibility rules described in the following sections.

2. Equity Universe

The Equity Universe for the index construction is defined by:

- Identifying eligible equity securities.

- Screening the eligible securities for inclusion in the investable universe based on appropriate country and stock exchange.

2.1 Defining Eligible securities

Eligible securities include all common stocks in the global equity universe with comparable characteristics from financial markets that provide real-time values and historical values.

Preferred shares that exhibit the characteristics of equity securities or those with limited voting power are generally defined as eligible securities. However, when preferred shares have similar features to a fixed income security, such as fixed dividend and/or, in case of liquidation, an entitlement to a company's net assets which is limited to the par value of the preferred share, they are not eligible for inclusion in the Equity Universe.

Similarly, mutual funds, ETFs, equity derivatives, tracking stocks, limited partnerships, and investment trusts are not eligible for inclusion in the Equity Universe.

2.2 Country Classification of Eligible Securities

The securities country classification model relies on a rules-based methodology including five criteria. The five criteria for the classification of a country as a part of the Europe investable equity universe include macroeconomic data, market capitalization, market liquidity[1], free currency convertibility on onshore and offshore markets, and no restrictions on capital flows. The process of country classification is illustrated with the following model.

The table provides a list of Countries and Stock Exchanges from the RBIS Europe Investable Universe that meet the five criteria as of 30.06.2014.

RBIS Europe Equity	
Austria	Vienna Stock Exchange
Belgium	NYSE EURONEXT Brussels
Czech Republic	Prague Stock Exchange
Denmark	NASDAQ OMX Copenhagen
Finland	NASDAQ OMX Helsinki
France	NYSE EURONEXT Paris

[1] For the above-mentioned criteria, the average data of the last three consecutive years are used in order to avoid short-term fluctuations, i.e. 2014 decisions are based on average data from 2010 to 2013.

Germany	Deutsche Borse
Greece	Athens Stock Exchange
Ireland	Irish Stock Exchange
Italy	Borsa Italiana
Luxembourg	Luxembourg Stock Exchange
Netherlands	NYSE EURONEXT Amsterdam
Norway	Oslo Bors
Portugal	NYSE EURONEXT Lisbon
Spain	Bolsa De Madrid
Sweden	NASDAQ OMX Stockholm
Switzerland	SIX Swiss Exchange
United Kingdom	London Stock Exchange

Each company and its securities are uniquely classified to a specific country and listing within the investable universe. The country classification and listing is based on the country of incorporation, the primary listing and the country of most liquid exchange. If a company incorporates in, has a stated headquarters location in, and also trades in the same country, the company is assigned to its country of incorporation.

However, in a few cases where a company is incorporated in one country while its securities have a main listing in a different country additional indicators such as primary asset/revenue location are used.

3. Investable Equity Universe

In order to make the index investable screens are applied at the individual security level.

3.1 Liquidity

A liquidity screen is applied for each company and only the most liquid stocks are considered. To be eligible for inclusion in the Investable Equity Universe, a security must have sufficient liquidity. Companies included in the index must have a minimum Average Daily Traded Value over a specified amount of time. The company's ADTV is based on the individual securities traded of the specific listing used for the index calculation.

R Risk-Based European Equity Index components must have a minimum ADTV of greater or equal than one (1) million EUR measured over 3-months. If there are less than 250 stocks that meet this determined ADTV level then the number of index components is adjusted downwards accordingly.

In case of events in the market that negatively affect the aggregated liquidity and market capitalization of entire markets, the number of the stocks in the index is reduced to a number of components that meet the liquidity requirement.

3.2 Minimum Length of Trading Requirement

The share must have started trading at least twelve months before being considered to be part of the index. For statistical calculation purposes, only stocks with at least 253 historical closing prices are considered.

4. Market Capitalization

To determine the eligible company size to be included in the R Risk-Based European Equity Index, the free-float market capitalization of each security is calculated.

4.1 Shares outstanding and prices

The free float is estimated based on the publicly available shareholder information. For each security, the free float is defined as the proportion of shares outstanding that are deemed to be available for purchase in the public equity markets by international investors.

The price to be used for the calculation of the free-float market capitalization is the closing price reported by the primary listing exchange. When a given stock market is closed on the scheduled implementation date due to a stock market holiday, the change will be effective on the next business day, using the price of the previous business day's close.

4.2 Free-float factors

In order to provide a more accurate reflection of market movements each security is assigned a unique free-float factor which is reviewed on a quarterly basis. The free-float factor reduces the number of shares to the actual amount available on the market and eliminates the locked-in shares that are not part of the available free float. All fractions of the total number of shares larger than 5% and whose holding is of a long-term nature are not included in the index calculation. This includes:

- Shareholdings owned by either governments or their agencies;
- Restricted shares that cannot be traded during a certain period or have a foreign ownership restriction which materially limit the ability of international investors to freely invest in a particular equity market, sector or security;
- Cross-ownership: stock owned either by the company itself, in the form of treasury shares, or owned by other companies;
- Shares owned by the company's principal officers, including shares owned by individuals or families that are related to or closely affiliated with the company's principal officers, members of the company's board of directors, or founding members deemed to be insiders;
- Shares held by the employees of the company held in a variety of ways including retirement and savings plans, incentive compensation programs and other deferred and employee pension funds;

4.3 Free-float market capitalization

The free-float market capitalization is the share of a stock's total market capitalization that is readily available in the market for portfolio investors and is calculated as follows:

Free-float market capitalization = free-float factor × full market capitalization.

4.4 Determining the Index components

The free-float adjusted market capitalization is calculated for all the stocks in the investable equity universe that passed the screens. Companies are sorted from largest to smallest by free-float market capitalization on each ranking date *t*. Existing constituents are selected top-down until the target constituent number is reached. A list of R Risk-Based European Equity Index components is produced by incorporating the largest 250 companies in the ranking list.

5. Weighting Methodology

The R Risk-Based European Equity Index is risk-weighted with a weighting factor based on the Equally-weighted Risk Contribution (ERC) model. ERC is a systematic and transparent model that combines volatility and correlation as risk factors to produce a portfolio where each invested asset contributes the same level of risk.

The ERC construction process aims:

- To lower the index volatility,
- To enhance the Sharpe ratio and
- To reduce the maximum drawdown without negatively impacting the index diversification and its expected return.

5.1 Weighting Calculation

Below are the successive steps to calculate the weightings for the R Risk-Based European Equity Index.

1.1. Definition of the number of Assets and the number of base currencies:

- N is the number of Assets composing the Index and N' is the number of base currencies of the N Assets composing the Index:
- $N \in \mathbb{N}^*$
- $N' \in \mathbb{N}^*$, $N' \leq N$

1.2. Definition of the asset vector $\boldsymbol{Asset}$:

- $Asset = \begin{bmatrix} asset_1 \\ \vdots \\ asset_N \end{bmatrix}$
- $\forall\, i \in [\![1, N]\!]$, $asset_i$ means the i^{th} Asset composing the index

1.3. Definition of the base currency vector $\boldsymbol{Crncy}$:

- $Crncy = \begin{bmatrix} crncy_1 \\ \vdots \\ crncy_N \end{bmatrix}$
- $\forall\, i \in [\![1, N]\!]$, $crncy_i$ means the base currency of the i^{th} Asset

1.4. Definition of the currency identification number vector $\boldsymbol{Cy}$:

- $Cy = \begin{bmatrix} cy_1 \\ \vdots \\ cy_N \end{bmatrix}$
- $\forall\, i \in [\![1, N]\!]$, $cy_i \in [\![1, N']\!]$
- cy_i means the identification number of the $crncy_i$ with $\forall\, i \in [\![1, N]\!]$, $cy_i \in [\![1, N']\!]$. The identification number cy_i is equal to 1 for the base currency that occurs the first in the base currency vector, 2 for the second base currency that occurs in the base currency vector, and continuing up to N' for the last base currency that occurs in the base currency vector.

1.5. Definition of the price matrix $\boldsymbol{P}$:

- $P = \begin{bmatrix} p_{1,1} & \cdots & p_{N,1} \\ \vdots & p_{i,d} & \vdots \\ p_{1,253} & \cdots & p_{N,253} \end{bmatrix}$
- $\forall (i, d) \in [\![1, N]\!] \times [\![1,253]\!]$, $p_{i,d}$ means the composite closing price of the i^{th} Asset to the date d after reinvestment of all dividends
- The price matrix P is defined by the daily closing price of each Asset over the last 253 trading days.
- The dates are defined according to the trading days of the London Stock Exchange.

- If for the i^{th} Asset, d is not a trading day, then $p_{i,d}$ is equal to the last closing price of the Asset in the previous trading day in its primary exchange.

1.6. Definition of the exchange rate matrix FX:

- $$FX = \begin{bmatrix} fx_{1,1} & \cdots & fx_{N',1} \\ \vdots & fx_{j,d} & \vdots \\ fx_{1,253} & \cdots & fx_{N',253} \end{bmatrix}$$
- $\forall (j,d) \in [\![1,N']\!] \times [\![1,253]\!]$, $fx_{j,d}$ means exchange rate of the j^{th} currency to the date d
- The exchange rate matrix FX is defined by the exchange rates of each Asset currency for the last 253 trading days of the London Stock Exchange according to the market exchange rate of the WM/Reuters Closing Spot Rates fixed at 4.00 p.m. London Time of each trading day.
- $fx_{j,d}$ is the direct quote between the j^{th} currency and Euro at the date d.

1.7. Calculation of the daily return matrix R:

- $$R = \begin{bmatrix} r_{1,1} & \cdots & r_{N,1} \\ \vdots & r_{i,d} & \vdots \\ r_{1,252} & \cdots & r_{N,252} \end{bmatrix}$$
- $\forall (i,d) \in [\![1,N]\!] \times [\![1,252]\!]$, $r_{i,d} = log\left(\frac{p_{i,d+1}}{p_{i,d}} . \frac{fx_{cy_i,d+1}}{fx_{cy_i,d}}\right)$
- The daily return matrix R is defined by the daily returns of each Asset in the last 252 trading days.

1.8. Calculation of the average return vector $\bar{R}$:

- $$\bar{R} = \begin{bmatrix} \overline{r_1} \\ \vdots \\ \overline{r_N} \end{bmatrix}$$
- $\forall\, i \in [\![1,N]\!]$, $\overline{r_i} = \frac{\sum_{d=1}^{252} r_{i,d}}{252}$
- The average return vector $\bar{R}$ is defined by the average of the last 252 daily returns for each Asset.

1.9. Calculation of the volatility vector V:

- $V = \begin{bmatrix} v_1 \\ \vdots \\ v_N \end{bmatrix}$
- $\forall\, i \in [\![1, N]\!]\,,\ v_i = \sqrt{\frac{\sum_{d=1}^{252}(r_{i,d}-\bar{r}_i)^2}{251}}$
  - The volatility vector V is defined by the standard deviation based on a sample of the last 252 trading days for each Asset.

1.10. Calculation of the correlation matrix C:

- $C = \begin{bmatrix} 1 & \cdots & c_{1,N} \\ \vdots & c_{i,j} & \vdots \\ c_{1,N} & \cdots & 1 \end{bmatrix}$
- $\forall (\,i,j) \in [\![1, N]\!]^2,\ c_{i,j} = \frac{\sum_{d=1}^{252}(r_{i,d}-\bar{r}_i).(r_{j,d}-\bar{r}_j)}{\sqrt{\sum_{d=1}^{252}(r_{i,d}-\bar{r}_i)^2}.\sqrt{\sum_{d=1}^{252}(r_{j,d}-\bar{r}_j)^2}}$
  - The correlation matrix C is defined by the correlation of each Asset according to the daily returns of the last 252 trading days.

1.11. Calculation of the Marginal Risk Contribution vector MRC:

- $MRC = \begin{bmatrix} mrc_1 \\ \vdots \\ mrc_N \end{bmatrix}$
- $\forall i \in [\![1, N]\!],\ mrc_i = \frac{\sum_{j=1}^{N} v_j.v_i.c_{i,j}}{\sqrt{\sum_{j,k=1}^{N,N} v_j.v_k.c_{k,j}}}$
  - The Marginal Risk Contribution vector MRC is calculated to define which Assets have the highest risk contribution.

1.12. For each currency, sort all Assets by decreasing order according to their Marginal Risk Contribution:

- $Rank = SortEachColumn\left(\begin{bmatrix} mrc_1.1_{\{cy_1=1\}} & \cdots & mrc_1.1_{\{cy_1=N'\}} \\ \vdots & mrc_i.1_{\{cy_i=j\}} & \vdots \\ mrc_N.1_{\{cy_N=1\}} & \cdots & mrc_N.1_{\{cy_N=N'\}} \end{bmatrix}\right)$
- $\forall (i,j) \in [\![1, N]\!] \times [\![1, N']\!],\ 1_{\{cy_i=j\}} = \begin{cases} 0 & if\ i^{th}\ asset\ currency\ isn't\ the\ j^{th}\ currency \\ 1 & if\ i^{th}\ asset\ currency\ is\ the\ j^{th}\ currency \end{cases}$

The matrix $Rank$ gives a ranking for each Asset according to the vector MRC.

- $Rank := \begin{bmatrix} rank_{1,1} & \dots & rank_{1,N'} \\ \vdots & rank_{i,j} & \vdots \\ rank_{N,1} & \cdots & rank_{N,N'} \end{bmatrix}$
- $\forall (i,j) \in [\![1,N]\!] \times [\![1,N']\!], rank_{i,j}$ is the rank of the i^{th} Asset according to the j^{th} currency

1.13. Definition of the Risk Budget vector RB:

- Based on the ranking of the N Assets as described above in 1.12, the Index excludes approximatively the 50% most risky Assets and allocated weighting to the 50% less risky (i.e. approx. 125 stocks).
- For the Assets with the highest risk contribution, the risk budget is fixed to 0. For the Assets with the lowest risk contribution the risk budget is distributed identically – Equally-weighted Risk Contribution (ERC).

- $RB = \begin{bmatrix} rb_1 \\ \vdots \\ rb_N \end{bmatrix}$
- $\forall j \in [\![1,N']\!],\ n_j = \sum_{i=1}^{N} 1_{\{cy_i = j\}}$
- $n = N - \sum_{j=1}^{N'} \left\lfloor \frac{n_j}{2} \right\rfloor$
- $\forall j \in [\![1,N']\!],\ \forall i \in \left[\!\left[1, \left\lfloor \frac{n_j}{2} \right\rfloor \right]\!\right],\ rb_{rank_{i,j}} = 0$
- $\forall j \in [\![1,N']\!],\ \forall i \in \left[\!\left[\left\lfloor \frac{n_j}{2} \right\rfloor + 1, n_j \right]\!\right],\ rb_{rank_{i,j}} = \frac{1}{n}$

1.14. Definition of the weighting of each Asset:

- $W = \begin{bmatrix} w_1 \\ \vdots \\ w_N \end{bmatrix}$
- $\forall\, i \in [\![1,N]\!],\ rb_i = w_i \cdot \frac{mrc_i{}'}{\sum_j^N w_j . mrc_j{}'}$

With the following Marginal Risk Contribution vector MRC':

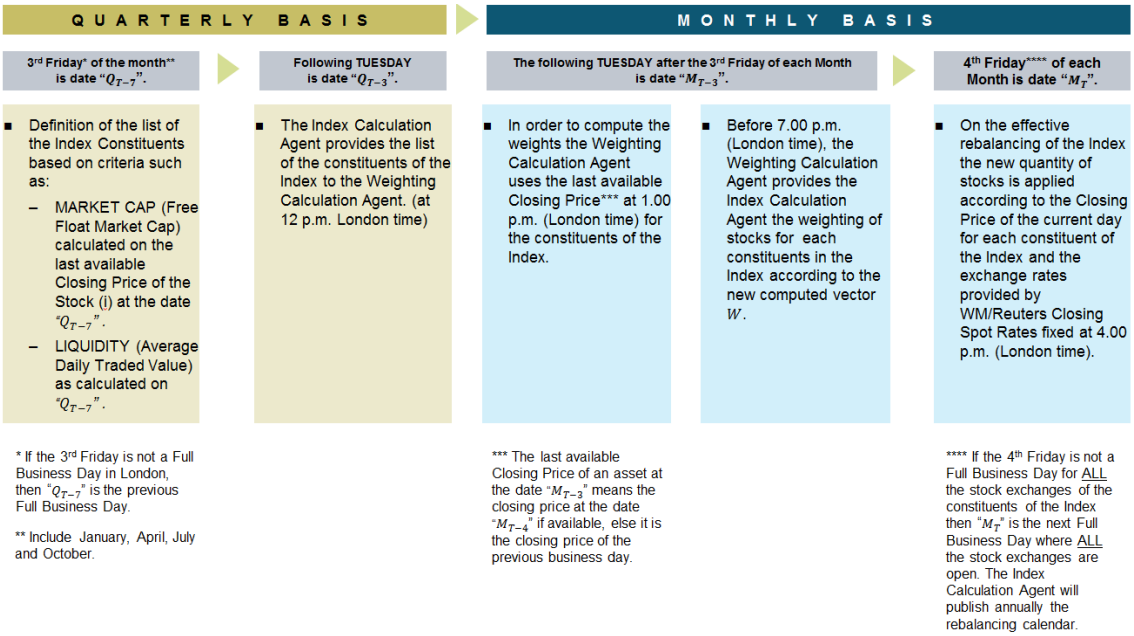
- $MRC' = \begin{bmatrix} mrc_1{}' \\ \vdots \\ mrc_N{}' \end{bmatrix}$
- $\forall\, i \in [\![1,N]\!],\ mrc_i{}' = \frac{\sum_{j=1}^{N} w_j . v_j . v_i . c_{i,j}}{\sqrt{\sum_{j,k=1}^{N,N} w_j . w_k . v_j . v_k . c_{k,j}}}$

The weighting of each Asset is defined by their risk budget, volatility and correlation. The formulas above include the following conditions:

- $\forall\, i \in [\![1, N]\!],\ w_i \geq 0$
- $\sum_{i=1}^{N} w_i = 1$

6. Index Construction

6.1 Index Review



6.2 Index Calculation

1.1. Calculation of the number of shares (q_i) vector:

- $Q = \begin{bmatrix} q_1 \\ \vdots \\ q_N \end{bmatrix}$
- $\forall\, i \in [\![1, N]\!],\ q_i = \frac{1000}{sp_i.fx_{cy_i}}.w_i$

- The vector Q defines the number of shares for each Asset in the Index at the date "M_T" according to the weighting vector W calculated at the date "M_{T-3}".

- sp_i is the spot closing price for the i^{th} Asset at the date "M_T".

- fx_{cy_i} is the direct quote between the i^{th} Asset currency and Euro at the date "M_T" according to the market exchange rate of the WM/Reuters Closing Spot Rates fixed at 4.00 p.m. London Time of each trading day.

The vector Q is calculated and applied at the date "M_T" which is a business day for all Index constituents stock exchanges.

1.2. Calculation of the Index Level:

For each trading day in the London Stock Exchange, we define the date t from the base date $t = 0$.

Then, the Index level is calculated and published on a daily basis for each date t as follows:

- $IndexLevel(t) = \frac{IndexMarketValue(t)}{IndexDivisor(t)}$

- $IndexLevel(0) = 1{,}000.00$

The Index Market Value is calculated as follows:

- $IndexMarketValue(t) = \sum_{i=1}^{N} sp_{i(t)}.fx_{cy_i}(t).q_i(t)$

The Index Divisor is calculated as follows:

- $IndexDivisor(t) = IndexDivisor(t-1).\frac{\sum_{i=1}^{N} sp_{i(t)}.fx_{cy_i}(t).q_i(t)}{\sum_{i=1}^{N} sp_{i(t)}.fx_{cy_i}(t).q_i(t-1)}$
- $IndexDivisor(0) = \frac{\sum_{i=1}^{N} sp_{i(0)}.fx_{cy_i}(0).q_i(0)}{IndexLevel(0)}$

The Price Return Index Closing Level is calculated as follows:

- $PRIL(t) = \frac{\sum_{i=1}^{N} sp_{i(t)}.fx_{cy_i}(t).q_i(t)}{IndexDivisor(t)}$

Where

- $\forall(i,t) \in [\![1,N]\!] \times \mathbb{N}, sp_i(t)\ is\ the\ spot\ closing\ price\ of\ the\ i^{th}\ Asset\ at\ the\ date\ t$
- $\forall(i,t) \in [\![1,N]\!] \times \mathbb{N}, fr_{cy_i}(t)$ is the direct quote between the i^{th} Asset currency and Euro at the rebalancing date at the date t
- $\forall(i,t) \in [\![1,N]\!] \times \mathbb{N}, q_i(t)\ is\ the\ number\ of\ shares\ for\ the\ i^{th}\ Asset\ at\ the\ date\ t$

7. Corporate Events and Treatments

7.1 Treatment procedure

Corporate events are treated via "Adjustment Factors". For the occurrence of a corporate event associated to an index constituent, the position of this index constituent within the index is adjusted by its adjustment factors.

Two types of "Adjustment Factors" are specified:

Price Adjustment Factor ($\mathrm{P\_AF_t^i}$)

Number of Shares Adjustment Factor ($\mathrm{NOSH\_AF_t^i}$)

7.2 List of Corporate Events

The following different types of corporate actions are defined below:

No.	Event Type	CAPITAL RESTRUCTURE DIVIDENDS
1	DIVIDEND	Cash Dividend
2	DIVIDEND	Special Dividend
3	DIVIDEND	Stock Dividend or Script Dividend
4	DIVIDEND	Optional Dividend
5	DIVIDEND	Bonus
6	CAPITAL CHANGE	Stock Split
7	CAPITAL CHANGE	Stock Consolidation / Reverse Split
8	CAPITAL CHANGE	Share Redenomination
9	MERGER & ACQUISITION	Merger
10	MERGER & ACQUISITION	De-merger/ Spin-Off
11	MERGER & ACQUISITION	Takeover

12	MERGER & ACQUISITION	Acquisition
13	EXCEPTIONAL MARKET CONDITION	Bankruptcy
14	EXCEPTIONAL MARKET CONDITION	Change of Listing
15	EXCEPTIONAL MARKET CONDITION	Suspension
16	EXCEPTIONAL MARKET CONDITION	Share Conversion
17	EXCEPTIONAL MARKET CONDITION	Write-Up of Capital
18	EXCEPTIONAL MARKET CONDITION	Write-Off of Capital
19	EXCEPTIONAL MARKET CONDITION	Change to No Par Value
20	CAPITAL INCREASE	Rights Issue
21	CAPITAL RETURN	Capital Return or Capital Repayment
22	CAPITAL RETURN	Share Buy-Back

7.3 Treatment Specifications**1. Cash Dividend**

Dividends are payments made by a corporation to its shareholders. Sometimes, when a corporation earns a profit, that money can be put to two uses: it can be either re-invested in the business or it can be paid to the shareholders as a dividend. The Gross Dividend Amount is the amount before applying tax rates (Net Dividend Amount).

The regular cash dividend is reinvested after deduction of withholding tax by applying the maximum rate of the company's country of incorporation applicable to institutional investors. A withholding tax related to a dividend is a tax on the income of the shareholder withheld by the company when the dividend is paid to a shareholder. RBIS applies the maximum rate applicable to non-resident institutional investors who do not benefit from double taxation treaties. The tax rate applicable is defined as $\mathbf{T\_Rate_t^i}$. Annually, the Index Calculation Agent will provide a page with the applicable **T_Rate.**

For example:

Company $\mathbf{i}$ announces to pay a regular dividend; the ex-date is day $\mathbf{t}$.

Specifically, the gross dividend amount is $\mathbf{Div_t^i}$ in the same currency as the stock currency; the tax rate applicable to this dividend is $\mathbf{T\_Rate_t^i}$.

Treatment:

The Price index does not take into account the Cash Dividend:

$$\mathbf{P\_AF_{t-1}^i = 1}$$

$$\mathbf{NOSH\_AF_{t-1}^i = 1}$$

The Net Total Return index requires adjustment for the Net of Tax Cash Dividend:

$$\mathbf{P_{t,Open}^i = P_{t-1,Close}^i - Div_t^i \times FX_t^i \times (1 - T\_Rate_t^i)}$$

$$\mathbf{P\_AF^{i}_{t-1}} = \frac{\mathbf{P^{i}_{t,Open}}}{\mathbf{P^{i}_{t-1,Close}}}$$

$$\boldsymbol{NOSH\_AF^{i}_{t-1}} = \frac{\mathbf{1}}{\boldsymbol{P\_AF^{i}_{t-1}}}$$

Note:

There are exceptions to the general rules on:

The date to implement dividends

If a dividend amount is not available on the **XD**, then the dividend amount one day prior to the pay date (**PD**) is applied.

2. Special Dividend

Special dividends are those dividends that are outside of the normal payment pattern established historically by the corporation. Whether a dividend is funded from operating earnings or from other sources of cash does not affect the determination of whether it is a special dividend. Instead, it is considered a special dividend when the market perceives it as a special dividend with dividends outside the normal payment pattern.

The Special dividend is reinvested after deduction of withholding tax by applying the maximum rate of the company's country of incorporation applicable to institutional investors. A withholding tax related to a dividend is a tax on the income of the shareholder withheld by the company when the dividend is paid to a shareholder. RBIS applies the maximum rate applicable to non-resident institutional investors who do not benefit from double taxation treaties. The tax rate applicable is defined as $\mathbf{T\_Rate^{i}_{t}}$.
Note that: Different from regular **Cash Dividends**, a tax rate in some circumstances may not apply in case of **Special Dividends**. For example, when the cash pay-out is a return of capital or a distribution resulting from the disposal of an asset, the tax is not applicable for this special dividend.

Example:

Company $\mathbf{i}$ announces to pay a special dividend; the ex-date is day $\mathbf{t}$.
Specifically, the gross dividend amount is $\mathbf{Div^{i}_{t}}$ in the same currency as the stock currency; the tax rate applicable to this dividend is $\mathbf{T\_Rate^{i}_{t}}$

Treatment:

In the case that tax is applicable for this special dividend, the Net Total Return index requires adjustments for the Net of Tax Special Dividend as below:

$$\mathbf{P^{i}_{t,Open} = P^{i}_{t-1,Close} - Div^{i}_{t} \times FX^{i}_{t} \times (1 - T\_Rate^{i}_{t})}$$

$$\mathbf{P\_AF^{i}_{t-1} = \frac{P^{i}_{t,Open}}{P^{i}_{t-1,Close}}}$$

$$\boldsymbol{NOSH\_AF^{i}_{t-1} = \frac{1}{P\_AF^{i}_{t-1}}}$$

In the case that tax is **not** applicable for this special dividend, the Net Total Return index requires adjustments for the Special Dividend as below:

$$\mathbf{P^{i}_{t,Open} = P^{i}_{t-1,Close} - Div^{i}_{t} \times FX^{i}_{t}}$$

$$\mathbf{P\_AF^{i}_{t-1} = \frac{P^{i}_{t,Open}}{P^{i}_{t-1,Close}}}$$

$$\boldsymbol{NOSH\_AF^{i}_{t-1} = \frac{1}{P\_AF^{i}_{t-1}}}$$

3. Stock Dividend

The stock dividend is a distribution of shares to shareholders as an alternative to a cash payment. In some instances the stock dividend can be optional, whereby the shareholder may choose the shares instead of a cash dividend payment. In this case the shares are issued for the value.

Example:

Company $\mathbf{i}$ announces to pay a stock dividend; the ex-date is day $\mathbf{t}$.
Specifically, every 1 unit of stock held pays the shareholders of $\mathbf{Div\_Ratio^{i}_{t}}$ unit(s) of new shares in the same company.

Treatment:

A price adjustment is done on the opening of the event ex-date, and the number of shares is almost adjusted (increased) either:

On the ex-date for those cases where a stated amount of stock is announced; or

On the pay-date, only if an undetermined amount of stock is announced based on earnings and profits to be distributed at a future date.

When there is no cash alternative, the stock dividend represents a script / bonus issue and the adjustment factor should be calculated in the same way.

$$\mathbf{P^i_{t,Open}} = \mathbf{P^i_{t-1,Close}} \times \frac{\mathbf{1}}{(\mathbf{1} + \mathbf{Div\_Ratio^i_t})}$$

$$\mathbf{P\_AF^i_{t-1}} = \frac{\mathbf{P^i_{t,Open}}}{\mathbf{P^i_{t-1,Close}}} = \frac{\mathbf{1}}{(\mathbf{1} + \mathbf{Div\_Ratio^i_t})}$$

$$\mathbf{NOSH^i_t} = \mathbf{NOSH^i_{t-1}} \times (\mathbf{1} + \mathbf{Div\_Ratio^i_t})$$

$$\mathbf{NOSH\_AF^i_{t-1}} = \frac{\mathbf{NOSH^i_t}}{\mathbf{NOSH^i_{t-1}}} = \mathbf{1} + \mathbf{Div\_Ratio^i_t}$$

4. Optional Dividend

A company offers its shareholders the choice of receiving the dividend in cash or in shares. It is assumed that investors select the cash option a) on the ex-date for those cases where a stated equivalent of stock is announced and b) on the pay-date for those cases where an undetermined amount of stock is announced based on earnings and profits to be distributed at a future date. Thus, the dividend is treated in the same way as **Cash Dividend** in the **Section 1**.

5. Bonus

A bonus is an offer of free additional shares to existing shareholders. A company may decide to distribute further shares as an alternative to increasing the dividend pay-out. The same treatment as stock splits applies. On the ex-date, an adjustment is required to the price, the number of shares and the dividends. It does not require divisor adjustment. Please see the Split in the **Section 6** below.

6. Stock Split

Existing shares are subdivided into larger number of shares with an equivalent reduction in the Nominal Value of each share (where applicable).

A stock split increases the number of shares in a public company. The price is adjusted so that before and after this corporate event the market capitalization of the company remains the same and dilution does not occur.

Example:

Company $\boldsymbol{i}$ announces a stock a stock split event; the ex-date is day $\boldsymbol{t}$.
Specifically, every 1 unit of stock held splits into $\boldsymbol{Split\_Ratio^i_t}$ unit(s) of new share in the same company.

Treatment:

The number of shares, dividends and the stock price are adjusted by the split factor on the ex-date. The stock split does not have impact on the divisor as at the ex-date $\boldsymbol{t}$.

$$\boldsymbol{P^i_{t,Open} = P^i_{t-1,Close} \times \frac{1}{Split\_Ratio^i_t}}$$

$$\boldsymbol{P\_AF^i_{t-1} = \frac{P^i_{t,Open}}{P^i_{t-1,Close}} = \frac{1}{Split\_Ratio^i_t}}$$

$$\boldsymbol{NOSH^i_t = NOSH^i_{t-1} \times Split\_Ratio^i_t}$$

$$\boldsymbol{NOSH\_AF^i_t = \frac{NOSH^i_t}{NOSH^i_{t-1}} = Split\_Ratio^i_t}$$

7. Consolidation / Reverse Split

A reverse stock split or reverse split is a reduction in the number of shares and an accompanying increase in the share price.

Example:

Company $\boldsymbol{i}$ announces a stock a stock split event; the ex-date is day $\boldsymbol{t}$.
Specifically, every 1 unit of stock held splits into $\boldsymbol{Split\_Ratio^i_t}$ unit(s) of new share in the same company.

Treatment:

The reverse split does not have impact on the divisor as at the ex-date $\boldsymbol{t}$.
The procedure is the same as in the section 6 above. In essence, it means that:

$$\boldsymbol{Split\_Ratio^i_t = \frac{1}{Consolidation\_Ratio^i_t}}$$

The calculation is the same regardless of whether the nominal value of a share changes ("stock consolidation") or remains the same ("capital reduction").

8. Share Redenomination

The nominal value of existing shares in issue changes due to the change of currency. Therefore, the amount is converted using a set rate.

9. Merger

Merger generally means that two or more companies merge to form one larger company.
A merger is considered completed if it has been declared unconditional and has received the approval of all the regulatory agencies with jurisdiction over the transaction regardless of the status of the securities (index constituents or non-index constituents) involved in the event.

The result of a merger is one out of the two possibilities as below:

The merging entities cease to exist and a new entity ("**New Name**") is created.

Only one name ("**Surviving Name**") will survive out of all the merging companies.

In either case, we refer this surviving/new name as the **Resulting Name** (or **Resulting Stock**).

Usually the shareholders of the merging companies exchange their merging company shares for shares in the resulting company.

Example:

There are $\boldsymbol{n}$ companies $\boldsymbol{k1}, \boldsymbol{k2}, \ldots, \boldsymbol{kn}$ merging into the resulting stock $\boldsymbol{m}$**;** the ex-date is day $\boldsymbol{t}$.
Specifically, for every $\boldsymbol{1}$ unit holding of stock $\boldsymbol{ki}$, the shareholders receive $\boldsymbol{CRi}$ unit(s) of stock $\boldsymbol{m}$ and a cash amount of $\boldsymbol{Cash^i}$ $(if\ applicable)$, $(\boldsymbol{i} = \boldsymbol{1}, \boldsymbol{2}, \ldots, \boldsymbol{n})$; the opening price of the **Resulting Stock** is $\boldsymbol{P^m_{t,Open}}$ is either announced by the company or implied by the company accouchement.

Scenarios

If there is a merger event occurring on one index constituents, normally the scenario may fall into one of the following cases:

Case1: All the relevant merging entities are index constituents.

Case2: Some relevant merging entities are not index constituents; and the resulting entity is a "**New Name**".

Case3: Some relevant merging entities are not index constituents; the resulting entity is a "**Surviving Name**"; and the "**Surviving Name**" is an index constituent before the merger event

Case4: Some relevant merging entities are not index constituents; the resulting entity is a "**Surviving Name**"; the "**Surviving Name**" is not an index constituent before the merger event

The corresponding treatments for different scenarios are the following:

Treatments: Case 1, Case 2 and Case 3

In these cases, some or all the merging companies are index constituents; say these are companies $\mathrm{k1}, \mathrm{k2}, \ldots, \mathrm{and}\ \mathrm{km}\ (\mathrm{m} \leq \mathrm{n})$. The resulting new entity m replaces the all these m companies in the index with a weight equal to the sum of the weights of the merging companies prior to the merger with no divisor change in principle. Therefore, the following equations apply:

$$\boldsymbol{NOSH\_AF_{t-1}^{ki} = 0}\ \textit{and}\ \boldsymbol{NOSH_t^{ki} = 0\ ;\ i = 1, 2, \ldots, n.}$$

$$\boldsymbol{NOSH_t^m = \sum_{i=1}^{n} NOSH_{t-1}^{ki} \times CRi + \frac{\sum_{i=1}^{n} Cash^i}{P_{t,Open}^m}}$$

Treatments: Case 4

In this case, only some of the merging companies are index constituents; say they are companies $\boldsymbol{k1, k2, \ldots, and\ km}\ (\boldsymbol{m} < n)$. Essentially, these associated index constituents are taken over or acquired by the **"Surviving Name"**. However, this acquiring company, *i.e.* **"Surviving Name"** is not eligible for the index. Therefore, these associated index constituents are removed from the index on day t and a weight equal to the sum of the weights of the merging companies prior to the merger will be distributed proportionally into all the remaining stocks ($\boldsymbol{REMi}$, $\boldsymbol{i = 1, 2, \ldots L}$). the following equations apply:

$$\boldsymbol{NOSH\_AF_{t-1}^{ki} = 0}\ \textit{and}\ \boldsymbol{NOSH_t^{ki} = 0\ ;\ i = 1, 2, \ldots, m.}$$

$$\boldsymbol{NOSH_t^m = \sum_{i=1}^{n} NOSH_{t-1}^{ki} \times CRi + \frac{\sum_{i=1}^{n} Cash^i}{P_{t,Open}^m}}$$

10. Acquisition

An acquisition is the procurement of a controlling interest of more than 50% in one company by another larger company and the acquired company may continue to trade. Shareholders of the target company are offered cash and/or shares for their holding.

Treatments:

Case1: After the acquisition, the acquired company stocks are still outstanding and trading:

No adjustment is made for treating this event.

Case2: After the acquisition, the acquired company stocks stopped trading:

The procedure to implement this corporate event is as per the **Merger Section 9** above.

11. Demerger / Spin-off

A company or group of companies splits up so that its activities are carried on by two or more independent companies. One of the main reasons for doing this is to improve the value of the company's shares, especially if one part of the group's value can be better reflected by a separate share quotation.

A spin-off is the distribution of shares in a wholly-owned or a partially-owned company to the parent company's existing shareholders. A new independent company is formed from an existing division or a subsidiary of the parent company or corporation through issuing share entitlement in the new company.

For a current index constituent incurring a spin-off:

any cash paid as part of the spin-off is reinvested in the index with a divisor change;

the parent company is kept in the index provided it remains listed and continues to trade;

a position in the spun-off company is placed into the index if and only if the spun-off company passes bespoke rules regarding prices, stock exchanges and other applicable eligibility criteria.

Example:

There is an entity $\boldsymbol{K}$ spins off n different entities $\boldsymbol{D1, D2, \dots, Dn}$; the ex-date is day $\boldsymbol{t}$.
Specifically, every $\boldsymbol{1}$ unit holding of stock $\boldsymbol{K}$ spins off $\boldsymbol{DRi}$ unit(s) of stock $\boldsymbol{Di}$ $(\boldsymbol{i = 1, 2, \dots, n})$ and an amount of cash equal to $\boldsymbol{KCash}$ in the same currency as the stock ($\boldsymbol{KCash = 0}$ $if\ not\ applicable$). The opening stocks prices in companies $\boldsymbol{D1, D2, \dots, Dn}$ are usually determined and announced in advance of the corporate event, say, as $\boldsymbol{P^{Di}_{t,Open}}$ $(\boldsymbol{i = 1, 2, \dots, n})$.

Treatments:

When there is a demerger/spin-off event occurring on one index constituents, there are three options to treat this event as below.

Option 1: Provided the spun-off entities meet the inclusion criteria, the following treatment applies**.**

Keep this index constituent in the index and include all the spun-off companies into the index.

$$\boldsymbol{P^{K}_{t,Open} = P^{K}_{t-1,Close} - KCash - \sum_{i=1}^{n} P^{Di}_{t,Open} \times DRi}$$

$$P\_AF_{t-1}^{K} = \frac{P_{t,Open}^{i}}{P_{t-1,Close}^{i}}$$

$$NOSH\_AF_{t-1}^{K} = 1 + \frac{KCash}{P_{t,Open}^{K}}$$

$$NOSH_{t}^{Di} = NOSH_{t-1,Close}^{K} \times DRi, \text{ while } NOSH_{t-1,}^{Di} = 0;\ (i = 1, 2, \dots, n)$$

Option 2: If the spun-off entities do not meet the index eligibility criteria:

Keep this index constituent in the index but exclude all the spun-off companies; these associated index constituents are removed from the index on day t and a weight equal to the sum of the weights of the removed companies prior to the spin-off will be reinvested into the spinning-off stock K. The following equations apply:

$$P_{t,Open}^{K} = P_{t-1,Close}^{K} - KCash - \sum_{i=1}^{n} P_{t,Open}^{Di} \times DRi$$

$$P\_AF_{t-1}^{K} = \frac{P_{t,Open}^{i}}{P_{t-1,Close}^{i}}$$

$$NOSH\_AF_{t-1}^{K} = \frac{1}{P\_AF_{t-1}^{K}}$$

$$NOSH_{t}^{Di} = 0$$

Option 3: In rare cases, the parent company ceases to be eligible for the indices itself:

Exclude this index constituent and exclude all the spun-off companies; these associated index constituents are removed from the index on day t and a weight equal to the sum of the weights of the merging companies prior to the merger will be distributed proportionally into all the remaining stocks (REMi , $i = 1, 2, \dots L$). The following equations apply:

$$NOSH\_AF_{t-1}^{K} = 0 \text{ , and } NOSH_{t}^{K} = 0$$

$$NOSH_{t}^{Di} = 0$$

$$NOSH\_AF_{t-1}^{REMi} = \frac{NOSH_{t-1}^{K} \times P_{t-1,Close}^{K}}{\sum_{i=1}^{L} NOSH_{t-1}^{REMi} \times P_{t}^{REMi}}$$

12. Takeover

A takeover is also the acquisition of one company by another. However this term is normally - but not always - used to imply that the acquisition is made on the initiative of the acquirer and often without the full agreement of the acquired company. Shareholders of the target company are given cash and/or shares for their holding.

A reverse takeover is the acquisition of a larger company by a smaller one, based on certain criteria such as turnover, profits or net assets.

The mechanisms for carrying out an acquisition or takeover may be through a cash offer -fixed, open or tender-, a share exchange or a combination of both.

The procedure to implement this corporate event is as per the **Merger Section 9** above.

13. Bankruptcy

A company legally declares inability or impairment of ability to pay their creditors. Creditors may file a bankruptcy petition against a debtor in an effort to recoup a portion of what they are owed. However, in the majority of cases, bankruptcy is initiated by the debtor. After undergoing reorganization, a company is liquidated.

Constituents that fall under bankruptcy as at $\boldsymbol{t}$ are removed from the index after the close of "t+1" to give one day notice to clients. The company is removed based on the "t+1" closing price if available or at zero.

14. Change of Listing

If a company is delisted from a main liquid Stock Exchange within the universe of eligible stock exchanges for the index, there are two different options to consider:

- The company's listing changes to another main liquid stock exchange that is considered eligible for the index. There is no change in the index.
- The company remains unlisted, or the listing changes to a stock exchange that is not considered eligible for the index. The company is removed from the index at its last closing price as securities would not be eligible for inclusion in a standard index.

  $\boldsymbol{NOSH\_AF^{i}_{t-1} = 0}$, and $\boldsymbol{NOSH^{i}_{t} = 0}$

  Here "$\boldsymbol{i}$" refers to the event associated index component.

$$\boldsymbol{NOSH\_AF^{REMi}_{t-1} = \frac{NOSH^{K}_{t-1} \times P^{K}_{t-1,Close}}{\sum_{i=1}^{L} NOSH^{REMi}_{t-1} \times P^{REMi}_{t,Close}}}$$

15. Suspension

A security is removed at its last trading price if a stock is suspended for full trading for at least ten trading days. During those ten trading days, the index calculation takes into account the last trading price for the security which is suspended.

There are two scenarios: a company is suspended before the stock exchange closes or it is announced that the company is going to be suspended for the open of the next trading session. However, for both cases the same implementation occurs for this corporate event.

For example a company was suspended during the trading hours of the 29/07/2009 or it was announced that it would be suspended for the open of the 30/07/2009, if the company is still suspended after the close of the 13/08/2009 and the company is removed from the index after the close of the 13/08/2009.

16. Share Conversion

Share conversion is the exchange of one form of security for another security of the same company. For example: preferred stock for common stock, debt securities for equity.

Treatment:

No treatment is required for this event.

17. Write-Up of Capital

Existing shares in issue are converted one for one into Ordinary Shares with an increased Nominal Value.

Please note that a company may have as many different types of shares as it wishes, all with different conditions attached to them. Generally share types fall into the following categories:

Ordinary Shares

Ordinary Shares do not have special rights or restrictions. The company may divide them into classes of different value.

Preference Shares

Preference Shares normally carry a right that the company should pay any annual dividends available for distribution on these shares before other classes.

Cumulative preference Shares

Cumulative preference Shares carry a right that, if the company cannot pay the dividend in one year, it will carry it forward to successive years.

Redeemable Shares

The company issues Redeemable Shares with an agreement that it will buy them back at the option of either the company or the shareholder after a certain period, or on a fixed date. A company cannot have only redeemable shares.

Treatment:

No treatment is required for this event.

18. Write-Off of Capital

Existing shares in issue are converted one for one into shares with a reduced Nominal Value. This can happen because the market price of the shares has dropped below its Nominal Value.

Treatment:

No treatment is required for this event.

Note:

In the UK this event also involves a number of deferred shares, which are subsequently cancelled by the company. However, when considering shares, it is usually the market value and not the nominal or book amount which investors and other stakeholders are interested in.

19. Change to No Par Value

Existing shares in issue are converted into shares with no Nominal (par) Value. This means that the Nominal Value is equal the Issue Price.

Treatment:

No treatment is required for this event.

20. Rights Issue

Shareholders are offered the right to buy new shares in proportion to their existing holding at a set offer price usually (but not always) at a discount to the market price. Rights are an offer of additional shares to existing shareholders. A company may decide to distribute further shares as an alternative to increasing the dividend pay-out.

Rights issues can be renounceable or non-renounceable.

Right issues are disregarded if they are out of the money at the close of *XD-1*. Right issues in the money are adjusted after the close of *XD-1*.

Example:

There is an entity $\boldsymbol{i}$ offers rights issue; the ex-date is day $\boldsymbol{t}$.
Specifically, every $\boldsymbol{1}$ unit holding of the rights can buy $\boldsymbol{R}$ units of stocks in entity $\boldsymbol{i}$ with at the subscription price $\boldsymbol{P^i_{Sub}}$.

Treatment

The principle of the default treatment is to keep market value neutral throughout this event. In essence, under this treatment, the index executes a portion of the stock rights with funding from selling the rest remainder of the rights.

$$\boldsymbol{P^i_{t,Open} = \frac{P^i_{t-1,Close} + R \times P^i_{Sub}}{1 + R}}$$

$$\boldsymbol{P\_AF^i_t = \frac{P^i_{t,Open}}{P^i_{t-1,Close}}}$$

$$\boldsymbol{NOSH\_AF^i_t = \frac{1}{P\_AF^i_t}}$$

21. Capital Return or Capital Repayment

Capital repayments to shareholders is the return of all or any portion of the issued capital of a company in the winding up of operations or the return of capital in excess of a company's requirements. A capital repayment refers to payments that exceed the growth (net income/taxable income) of a business back to "capital owners", such as shareholders, partners or unit holders. The capital repayment is a transfer of value from the company to the existing owners, but with a different tax treatment to the one applied to the dividends.

Strictly speaking these are dividends taken from paid-in capital rather than current earnings or retained earnings. They are generally not tax liable for the shareholder when paid.

At present this capital change type is being used for a variety of global events including the following:

The nominal value of the company is adjusted and the difference is returned to shareholders in cash

Cash distributions resulting from the sale of capital assets or securities, or tax breaks from depreciation

The capital return is perceived to be replacing regular cash dividends, then it is only applied to the Total Return Indices on the ex-date and it does require a divisor adjustment. Capital repayments are therefore treated as per cash dividends in the **Section 1**.

However, for those specific cases where the market does not perceive the capital return to be replacing a cash dividend then the treatment is as per special dividends in the **Section 2**.

22. Share Buy-Back

The repurchase by a company of its own shares, in order to reduce the number of shares in issue, usually at a set price either as a percentage of shares issued or ratio of shares held.

The following reasons may explain why to carry it out:

return surplus cash to shareholders

reduce the company's cost capital

enhance earnings per share in the hope of increasing market price per share and to reduce the possibility of a hostile takeover bid

A share buyback may be performed via a repurchase tender offer (to all shareholders), an open market purchase or a privately negotiated purchase. Share buybacks are implemented only under a tender offer form.

Example:

There is an entity $\boldsymbol{i}$ offers share buy-back; the ex-date is day $\boldsymbol{t}$.
Specifically, every $\boldsymbol{1}$ unit holding of the stock, the shareholders can sell back $\boldsymbol{R}$ units of stocks in entity $\boldsymbol{i}$ with at the subscription price $\boldsymbol{P^i_{Buyback}}$

Treatment:

$$\boldsymbol{P^i_{t,Open} = \frac{P^i_{t-1,Close} - R \times P^i_{Buyback}}{1 - R}}$$

$$\boldsymbol{P\_AF^i_{t-1} = \frac{P^i_{t,Open}}{P^i_{t-1,Close}}}$$

$$\boldsymbol{NOSH\_AF^i_t = \frac{1}{P\_AF^i_t}}$$