



# Rothschild & Co Risk-Based Europe Index

Methodology

November 5, 2018

## Disclaimer

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# 1. Overview

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**The Rothschild & Co Risk-Based Europe Index** is an index designed to provide a broad and liquid representation of large capitalization companies in the European Area. Rothschild & Co Risk-Based Europe Index focuses on the listed companies representing the largest market capitalization, reflecting a significant proportion of the total value of the market. The Index is based on a transparent construction process including a systematic monthly rebalancing so that the portfolio at the beginning of each month is weighted to lead to an Equally-weighted Risk Contribution (ERC) for every invested asset in the Index. On each monthly rebalancing date the weightings will respect the following rules on issuer-level concentrations: no individual issuer exposure will exceed 5% of the portfolio. The index will not be leveraged (i.e. the sum of exposures will at no point exceed 100%).

**Table 1. Rothschild & Co Risk-Based Europe Index**

<b>Base date</b>	14th of January 2000
<b>First date of index publication</b>	3rd March 2017
<b>Price, Gross and Net Return (EUR)</b>	Closing price of every business day
<b>Index type and currency</b>	Price, Gross and Net Return in EUR
<b>Weighting</b>	Risk-Based Weighting
<b>Selected Components</b>	Approx. 250
<b>Invested Components</b>	Approx. 125
<b>Review Frequency</b>	Quarterly
<b>Rebalanced</b>	Monthly
<b>Index Sponsor</b>	Rothschild & Co Risk Based Investments LLC ("RBI"), a wholly-owned subsidiary of Rothschild & Co.
<b>Index Calculation Agent</b>	S&P Dow Jones Indices LLC ("SPDJI")
<b>Weighting Calculation Agent</b>	Rothschild & Co Risk Based Investments LLC, a wholly-owned subsidiary of Rothschild & Co.

The Rothschild & Co Risk-Based Europe Index is composed of securities which meet the eligibility rules described in the following sections.

## 2. Index Management

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### 2.1 Index Sponsor

The Index Sponsor will retain all ownership rights, expressed or otherwise, with respect to the Index, including the ability to license, sell or transfer any or all of its ownership rights with respect to the Index.

The Index Sponsor has appointed an Index Calculation Agent to calculate and maintain the Index on its behalf. The Index Sponsor may in the future terminate its relationship with the Index Calculation Agent named herein and appoint a replacement index calculation agent.

To the extent that the Index Sponsor makes any determinations in accordance with this Index Rulebook, such determinations will be made by it in its sole and absolute discretion by reference to such factors as it deems appropriate and, in the absence of manifest error, will be final, conclusive and binding.

While the Index Sponsor currently employs the rules, procedures and methodology described in this Index Rulebook, no assurance can be given that market, regulatory, judicial, fiscal, financial or other circumstances will not arise that would, in the view of the Index Sponsor, necessitate or make desirable a modification to, adjustment to and/or deletion of this Index Rulebook or any provision herein. The Index Sponsor may also make modifications to the terms of the Index in any manner that it may deem necessary or desirable, including (without limitation) to correct any manifest or proven error or to cure, correct or supplement any defective provision contained in this Index Rulebook. Upon making any such modification, adjustment and/or deletion, the Index Sponsor will provide details thereof to the Index Calculation Agent.

The Index Sponsor will make available upon request any such modification, adjustment and/or deletion.

### 2.2 Index Calculation Agent

The Index Calculation Agent will employ the methodology described in this Index Rulebook, as may be modified and/or adjusted and/or subject to deletions from time to time, in its calculation of the Index Value on each Index Valuation Date (subject always to the terms of Section 4) and will be responsible for the publication of the Index Value. Subject to the terms of this Index Rulebook, any determination by the Index Calculation Agent will be made in its sole and absolute discretion by reference to such factors as it deems appropriate at such time. Any such determination by the Index Calculation Agent will, in the absence of manifest error, be final, conclusive and binding. For the avoidance of doubt, the Index Calculation Agent has no authority to require a modification, adjustment or deletion of any provision in this Index Rulebook.

The Index Sponsor may, in its sole discretion and without notice, appoint an alternative Index Calculation Agent at any time which may be the Index Sponsor or one of its Affiliates.

## 2.3 Index Committee

The Index Committee will, and its primary role is to determine whether a modification, adjustment and/or deletion of this Index Rulebook and/or any provision herein (including, without limitation, the methodology) is necessary, in order to:

1. Ensure continuity in calculation and publication of the Index;
2. Preserve or enhance performance of the Index; and/or
3. Maintain the integrity of the Index, to the extent possible, given its stated objective.

Modifications or adjustments which, pursuant to the terms of this Index Rulebook, the Index Committee may make include, without limitation, amendments to the methodology, determination of the value of any Underlying Component and substitution or removal of any Underlying Component from the Index which, in either case, may have a negative impact on the performance of the Index.

Upon making any such modification, adjustment and/or deletion, the Index Sponsor will provide details thereof to the Index Calculation Agent.

## 3. Equity Universe

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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.

### 3.1 Defining Eligible securities

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

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

### 3.2 Country Classification of Eligible Securities

The securities country classification is based on the domicile of the primary exchange of the common stocks.

For each country, the number of securities selected for the universe is defined.

The table below provides a list of Countries and Stock Exchanges from the European Investable Universe.

**Table 2. Rothschild & Co Risk-Based Europe Index**

<b>Country</b>	<b>Exchange</b>	<b>Number of selected securities</b>
Austria	Vienna Stock Exchange	5
Belgium	NYSE EURONEXT Brussels	10
Denmark	NASDAQ OMX Copenhagen	15
Finland	NASDAQ OMX Helsinki	5
France	NYSE EURONEXT Paris	30
Germany	Frankfurt Stock Exchange, Xetra	35
Ireland	Irish Stock Exchange (Dublin)	5
Italy	Borsa Italiana	10
Netherlands	NYSE EURONEXT Amsterdam	10



<b>Country</b>	<b>Exchange</b>	<b>Number of selected securities</b>
Norway	Oslo Bors	5
Portugal	NYSE EURONEXT Lisbon	5
Spain	Bolsa De Madrid (Madrid), Sociedad de Bolsas (SIBE)	10
Sweden	NASDAQ OMX Stockholm	15
Switzerland	SIX Swiss Exchange (SIX-SW)	20
United Kingdom	London Stock Exchange	70

## 4. Investable Equity Exchange

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

### 4.1 Liquidity

A liquidity screen is applied. To be eligible for inclusion in the Investable Equity Universe, a security must have sufficient liquidity. Securities included in the Index must have a minimum Average Daily Traded Value (“ADTV”) 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.

Rothschild & Co Risk-Based Europe Index components must have a minimum ADTV of greater or equal than one (1) million EUR measured over 3-months.

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.

### 4.2 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.

## 5. Market Capitalization

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To determine the eligible company size to be included in the Rothschild & Co Risk-Based Europe Index, the free-float market capitalization of each security is calculated.

### 5.1 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.

### 5.2 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.

### 5.3 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.

### 5.4 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. For each country classification, only the common stocks from the companies with the largest free-float adjusted market capitalization remain in the selection universe.

## 6. Weighting Methodology

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The Rothschild & Co Risk-Based Europe 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.

### 6.1 Input

The inputs are the one year volatility and the one year correlation of each security in the selected universe.

$$v_i = \sqrt{\frac{\sum_{d=1}^{252} (r_{i,d} - \bar{r}_i)^2}{251}}$$
$$c_{i,j} = \frac{\sum_{d=1}^{252} (r_{i,d} - \bar{r}_i) \cdot (r_{j,d} - \bar{r}_j)}{\sqrt{\sum_{d=1}^{252} (r_{i,d} - \bar{r}_i)^2} \cdot \sqrt{\sum_{d=1}^{252} (r_{j,d} - \bar{r}_j)^2}}$$

$r_{i,d}$  means the daily log total return of the security  $i$  and the date  $d$  in the Index currency

$\bar{r}_i$  means the one year average daily log return of the security  $i$  in the Index currency

$v_i$  means the one year volatility of the security  $i$

$c_{i,j}$  means the one year correlation of the security  $i$  with the security  $j$

### 6.2 Investment universe

For each traded currency of the selected universe, the investment universe keeps the less risky securities using the following risk measurement:

$$rm_i = \sum_{j=1}^N v_j \cdot v_i \cdot c_{i,j}$$

Approximatively 125 securities remain in the investment universe.

### 6.3 Weighting

The securities weights are defined by the following optimization problem:

$$\left\{ \begin{array}{l} \min \left( \sum_{k=1}^{N,N} \|rb_k - rb_j\| \right) \\ \sum_{i=1}^N w_i = 1 \\ \sum_{i=1}^N w_i \cdot 1_{\{w_i > 5\% \}} \leq 40\% \\ \forall i \in \llbracket 1, N \rrbracket, w_i \geq 0 \\ \forall i \in \llbracket 1, N \rrbracket, w_i \leq 5\% \end{array} \right.$$

With:

$$rb_i = w_i \cdot \frac{mrc_i}{\sum_j^N w_j \cdot mrc_j}$$

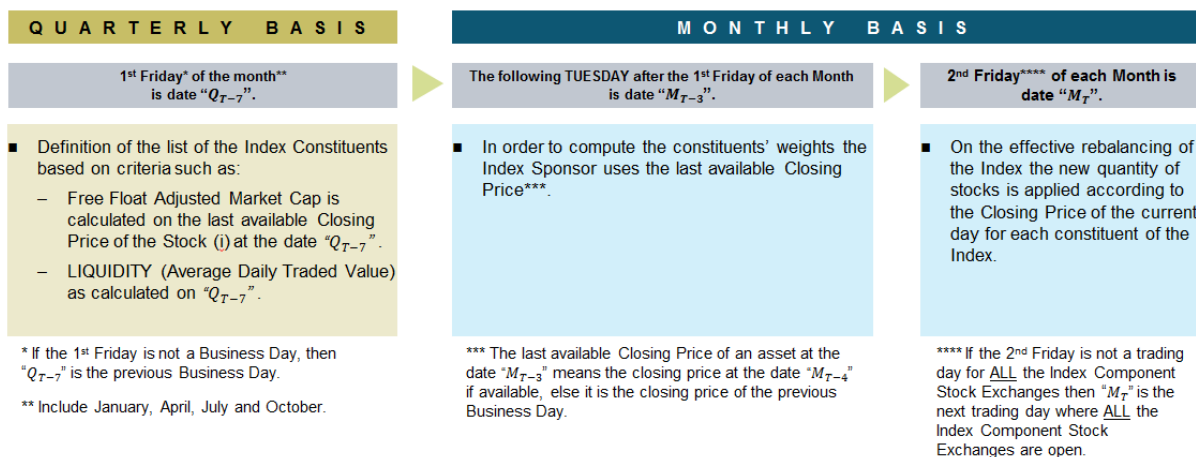
$$mrc_i = \frac{\sum_{j=1}^N w_j \cdot v_j \cdot v_i \cdot c_{i,j}}{\sqrt{\sum_{j,k=1}^{N,N} w_j \cdot w_k \cdot v_j \cdot v_k \cdot c_{k,j}}}$$

$rb_i$  is the risk budget of the stock  $i$

$mrc_i$  is the marginal risk contribution of the stock  $i$

## 7. Index Construction

### 7.1 Index Review



### 7.2 Index Calculation

As at the date of this Index Methodology, the Index Sponsor has appointed S&P Dow Jones Indices LLC as Index Calculation Agent to calculate and publish the Index in accordance with the Index Conditions.

The Index calculation follows the standard SPDJI's Index Mathematics Methodology for Modified Market Capitalization Weighted Indices as of August 2016, or any updated version.

Upon request, SPDJI can provide the detailed Index Mathematics Methodology.

## 8. Corporate Events and Treatments

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As at the date of this Index Methodology, the Index Sponsor has appointed S&P Dow Jones Indices LLC as Index Calculation Agent to calculate and publish the Index in accordance with the Index Conditions.

The corporate events and treatments follow the standard SPDJI's Index corporate actions methodology detailed in the Equity Indices Policies & Practices Methodology as of September 2016, or any updated version.

Upon request, SPDJI can provide the detailed index Equity Indices Policies & Practices Methodology.

## 9. Index Adjustments, Suspensions, Modification and Cancellation

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### 9.1 Correction of Index Values

If the Index Sponsor determines that a material error has occurred in the calculation of the Index, resulting in publication of a materially inaccurate Index Value, the Index Sponsor may instruct the Index Calculation Agent to calculate and publish a corrected Index Value and shall determine, in its sole and absolute discretion, whether such corrected Index Value shall apply on a retrospective basis or only from the date such correction is published for the purposes of Index calculations.

### 9.2 Index Adjustment and Index Suspension

If, in respect of any Index Valuation Date, the Index Sponsor determines, in its sole and absolute discretion, that an Index Disruption Event has occurred then, in its sole discretion, the Index Sponsor may determine:

- the value of any affected Underlying Component in respect of such Index Valuation Date in a commercially reasonable manner which reflects the nature of the Index Disruption Event (“Index Adjustment”), or
- that the calculation and publication of the Index Value be suspended, delayed or postponed (“Index Suspension”).
- The Index Sponsor shall communicate any such Index Adjustment and/or Index Suspension to the Index Calculation Agent.
- Notwithstanding the foregoing, if the Index Sponsor determines that an Index Disruption Event has occurred, the Index Sponsor may, in its sole and absolute discretion, convene the Index Committee to determine what action, if any, is appropriate in accordance with this Index Rulebook. “Index Disruption Event” means (in the opinion of the Index Sponsor):
- there has been a material delay or failure in the calculation or publication of values for any of the Underlying Components used in the calculation of the Index;
- there has been a suspension or disruption in the trading or settlement of any Underlying Component;
- an event resulting in the breakdown in any means of communication which is utilized in the determination of the Index Value where, as a consequence, in the sole and absolute discretion of the Index Sponsor, the last reported Index Value should not be relied upon
- any other event which materially disrupts or impairs the accuracy of any procedure normally used in determination of the Index Value including, but not limited to, Force Majeure Events;



- any other event which materially disrupts or impairs the ability of market participants in general to effect transactions in or obtain market values for an Underlying Component or observe the level of such Underlying Component;
- any other event which is prejudicial to the continuity in calculation and publication of the Index or the ability of the Index to achieve its stated objective;
- any other event which would otherwise require the Index Sponsor and/or Index Calculation Agent to depart from the terms of this Index Rulebook in the management, maintenance, calculation or publication of the Index; or
- a determination by the Index Sponsor (acting through the Index Committee) that there should be a change to this Index Rulebook, and it is impractical, prior to the implementation of such change, for the Index Calculation Agent to continue its calculation and/or for its publication, of the Index.

### **9.3 Index Modification**

The Index Sponsor (acting always through the Index Committee) reserves the right to take any such actions that it believes are necessary and/or appropriate in order to preserve or enhance the ability of the Index to achieve its objectives; and/or to modify the principles underlying the Index, as set forth in this Index Rulebook, from time to time, if it believes such modifications to be necessary and/or appropriate.

Such actions include but are not limited to:

- replacement of the Index with a successor index;
- removal, replacement or addition of any Underlying Component and any subsequent modification of this Index Rulebook to reflect such removal, replacement or addition;
- an amendment of the formula for or method of determining the Index Value or an amendment to the current weightings of the Underlying Components of the Index;

Upon taking any such action and/or making any such modification, the Index Sponsor will provide details thereof to the Index Calculation Agent.

The Index Sponsor will maintain a record of any amendment, modification or deletion to this Index Rulebook, which is available upon request from any investor in respect of a Related Financial Product, subject to provision of such evidence of interest in such Related Financial product as the Index sponsor in its sole and absolute discretion may require to the Index Sponsor.

### **9.4 Index Cancellation**

The Index Sponsor (acting through the Index Committee, but otherwise in its sole and absolute discretion) may at any time, for any reason and without notice permanently cancel (and instruct the Index Calculation Agent to cease its calculation of) the Index.

Upon a decision to permanently cancel the Index, the Index Sponsor will communicate this to the Index Calculation Agent

## 9.5 Events Leading to an Index Modification or Index Cancellation

The following is a non-exhaustive list of events on the occurrence of which the Index Sponsor (acting through the Index Committee) may determine that it is appropriate to modify, adjust or permanently cancel the Index:

- the Index Notional has fallen below the level at which it is considered justifiable and economical to maintain the Index;
- a material increase in the costs incurred by the Index Sponsor and/or the Index Calculation Agent in the maintenance and publication and/or, as the case may be, calculation of the Index;
- a Change in Law.

## 10. Defined Terms

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**Adjusted closing price** means the closing price which includes any distributions and corporate actions that occurred at any time prior;

**Business Day** means a trading day for at least one stock exchange of the Index components;

**Change in Law** means (a) the adoption of, or any change in, applicable law or regulation (including, without limitation, any tax law) or (b) the promulgation of, or any change in the interpretation by any court, tribunal or regulatory authority with competent jurisdiction of, any applicable law or regulation (including action taken by a taxing authority) which, in the determination of the Index Sponsor (in its sole discretion) would (i) make it illegal for the Index Sponsor to perform its duties or (ii) cause the Index Sponsor to incur a materially increased cost of performing its obligations under this Index Rulebook (including, without limitation, due to any increase in tax liability, decrease in tax benefit or other adverse effect on its tax position);

**Force Majeure Event** means an event or circumstance (including, without limitation, a systems failure, fire, building evacuation, natural or man-made disaster, act of God, act of state, armed conflict, act of terrorism, riot or labor disruption or any similar intervening circumstance) that is beyond the reasonable control of the Index Sponsor;

**Index Calculation Agent** means S&P Dow Jones Indices LLC or any replacement index calculation agent determined by the Index Sponsor from time to time;

**Index Committee** means the committee consisting of representatives from certain businesses and control functions as determined by the Index Sponsor;

**Index Component Stock Exchanges** include all stock exchanges as defined in the list of the part “3.2 Country Classification of Eligible Securities” of this document;

**Index Rulebook** means this document, as updated and amended from time to time;

**Index Sponsor** means Rothschild & Co Risk Based Investments LLC, a wholly-owned subsidiary of Rothschild & Co;

**RBI**: means Rothschild & Co Risk Based Investments LLC, a wholly-owned subsidiary of Rothschild & Co.