

MSCI EUROPE EQUAL RISK CONTRIBUTION (ERC) INDEX METHODOLOGY

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1 INTRODUCTION

The MSCI Europe ERC Index is calculated by optimizing the parent MSCI Europe Index to produce an index where the securities are assigned weights such that each security contributes equally to the ex-ante risk of the Index at the time of rebalancing.

2 INDEX CONSTRUCTION METHODOLOGY

The applicable universe includes all the existing constituents of the underlying MSCI Europe Index (herein, “Parent Index”). The MSCI Europe ERC Index is constructed by optimizing the Parent Index in conjunction with the GEM2S Barra Equity Model to achieve risk parity among the constituents of the Index. The optimization is performed using EUR as the base currency.

The steps for constructing the MSCI Europe ERC Index are described below.

2.1 ELIGIBLE UNIVERSE

All the securities from the Parent Index are part of the eligible universe. The optimization relies on the factor exposures for all the securities in the Parent Index and the factor covariance matrix of the GEM2S Barra Equity Model.

2.2 SECURITY SELECTION

All the securities from the eligible universe are included in the MSCI Europe ERC Index with weights determined by the optimization.

2.3 WEIGHTING SCHEME

The securities selected in the previous step are assigned weights through the process of optimization.

The optimization objective is to set risk parity among the constituents of the MSCI Europe ERC Index.

The Index aims to equalize the ex-ante risk contribution from each constituent in the Parent Index. The risk contribution of the security is the share of ex-ante index risk attributable to that security. It is computed as the product of the weight of the security in the index and its ex-ante marginal risk contribution. The ex-ante risk estimates are derived from the GEM2S Barra Equity Model.

$$RC_i = w_i * MCR_i$$

where,

- RC_i = Risk Contribution of security i
- w_i = weight of security i in the MSCI Europe ERC Index
- MCR_i = Marginal Contribution to the index Risk for security i

The optimization objective is

$$RC_1 = RC_2 \dots \dots = RC_n = k$$

where k is the ratio of ex-ante index risk to the number of securities in the applicable universe. The only optimization constraint applied is to establish risk parity among all the securities from the Parent Index.

In case of an infeasible optimization during the construction or rebalancing of the MSCI Europe ERC Index, please refer to Appendix I.

3 MAINTAINING THE INDEX

3.1 QUARTERLY INDEX REVIEWS

The MSCI Europe ERC Index is rebalanced on a quarterly basis coinciding with the Quarterly Index Reviews (QIRs) of the MSCI Global Investable Market Indexes, usually as of the close of the last business day of February, May, August and November. GEM2S Barra Equity Model data as of the end of January, April, July and October are used respectively. The pro forma MSCI Europe ERC Index is announced nine business days before the effective date.

3.2 ONGOING EVENT RELATED CHANGES

In general, the MSCI Europe ERC Index follows the event maintenance of the Parent Index.

3.2.1 IPOs AND OTHER EARLY INCLUSIONS

IPOs and other newly listed securities will only be considered for inclusion at the next review for the MSCI Europe ERC Index, even if they qualify for early inclusion in the Parent Index.

3.2.2 ADDITIONS AND DELETIONS DUE TO CORPORATE EVENTS

The general treatment of additions and deletions due to corporate events aims at minimizing turnover in the MSCI Europe ERC Index.

There will be no early inclusion of new securities to the MSCI Europe ERC Index, except when the new security results from an event affecting an existing constituent (e.g., merger, acquisition, spin off).

In the event of a merger or an acquisition where an index constituent acquires another index constituent or merges with another index constituent, the remaining company is maintained in the index with a constraint factor calculated as the weighted average of the constraint factors before the corporate event.

If a spun off security of an index constituent is added to the Parent Index, it will be added to the MSCI Europe ERC Index with the same constraint factor as the Parent Security.

A constituent deleted from the Parent Index following a corporate event or during the Quarterly Index Review of the Parent Index will be simultaneously deleted from the MSCI Europe ERC Index.

Please refer to the MSCI Corporate Events Methodology book available at: <https://www.msci.com/index-methodology> for more details.

APPENDIX I: HANDLING INFEASIBLE OPTIMIZATIONS

During the index review, in the event that there is no optimal solution that satisfies the optimization constraints defined in Section 2, the optimization-based risk parity solution will be deemed infeasible. In such a scenario, all the securities in the Parent Index will be assigned the weights in the inverse proportion of their volatility (σ). The volatility of the security is the standard deviation computed using weekly returns over three years prior to the rebalancing date. The volatility will be determined in accordance with the methodology for MSCI Risk Weighted Indexes (Section 2.3). The methodology book is available at

<https://www.msci.com/index-methodology>

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