MSCI RISK CONTROL INDEXES METHODOLOGY

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Contents

1 Introduction

The MSCI Risk Control Indexes aim to replicate the performance of an investment strategy that targets a specific level of risk by varying the weights of an underlying MSCI equity index and a cash component. The weights of the MSCI parent index and the cash component are determined daily based on the ratio of the specific risk level and the realized volatility of the MSCI parent index and are subject to a maximum leverage.

The MSCI Risk Control Indexes may serve as benchmarks for managed volatility strategies and as the basis for exchange traded funds and structured products.

The MSCI Risk Control Indexes are part of the MSCI Blended Index Family. For further details on the MSCI Blended Index Family, please refer to the MSCI Blended Index Family – Benchmark statement available on www.msci.com.

2 Applicable Universe, Cash Component and Specific Risk Levels

The MSCI Risk Control Index methodology is applicable to any existing MSCI parent index.

The MSCI Risk Control Index methodology uses the short-term rates for determining the returns of the cash component. Refer to Appendix 2 for more information on short-term rates.

The MSCI Risk Control Indexes are available for four specific risk levels: 10%, 12.5%, 15%, and 17.5%.

3 Volatility Estimation

The returns of the MSCI parent index in a specific base currency are used for volatility estimation. The volatility estimation approach takes into account both the short-term and the long term volatility trends of the MSCI parent index.

The MSCI Parent Index Volatility of an MSCI Risk Control Index is calculated as the maximum of two volatility estimates: the short-term realized volatility estimate, calculated over a short horizon of 20 days, and the long-term realized volatility estimate, calculated over a long horizon of 60 days. The volatility estimation approach uses equally weighted daily gross total returns of the MSCI parent index for both horizons. The volatility calculation formulas are described below:

$$Realized\ Volatility_t = \sqrt{\frac{252}{n} * Variance(t)}$$

$$Variance(t) = 1/N * \sum_{t-N+1}^{t} [ln(MSCI\ Parent\ Index(i)/MSCI\ Parent\ Index(i - n))]^2$$

n = Number of interval days used for return calculation; n=1 for daily returns.

N = Total number of historical trading days used for variance calculation and varies for short-term volatility estimate (N = 20) and long-term volatility estimate (N = 60)

$$MSCI\ Parent\ Index\ Volatility_t = Max\ (Short{-}term\ Realized\ Volatility_t,\ Long{-}term\ Realized\ Volatility_t)$$

4 Index Leverage of MSCI Risk Control Indexes

The objective of the MSCI Risk Control Indexes is to replicate the performance of a strategy that targets a specific level of risk by varying the weights of the MSCI parent index and a cash component.

The Index Leverage of an MSCI Risk Control Index is the weight of the MSCI parent index and is calculated daily as the ratio of the specific risk level and the MSCI Parent Index Volatility subject to a maximum leverage of 150% and turnover buffers.

If the MSCI Parent Index Volatility is higher than the specific risk level then the weight of the MSCI parent index will be less than 100% while the weight of the cash component will be 100% minus the weight of the MSCI parent index. The daily return on the cash component is determined using the short-term rate[1] in the applicable currency. Similarly, if the MSCI Parent Index Volatility is lower than the specific risk level, the weight of the MSCI parent index will be more than 100% subject to a maximum leverage of 150%. The borrowing cost associated with daily Index Leverage is calculated using the short-term rate in the applicable currency.

The Index Leverage applicable on an effective date is determined using the MSCI Parent Index Volatility estimated two trading days before the effective date.

[1] Refer to Appendix 2 for more information on short-term rates.

5 Turnover Buffers and Exchange Holidays

The MSCI Risk Control Indexes apply turnover buffers to reduce turnover associated with changes in Index Leverage arising from changes in the realized volatility of the MSCI parent index. These indexes are rebalanced daily subject to a turnover buffer of 5% and are rebalanced only when the percentage change in daily Index Leverage exceeds 5%. On days when the MSCI Risk Control Indexes are not rebalanced, the Index Leverage from the previous trading day is maintained.

The MSCI Risk Control Indexes are not rebalanced when 10% or more of the constituents of the MSCI parent index (calculated by the constituent weights) are not traded due to exchange holidays on the day prior to the effective date.

6 Treatment of Corporate Events

The MSCI Risk Control Indexes are derived from the existing underlying MSCI parent indexes. As a result, corporate events are reflected in the MSCI Risk Control Indexes as they occur and as they are captured in the underlying MSCI parent indexes.

7 Index Calculations

The objective of the MSCI Risk Control Indexes is to replicate the performance of a strategy that targets a specific level of risk by varying the weights of an MSCI parent index and a cash component. The MSCI Risk Control Indexes take into account:

1. Return of the MSCI parent index, and

2. Return of the cash component.

For the MSCI Risk Control Indexes, two index level variants are calculated:

1. The Total Return Index that represents the weighted return of the MSCI parent index and the cash component.

2. The Excess Return Index that represents the return of the Total Return Index minus the return of the cash component.

These index levels variants are determined for both the Gross Daily Total Return Index level and the Net Daily Total Return Index[2] level of the MSCI parent index.

The Index calculation formulas are described below:

$$MSCI\ Risk\ Control\ Total\ Return\ Index\ Level_t = MSCI\ Risk\ Control\ Total\ Return\ Index\ Level_{t-1} \times (1 + MSCI\ Risk\ Control\ Total\ Return\ Index\ Return_t)$$

$$MSCI\ Risk\ Control\ Total\ Return\ Index\ Return_t = Index\ Leverage_t \times MSCI\ Parent\ Index\ Return_t + (1 - Index\ Leverage_t) \times Return\ on\ Cash\ Component_t$$

$$MSCI\ Risk\ Control\ Excess\ Return\ Index\ Level_t = MSCI\ Risk\ Control\ Excess\ Return\ Index\ Level_{t-1} \times (1 + MSCI\ Risk\ Control\ Excess\ Return\ Index\ Return_t)$$

$$MSCI\ Risk\ Control\ Excess\ Return\ Index\ Return_t = Index\ Leverage_t \times (MSCI\ Parent\ Index\ Return_t - Return\ on\ Cash\ Component_t)$$

$$Index\ Leverage_t = Minimum\ \left(1.5, \frac{Specific\ Risk\ Level}{MSCI\ Parent\ Index\ Volatility_{t-2}}\right)$$

$$MSCI\ Parent\ Index\ Return_t = \frac{MSCI\ Parent\ Index\ Level_t}{MSCI\ Parent\ Index\ Level_{t-1}} - 1$$

$$Return\ on\ Cash\ Component_t = \frac{Rate_{t-1}}{N} \times (Number\ of\ calendar\ days\ between\ t\ and\ t-1)$$

$Rate_{t-1}$ = Short-term rate published on the previous day
N = Day count convention used by the short-term rate

[2] MSCI Gross total return indexes reinvest all of the constituent companies' dividend distributions. Net total return indexes reinvest dividends after the deduction of withholding taxes.

Appendix 1

RISK CONTROL INDEX METHODOLOGY PARAMETERS

Exhibit 2: Main methodology parameters for MSCI Risk Control Indexes

	MSCI Risk Control Index Methodology Parameters	Available Settings
1	MSCI Parent Index	Any MSCI parent index
2	Cash Component	Short-term rates applicable for the MSCI Risk Control Indexes
3	Specific Risk Level	10%, 12.5%, 15%, 17.5% or any custom risk level specified
4	Number of days used for Volatility Calculation	as specified
5	Maximum Leverage	as specified
6	Turnover Buffer	as specified
7	Exchange Holiday Rule Threshold	as specified
8	Lag between Rebalancing Date and Effective Date	as specified

CALCULATION OF RETURN ON CASH COMPONENT USING T-BILLS

When US Treasury Bills are used the return on Cash component is calculated as follows:

$$Return\ on\ Cash\ Component_t = (1 + Cash\ Rate_{t-1})^{Number\ of\ calendar\ days\ between\ t\ and\ t-1} - 1$$

$$Cash\ Rate = [1/(1 - (T\text{-}Bill\ Tenor/360 \times T\ Bill\ Rate_{t-1}))]^{1/T\text{-}Bill\ Tenor} - 1$$

$T\text{-}Bill\ Tenor = Maturity\ of\ the\ US\ Treasury\ Bill$; for example, T-Bill Tenor is 91 for a 91day T−Bill

Appendix 2

SHORT-TERM RATES

Coinciding with the August 2021 Quarterly Index Review, MSCI Risk Control Indexes transition away from LIBOR to the short-term replacement rates.

The short-term rates replacing 3-month LIBOR are highlighted below.

3-month LIBOR	USD	GBP	EURO	CHF	JPY
Short-term Rate	Overnight SOFR	Overnight SONIA	3-month EURIBOR	Overnight SARON	3-month TIBOR

MSCI indexes may use other rates as applicable for determining the returns of the Cash component.

Methodology Book Tracked Changes

The following sections have been modified since April 2012:

• The introduction has been updated to reflect that the index is a part of the MSCI Blended Index Family.

The following sections have been modified effective August 2021:

• The methodology book has been updated to reflect the transition to short-term rates from LIBOR.

• Deleted the list of MSCI Risk Control Indexes from Appendix 1.

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