MSCI WORLD CUSTOM RISK CONTROL 10% INDEX METHODOLOGY

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1 INTRODUCTION

The MSCI World Custom Risk Control 10% Index (the “Index”) aims to represent the performance of an investment strategy that targets a specific level of risk by varying its exposure between cash and the MSCI World Index (the “Parent Index”). The weights of the MSCI World Index and the cash component are determined daily based on the ratio of the specific risk level and the realized volatility of the Parent Index and are subject to a maximum leverage.

The methodology is based on the MSCI Risk Control Index methodology[1] with customized exponential weighted volatility estimation. The sections below describe the volatility estimation as well as the parameters specific to the MSCI World Custom Risk Control 10% Index.

[1] https://www.msci.com/index-methodology

2 APPLICABLE UNIVERSE, CASH COMPONENT AND SPECIFIC RISK LEVELS

The MSCI World Custom Risk Control 10% Index is available with a base currency of USD.

The Index uses the 3-month Libor rates in USD for determining the returns of the cash component.

The risk level for the Index is set at 10%.

3 VOLATILITY ESTIMATION

The returns of the Parent Index in specified USD 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 Parent Index. The leverage applied in the Index is determined based on customized exponential weighted volatility estimation. For the exact values of the parameters applicable to the Index, please refer to the Parameters in section 8.

The realized volatility RV_T on date T is the maximum of the long term and short term realized volatilities of the Parent Index on date T calculated using the exponential weighted methodology and is calculated as follows:

$$\sigma^2_{ST,T} = \lambda_{ST}\sigma^2_{ST,T-1} + (1 - \lambda_{ST})r^{\,2}_{T-i}$$
$$\sigma^2_{LT,T} = \lambda_{LT}\sigma^2_{LT,T-1} + (1 - \lambda_{LT})r^{\,2}_{T-i}$$

where,

$\sigma^2_{ST,T}$ and $\sigma^2_{LT,T}$ are short term and long term realized volatilities respectively for day T

$\sigma^2_{ST,T-1}$ and $\sigma^2_{LT,T-1}$ are short term and long term realized volatilities respectively for day T-1

λ_{ST} and λ_{LT} are short term and long term decay factors respectively

“i” is the number of days lagged return for computing volatility

r_{T-i} is the daily log return of the index on “T-i” day (in the defined variant and currency)

The variance on day T is dependent on the initial estimate of variance which can either be user defined or computed using the formula below:

$$\sigma^2_{ST,T_{ini}+1} = (1 - \lambda_{ST})\sum_{j=1}^{T_{ini}} \lambda_{ST}^{(T_{ini}-j)} r_j^2$$
$$\sigma^2_{LT,T_{ini}+1} = (1 - \lambda_{LT})\sum_{j=1}^{T_{ini}} \lambda_{LT}^{T_{ini}-j} r_j^2$$

Where T_{ini} is the number of days for calculating initial volatility estimate.

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

4 INDEX LEVERAGE OF MSCI WORLD CUSTOM RISK CONTROL 10% INDEX

The objective of the MSCI World Custom Risk Control 10% Index is to represent the performance of a strategy that targets a specific level of risk at 10% by varying the weights of the Parent Index and the cash component.

The Index Leverage of the MSCI World Custom Risk Control 10% Index is the weight of the Parent Index and is calculated daily as the ratio of the specific risk level and the MSCI Parent Index Volatility(as per section 3) subject to a maximum leverage of 150% and turnover buffers set to 5%.

If the MSCI Parent Index Volatility is higher than the specific risk level then the weight of the Parent Index will be less than 100% while the weight of the cash component will be 100% minus the weight of the Parent Index. The daily return on the cash component is determined using the 3-month USD Libor rate. Similarly, if the MSCI Parent Index Volatility is lower than the specific risk level, the weight of the 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 3-month USD Libor rate.

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

5 TURNOVER BUFFERS AND EXCHANGE HOLIDAYS

The MSCI World Custom Risk Control 10% Index applies turnover buffers of 5% to reduce turnover associated with changes in Index Leverage arising from changes in the MSCI Parent Index Volatility. 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 Index is not rebalanced, the Index Leverage from the previous trading day is maintained.

The Index is not rebalanced between cash and equity when 10% or more of the constituents of the 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 World Custom Risk Control 10% Index is derived from the existing underlying MSCI World Index. As a result, corporate events are reflected in the Index as they occur and as they are reflected in the underlying Parent Index.

7 INDEX CALCULATIONS

The objective of the MSCI World Custom Risk Control 10% Index is to represent the performance of a strategy that targets a specific level of risk at 10% by varying the weights of the Parent Index and the cash component. The Index takes into account:

1. Return of the 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:

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

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

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

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

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

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

$$Return\ on\ Cash\ Component_t = \frac{Libor_{t-1}}{360} \times (Number\ of\ calendar\ days\ between\ t\ and\ t-1)$$

[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.

8 PARAMETERS

The following parameters are used in the calculation of the Index

	MSCI Risk Control Index Methodology Parameters	
1	MSCI Parent Index	MSCI World Index
2	Cash Component	3 Month USD LIBOR
3	Base Currency of MSCI Parent Index and Cash Component	USD
4	Specific Risk Level	10%
5	Short term decay factor (λ_{ST})	94%
6	Long term decay factor (λ_{LT})	97%
7	Number of days for calculating initial volatility estimate (T_{ini})	260
8	Number of days lagged return for computing volatility (i)	0
9	Maximum Leverage	150%
10	Turnover Buffer	5%
11	Exchange Holiday Rule Threshold	10%
12	Lag between Rebalancing Date and Effective Date	2 business days

The following sections have been modified since May 2015:

Section 2,4,5,6,7: Additional section describing Index calculation and maintenance details

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