

MSCI Select Corridor Hedged Indexes Methodology

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1 MSCI Select Corridor Hedged Indexes

1.1 OVERVIEW

MSCI Select Corridor Hedged Indexes (“the Indexes”) are designed to represent a close estimation of the return that can be achieved by hedging the currency exposures of the index using FX Forward contracts (“Forwards”) at the end of month as well as intra-month if the unhedged exposure reaches certain threshold during the month. The MSCI Select Corridor Hedged Indexes aim to represent the hedging of each foreign currency corresponding to the constituents of the underlying index back to the home currency of the investor that would be achieved by selling each foreign currency Forward at the one-month Forward rate during monthly rebalance. In addition, the Index methodology also involves intra-month adjustment of hedge positions based on certain conditions (“corridor breach”, as described in Section 1.4). The amount of Forwards sold on the last weekday of the month represents the value (or the market capitalization) of the index as of the close of two weekdays before the first calendar day of the following month. The foreign currency weights, however, take into account any changes in the composition of the index implemented as of the close of last weekday of the month. Adjustments to the hedge is done only in the case of a corridor breach, where the amount of Forwards to be sold is determined on the day of the breach (“detection day”) and become effective on the next trading day (“adjustment day”).

1.2 CONSTRUCTING THE MSCI SELECT CORRIDOR HEDGED INDEXES

Constructing the MSCI Select Corridor Hedged Indexes involves the following steps:

- Defining the home currency
- Identifying the currencies to be hedged
- Identifying the weight for each currency to be hedged in the index
- Calculation of hedged Index levels

1.2.1 DEFINING THE HOME CURRENCY

The home currency is the home currency of an investor investing in the international equity markets. For construction of MSCI Select Corridor Hedged Indexes the default home currency is the US Dollar. The MSCI Select Corridor Hedged Indexes can also be constructed with reference to any home currency.

1.2.2 IDENTIFYING THE CURRENCIES TO BE INCLUDED IN THE INDEX

Constituent prices of MSCI Equity Indexes can be quoted in different foreign currencies. Each foreign currency used to denote the security prices in the underlying MSCI Equity Index is included in the calculation of the MSCI Select Corridor Hedged Indexes. For example, for a US-based investor who is investing in the MSCI Emerging Markets Index, the calculation would combine the unhedged MSCI Emerging Markets index return in US dollars (USD) with the performance impact of hedging the currency exposure of all the currencies represented in the MSCI Emerging Markets Index relative to the US Dollar.

1.2.3 IDENTIFYING THE WEIGHT OF EACH CURRENCY IN THE INDEX

In the MSCI Select Corridor Hedged Indexes, the weight of each currency corresponds to the relative market cap weight of the securities quoted in that currency in the underlying MSCI Equity Index.

The weights are derived from the aggregate free-float adjusted market capitalization of the securities quoted in the respective currencies in the underlying MSCI Equity Index as of the close of two business days before the first calendar day of the following month. The weight calculation takes into account any changes in the index constituents due to a rebalancing and/or corporate actions becoming effective on the first business day of the next month. For the intra-month adjustment of hedges, the weights are derived from the aggregate free-float adjusted market capitalization of the securities quoted in the respective currencies in the underlying MSCI Equity Index as of the close of the detection day of corridor breach, but taking into account any changes in the index constituents due to the corporate actions becoming effective on the next weekday (adjustment day).

1.2.4 CALCULATION OF HEDGED INDEX LEVELS

The MSCI Select Corridor Hedged Index level is calculated as a sum of the Equity Component expressed in the home currency, the Hedge Impact and accrued cash. The calculations are described in detail in section 1.4.

1.3 MAINTAINING THE MSCI SELECT CORRIDOR HEDGED INDEXES

The MSCI Select Corridor Hedged Indexes are maintained with an objective of reflecting the evolution of the underlying currency exposures in the MSCI Equity Indexes on a timely basis. In particular, index maintenance involves:

- Resetting the weights of the currencies to be hedged in the index
- Rolling the Forward contracts over to the next month

The MSCI Select Corridor Hedged Indexes are rebalanced monthly on the last trading day of the month, when the index will take into account the effect of rolling into new 1-month Forward contracts based on the newly determined weights of currency to be hedged for the next month's index calculation. The currency weights and corresponding foreign currency notional amounts are determined as of the close of two business days before the first calendar day of the following month. Adjustment to the hedge is done only in the event of a corridor breach, where the amount of Forwards "sold" is determined on the day of corridor breach based on odd-days Forward rate and the newly determined weights of currency for adjustment on next weekday.

1.3.1 EXCHANGE HOLIDAYS

The MSCI Select Corridor Hedged Indexes are not adjusted for the corridor breaches when more than a pre-defined threshold ('Holiday Weight threshold'¹ parameter) of the constituents of the underlying MSCI Equity Index (calculated by the constituent weights) are not traded due to exchange holidays on the adjustment day. In this case, the corridor breaches on the detection day, if any, are overridden to FALSE.

1.4 MSCI SELECT CORRIDOR HEDGED INDEX CALCULATION FORMULA

There are three components to the MSCI Select Corridor Hedged Index:

1. The unhedged equity component in the home currency ("Equity Component")
2. The hedge impact (aimed to represent the gain or loss on the Forward contracts) in the home currency
3. The accrued cash in the home currency

The intra month adjustment of hedges is triggered based on the value of Investment Ratio (as described in Appendix I) and Hedge Ratio (as described in Appendix I).

A corridor breach occurs if, the Investment Ratio or Hedge Ratio moves beyond a pre-defined threshold (corridor). For example, if the Investment Ratio corridor threshold is set at 5% then corridor breach is set to TRUE when the ratio is below 0.95 or it is above 1.05.

If the corridor breach is observed for both Investment Ratio and Hedge Ratio on the same day, then the procedure for adjusting the Investment Ratio is followed.

¹ Please refer to Appendix III for details.

If the corridor breach is observed on the penultimate date of the month, no adjustment is made due to the corridor breach, because the positions will be reset at the end-of-month based on the monthly reset.

If currencies are added to the underlying MSCI Equity Indexes in between monthly resets, then no additional forwards are created for new currencies until the next adjustment triggered by corridor breach or monthly reset. If any of the currencies are deleted from the underlying MSCI Equity Indexes in between the monthly resets, then forwards of the deleted currencies are closed on the last applicable day of those currencies in the MSCI Equity Indexes and hedge impact generated from them is added to the equity component. Additionally, the adjustments are carried out on the next business day (not applicable if next business day is the first calendar day of the month) in line with the adjustments made after the Investment Ratio corridor breach.

1.4.1 EQUITY COMPONENT

The Equity Component, is calculated as follows:

- a) At the first calendar day of the month,

$$EQ_Comp(M) = HedgedIndex_{M-1} * \frac{EquityIndex_M}{EquityIndex_{M-1}}$$

- b) If an Investment Ratio corridor breach is detected on a weekday (t-1), then, on the adjustment day (t), the Hedge Impact and Accrued Cash from (t-1) are added to the Equity Component,

$$EQ_Comp(t) = EQ_Comp(t-1) * \frac{EquityIndex_t}{EquityIndex_{t-1}} + HI(t-1) + AccruedCash(t-1)$$

- c) Otherwise, the Equity Component follows the underlying unhedged MSCI Equity Index in the home currency,

$$EQ_Comp(t) = EQ_Comp(t-1) * \frac{EquityIndex_t}{EquityIndex_{t-1}}$$

where

t	= Index calculation date
M	= First calendar day of the month
$EquityIndex_t$	= Value of the unhedged MSCI Equity Index in home currency on the calculation date
$EquityIndex_{t-1}$	= Value of the unhedged MSCI Equity Index in home currency on a weekday before the calculation date

$EquityIndex_{M-1}$	= Value of the unhedged MSCI Equity Index in home currency on the last weekday of the previous calendar month
$HedgedIndex_{M-1}$	= Value of the MSCI Select Corridor Hedged Index on the last weekday of the previous calendar month.
$EQ_Comp(t-1)$	= Value of the unhedged equity component on a weekday before the calculation date
$HI(t-1)$	= Hedge Impact on a weekday before the calculation date
$Accrued\ Cash(t-1)$	= Accrued cash on a weekday before the calculation date

1.4.2 HEDGE IMPACT

The Hedge Impact, is calculated as follows (all currency exchange rates are expressed as amount of foreign currency for 1 unit of home currency):

$$HI(t) = HedgeValue_{adj_t} \times \sum_{i=1}^n \left\{ Weight_{i,adj_t} \times FXRate_{i,adj_t} \times \left(\frac{1}{FFRate_{i,adj_t}} - \frac{1}{FFRate_{i,odd-days_t}} \right) \right\}$$

where

t	= Index calculation date
M	= First calendar day of the month
$HI(t)$	= Index Hedge Impact at time t
$HedgeValue_{adj_t}$	= Proportionate hedge value sold at the time of reset (monthly reset or reset because of corridor breach) in the home currency which is applicable at time t.
This term equals,	
$HedgedIndex_{M-1}$	...at the first calendar day of the month (t) and if there is a Hedge Ratio corridor breach detected on (t-1),
$HedgedIndex_{M-2}$	...at the first calendar day of the month (t) and if no corridor breach is detected on (t-1),
$HedgedIndex_{t-1}$	...on the adjustment day (t) when (t-1) is the detection day of Investment Ratio corridor breach,
EQ_Comp_{t-1}	...on the adjustment day (t) when (t-1) is the detection day of Hedge Ratio corridor breach
$HedgeValue_{adj_{t-1}}$	...on all other days

	At inception, $HedgedIndex_{M-2}$ is set to base value which equals $HedgedIndex_{M-1}$
$Weight_{i,adj_t}$	= Weight of the currency i in the underlying MSCI Equity Index at the time of reset
	At the first calendar day of the month (t) and if there is a Hedge Ratio corridor breach detected on (t-1), this term equals $Weight_{i,M-1}$, taking into account any changes in the index constituents due to the corporate actions becoming effective on (t)
	At the first calendar day of the month (t) and if no corridor breach is detected on (t-1), this term equals $Weight_{i,M-2}$, taking into account any changes in the index constituents due to the corporate actions becoming effective on (t)
	During intra-month reset, the weight at adjustment day (t) is one weekday before the adjustment day, but taking into account any changes in the index constituents due to the corporate actions becoming effective at adjustment day ($Weight_{i,t-1}$).
	Otherwise, it is same as $Weight_{i,adj_{t-1}}$
$FXRate_{i,adj_t}$	At inception, $Weight_{i,adj_t}$ is set to $Weight_{i,M-1}$
	= Spot Rate of the currency i at the time of reset (monthly reset or reset because of corridor breach) which is applicable at time t.
	At the first calendar day of the month (t) and if there is a Hedge Ratio corridor breach detected on (t-1), spot rate of the currency i is one business days before the start of the current calendar month ($FXRate_{i,M-1}$),
	At the first calendar day of the month (t) and if no corridor breach is detected on (t-1), spot rate of the currency i is two business days before the start of the current calendar month ($FXRate_{i,M-2}$),
	At the time of corridor breach, the spot rate at adjustment day (t) is one weekday before the adjustment day ($FXRate_{i,t-1}$),
	Otherwise, it is same as $FXRate_{i,adj_{t-1}}$

	This term determines the notional amount of the foreign currency to be sold corresponding to its weight in the index. At inception, $FXRate_{i,adj_t}$ is set to $FXRate_{i,M-1}$
$FFRate_{i,odd-days_t}$	= Interpolated odd-days Forward rate of the currency i on day t. This term is used to mark to market the currency position intra month and is equal to the Spot rate of currency i on the last day of the month. Its calculation is defined in Section 1.6.1.
$FFRate_{i,adj_t}$	= Selling rate at the time of reset (monthly reset or reset because of corridor breach) for the currency i which is applicable at time t. At the first calendar day of the month (t) and if there is a Hedge Ratio corridor breach detected on (t-1), this term equals $FFRate_{i,odd-days_t}$ At the first calendar day of the month (t) and if no corridor breach is detected on (t-1), this term equals 1-month Forward for the currency i one business day before the start of the current calendar month (or last business day of the previous calendar month), At the time of corridor breach, this term equals $FFRate_{i,odd-days_t}$ on the adjustment day (t), Otherwise, it is same as $FFRate_{i,adj_{t-1}}$

1.4.3 ACCRUED CASH

The Accrued Cash is calculated as follows:

- At the first calendar day of the month (t) and if there is a Hedge Ratio corridor breach detected on (t-1),

$$\begin{aligned}
 AccruedCash(M) &= HedgeIndex_{M-2} \\
 &\times \sum_{i=1}^n \left\{ Weight_{i,M-2} \times FXRate_{i,M-2} \right. \\
 &\times \left. \left(\frac{1}{FFRate_{i,M-1}} - \frac{1}{FFRate_{i,odd-days_t}} \right) \right\}
 \end{aligned}$$

- b) At the first calendar day of the month and if no corridor breach is detected on (t-1), the Accrued Cash is reset to 0,

$$AccruedCash(M) = 0$$

- c) If an Investment Ratio corridor breach is detected on a weekday (t-1), then, on the adjustment day (t), the Accrued Cash contains one weekday (difference between adjustment day and detection day) realized P&L from the forwards and interest earned on previous accrued cash for one weekday,

$$AccruedCash(t) = HedgeValue_{adj_{t-1}} \times \sum_{i=1}^n \left\{ Weight_{i,adj_{t-1}} \times FXRate_{i,adj_{t-1}} \times \left(\frac{1}{FFRate_{i,odd-days_{t-1}}} - \frac{1}{FFRate_{i,odd-days_t}} \right) \right\} + (AccruedCash(t-1) * DailyCashRet_t)$$

- d) If a Hedge Ratio corridor breach is detected on a weekday (t-1), then, on the adjustment day (t), the Accrued Cash contains realized P&L from the forwards and previous accrued cash plus interest earned on previous accrued cash,

$$AccruedCash(t) = HedgeValue_{adj_{t-1}} \times \sum_{i=1}^n \left\{ Weight_{i,adj_{t-1}} \times FXRate_{i,adj_{t-1}} \times \left(\frac{1}{FFRate_{i,adj_{t-1}}} - \frac{1}{FFRate_{i,odd-days_t}} \right) \right\} + (AccruedCash(t-1) * (1 + DailyCashRet_t))$$

- e) Otherwise,

$$AccruedCash(t) = AccruedCash(t-1) * (1 + DailyCashRet_t)$$

where

$DailyCashRet(t)$ = Return on cash between the previous weekday (t-1) and the calculation date (t)

$$\left(\frac{days(t-1, t)}{360} \times Rate_{t-1} \right)$$

$days(t-1, t)$ = the number of calendar days between (t-1) and (t) (including day t)

$Rate_{t-1}$ = short-term rate on the previous weekday prior to the calculation date (t). Short-term rates are detailed in Appendix IV

1.4.4 HEDGED INDEX

The Hedged Index is the combination of the unhedged Equity Component (in home currency), the Hedge Impact and the Accrued Cash:

$$HedgedIndex(t) = EQ_Comp(t) + HI(t) + AccruedCash(t)$$

where

$EQ_Comp(t)$ = Value of the unhedged Equity Component on the calculation date

$HI(t)$ = Hedge Impact on the index calculation date defined above

$Accrued\ Cash(t)$ = Accrued cash on the index calculation date defined above

1.5 CALCULATION OF DAILY RETURNS

1.5.1 MARKING TO MARKET THE FORWARD CONTRACTS ON A DAILY BASIS

The daily calculation of MSCI Select Corridor Hedged Indexes marks to market the one-month Forward contracts on a daily basis by using an equal and offsetting Forward position. For instance, after 8 days, the Forward would be marked to market using a 22-days offsetting Forward in the case of a month when the last business day of the month is the 30th (i.e. $30 - 8 = 22$).

1.5.2 PRICING THE OFFSETTING FORWARD

Typically, only a limited number of standard duration of Forwards is available in the market. These rates are called “tenors”, and represent one day, one week, one month, etc. This means that other durations for Forwards (called odd-days Forwards) are generally not available, but need to be calculated. For the sake of simplicity, when calculating MSCI Select Corridor Hedged Indexes, MSCI uses a linear interpolation based solely on the 1-month Forwards to estimate the value of odd-days Forwards every day during the whole month. Odd-days Forwards are computed simply as the Spot rate plus the 1-month Forward premium or discount pro-rated for the number of days until the last business day of the month.

1.6 ODD-DAYS FORWARDS CALCULATION USING A LINEAR INTERPOLATION

1.6.1 CALCULATION FORMULA

MSCI uses a linear interpolation formula to compute odd-days Forwards. The general formula is as follows:

$$FFRate_{odd-days_t} = FXRate_t + \left((FFRate_{1-month_t} - FXRate_t) \times \frac{Odd-days_t}{TotNbOfCalDaysDuringMonth} \right)$$

where

$FXRate_t$ = Spot rate at time t

$FFRate_{1-month_t}$ = 1-Month Forward rate at time t

$Odd-days_t$ = Number of days until the last weekday of the current month (not counting t)

2 Appendix I: Investment Ratio and Hedge Ratio

2.1 INVESTMENT RATIO

The Investment Ratio is calculated as follows:

- a) At last calendar day of the month,

$$Investment\ Ratio(t) = \left(\frac{EQ_Comp(t) + HI(t) + AccruedCash(t)}{HedgedIndex(t)} \right)$$

- b) Otherwise,

$$Investment\ Ratio(t) = \frac{EQ_Comp(t)}{HedgedIndex(t)}$$

where

$EQ_Comp(t)$ = Value of the unhedged Equity Component on the calculation date

$HI(t)$ = Hedge Impact on the index calculation date defined above

$AccruedCash(t)$ = Accrued cash on the index calculation date defined above

The calculations are described in detail in section 1.4

2.2 HEDGE RATIO

The Hedge Ratio is calculated as follows:

- a) At the last calendar day of the month,

$$Hedge\ Ratio(t) = \sum_{i=1}^n \left\{ Weight_{i,t} \times \left(\frac{HedgeIndex_{t-1} * FXRate_{i,t-1}}{HedgeIndex_t * FXRate_{i,t}} \right) \right\}$$

- b) Otherwise,

$$Hedge\ Ratio(t) = \sum_{i=1}^n \left\{ Weight_{i,t} \times \left(\frac{Weight_{i,adj_t} * HedgeValue_{adj_t} * FXRate_{i,adj_t}}{EQ_Comp_Foreign_i(t)} \right) \right\}$$

where

$Weight_{i,t}$ = Weight of the currency i in the underlying MSCI Equity Index at the time t

The calculations are described in detail in section 1.4

2.2.1 EQUITY COMPONENT IN FOREIGN CURRENCY

The Equity Component in the foreign currency i , is calculated as follows:

- a) At the first calendar day of the month,

$$\begin{aligned} EQ_Comp_Foreign_i(M) \\ &= Weight_{i,M-1} * HedgedIndex_{M-1} * FXRate_{i,M-1} \\ &\quad * \frac{EquityIndexForeign_{i,M}}{EquityIndexForeign_{i,M-1}} \end{aligned}$$

- b) If an Investment Ratio corridor breach is detected on a weekday $(t-1)$, then, on the adjustment day (t) , the Hedge Impact and Accrued Cash from $(t-1)$ are added to Equity Component,

$$\begin{aligned} EQ_Comp_Foreign_i(t) \\ &= EQ_Comp_Foreign_i(t-1) * \frac{EquityIndexForeign_{i,t}}{EquityIndexForeign_{i,t-1}} + Weight_{i,t-1} \\ &\quad * (HI(t-1) + AccruedCash(t-1)) * FXRate_{i,t-1} \end{aligned}$$

- c) Otherwise, Equity Component follows the underlying unhedged MSCI Equity Index in the foreign currency,

$$EQ_Comp_Foreign_i(t) = EQ_Comp_Foreign_i(t-1) * \frac{EquityIndexForeign_{i,t}}{EquityIndexForeign_{i,t-1}}$$

where

$EquityIndexForeign_{i,t}$	= Value of the unhedged MSCI Equity Index in foreign currency i on the calculation date
$EquityIndexForeign_{i,t-1}$	= Value of the unhedged MSCI Equity Index in foreign currency i on a weekday before the calculation date
$EquityIndexForeign_{i,M-1}$	= Value of the unhedged MSCI Equity Index in foreign currency i on the last weekday of the previous calendar month
$EQ_Comp_Foreign_i(t-1)$	= Value of the unhedged equity component in foreign currency i on a weekday before the calculation date

3 Appendix II: Common Principles in the Calculation of MSCI Select Corridor Hedged Indexes

3.1 CURRENCY DATA

3.1.1 CLOSING SPOT RATES

MSCI uses the WM/Reuters closing Spot rates (the mid-point of closing bid and ask rates to five decimal places), taken at 4 p.m. UK time in the daily index calculation and also in the determination of the notional amount of currencies to be sold forward on the roll date.

The WM/Reuters closing Spot rates are provided by Thomson Reuters. MSCI may elect to use alternative sources of exchange rates if the WM/Reuters rates are not available, or if MSCI determines that the WM/Reuters rates may not reflect market conditions.

3.1.2 CLOSING FORWARD RATES

MSCI uses the mid values of the 1-month WM/Reuters Forward rates published by Thomson Reuters at 4 p.m. UK time.

3.1.3 MISSING SPOT OR FORWARD RATES

In the case Thomson Reuters does not provide Spot rates for specific markets on given days (for example, Christmas Day and New Year Day), the Spot rates on the last weekday for which they are available will be used. If a Forward rate is missing, the Forward premium/discount on the last weekday for which it is available is applied to the current day's Spot rate.

3.1.4 CURRENCY CRISIS

Disruptions in the currency Spot and/or Forward market may potentially result in a currency being excluded from the MSCI Select Corridor Hedged Indexes even though the currency may be still included in the parent MSCI Equity Indexes. In this case, the resulting currency weights may be different from the currency weights in the parent MSCI Equity Index.

In such circumstances, MSCI would send an announcement to clients with the related information and with sufficient advance notice. Such decisions are to be made by the MSCI Equity Index Committee (EIC) if warranted.

3.2 CALCULATION TIME AND FREQUENCY

The MSCI Select Corridor Hedged Indexes are calculated at the same time as the underlying MSCI Equity Index.

More details about calculation time and frequency of MSCI indexes can be found in the MSCI Index Calculation Methodology available on MSCI's web site at www.msci.com/index-methodology.

Similar to the MSCI Equity Index calculation schedule, the official month-end index level for the MSCI Select Corridor Hedged Indexes is calculated on the last weekday of the month.

4 **Appendix III: Index Parameters for the MSCI Select Corridor Hedged Indexes**

This appendix specifies the Index parameters for the MSCI Select Corridor Hedged Indexes.

Default value of Hedge Ratio threshold is 1%.

Default value of Investment Ratio threshold is 4%².

Default variant of Equity Index variant is Net variant.

Default value of Holiday Weight threshold is 30%.

² The Investment Ratio threshold parameter of the MSCI USA Select Corridor Hedged to GBP Index is set to 2% for a period of 6th August 2021 to 31st October 2021.

5 Appendix IV: Short-term Rates

Coinciding with the August 2021 Quarterly Index Review, the MSCI Select Corridor Hedged Indexes transition away from London InterBank Offered Rates (LIBOR) to the respective short-term replacement rates.

The short-term rates replacing 1-month LIBOR are highlighted below:

1-month LIBOR	USD	GBP	EURO	CHF	JPY
Short-term Rate	Secured Overnight Financing Rate (SOFR)	Sterling Overnight Index Average (SONIA)	1-month Euro InterBank Offered Rate (EURIBOR)	Swiss Average Rate Overnight (SARON)	1-month Tokyo InterBank Offered Rate (TIBOR)

MSCI indexes may use other rates as applicable.

The following sections have been modified since September 2020:

1. Section 1.3: Maintaining the MSCI Select Corridor Hedged Indexes
 - Addition of Exchange Holidays
2. Section 1.4: MSCI Select Corridor Hedged Index Calculation Formula
 - Update to the calculation formula for the MSCI Select Corridor Hedged Indexes
3. Appendix III: Index Parameters for the MSCI Select Corridor Hedged Indexes
 - Update to the index parameters for the MSCI Select Corridor Hedged Indexes

The following sections have been modified effective August 2021:

1. Appendix IV: Short-term Rates
 - The methodology book has been updated to reflect the transition to short-term rates from LIBOR

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