Monthly index update

Monthly indices are computed by compounding monthly total returns. Monthly indices are rebalanced on a quarterly-basis.

Asset pricing

The intra quarter asset pricing is designed to reflect the latest data in the interest rates curve component of our DCF Implementation. The cashflow forecast component is obtained from the latest quarterly index update. The risk premia/ credit spread component also rests on quarterly estimates but are linearly interpolated between quarters to a monthly frequency.

Updating index returns

By default, the index computes the total investment return on a quarterly basis as in Total Investment Return

$$TR_t = \sum_i^n w_{i,t-1}(\frac{V_{i,t,RepCCY} + D_{i,t,RepCCY}}{V_{i,t-1,RepCCY}} - 1)$$

where:

TR_t denotes the total return of the index during the quarter *t*.
$w_{i,t-1}$ represents an index-constituent weight (either value weighted, capped value weighted, or equally weighted) for the quarter *t*. It is determined at the end of the quarter *t-1*.
$V_{i,t,RepCCY}$ and $V_{i,t-1,RepCCY}$ denote an index-constituent fair value expressed in the reporting currency at the end of quarter *t* and *t-1* respectively.
$D_{i,t,RepCCY}$ denotes an index-constituent coupon/dividend payment during the quarter *t* expressed in reporting currency.

Here t indicates each quarter. Unfortunately, the above formula cannot be used directly in the case of the monthly index update. This is because the initial asset value recognition has the quarterly frequency, which would be monthly if this formula is used directly in the monthly computation. As a result, the monthly updated index would not be reconciled with the quarterly one. Thus we re-formulate the computation of the monthly total investment return to make the initial asset value recognised quarterly as below

$$TR_{m,t} = \sum_i^n u_{i,m,t}(\frac{V_{i,m,t,RepCCY} - V_{i,m-1,t,RepCCY} + D_{i,m,t,RepCCY}}{A_{i,m-1,t,RepCCY}})$$

where:

$TR_{m,t}$ denotes the total return of the index for the m-th month of the quarter t.
$V_{i,m,t,RepCCY}$ denotes an index-constituent fair value expressed in the reporting currency at the end of the m-th month in the quarter t.
$D_{i,m,t,RepCCY}$ denotes an index-constituent coupon/dividend payment during the m-th month in the quarter t expressed in reporting currency.

$A_{i,m,t,RepCCY} = V_{i,m,t,RepCCY} + \sum_{k=1}^{m} D_{i,k,t,RepCCY}$ is the total investment value of the *i*-th company in the end of the m-th month in the quarter t expressed in the reporting currency. When $m = 0$, $A_{i,m,t,RepCCY} = V_{i,t-1,RepCCY}$.

$u_{i,m,t} = \frac{w_{i,t-1}G_{i,m-1,t,RepCCY}}{\sum_k^n w_{k,t-1}G_{k,m-1,t,RepCCY}}$ is the weight adjusted by the value growth rate of the company $G_{i,m,t,RepCCY} = \frac{A_{i,m,t,RepCCY}}{V_{i,t-1,RepCCY}}$. It is obvious that $G_{i,m=0,t,RepCCY} = 1$ and $u_{i,m=1,t} = w_{i,t-1}$.

Unsmoothing of index volatility

Monthly indices are based on an asset pricing model that is calibrated quarterly. Monthly equity risk premia are interpolated for the intra-quarter months. While a new term structure of interest rates is used each quarter to build the cash flow discount factors, this linearisation of the intra-quarter risk premia introduces some smoothness in the returns timeseries of the monthly indices for up to 3 months (or 3 lags).

For example, the serial correlation in the returns of monthly infra300® index for 3-lags and their statistical significance as measured by the Ljung-Box test is given below (computed in Feb 2021 for the index as of Q4 2020).

	1-lag return	2-lag return	3-lag return
Serial correlation	0.3494	0.1859	0.1139
Ljung-Box test (p-value)	0.00000002920707	0.000000002643376	0.000000002719659

These serial correlations are statistically significant as compared to the quarterly infra300 index, which shows no serial correlation on a quarterly basis. To remove this serial correlation and improve the risk measure based on the returns time-series, we unsmooth monthly returns with Geltner's method. With one lag all statistical significance in the autocorrelation is removed as shown below:

	1-lag return	2-lag return	3-lag return
Serial correlation	-0.0249	0.0532	0.0979
Ljung-Box test (p-value)	0.692377	0.64624	0.34649

The risk measures of monthly indices such as volatility and Value-at-risk use the unsmoothed volatility of monthly returns. Examples of the volatility of the monthly index return and its unsmoothed version are shown below (computed in Feb 2021 for the index as of Q4 2020):

	Raw monthly returns	Unsmoothed returns
Annualised Volatility	7.71%	11.12%