SOLACTIVE POST EX-DATE DIVIDEND ADJUSTMENT METHODOLOGY IN DIVISOR INDICES

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1. INTRODUCTION

This document provides guidance on the proposed Solactive Post Ex-Date Dividend Adjustment for Japanese and South Korean companies in Divisor Indices. The methodology is intended to reflect the general dividend distribution practice in Japan and South Korea, as well as the mathematics of the Post Ex-Date Dividend Adjustment in index calculation. Defined terms used in this document shall have the meaning ascribed in General Index Guideline and Index Calculation Guideline available on Solactive's website.

2. DIVIDEND DISTRIBUTION IN JAPAN AND SOUTH KOREA

1.1 JAPAN

The majority of dividend distributions in Japan are declared in estimated amounts and these estimates are not confirmed by companies prior to the ex-date. In addition to this, some companies do not provide an estimate for dividend amounts. The final dividend amounts are declared after the ex-date. In both cases, the final dividend amounts are confirmed after their ex-dates.

1.2 SOUTH KOREA

The majority of South Korean companies do not declare an estimation for their upcoming dividend distribution prior to the ex-date. The final dividend amounts are declared after the ex-date.

3. CURRENT SOLACTIVE TREATMENT FOR DIVIDEND PAYMENTS IN JAPAN AND SOUTH KOREA

Solactive currently applies the dividend payments in indices for which an estimation is available from data vendors. In case the estimation for the dividend amount is not available, Solactive does not use any forecast mechanism to reflect the upcoming dividend payments in indices. In addition to this, the estimated amounts are considered as final dividend amounts. Consequently, Solactive performs no post ex-date correction when the estimated dividend amount is different than the dividend amount published by the relevant company.

4. POST EX-DATE DIVIDEND ADJUSTMENT

According to the proposed methodology, Solactive will perform an adjustment in case the confirmed dividend amount is different than the estimated amount that is applied on the ex-date.

The delta amount between the confirmed and estimated dividend amount will be applied to the affected indices by using the index dividend points calculated with the number of shares on the dividend ex-date. With respect to the post ex-date dividend adjustment the historical index levels are not restated.

The ex-date dividend adjustment is performed on the pre-defined Implementation Days that are scheduled weekly on Friday. Should Friday not be a Trading Day, the Implementation Date is to be postponed to the next Business Day.

The following section is dedicated to the mathematics of the Divisor Indices and Post Ex-Date Dividend Adjustment.

Index level is calculated by the relation between index market capitalization and the index divisor:

$$(1)\ IL_t = \frac{Index\ MCAP_t}{Divisor_t}$$

with:

$IL_t =$ *Index Level on business day t*

$Index\ MCAP_t =$ *Index Market Capitalization on business day t*

$Divisor_t =$ *Index Divisor on business day t*

$$(2)\ Index\ MCAP_t = \sum_{i=1}^{n} x_{i,t} * p_{i,t} * FX_{i,t} * WCF_{i,t} * FFF_{i,t}$$

with:

$x_{i,t} =$ *Total Number of Shares of index component i on business day t*

$p_{i,t} =$ *price of index component i on business day t*

$FX_{i,t} =$ *foreign Exchange Rate of index component i on business day t*

$WCF_{i,t} =$ *Weighting Cap Factor of index component i on business day t*

$FFF_{i,t} =$ *Free Float Factor of index component i on business day t*

To reflect the dividend payments in the index the close prices of the dividend paying stocks are adjusted. The adjusted prices are used to calculate the index market capitalization after dividends. The adjusted opening stock price after dividend at the dividend ex-date is calculated as follows:

$$(3) \; p_{i,t+1}^{Adj} = \; p_{i,t} - d_{i,t+1} * \left(1 - w_{i,t+1}\right) * FX_{i,t}$$

with:

$p_{i,t+1}^{Adj} =$ *Adjusted Opening Price of index conponent i on business day t + 1*

$d_{i,t+1} =$ *dividend amount of index component i on business day t + 1*

$w_{i,t+1} =$ *Withholding Tax Rate in the country of incorporation of index component i*
     on business day t + 1

The price adjustments due to the dividend payments cause a delta between the closing (t) and the opening index market capitalization (t+1).

$$(4) \; \Delta MCAP = \sum_{i=1}^{n} x_{i,t} * p_{i,t} * FX_{i,t} * WCF_{i,t} * FFF_{i,t} - \sum_{i=1}^{n} x_{i,t} * p_{i,t+1}^{Adj} * FX_{i,t} * WCF_{i,t} * FFF_{i,t}$$

This change on the market capitalization which is triggered by the dividend adjustment needs to be equalized to keep the index level constant. Accordingly, the opening index divisor on the dividend ex-date is adjusted.

$$(5) \; Divisor_{t+1}^{Open} = \frac{Index \; MCAP_t - \Delta MCAP}{IL_t}$$

with:

$Divisor_{t+1}^{Open} =$ *Opening Index Divisor on business day t + 1*

$\Delta MCAP =$ *delta index market capitalization between the close index MCAP*
     on business day t and the open MCAP on business day t + 1

The estimated dividend amounts for Japanese and South Korean companies will be applied to the indices as described above. A post ex-date dividend adjustment in terms of index dividend points to reflect the delta dividend between the confirmed and estimated amounts is calculated:

$$(6) \Delta d_{i,t} = (d_{i,ID} - d_{i,EX}) * (1 - w_{i,EX})$$

with:

$\Delta d_{i,t} =$ *delta dividend of component i on business day t*

$d_{i,ID} =$ *confirmed dividend amount of component i on Implemantation Date*

$d_{i,EX} =$ *estimated dividend amount of component i on Ex − Date*

$w_{i,Ex} =$ *Withholding tax rate rate in the country of incorporation of*

            index component i on Ex − Date

For the calculation of index dividend points on the Implementation Date, the calculation parameters of the particular stock from the ex-date are multiplied by the delta dividend and divided by the index divisor from the ex-date:

$$(7) DP_{i,ID} = \frac{\Delta d_{i,ID} * x_{i,EX} * FX_{i,ID-1} * WCF_{i,EX} * FFF_{i,EX}}{Divisor_{EX}}$$

with:

$DP_{i,ID} =$ *index dividend points of component i on Implementation Date*

$\Delta d_{i,ID} =$ *delta dividend of component i on Implementation Date*

$x_{i,EX} =$ *Total Number of Shares of component i on Ex − Date*

$FX_{i,ID-1} =$ *foreign Exchange Rate of index component i on Implementation Date − 1*

$WCF_{i,EX} =$ *Weighting Cap Factor of index component i on Ex − Date*

$FFF_{i,EX} =$ *Free Float Factor of index component i on Ex − Date*

$Divisor_{EX} =$ *Index Divisor on Ex − Date*

The index dividend points correspond to the delta index market capitalization in index level. In case multiple index constituents are affected, the individual dividend points of each constituent are aggregated. The aggregated value of index dividend points is added to the index level to reflect the delta dividends. Since the dividend point might be positive or negative, the index level is adjusted on the implementation date accordingly. The adjustment of the index level leads to a change on the index divisor.

$$(8) IL_{ID}^{Open} = IL_{ID-1}^{Close} + \sum_{i=1}^{n} DP_{i,ID}$$

with:

$IL_{ID}^{Open} =$ *Opening Index Level on Implementation Date*

$IL_{ID-1}^{Close} =$ *Closing Index Level on Implementation Date − 1*

The adjustment of the index level at the opening of the Implementation Date triggers a divisor adjustment. The index divisor from one day prior to the Implementation Date is adjusted by the Divisor Correction Factor which is the relation between the adjusted index level at the open of the Implementation Date and the close index level before the Implementation Date.

$$(9) Divisor_{ID}^{Open} = Divisor_{ID-1}^{Close} * \frac{IL_{ID-1}^{Close}}{IL_{ID}^{Open}}$$

with:

$Divisor_{ID-1}^{Close} =$ *Closing Index Divisor on Implementation Date − 1*

$Divisor_{ID}^{Open} =$ *Open Index Divisor on Implementation Date*

The post ex-date dividend adjustment is only applicable if the affected stock with delta dividend amount is an index constituent on the ex-date. Furthermore, the adjustment of the delta dividend is performed even when the stock with delta is not an index constituent on the Implementation Day anymore since this respective stock was an index constituent on the original ex-date.

Solactive can define the post ex-date dividend adjustment index-specifically, if the adjustment methodology is applicable for the particular index. The implementation overview below reflects two different options for the implementation. For Solactive-owned indices, the Option 1 will be applied. Upon request of our clients, we will be able to deactivate the proposed post ex-date dividend adjustment when our client is the index owner / administrator.
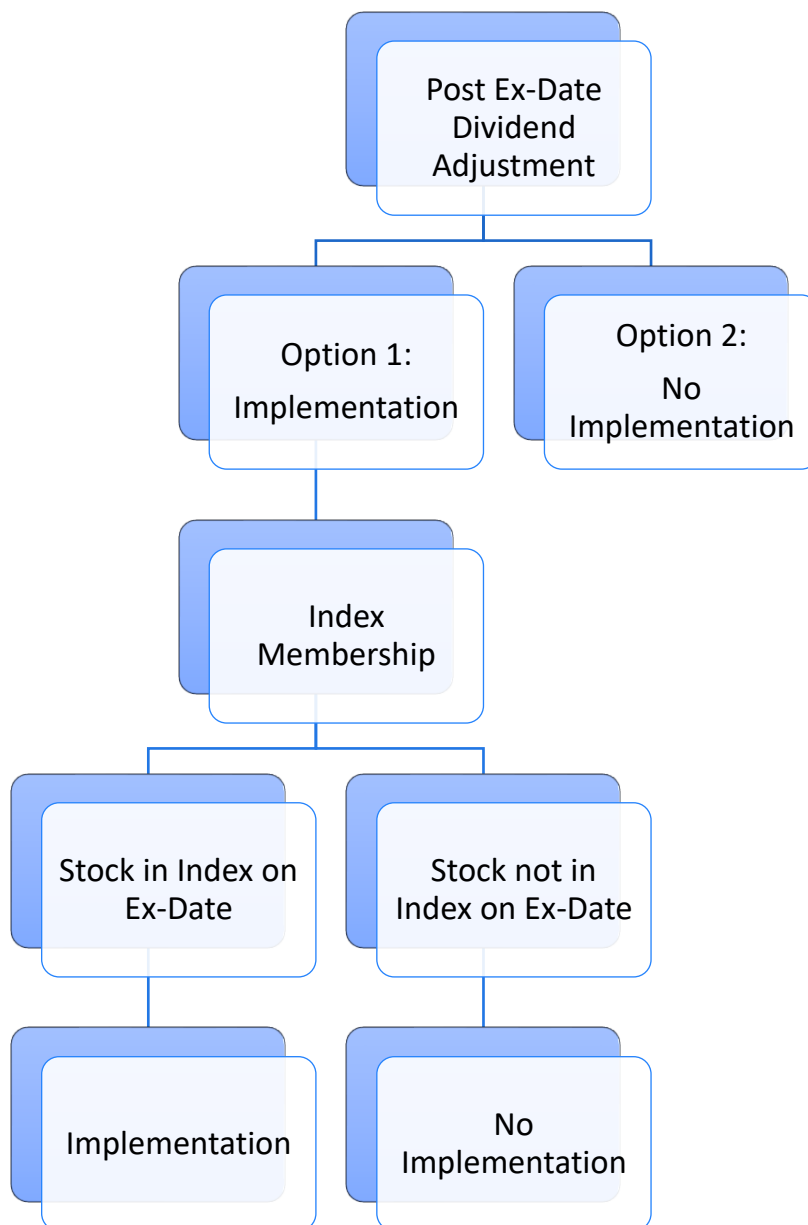
5. DIVIDEND ESTIMATION

Solactive will use the estimations provided from data vendors as dividend amounts on the ex-date. In case no estimation is available, Solactive will consider the dividend amount from the same dividend period of the previous year, adjusted for any share changes such as stock splits, stock dividends or right issues between the relevant dividend period and the ex-date. If a company did not pay any dividend last year and no estimation is available for the dividend amount, Solactive will apply a dividend amount of zero as estimation to be able to conduct a further adjustment when the company confirms a dividend payment for this particular ex-date.

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