Market Consultation DAX Methodology Change Document

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Current Rule	Proposed Rule
5.1.4 Extraordinary Free-Float Adjustments If the free-float factor of a company included in a selection index changes by more than 10 percentage points between two regular chaining dates due to a corporate action (e.g., subscription right or changes in share capital), the free-float factor will be updated extraordinarily. The rule does not apply to cases where the absolute change of the free-float adjusted number of shares (ffiT x qiT) before the ex-date of the corporate action is less than or equal to 10%, i.e., the corporate action is deemed market cap neutral. STOXX Ltd. will announce the new free-float factor at least two trading days before the change becomes effective. Free-float adjustments resulting from ongoing acquisitions (acquisitions as defined by the German Securities Acquisition and Takeover Act (WpÜG)) will be made extraordinarily in the respective index after the initial announcement and the final announcement at the end of each offer period or after the tender offer cancellation. Index changes will be announced two trading days before the change becomes effective. Shares held in fixed ownership will remain unchanged until further information, i.e., according to the WpHG (Germany's Securities Trading Act) or other official sources, is available. The extraordinary adjustment in each case will be carried out as described in section 7.1.1, with the only difference that the index composition will not be changed and only the free-float factor of the affected company will be updated.	**5.1.4 Extraordinary Adjustments in Free-Float and Number of Shares** The indices are updated to reflect changes in the number of free-floating shares and/or free-float factors due to corporate actions. The timing depends on the magnitude of the change: • Standard Corporate Actions: - Changes to **the number of free-floating shares due to stock dividends, splits, rights issues** etc. are implemented immediately and become effective the next trading day. • Mergers & Acquisitions: - If the free-float factor of a company included in a selection index changes by more than **10 percentage points** during the period of two regular chaining dates because of a corporate action (e.g., subscription right or changes in share capital), the free-float factor will be updated extraordinarily. - Changes to the number of shares greater than **10 percent** from one trading day to the next are announced immediately, implemented two trading days later and become effective the trading day after implementation. - Changes to the **combined free-float adjusted number of shares greater than 10 percent** from one trading day to the next are announced immediately, implemented with 2-trading days' notice and become effective the next trading day after implementation. • Other: - All **other applicable changes** are announced on the next quarterly underlying data announcement date, implemented on the quarterly chaining date and become effective at review effective dates. ~~The rule does not apply to cases where the absolute change of free float-adjusted number of shares (ffiT x qiT) before the ex-date of the corporate action is less than or equal to 10%, i.e., the corporate action is deemed market cap~~

~~neutral. STOXX Ltd. will announce the new free float factor at least two trading days before the change becomes effective.~~

Free-float adjustments resulting from ongoing acquisitions (as defined by the German Securities Acquisition and Takeover Act (WpÜG)), will be made extraordinarily in the respective index between the initial announcement and the final announcement at the end of each offer period or after the cancellation of the tender offer. Index changes will be announced two trading days before the change becomes effective. Shares held in fixed ownership will remain unchanged until further information, i.e., according to the WpHG (Germany' Securities Trading Act) or other official sources, is available.

In each case, the extraordinary adjustment will be carried out as described in section 7.1.1, with the only difference that the index composition will not be changed and only the free-float factor of the affected company will be updated.

6.1 INDEX FORMULAS

6.1.1 Index Formula for free-float market capitalisation weighted indices

The selection indices of the DAX® index family are capital weighted. Only the shares in free-float are considered when calculating the capitalization. The indices are each calculated as price and performance indices.

The indices in the DAX® family use the Laspeyres index formula and are calculated as follows:

$$Index_t = K_T \cdot \frac{\sum p_{it} \cdot ff_{iT} \cdot q_{iT} \cdot c_{it}}{\sum p_{i0} \cdot q_{i0}} \cdot Base$$

whereby:

c_{it} = Adjustment factor of company i at time t
ff_{iT} = Free float factor of share class i at time T
n = Number of shares in the index

6.1 INDEX FORMULA AND DIVISOR CALCULATION

The indices are calculated with the Laspeyres formula, which measures price changes against a fixed base quantity weight. Each index has a unique index divisor, which is adjusted to maintain the continuity of the index's values across changes due to corporate actions.

6.1.1 Market Capitalization-Weighted (replaces former sections 6.1.1 and 6.1.2)

The indices are calculated with the Laspeyres formula, which measures price changes against a fixed base quantity weight:

$$Index_t = \frac{\sum_{i=1}^{n}(p_{it} \cdot s_{it} \cdot ff_{it} \cdot cf_{it} \cdot x_{it})}{D_t} = \frac{M_t}{D_t}$$

Where:

t = Time the index is computed
n = Number of companies in the index
p_{it} = Price of company (i) at time (t)
s_{it} = Number of shares of company (i) at time (t), *previously known as q_{it}*
ff_{it} = Free float factor of company (i) at time (t)
cf_{it} = Weighting cap factor of company (i) at time (t), *previously directly adjusted in q_{it}*

p_{i0} = Closing price of share i on the trading day before the first inclusion in the index
p_{it} = Price of share i at time t
q_{i0} = Number of shares of company i on the trading day before the first inclusion in the index
q_{iT} = Number of shares of company i at time T
t = calculation time of the index
K_T = Index-specific chaining factor valid as of chaining date T
T = Date of the last chaining
Base = value of the index at base date

The formula set out below is equivalent in analytic terms, but designed to achieve relative weightings:

$$\text{Index}_t = \frac{\sum_{i=1}^{n} p_{it} \cdot (K_T \cdot \frac{ff_{iT} \cdot q_{iT}}{\sum_{i=1}^{n} q_{i0}} \cdot 100 \cdot c_{it})}{\sum_{i=1}^{n} p_{i0} \cdot \frac{q_{i0}}{\sum_{i=1}^{n} q_{i0}} \cdot 100} \cdot \text{Basis} = \frac{\sum_{i=1}^{n} p_{it} \cdot F_i}{A} \cdot \text{Basis}$$

whereby:
$$A = \sum_{i=1}^{n} p_{i0} \cdot \frac{q_{i0}}{\sum_{i=1}^{n} q_{i0}} \cdot 100$$

and:
$$F_i = K_T \cdot \frac{ff_{iT} \cdot q_{iT}}{\sum_{i=1}^{n} q_{i0}} \cdot 100 \cdot c_{it}$$

The index calculation can be reproduced in simplified terms by using the expression Fi:

- Multiply the current price by the respective Fi weighting factor;
- Take the sum of these products; and
- Divide this by the base value (A), which remains constant until the index composition is modified.

The Fi factors provide information on the number of shares required from each company to track the underlying index portfolio.

6.1.2 Index Formula for Market Cap-Weighted Indices

The same index formula as described under 6.1.1 is used for indices that are not weighted by Free Float Market Capitalisation, but by full market capitalisation, with the difference that:
ff_{iT} = 1

x_{it} = Exchange rate from local currency into index currency for company (i) at time (t), *previously not considered*
M_t = Free float market capitalization of the index at time (t), *previously not shown separately*
D_t = Divisor of the index at time (t), *previously not part of the concept*

Each index has a unique index divisor that is adjusted to maintain the continuity of the index's values across changes due to corporate actions. Changes in weights due to corporate actions are distributed proportionally across all index components. The index divisors are calculated as follows:

$$D_{t+1} = D_t \cdot \frac{\sum_{i=1}^{n}(p_{it} \cdot s_{it} \cdot ff_{it} \cdot cf_{it} \cdot x_{it}) \pm \Delta MC_{t+1}}{\sum_{i=1}^{n}(p_{it} \cdot s_{it} \cdot ff_{it} \cdot cf_{it} \cdot x_{it})}$$

Where:

D_{t+1} = Divisor at time (t+1)
D_1 = Divisor at time (t)
n = Number of companies in the index
p_{it} = Price of company (i) at time (t)
s_{it} = Number of shares of company (i) at time (t)

ff_{it} = Free float factor of company (i) at time (t)
cf_{it} = Weighting cap factor of company (i) at time (t) (only applicable if index is capped)
x_{it} = Exchange rate from local currency into index currency for company (i) at time (t)
ΔMC_{t+1} = The difference between the closing market capitalization of the index and the adjusted closing market capitalization of the index:
For companies with corporate actions effective at t+1, the free-float market capitalization is calculated with adjusted closing prices, the new number of shares at time (t+1) and the free-float factor at time (t+1) minus the free- float market capitalization calculated with closing prices, number of shares at time (t) and free-float factor at time (t).

For Full Market-Cap weighted Indices set ff_{it} = 1

6.1.3 Index Formula for Equally Weighted Indices

The same index formula as described under 6.1.1 is used for equally weighted indices, such as the Scale All Share, with the difference that:

ff_{iT} = 1

q_{i0} = Weighting factor of company i on the trading day before the first inclusion in the Scale All Share Index

q_{iT} = Weighting factor of company i at time T

6.1.3 Price-Weighted With Weighting Factors

The indices are weighted based on the components' stock prices and weighting factors:

$$Index_t = \frac{\sum_{i=1}^{n}(p_{it} \cdot wf_{it} \cdot cf_{it} \cdot x_{it})}{D_t} = \frac{M_t}{D_t}$$

Where:

t = Time the index is computed

n = Number of companies in the index

p_{it} = Price of company (i) at time (t)

wf_{it} = Weighting factor of company (i) at time (t)

cfi_t = Weighting cap factor of company (i) at tim

x_{it} = Exchange rate from local currency into ind

M_t = Total 'units' of the index at time (t)

D_t = Divisor of the index at time (t)

Each index has a unique index divisor that is adjusted to maintain the continuity of the index's values across changes due to corporate actions. Changes in weights due to corporate actions are distributed proportionally across all index components. The index divisors are calculated as follows:

$$D_{t+1} = D_t \cdot \frac{\sum_{i=1}^{n}(p_{it} \cdot wf_{it} \cdot cf_{it} \cdot x_{it}) \pm \Delta MC_{t+1}}{\sum_{i=1}^{n}(p_{it} \cdot wf_{it} \cdot cf_{it} \cdot x_{it})}$$

Where:

D_{t+1} = Divisor at time (t+1)

D_t = Divisor at time (t)

n = Number of companies in the index

p_{it} = Price of company (i) at time (t)

wf_{it} = Weighting factor of company (i) at time (t)

cf_{it} = Weighting cap factor of company (i) at time (t) (only applicable if index is capped)

x_{it} = Exchange rate from local currency into index currency for company (i) at time (t)

ΔMC_{t+1} = The difference between the units in the index at closing and the units in the index after calculation parameters have been adjusted as follows:

For companies with corporate actions effective at time (t+1), the

	units in the index are calculated with adjusted closing prices, the adjusted weighting factors at time (t+1) and the adjusted weighting cap factors at time (t+1) minus the units in the index calculated with closing prices, weighting factors at time (t) and weighting cap factors at time (t).

8 ADJUSTMENTS – CORPORATE ACTIONS

The total return indices are adjusted for external influences (e.g., price-relevant capital changes) by means of certain correction factors, assuming a reinvestment according to the "opération blanche".

The indices are simultaneously adjusted for systematic price changes using ex-ante calculations of the correction factor. The prerequisite for this is to calculate the correction factor on an ex-ante basis.

Consequently, the first "ex" price can be adequately included for index calculation purposes. The ex-ante incorporation of adjustments presupposes a general acceptance of the computation formula as well as a general availability of the parameters used.

The calculated adjustment factor and a synthetic price accordingly adjusted for this factor are used in the index from the ex-date of a share as long as no "ex" price is available.

8 ADJUSTMENTS – CORPORATE ACTIONS

The list of corporate actions indicate the calculation of the adjusted prices and the impact on the index divisor. All corporate actions and dividend payments are implemented at the effective date (ex-date); i.e. with corporate actions where cash or other corporate assets are distributed to shareholders, the price of the stock will drop on the ex-date. Changes in weights due to corporate actions are distributed proportionally across all index components and equal an investment into the portfolio.

Withholding taxes are considered for all corporate actions and dividends where applicable and defined per country. If STOXX becomes aware of an exception on the taxation; e.g. in case a company confirms a deviating tax treatment, the exception will be used for the index calculation.

For the latest update on withholding taxes, please visit the following link:
http://www.stoxx.com/indices/taxes.html

For the corporate actions listed below, the following assumptions apply:

- Shareholders will receive "B" new shares for every "A" share held (where applicable).
- All adjusted prices consider withholding taxes based on the new shares being distributed: B × (1 – withholding tax where applicable).
- If the new shares have a dividend disadvantage - i.e. new shares have a different dividend versus the dividend paid on old shares - the price for these new shares will be adjusted according to the gross dividend amount.

8.1 DISTRIBUTIONS

8.1.1 Cash Dividends and Other Distributions

Cash dividends and bonus distributions are only corrected in performance and net return indices. Special distributions are taken account of in all performance, net return, and price indices. Within the framework of index calculation, the share price is thus modified by the amount of the respective cash distribution, as defined of Section 2.1 in DAX Equity Index Guide.

The cash dividend and other distributions are determined according to publicly available data such as issuers, financial regulators' announcements.

The c_{it} adjustment factors for cash dividends, bonuses and special distributions are calculated as follows:

$$c_{it} = \frac{p_{i,t-1}}{p_{i,t-1} - D_{i,t}(1-\tau)} \cdot c_{it-1}$$

Where:

- $p_{i.t-1}$ = Closing price of the relevant share on the day before the ex-dividend date
- $D_{i,t}$ = Cash dividend, bonus, or special distribution on day t
- τ = withholding tax, only for net return indices, otherwise $\tau = 0$

The withholding tax used to calculate the net return indices can be found on www.stoxx.com.

8.1.2 Stock Dividend

The issue of shares instead of the distribution of cash to provide dividends is treated in the same way as bonus shares or nominal value changes and is accounted for in both performance and price indices. If the holder is granted the right to choose between cash dividends and stock dividends, it shall be assumed that cash dividends will be drawn.

8.1 DISTRIBUTIONS

8.1.1 Cash Dividends and Other Distributions

Cash dividend (applies to return indices only)

Definition: Cash distributions that are within the scope of the regular dividend policy or that the company defines as a regular distribution.

Adjusted price (net return) = closing price - dividend announced by the company × (1 – withholding tax)

Adjusted price (gross return) = closing price - dividend announced by the company

Divisor decreases

Special cash dividend (applies to price and return indices)

Definition: Cash distributions that are outside the scope of the regular dividend policy or that the company defines as an extraordinary distribution.

Adjusted price = closing price - dividend announced by the company × (1 - withholding tax if applicable)

Divisor decreases

8.1.2. Stock dividend

Adjusted price = closing price × A / (A + B)
New number of shares = old number of shares × (A + B) / A

For price-weighted indices with weighting factors:
New weighting factor = old weighting factor × (A + B) / A

Divisor unchanged

8.2 CHANGES IN SHARE CAPITAL

8.2 CHANGES IN SHARE CAPITAL

8.2.1 Capital Increases

The c_{it} adjustment factors for capital increases (against cash contributions, or using company reserves) are determined as follows:

$$c_{it} = \frac{p_{i,t-1}}{p_{i,t-1} - BR_{i,t-1}} \cdot c_{it-1}$$

Where:

$$BR_{i,t-1} = \frac{p_{i,t-1} - p_B - DN}{BV + 1}$$

and:

$p_{i,t-1}$ = Closing price on the day before the ex-date
$BR_{i,t-1}$ = Theoretical value of subscription rights
p_B = Subscription price
BV = Subscription ratio
DN = Dividend disadvantage

For capital increases using company reserves:
$p_B = 0$

The dividend disadvantage is equivalent to the last dividend paid or the proposed dividend published by financial data providers. For issues on which options are traded at Eurex, this procedure is coordinated with Eurex, taking account of the respective rights markdown to adjust the basis prices of the various equity options.

If the subscription price is not available or equal to or greater than the closing price on the day before the effective date, then no adjustment is made.

If the subscription price is available as a price range and not as a fixed price, Cit factor adjustment is performed only if both lower and upper range are in the money. The average value between lower and upper range will be used as a subscription price.

8.2.1 Rights offering

Standard rights issue treatments
a) Free-float market capitalization weighted indices
Adjusted price = (closing price × A + subscription price × B) / (A + B)

New number of shares = old number of shares × (A + B) / A

Divisor increases

b) Price weighted indices with weighting factors
Adjusted price = (closing price × A + subscription price × B) / (A + B)

New weighting factor = old weighting factor × closing price / adjusted price

Further distinctions are made applicable for both weighting schemas:

- Extremely dilutive rights issue with a share ratio larger or equal to 2000% (B/A≥20)
- Highly dilutive rights issue with a share ratio larger or equal to 200% (B/A≥2)

Extremely dilutive rights issues are treated as following:

- STOXX will announce the deletion of the company from all indices following the standard rules for index replacements if sufficient notice period can be given
- Sufficient notice period: STOXX is able to make an announcement about index changes two trading days before the ex-date
- The company may enter the indices again at the next periodic index review, but only after the new shares have been listed

Extremely dilutive rights issues without sufficient notice period and all highly dilutive rights issues are treated as follows:

Inclusion of the rights into the indices with a theoretical price on the ex-date.
The rights must be listed on an eligible stock exchange and tradable starting on the ex-date otherwise only a price adjustment is made.

The rights will have the same parameters as the parent company.

The rights will be removed at the close of the day they start to trade with traded price being available. The number of shares and weighting factors will be increased after the new shares have been listed.

If the subscription price is not available or equal to or greater than the closing price on the day before the effective date, then no adjustment is made.

If the subscription price is available as a price range and not as a fixed price, the price and share adjustment is performed only if both lower and upper range are in the money. The average value between lower and upper range will be used as a subscription price.

Divisor Unchanged

8.2.2 Capital Reductions

The following formula is used to calculate the c_{it} adjustment factor in the case of a simplified capital reduction:

$$c_{it} = \frac{1}{V_{it}} \cdot c_{it-1}$$

Where:

V_{it} = Reduction ratio of company i valid at time t

In the event of a capital reduction and subsequent capital increase against additional contributions, the introduction of a new class of shares is handled as follows:

The old classes are removed, and the new class is included with the corresponding computation of a chaining factor. In this context, two assumptions are made: firstly, that the last traded price could have been achieved, and secondly that the released capital will be invested in the new class on the subsequent day. The new class is included in the index based on the respective opening price on the first day of the new quotation.

8.2.2 Return of capital and share consolidation

Adjusted price = [closing price - capital return announced by company × (1 - withholding tax)] × A / B
New number of shares = old number of shares × B / A

For price-weighted indices with weighting factors:
new weighting factor = old weighting factor × B / A

Divisor decreases

8.3 Nominal Value Changes and Share Splits

In the case of nominal value changes (or share splits), it is assumed that the respective price changes occur in proportion to the related nominal value (or number of shares). The adjustment factor reflects this assumption accordingly:

$$c_{it} = \frac{N_{i,t-1}}{N_{i,t}} \cdot c_{it-1}$$

Where:

$N_{i,t-1}$ = Previous nominal value of share class i (or new number of shares)

$N_{i,t}$ = New nominal value of share class i (or previous number of shares)

8.4 Spin-offs

Where a company, A, spins off one of its divisions into new, independent companies, the adjustment is carried out as described below.

A theoretical markdown cannot be calculated on an ex-ante basis since there is no closing price for the shares of the new companies. The spun-off entities are additionally included in the index at a price of 0 on the ex-date to avoid any index tracking errors. For a spin-off affecting the DAX®, for instance, this implies that the index is calculated based on more than 40 issues for at least one day. After close of trading on their first trading day the spun-off companies are removed from the index. At the same time, the c_i factor of company A is adjusted as follows:

$$c_{i,t}^{A} = \left(1 + \sum_{j=B}^{N} \frac{c_{i,t-1}^{j} \cdot p_{i,t-1}^{j}}{c_{i,t-1}^{A} \cdot p_{i,t-1}^{A} \cdot \mathrm{BVj}}\right) \cdot c_{i,t-1}^{A}$$

Where:

$p_{i,t-1}^{A}$ = Closing price of "A" shares on t-1

$p_{i,t-1}^{j}$ = Closing price of spun-off company j on t-1

BV_j = Subscription ratio of spun-off company j

t-1 = First trading day of spun-off company j

t = point in time in which the spun-off companies are removed from the index

8.3 Split and reverse split

Adjusted price = closing price × A / B

New number of shares = old number of shares × B / A

For price-weighted indices with weighting factors: new weighting factor = old weighting factor × B/A

Divisor unchanged

8.4 Spin-off

Each spin-off stock is temporarily added to all affected indices, including the fixed component indices, based on the price of 0. As a precondition, the basic criteria set out in chapter 4.1.1.1 must be met. If the spin-off company does not qualify based on the rules set out below, it will be deleted at the close of the day it starts to trade with the traded price being available. Separate buffer rules and additional requirements for individual indices may be applied according to specific index methodology, as outlined in the DAX methodology guides.

Changes are announced immediately, implemented two trading days later and become effective on the next trading day after implementation.

DAX selection Indices

After the end of the first trading day, each spin-off is added to the latest ranking list based on a pro-rata calculation of the Market Capitalization and Order Book Volume of the mother company.
Each spin-off stock qualifies for addition, if it lies within the Fast Entry buffer on the latest index ranking list for the specific index. The spin-off replaces the lowest ranked stock in that index, as determined by the latest ranking list
Consequently, the leaving stock is added to the subordinated index, in which again the lowest ranked company will be replaced and so forth.

Qualifying spin-off stocks are added in sequence:
The largest qualifying spin-off stock replaces the original stock in the index

The next qualifying spin-off stock replaces the lowest ranked stock in the index

Likewise for the other qualifying spin-off stocks

For all share indices and derived indices:
The spin-off stock is added, if it qualifies for the respective All Share Index.

Determination of adjusted Price to determine Divisor change.

a) Free-float market capitalization weighted indices:
Adjusted price = (closing price × A - price of spun-off shares × B) / A

Divisor decreases

b) Price-weighted indices with weighting factors:
Adjusted price = (closing price × A - price of spun-off shares × B) / A

New weighting factor for the spin-off = weighting factor of the parent company × B/A

Divisor decreases

11.2 CALENDAR OF PUBLICATIONS

Event	Point in Time
Publication Equity Index Rankings (monthly)	3rd trading day of the month after 10 p.m. CET
Publication additions/ deletions	3rd trading day in March, June, September, December after 10 p.m. CET
Publication DAX 50 ESG Index Rankings	4th trading day of the month after 10 p.m. CET
Publication DAX 50 ESG Index additions/ deletions	4th trading day in March, June, September, December after 10 p.m. CET
Publication Business Forecast	One trading day (before 9 a.m. CET) before chaining date in March, June, September, December
Chaining date, also referred to as review date	3rd Friday in March, June, September, December
Cut-off date for creation of ranking list	Last trading day of the month (at 5:30 p.m. CET) for which the ranking list will be created, e.g. May 31st for May ranking list
Meeting Advisory Board for Equity Indices	not later than the 6th trading day in March and September
Annual sector classification review	annually in August with publication in September

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Event	Point in Time
Publication Equity Index Rankings (monthly)	3rd trading day of the month after 10 p.m. CET
Publication additions/ deletions	3rd trading day in March, June, September, December after 10 p.m. CET
Publication DAX 50 ESG Index Rankings	4th trading day of the month after 10 p.m. CET
Publication DAX 50 ESG Index additions/ deletions	4th trading day in March, June, September, December after 10 p.m. CET
Publication Business Forecast/ Index Review File	5th trading days before the chaining date in March, June, September, December at 22:00 CET
Chaining date, also referred to as review date	3rd Friday in March, June, September, December or the following trading days in case the 3rd Friday is a bank holiday
Cut-off date for creation of ranking list	Last trading day of the month (at 5:30 p.m. CET) for which the ranking list will be created, e.g. May 31st for May ranking list
Meeting Advisory Board for Equity Indices	not later than the 6th trading day in March and September
Annual sector classification review	annually in August with publication in September