

**GUIDE TO CALCULATION
METHODS FOR THE
FTSE GLOBAL EQUITY
INDEX SERIES**

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SECTION 1

1.0 PURPOSE OF THE GUIDE

1.1 The aims of the guide are:

- (a) to describe how the indices are calculated;
- (b) to make it easier for users to replicate the indices in order to support their investment and trading activities; and
- (c) to assist users in understanding the component factors which influence the performance of the indices.

SECTION 2

2.0 STATEMENT OF PRINCIPLES

2.1 The guiding principles behind the calculation methods described in the guide are:

- (a) the indices and index statistics are produced primarily for use in analysing investment strategies and as a measure of portfolio performance for professional investors such as pension funds, insurance companies and other institutional investors;
- (b) all calculations are based on declared dividends;
- (c) the calculation methods should reflect reality wherever practical;
- (d) the indices should be capable of being replicated by users. The calculation methods should not, therefore, be over-complex or use data not readily available;
- (e) only historic data should be used in calculating the index statistics;
- (f) data used in the indices should originate from an authoritative source. Wherever possible, data published in audited accounts and other public statements from companies (including interim statements) will be used with minimal amendment;
- (g) continuity with the past should be retained wherever possible;
- (h) consistency of calculation methods and data should be maintained wherever practical;
- (i) market practitioners from among both investors and brokers should be actively involved in determining 'best practice' to be used in the calculation of the indices and in ensuring that the indices continue to meet current market needs;
- (j) the views of users from around the world should be represented on our practitioner committees. Our decisions should be consensus driven wherever possible;
- (k) decisions should be taken independent of any single interest group. The interests of investors, analysts and constituent companies will be balanced in managing the indices;
- (l) the indices should be transparent and predictable;
- (m) in applying stock events, the position of the underlying portfolio should be accurately reflected;
- (n) Occam's razor: Wherever possible the simple and practical approach should be preferred;
- (o) the primary purpose of the indices is to reflect movements in the underlying market accurately.

SECTION 3

3.0 INDEX CALCULATION METHOD

- 3.1 The FTSE Global Equity Index Series is an arithmetic weighted Series where the weights are the market capitalisation of each company. The price index is the summation of the free float adjusted market values (or capitalisations) of all companies within the index and each constituent company is weighted by its market value (shares-in-issue multiplied by share price multiplied by free float factor) to which an investibility weighting may be applied. The price movement of a larger company (say, representing five per cent of the value of the index) will, therefore, have a larger effect on the index than a smaller company (say, representing one per cent of the value of the index).
- 3.2 The formula used for calculating the indices is straightforward. However, determining the capitalisation of each constituent company and calculating the capitalisation adjustments to the index is more complex. The index value itself is simply a number which relates the total market value of all companies within the index at a particular point in time compared to a comparable calculation at a starting point.
- 3.3 The algorithms used to calculate the index are detailed in Section 8.
- 3.4 The FTSE Global Equity Index Series consists of those countries listed in Appendix F of the FTSE Global Equity Index Series Ground Rules.
- 3.5 Where a company does not list all its shares in an eligible class these unlisted shares are not eligible for index inclusion, but are included for ranking purposes where recognised. Where a company does not list an entire class, these unlisted shares are not eligible.

SECTION 4

4.0 STATISTICAL PROCEDURES

4.1 Capital Changes

The general rule for calculating the required adjustment following capital changes is:

$$\text{Adjustment} = \text{Last price} [(\text{total number of shares now in issue} \times \text{adjustment factor}) - \text{previous number of shares in issue}]$$

The "adjustment factor" represents the adjustment to historic prices required to maintain comparability with current prices.

Example 1 - Rights Issue

Current Price	=	300p
Shares in Issue	=	300m
		Terms: 1 for 4 at 260p
Theoretical ex-rights	=	$[(4 \times 300) + (1 \times 260)] \div 5$
	=	292p
Adjustment factor	=	Ex-Rights Price/Cum-Rights Price
	=	292/300
	=	0.9733

The required adjustment to overall market capitalisation can be looked at simply as the value of the new equity being added, i.e. $75\text{m} \times 260\text{p} = \text{£}195\text{m}$. The general adjustment rule below would provide the same answer:

$$\begin{aligned} \text{Required adjustment} &= 300\text{p} [(375\text{m} \times 0.9733) - 300\text{m}] \\ &= \text{£}195\text{m} \end{aligned}$$

Please note: In the event that the market price is equal to or below the rights offer price at the close of business immediately before trading ex-dividend, no adjustments will be made. In this circumstance, any resulting new shares will only be added to the index weighting once the take-up proportion is known and together with any associated change to the company's free float.

SECTION 4

Example 2 - Scrip Issue

Current Price	=	300p
Shares in Issue	=	300m
		Terms: 1 for 1 scrip (equivalent to 2 for 1 US stock split)
Ex-Scrip Price	=	150p
Ex-Scrip Shares in issue	=	600m
Adjustment factor	=	$150/300 = 0.5$

Application of the general adjustment rule would show that no adjustment to the overall market capitalisation is required:

Required adjustment	=	$300p [(600m \times 0.5) - 300m]$
	=	Nil

The following table shows the adjustment to overall market capitalisation following capital changes. The example overleaf illustrates how those adjustments maintain the continuity of the indices;

Example 3 - Maintaining Continuity

DAY	EVENT	ACTION	START CAPITALISATION	MARKET MOVEMENT	END CAPITALISATION	CLOSING INDEX*
					1000.0	100.00
DAY 1			1000.0	2.0 %	1020.0	102.00
DAY 2	Stock XYZ added	Add market cap (50m)	1070.0	3.0 %	1102.1	105.06
DAY 3	Rights issue	Add value of rights (100m)	1202.1	- 4.0 %	1154.0	100.86
DAY 4	Scrip issue	None	1154.0	5.0 %	1211.7	105.90
DAY 5	Stock XYZ deleted	Decrease market cap (60m)	1151.7	1.0 %	1163.2	106.96

*Index = Previous Index (End Cap/Start Cap)

SECTION 4

Corporate Actions

TYPE OF ACTION	ADJUSTMENT FACTOR	ADJUSTMENT REQUIRED
Rights issue	$\begin{aligned} & (\text{No of shares held before issue} \times \text{Last cum-rights}) \\ & + (\text{Number of new shares} \times \text{Call}) \\ & \div (\text{Number of old shares held} + \text{new shares}) \times \text{last cum-rights price} \end{aligned}$	Increase Cap by: (New shares \times Call) *
Scrip issue (sometimes known as capitalisation bonus or gratis issue)	$\begin{aligned} & \text{Number of shares held before issue} \\ & \div \text{No of shares held after issue} \end{aligned}$	None
Scrip issue of different, eligible security	$\begin{aligned} & \text{Value of both securities after issue} \\ & \div \text{Value of security before issue} \end{aligned}$	None
Scrip issue of different, ineligible security	$\begin{aligned} & \text{Value of original security after issue} \\ & \div \text{Value of security before issue} \end{aligned}$	Decrease Cap by: (New shares \times Price of other stock) *
Combined scrip and rights issue	$\text{Rights issue adj factor} \times \text{Scrip issue adj factor}$	Increases Cap by: New equity raised *
Consolidation (Reverse split)	$\begin{aligned} & \text{No of shares held before issue} \\ & \div \text{No of shares held after issue} \end{aligned}$	None
Combined sub-division and scrip issue	$\text{Sub-division adj factor} \times \text{Scrip issue adj. Factor}$	None
Stock dividend	$100 \div 100 + \text{stock dividend amount}$	None
Capital repayment and spin-off	$\begin{aligned} & \text{Price of parent company after spin-off} \\ & \div \text{Price of parent before spin-off} \end{aligned}$	Decrease Cap by: Value of spin-off
New Issue		Increase Cap by: (New shares \times Price at Inclusion) *

*Investibility weights are also applied where necessary.

SECTION 4

4.2 Stocks Trading on a Non-Domestic Exchange

The price source and nationality of constituent stocks is decided individually (see FTSE Global Equity Index Series Ground Rule 3.1), therefore the constituents of a Country Index may price from non-domestic stock exchanges. Thus, price movements and exchange rate movements may be reflected in a Country Index when the domestic exchange is closed. Companies trading in a currency other than the currency of the domestic market (e.g., Jardine Group companies) or in markets that share currencies with other markets (e.g., Eurozone markets, Shanghai & Shenzhen stock markets) may cause that market index to change when the market is closed, due to movements in the foreign exchange rate.

- 4.2.1 FTSE monitors the relative liquidity of the foreign board and domestic quotes of Thai and Malaysian stocks, and the most liquid line is used for pricing constituent stocks. Should there be a change in relative liquidity, measured on a monthly basis FTSE will swap to the most liquid line. Any changes are announced prior to implementation, which will be after the close of business on the third Friday in the month.

4.3 Dividends

- 4.3.1 The dividends used are the declared dividends, re-invested on their ex date.

4.4 Pricing of Brazilian Constituents

- 4.4.1 Constituents of the FTSE Brazil Index are priced in lots. FTSE uses the "Quote Lot" size, which may be altered from time to time by the Brazilian Stock Exchange. For more details please contact FTSE Client Services, whose details may be found in Section 13, below.

SECTION 5

5.0 TOTAL RETURN INDICES

The total return index calculations add the income a stock's dividend provides to the performance of the index. A series of net of tax indices are also calculated based on a Luxembourg based UCIT fund (Undertaking for Collective Investment in Transferable Securities). The underlying tax rate information is compiled by Datavenue Limited and is available from FTSE. The total return calculation for the FTSE Global Equity Index Series calculation can be expressed as:

$$RI_i = RI_{i-1} \cdot X_i / (X_{i-1} - (AD_i / (M_i / X_i)))$$

where

i	=	time period.
RI_i	=	Return Index at time i .
X_i	=	Capital Index at time i .
X_{i-1}	=	Capital Index at time $i-1$.
AD_i	=	Market Value of Dividends effective at time i .
M_i	=	market capitalisation of constituents at time i .

Note the formula $(AD_i / (M_i / X_i))$ calculates the XD adjustment for an index.

Aggregate Dividend

The aggregate dividend (D_i) represents the sum of the dividend value of all stocks included in the index:

$$AD_i = \sum adj \cdot n_j \cdot w_j \cdot c_f \cdot E_{j-1}$$

where

adj	=	the actual dividend for the stock in period i .
n_j	=	the number of shares issued and outstanding at the end of the period i .
w_j	=	the investibility weight of the stock in the index in period i .
c_f	=	the net of tax dividend adjustment factor for the relevant country in period i (please contact FTSE for further information on the tax rates used in the calculation). Please note that this factor is 1 for non-net of tax indices.
E_{j-1}	=	WM exchange rate as of 4pm London time of the index at $i-1$ (applies only to dividends paid in a different currency to the index).

SECTION 5

Dividend Yield

The dividend yield for a stock is calculated as follows:

$$\text{Stock Annual Dividend} / \text{Stock Price} = \text{Stock Yield (\%)}$$

The dividend yield for an index is calculated as follows:

$$\text{Dividend Mkt Cap} / \text{Index Mkt Cap} = \text{Index Yield (\%)}$$

NOTES:

1) Dividend Mkt Cap is the sum of the stock dividend market values within that index e.g. annual dividend x shares x weight x net of tax dividend adjustment factor (Please note that this factor is 1 for non-net of tax indices). Dividends will need to be converted into the currency of that index if different.

2) Index Market Cap is the net market cap for the index in question.

SECTION 6

6.0 FOREIGN EXCHANGE RATES

Foreign exchange rate values against the US dollar at the base date, 31 December 1986, were as follows:

REGION	COUNTRY	CURRENCY	EXCHANGE RATE AT 31 DECEMBER 1986
Europe/	Austria	Schilling	13.5425
Middle East/	Belgium	Franc	40.55
Africa	Czech Republic	Koruna	5.750000
	Denmark	Kroner	7.3525
	Egypt	Pound	0.693657
	Eurobloc	Euro	0.8684
	Finland	Markka	4.7669
	France	Franc	6.3750
	Germany	Deutsche Mark	1.9235
	Greece	Drachma	139.5000
	Hungary	Forint	0.021774
	Ireland	Punt	0.7097
	Israel	Shekel	149.797600
	Italy	Lira	1339.0
	India	Rupee	12.951350
	Luxembourg	Luxembourg Franc	40.5500
	Morocco	Dirham	8.616734
	Netherlands	Guilder	2.1910
	Norway	Krone	7.3675
	Pakistan	Rupee	17.004050
	Poland	Zloty	0.0050602
	Portugal	Escudo	146.1000
	Russia*	Ruble	1.00*
	Spain	Peseta	132.0
	Sweden	Krona	6.7550
	Switzerland	Franc	1.6130
	Turkey	Turkish Lira	0.001323
	United Kingdom	Pound	0.6745

* The FTSE Russia index uses US Dollars as the local currency

SECTION 6

(Foreign exchange rates, Con't)

REGION	COUNTRY	CURRENCY	EXCHANGE RATE AT 31 DECEMBER 1986
Americas	Argentina	Peso	1.256613
	Brazil	Real	0.5432*
	Chile	Peso	198.576200
	Columbia	Peso	218.839400
	Canada	Dollar	1.3810
	Mexico	Peso (Comm)	914.6220
	Peru	Sol	14.001350
	United States	Dollar	1.0000
	Venezuela	Bolivar	4.257760
	Asia Pacific	Australia	Dollar
Hong Kong		Dollar	7.7890
Indonesia		Rupiah	1630.0840
Japan		Yen	158.20
Korea		Won	853.861700
Malaysia		Ringgit	2.5965
New Zealand		Dollar	1.8832
Philippines		Peso	20.0661
Singapore		Dollar	2.17
Thailand		Baht	25.7655
Taiwan	New Dollar	35.053980	

* Adjusted for hyperinflation

*Further information on The WM/Reuters Closing Spot Rates™ service is available from The WM Company, World Markets House, Crewe Toll, Edinburgh, EH4 2PY
Tel: + 44 (0) 131 315 2000*

SECTION 7

7.0 FREE FLOAT ADJUSTMENT

7.1 Free Float

- 7.1.1 Free float is the proportion of shares tradable within the market place for a given stock. The free float adjustment which FTSE makes within its indices is to reflect situations where a party owns a proportion of a line of stock and that proportion is unlikely to be for sale. An example would be that, at the time of writing, Olivetti SpA owns 55% of Telecom Italia (Ord). In accordance with the banding structures as defined in Ground Rule 9.4.3 (vii), Telecom Italia would therefore be weighted at 50% in the index.
- 7.1.2 Free float is not purely restricted to which listed companies or other constituents own what proportion of other listed companies, but also takes into consideration interests held by other parties. An example of this case could be the Peugeot family, who own 25.11% of Peugeot. This would lead to a free float banding of 50%.
- 7.1.3 When testing the liquidity of existing constituents of an index, the banded free float weight as at the last date in the period of liquidity to be tested will be used for the calculation for the whole of that period.
- 7.2 The calculation of the investibility weight will use the following algorithm:

- BW_{t-1} = Width of Free-Float Band (previous)
 B_{t-1} = Free-Float Banded Value (previous)
 ff_{t-1} = Free-Float (previous)
 ff_t = Free-Float (current)
 R = Total Free-Float Restriction
 R_D = Domestic Free-Float Restriction
 R_F = Foreign Free-Float Restriction
 F_I = Foreign Ownership Restriction (Investible (%))
 F_N = Foreign Ownership Restriction (Non-Investible (%))
 I_w = Investible Free-Float adjusted Index Weighting (current)
 I_{w-1} = Investible Free-Float adjusted Index Weighting (previous)

$$\left[R = R_D + R_F \right] \left[100 = F_I + F_N \right] \left[F_I \geq R_F \right]$$

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We will be testing the inequality: $F_I - R_F \leq 100 - (R_F + R_D) = 100 - R$

This can be simplified by adding R_F either side of the equation, to give:

$$F_I \leq 100 - R_D$$

Now to show only the Non-Investible portion of the Foreign Ownership Restriction, we substitute F_I with $100 - F_N$ to give:

$$100 - F_N \leq 100 - R_D$$

This is further simplified by taking 100 and multiplying either side of the inequality by -1, to give:

$$F_N \geq R_D$$

[CASE 1]

If $F_N \geq R_D$

Then $100 - F_N - R_F$ takes precedence

$$ff_t = 100 - F_N - R_F \Rightarrow \text{GO TO BANDING ALGORITHM}$$

If $I_w \leq 100 - F_N$, Then $ff_t = I_w \Rightarrow \text{EXIT}$

Else $ff_t = 100 - F_N \Rightarrow \text{EXIT}$

[CASE 2]

Else If $F_N < R_D$

Then $100 - R$ takes precedence

$$ff_t = 100 - R \Rightarrow \text{GO TO BANDING ALGORITHM}$$

If $I_w \leq 100 - F_N$, Then $ff_t = I_w \Rightarrow \text{EXIT}$

Else $ff_t = 100 - F_N \Rightarrow \text{EXIT}$

SECTION 7

7.3 Free Float Banding Algorithm

if (exists ff_{t-1}) and not (exists B_{t-1}) then $B_{t-1} = ff_{t-1}$

if not (exists ff_{t-1}) or ($ff_t \leq 15\%$) or ($ff_t + 5 < B_{t-1} - BW_{t-1}$) or ($ff_t > B_{t-1} + 5$) then

$ff_t \leq 5\%$; $I_w = 0\%$,	$B_t = 0\%$,	$BW_t = 0\%$
$5\% < ff_t^* \leq 15\%$; $I_w = 0\%$,	$B_t = 0\%$,	$BW_t = 0\%$
$15\% < ff_t \leq 20\%$; $I_w = 20\%$,	$B_t = 20\%$,	$BW_t = 10\%$
$20\% < ff_t \leq 30\%$; $I_w = 30\%$,	$B_t = 30\%$,	$BW_t = 10\%$
$30\% < ff_t \leq 40\%$; $I_w = 40\%$,	$B_t = 40\%$,	$BW_t = 10\%$
$40\% < ff_t \leq 50\%$; $I_w = 50\%$,	$B_t = 50\%$,	$BW_t = 10\%$
$50\% < ff_t \leq 75\%$; $I_w = 75\%$,	$B_t = 75\%$,	$BW_t = 25\%$
$75\% < ff_t$; $I_w = 100\%$,	$B_t = 100\%$,	$BW_t = 25\%$

else

$$I_w = I_{w-1}$$

$$* I_{w_{t+\delta t}} \in \mathbb{Z} [6, 15]$$

t+ δt = next review date.

7.4 Implementing Changes to Free Float Bandings

7.4.1 **Corporate events:** changes to free float (subject to the five percentage points threshold) will be applied on the effective date of the corporate event. Where possible, users will be notified via the standard pre-announcements issued by FTSE. If no pre-announcement has been made by the constituent company, changes to free float bandings will still be applied on the effective date of the corporate event and will be announced on the day prior to the effective date.

7.4.2 **Advance warning of sales of restricted equity:** if FTSE is alerted to a change in a restricted holding, the change to the free float (subject to the five percentage points threshold, see FTSE Global Equity Index Series ground rules) will be made as close as possible to the timing of the event and announced accordingly.

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- 7.4.3 **Retrospective sales of restricted equity:** if FTSE is alerted to a historic change in a restricted holding, the change to the free float (subject to the five percentage points threshold) will be made and four working days notice will be provided accordingly.
- 7.4.4 **Greenshoes:** those shares potentially to be offered as a greenshoe will not be included in the initial calculation of the free float of a company offering shares to the market. Following the offering, if the greenshoe option is exercised, these shares will be treated as free float and the company's investibility weighting adjusted, in accordance with rules 5.3.4 and 5.4, above.
- 7.4.5 Investability weight changes, other than those arising from corporate actions and corporate events, resulting from the collation of data gathered by or supplied to FTSE intra review, for constituents incorporated in countries other than those specifically under review in a given quarter will usually be accumulated throughout each quarter. Any such changes will be announced via an additional technical notice and identified as intra review changes, the announcement will usually be made after the index review technical notice announcements pertaining to scheduled country review changes, and made effective after the close of business on the third Friday of March, June, September and December

7.5 Companies with Free Float Less than 15%

- 7.5.1 The market value test (USD 5.0bn or USD 2.5bn) will only be applied at the time of a periodic index review and the launch of a new issue (IPO);
- 7.5.2 Company valuations will be based on their full market capitalisation using official closing (end of day) prices and Reuters/WM 16:00hrs fx rates;
- 7.5.3 The FTSE Equity Indices Committee will have the right to review and amend the USD 5.0bn or USD 2.5bn values over time to reflect longer-term changes in the markets.

SECTION 8

8.0 FTSE GLOBAL EQUITY INDEX SERIES ALGORITHMS

8.1 Introduction

8.1.1 The indices are calculated using the Chained Paasche methodology.

8.1.2 The index for an individual country in local currency is calculated after all security prices and capital changes affecting constituents since the previous calculation have been collected (i.e. since the last working day). Country indices in other currencies are derived by applying currency factors. In this description of the algorithms we discuss translation into dollars and sterling. Composite indices are derived by calculating the weighted mean performance of the constituent countries. This can be proved to be equivalent to the calculation of composite indices from first principles.

8.2 Country Index in Local Currency

8.2.1 Notation

Free Float of company <i>s</i> in country <i>c</i> at time <i>t</i>	F_{cst}
Number of shares in issue for company <i>s</i> in country <i>c</i> at time <i>t</i>	N_{cst}
Price in local currency for company <i>s</i> in country <i>c</i> at time <i>t</i>	P_{cst}
Value in local currency of capital changes adjusted for free float for each capital change in country <i>c</i> at time <i>t</i>	C_{ct}
Value in dollars of each unit of local currency in country <i>c</i> at time <i>t</i>	D_{ct}
Value in sterling of each unit of local currency in country <i>c</i> at time <i>t</i>	S_{ct}
Summation of company data within country <i>c</i>	s
Summation of country data within region <i>r</i>	c
Value of index for country <i>c</i> at time <i>t</i>	I_{ct}
Value of composite index at time <i>t</i>	I_{rt}

A country index at time *t*
$$I_{ct} = \frac{\sum_s N_{cst} P_{cst} F_{cst}}{B_{ct}}$$

where B_{ct} is the index base adjusted for past capital changes.

At the start of the index the base is $B_{co} = \sum_s N_{cso} P_{cso} F_{cso}$

or, the total market capitalisation of the constituent stocks at the start of the index.

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Until the first capital change, the value of N_{Cst} will not change and the index is:

$$\frac{\sum_s N_{cso} P_{cst} F_{cso}}{\sum_s N_{cso} P_{cso} F_{cso}}$$

This can be written as:

$$\frac{\sum_s N_{cso} P_{cso} F_{cso} \left(\frac{P_{cst}}{P_{cso}} \right)}{\sum_s N_{cso} P_{cso} F_{cso}}$$

establishing that the index reflects the weighted-average price performance of the constituents

To ensure continuity, it is necessary to adjust the base whenever a capital change takes place. The capital change, C_{ct} , is deemed to occur after the close of trading on day t-1 and before the calculation of the index on day t.

Thus:

$$I_{cst} = \frac{\sum_s N_{cst-1} P_{cst-1} F_{cst-1}}{B_{ct-1}} = \frac{\left(\sum_s N_{cst-1} P_{cst-1} F_{cst-1} \right) + C_{ct}}{B_{ct}}$$

The new base, B_{ct} , therefore becomes:

$$B_{ct-1} \left[1 + \frac{C_{ct}}{\sum_s N_{cst-1} P_{cst-1} F_{cst-1}} \right]$$

or:

$$B_{ct-1} + \frac{C_{ct}}{I_{ct-1}}$$

Alternatively, the change in an index on any day can be viewed as reflecting the percentage change in market capitalisation for capital changes.

SECTION 8

The performance of an index can be derived from

$$\frac{I_{ct}}{I_{ct-1}}$$

This equals:

$$\begin{aligned} & \frac{\sum_s N_{cst} P_{cst} F_{cst}}{B_{ct}} \bigg/ \frac{\sum_s N_{cst-1} P_{cst-1} F_{cst-1}}{B_{ct-1}} \\ &= \frac{\sum_s N_{cst} P_{cst} F_{cst}}{\sum_s N_{cst-1} P_{cst-1} F_{cst-1}} \left(\frac{B_{ct-1}}{B_{ct}} \right) \\ &= \frac{\sum_s N_{cst} P_{cst} F_{cst}}{\sum_s N_{cst-1} P_{cst-1} F_{cst-1}} \left(\frac{\sum_s N_{cst-1} P_{cst-1} F_{cst-1}}{\sum_s (N_{cst-1} P_{cst-1} F_{cst-1}) + C_{ct}} \right) \\ &= \frac{\sum_s N_{cst} P_{cst} F_{cst}}{\sum_s (N_{cst-1} P_{cst-1} F_{cst-1}) + C_{ct}} \end{aligned}$$

The denominator in this expression is subsequently referred to as adjcap_{ct} .

8.3 Country Indices in Local Currencies and Dollars

A country index in dollars at time t is: $\$I_{ct} = \frac{\left(\sum_s N_{cst} P_{cst} F_{cst} \right) D_{ct}}{\$B_{ct}}$

where $\$B_{ct}$ = Base of dollar index.

At the start,

$$\$B_{co} = \left(\sum_s N_{cso} P_{cso} F_{cso} \right) D_{co}$$

SECTION 8

Changes in the base are derived as before such that:

$$\begin{aligned} \$B_{ct} &= \$B_{ct-1} \left(1 + \frac{C_{ct} D_{ct-1}}{\left(\sum_s N_{cst-1} P_{cst-1} F_{cst-1} \right) D_{cst-1}} \right) \\ &= \$B_{ct-1} \left(1 + \frac{C_{ct}}{\left(\sum_s N_{cst-1} P_{cst-1} F_{cst-1} \right)} \right) \end{aligned}$$

and, from the derivation of B_{ct} in Section A, it can be seen that: $\frac{\$B_{ct}}{\$B_{ct-1}} = \frac{B_{ct}}{B_{ct-1}}$

showing that the proportional changes in dollar base values are the same as those for local currency base values.

A dollar index can therefore be derived more simply from:

$$\$I_{ct} = I_{ct} \cdot \left(\frac{D_{ct}}{D_{co}} \right)$$

Similarly, a sterling index can be derived from:

$$£I_{ct} = I_{ct} \cdot \left(\frac{S_{ct}}{S_{co}} \right)$$

or

$$£I_{ct} = \$I_{ct} \cdot \frac{(\$ / £)_t}{(\$ / £)_o}$$

SECTION 8

8.4 Local Currencies for Composite indices

Composite (regional) Indices are calculated for regional areas, including the FTSE All-World Index.

A composite index is one which has constituent stocks denominated in multiple currencies. Two different types of calculation are carried out on these indices, the first is a standard index calculation (as described above), the second is a calculation of an index value with currency movements stripped out.

The formula for composite indices is:

$$XL_i = ((PI_i / M'_i) + 1) \cdot XL_{i-1}$$

and when $i=1$,

$$XL_i = 100$$

where

- i = time period
- XL_i = composite local index at time i
- PI_i = Index performance adjusted for exchange rate fluctuations at time i .
- M'_i = adjusted market capitalisation (adjusted for stock splits, stock dividends, rights issues, new issues of stock, stock cancellations for constituents, changes in free float and the addition or deletion of constituents) represented in dollars using the exchange rates at $i-1$.

The index performance is used in the calculation of composite local indices, essentially it is the performance of the constituent indices and is calculated by:

$$PI_i = \sum (M_i - M'_i) \cdot E_{i-1}$$

where

- M_i = market capitalisation of constituent index at time i .
- M'_i = adjusted market capitalisation of the constituent index (adjusted for stock splits, stock dividends, rights issues, new issues of stock, stock cancellations for constituents, free float changes and the addition or deletion of constituents)
- E_{i-1} = exchange rate of the constituent index at $i-1$

SECTION 9

9.0 FTSE CURRENCY HEDGING ALGORITHMS

The FTSE currency hedging methodology allows exposure to the returns of the foreign assets in the index without being exposed to the volatility of the foreign exchange rates.

The Indices hedge each currency in two stages. The first stage calculates the impact of hedging for each country; the second stage applies this calculation to the hedged index.

Impact of Hedging

$$\text{Impact of Hedging} = \frac{\sum_{i=1}^n \left(\text{Mcap}_i C_{t+1} * HF * \left(\frac{S_{t+1}}{FIR} - \frac{S_{t+1}}{S_{t+2}} \right) \right)}{\sum_{i=1}^n \text{Mcap}_i C_{t+1}}$$

The impact of hedging weights each country by market capitalisation and calculates the hedged gain or loss at the current calculation date.

Where: -

$\text{Mcap}_i C_{t+1}$	=	Country index market capitalisation at the close of the previous hedging period
HF	=	Hedging Factor (between 0 and 1), this is the proportion of the country to be hedged
S_{t+1}	=	Spot exchange rate at the close of the previous hedging period
S_{t+2}	=	Spot exchange rate at the close of the current calculation date
FIR	=	Forward interpolated rate

Please note the FTSE Currency Hedged Indices are based on a hedging factor of 1, with each underlying country constituent treated as having the same currency as its domestic index.

SECTION 9

Hedged Capital Index

$$\text{Hedged Capital Index} = HI_{t+1} * \left(\frac{UI_{t+2}}{UI_{t+1}} + IH \right)$$

The capital hedged index is derived from the unhedged capital index performance (as outlined in the FTSE Global Guide to Calculation Method) and the impact of hedging at the current calculation date.

Where: -

HI_{t+1}	=	Hedged Capital Index at the close of the previous hedging period
UI_{t+1}	=	Unhedged Capital Index at the close of the previous hedging period
UI_{t+2}	=	Unhedged Capital Index at the close of the current calculation date
IH	=	Impact of hedging

Hedged Total Return Index

$$\text{Hedged Total Return Index} = HTRI_{t+1} * \left(\frac{UTRI_{t+2}}{UTRI_{t+1}} + IH \right)$$

The hedged total return index is derived from the unhedged total return index performance (as outlined in the FTSE Global Guide to Calculation Method) and the impact of hedging at the current calculation date.

Where: -

$HTRI_{t+1}$	=	Hedged Total Return Index at the close of the previous hedging period
$UTRI_{t+1}$	=	Unhedged Total Return Index at the close of the previous hedging period
$UTRI_{t+2}$	=	Unhedged Total Return Index at the close of the current calculation date
IH	=	Impact of hedging

Forward Rates and Spot Rates

FTSE will use one month WM Reuters 16:00 hrs London Time mid price forward rates in its currency hedged indices calculation. All rates are the last working day of the relevant market month direct USD quotes. Spot rates that are used in the currency hedging calculation are WM/Reuters Closing Spot Rates™, compiled by The WM Company.

SECTION 9

Forward Interpolated Rates

$$\text{Forward Interpolated Rates} = F_{t+1} + \left(\frac{(S_{t+1} - F_{t+1})(N_{d-t})}{N_d} \right)$$

Forward interpolated rates enable FTSE to value a forward contract on a particular inter month period. They do this by calculating the spot/forward discount/premium at the beginning of the contract period, and then discount this over the life of the contract.

Where: -

N_{d-t} = Number of days left of forward contract

N_d = Number of days of forward contract

F_{t+1} = The forward contract (rate) bought at the close of the previous hedging period

S_{t+1} = Spot rate at the close of the previous hedging period

In the example below an index has been created that comprises of Canada, and the United States. The example is a capital index in Hong Kong Dollars where each country is 35 per cent hedged into Hong Kong Dollars. The index is based on a period of one calendar month.

Unhedged Index Values (Hong Kong Dollars)			
	31-10-2003	14-11-2003	28-11-2003
Unhedged Index	100.0000	99.9985	100.9567

Country Index Market Capitalisation (HKD million)	
	31-10-2003
Canada	3,350,967.3560
USA	78,576,567.7322

Spot Rates			
	31-10-2003	14-11-2003	28-11-2003
CAD / HKD	0.1697	0.1678	0.1674
USD / HKD	0.1288	0.1289	0.1288

Forward Interpolated Rates		
	14-11-2003	28-11-2003
CAD/ HKD	0.1699	0.1701
USD/ HKD	0.1288	0.1289

SECTION 9

Impact of Hedging (Inter Month Calculation)

The example below is based on calculating the impact of hedging for the 14th November.

$$\text{Impact of Hedging} = \frac{\sum_{i=1}^n \left(\text{Mcap}_{i,C_{t+1}} * HF * \left(\frac{S_{t+1}}{FIR} - \frac{S_{t+1}}{S_{t+2}} \right) \right)}{\sum_{i=1}^n \text{Mcap}_{i,C_{t+1}}}$$

Where: -

$$\frac{\left(3,350,967.3560 * 0.35 * \left(\frac{0.1697}{0.1699} - \frac{0.1697}{0.1678} \right) \right) + \left(78,576,567.7322 * 0.35 * \left(\frac{0.1288}{0.1288} - \frac{0.1288}{0.1289} \right) \right)}{3,350,967.3560 + 78,576,567.7322} =$$

$$\frac{-14,660.6776 + 21,335.7632}{3,350,967.3560 + 78,576,567.7322} = 0.0001$$

Forward Interpolated Rates (Inter Month Calculation)

$$\text{Forward Interpolated Rates} = F_{t+1} + \left(\frac{(S_{t+1} - F_{t+1})(N_{d-t})}{N_d} \right)$$

Where: -

$$\begin{aligned} N_{d-t} &= 14 \\ N_d &= 28 \\ F_{t+1} &= \text{CAD/HKD } 0.1701 \\ S_{t+1} &= \text{CAD/HKD } 0.1697 \end{aligned}$$

$$\text{Forward Interpolated Rates} = 0.1701 + \left(\frac{(0.1697 - 0.1701)(14)}{28} \right) = 0.1699$$

Hedged Index (Inter Month Calculation)

$$\begin{aligned} \text{Hedged Index} &= HI_{t+1} * \left(\frac{UI_{t+2}}{UI_{t+1}} + IH \right) \\ &= 100.0000 * \left(\frac{99.9985}{100.0000} + 0.0001 \right) \\ &= 100.0085 \end{aligned}$$

SECTION 9

Impact of Hedging (End of Month Calculation)

The impact of hedging calculation below is based on the last working day of the calendar month.

$$\text{Impact of Hedging} = \frac{\sum_{i=1}^n \left(\text{Mcap}_i C_{t+1} * HF * \left(\frac{S_{t+1}}{FIR} - \frac{S_{t+1}}{S_{t+2}} \right) \right)}{\sum_{i=1}^n \text{Mcap}_i C_{t+1}}$$

Where: -

$$\frac{\left(3,350,967.3560 * 0.35 * \left(\frac{0.1697}{0.1701} - \frac{0.1697}{0.1674} \right) \right) + \left(78,576,567.7322 * 0.35 * \left(\frac{0.1288}{0.1289} - \frac{0.1288}{0.1288} \right) \right)}{3,350,967.3560 + 78,576,567.7322} =$$

$$\frac{-18,872.2674 + (-21,335.7632)}{3,350,967.3560 + 78,576,567.7322} = -0.0005$$

Hedged Index (End of Month Calculation)

$$\begin{aligned} \text{Hedged Index} &= HI_{t+1} * \left(\frac{UI_{t+2}}{UI_{t+1}} + IH \right) \\ &= 100.0000 * \left(\frac{100.9567}{100.0000} - 0.0005 \right) \\ &= 100.9067 \end{aligned}$$

SECTION 10

10.0 REVIEW PROCESS

10.1 Addition of Countries

- 10.1.1 New countries may be added at any time after a prior announcement. The dollar value of the country index on inclusion is the dollar value of the FTSE Global Equity Index Series at that date. The local currency value of the country index on inclusion is the dollar value adjusted for the local currency movement against the dollar between 31st December 1986 and the inclusion date, except that some smaller adjustment may be made where a country that has experienced a period of hyperinflation is included.
- 10.1.2 New regional Indices may be added at any time after a prior announcement. The values of the new regional index in all currencies take the equivalent value of the FTSE Global Equity Index Series at that date.

SECTION 11

11.0 GUIDELINES FOR THE APPLICATION OF THE NATIONALITY RULE

- 11.1 A company will be allocated to a single country. A company that has been assigned UK nationality by virtue of the Ground Rules for the FTSE UK Index Series will also be assigned UK nationality under these rules. However, a company that was deemed ineligible for UK nationality under the Ground Rules for the FTSE UK Index Series may still be eligible for UK nationality under these rules.
- 11.2 If a company is incorporated in one country and has its sole listing in the same country, FTSE will allocate the company to that country.
- 11.3 In all other circumstances, FTSE will refer the company to the FTSE Nationality Committee who will decide the appropriate nationality for the company. The FTSE Nationality Committee will base its decision according to its assessment of various factors including, but not necessarily limited to, the following:
- The investor protection regulations present in the country of incorporation;
 - The country in which the company is domiciled for tax purposes;
 - The location of its factors of production;
 - The location of its headquarters;
 - The location of company meetings;
 - The composition of its shareholder base;
 - The membership of its board of directors;
 - The currency denomination of the company's shares;
 - The perception of investors.

In certain circumstances, outlined in Rules 11.4 to 11.6 below, consideration will also be given to the relative liquidity of trading in those countries where the company's shares trade. In calculating the liquidity associated with a country, trading volumes will be amalgamated from all trading venues which have admitted the shares to trading based on a listing conferred by that country's listing authority. Trades taking place on multi-lateral trading facilities will be included in the calculation and assigned to the country that conferred the listing to the company provided that the country of listing and the multi-lateral trading facility operate within a similar time zone.

- 11.4 If a company is incorporated in a country, has a listing in that country and listings in other countries, the FTSE Nationality Committee will normally assign the company to the country of incorporation. If the company fails FTSE's liquidity test in the country of incorporation, the FTSE Nationality Committee may assign the company to the country which exhibits the greatest liquidity. However, save for the circumstances set out in Rule 11.6, a company incorporated in a country other than a developed country (as classified in the FTSE Global Equity Index Series) may not be assigned to a developed country.

SECTION 11

- 11.5 If a company is incorporated in a country, and is listed only in countries other than the country of incorporation, the FTSE Nationality Committee will normally allocate the company to the country with the greatest liquidity. However, save for the circumstances set out in Rule 11.6, a company incorporated in a country other than a developed country may not be assigned to a developed country.
- 11.6 If a company is incorporated in a country other than a developed country, has no listing in that country and is listed only in one or more developed countries, that company will only be eligible for FTSE Global Equity Index Series inclusion if the country of incorporation is internationally recognised as having a low taxation status that has been approved by the FTSE Nationality Committee. For companies incorporated in approved low taxation countries, the FTSE Nationality Committee will normally assign the company to the developed country with the greatest liquidity.
- 11.7 The country allocation of any FTSE index constituents may be reassessed at any time at the FTSE Nationality Committee's discretion.
- 11.8 An appeal against a decision of the FTSE Nationality Committee can only be made to the FTSE Policy Group.

SECTION 12

12.0 FURTHER INFORMATION

For further information and any other ground rules please visit www.ftse.com, or to contact client services please email to info@ftse.com.

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