METHODOLOGY BOOK FOR:

- LIBERTYQ INTERNATIONAL EQUITY INDEX
- LIBERTYQ EUROPE INDEX
- LIBERTYQ AC ASIA EX JAPAN INDEX

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CONTENTS

1 INTRODUCTION

MSCI Indexes are constructed and maintained in accordance with the MSCI Global Investable Market Indexes Methodology and calculated as per the MSCI Index Calculation Methodology. This methodology book provides a description of the rules and guidelines followed by MSCI for the construction and maintenance of the LibertyQ International Equity Index, LibertyQ Europe Index and the LibertyQ AC Asia ex Japan Index. These Indexes are designed to represent the performance of a strategy that seeks exposure to four style factors – Quality, Value, Momentum and Low Volatility.

2 INDEX CONSTRUCTION METHODOLOGY

2.1 DEFINING THE ELIGIBLE UNIVERSE

The eligible universe of the LibertyQ Equity Indexes includes all constituents of their respective Parent Index.

Index	Parent Index
LibertyQ International Equity Index	MSCI EAFE Index
LibertyQ Europe Index	MSCI Europe Index
LibertyQ AC Asia ex Japan Index	MSCI AC Asia ex Japan Index

2.2 DETERMINATION OF FACTOR SCORE

2.2.1 CALCULATING THE Z-SCORE FOR EACH INDIVIDUAL FACTOR

The z-score for a factor is computed by combining the region relative z-scores of individual descriptors defined for each factor.

In the first step, the z-score for a descriptor for each security is calculated as described below.

$$z = \frac{(x-\mu)}{\sigma}$$

Where:

- z is the individual descriptor z-score
- x is the descriptor value for a given security included in the Parent Index
- μ is the equal weighted mean of the descriptor values of all the securities included in the Parent Index
- σ is the equal weighted standard deviation of the descriptor values of all the securities included in the Parent Index

Z-scores are then winsorized at +/-3 (i.e., the z-scores above 3 are capped at 3 and z-scores below -3 are floored at -3). If a z-score of an individual descriptor is not computed due to the unavailability of the underlying descriptor data, the universe average z-score is used.

A region relative z-score is then computed for a descriptor by standardizing the individual descriptor z-scores within the sector groups for each region.

The three sector groups defined to apply region relative z-scores are:

a.) Securities belonging to the GICS "Financials" Sector (Sector "40" of the Global Industry Classification Standard (GICS®))

b.) Securities belonging to the GICS "Real Estate" Sector (Sector "60" of the Global Industry Classification Standard (GICS®))

c.) Securities belonging to all the other GICS sectors except "Financials" and "Real Estate" Sectors

The regions selected to compute region relative z-scores within each sector group for the LibertyQ International Equity Index are:

a.) Europe & Middle East

b.) Pacific

The regions selected to compute region relative z-scores within each sector group for the LibertyQ Europe Index are:

a.) Europe ex UK

b.) UK

The regions selected to compute region relative z-scores within each sector group for the LibertyQ AC Asia ex Japan Index are:

a.) EM Asia ex China

b.) Asia ex Japan

c.) China

Please refer to Appendix II for further details on region definitions.

$$Z_{\text{reg\_rel}} = \frac{(z - \mu_{\text{reg\_rel}})}{\sigma_{\text{reg\_rel}}}$$

Where:

- $Z_{\text{reg\_rel}}$ is the region relative z-score for a descriptor
- z is the individual descriptor z-score for a given security within a sector group for each region
- $\mu_{\text{reg\_rel}}$ is the equal weighted mean of the descriptor z-scores of all the securities included in a sector group for each region

- σ_{reg_rel} is the equal weighted standard deviation of the descriptor z-scores of all the securities included a sector group for each region

A region relative z-score for each sector group universe is then winsorized at +/- 3.

The Factors and the individual descriptors defining each of the four factors are as follows:-

(i) Quality Factor

Computed by equal weighting the region relative z-scores of the relevant descriptor as follows:

For all the securities in the GICS "Financials" and "Real Estate" Sectors

a.) Return on Equity (ROE)

b.) Negative of Earnings Variability

c.) Cash ROA

For all the securities except for "Financials" and "Real Estate" Sectors

a.) Return on Equity (ROE)

b.) Negative of Earnings Variability

c.) Cash ROA

d.) Negative of Leverage

(ii) Value Factor

Computed by weighting the region relative z-scores of the relevant descriptor as follows:

For all the securities in the GICS "Financials" and "Real Estate" Sectors

a.) Inverse of Price to Book Value (P/B) with a weight of 66.66%

b.) Dividend Yield (DY) with a weight of 33.33%

For all the securities except for "Financials" and "Real Estate" Sectors

a) Inverse of Price to Earnings (P/E) with a weight of 33.33%

b) Inverse of Price to Forward Earnings (P/E fwd) with a weight of 33.33%

c) Dividend Yield (DY) with a weight of 33.33%

(iii) Momentum Factor

Computed by equal weighting the region relative z-scores of the following descriptors

a.) 6-month Risk-adjusted Price Momentum

b.) 12-month Risk-adjusted Price Momentum

(iv) Volatility Factor

a.) Region Relative z-score of Negative of Historical Beta estimated over the trailing 104 weekly returns

Please refer to Appendix III for further details on the calculation of each factor.

2.2.2 CALCULATING THE COMPOSITE FACTOR Z-SCORE

The Composite Factor Z-Score is computed from the factor z-scores as described below.

$$Z_{Comp} = 0.50 * Z_{\text{Quality}} + 0.30 * Z_{\text{Value}} + 0.10 * Z_{\text{Momentum}} + 0.10 * Z_{\text{Volatility}}$$

Where:

- Z_{Comp} is composite factor z-score
- $Z_{Quality}$ is the quality factor z-score as calculated in the previous section
- Z_{Value} is the value factor z-score as calculated in the previous section
- $Z_{Momentum}$ is the momentum factor z-score as calculated in the previous section
- $Z_{Volatility}$ is the volatility factor z-score as calculated in the previous section

2.2.3 CALCULATING THE FINAL FACTOR SCORE

The Final Factor Score is computed from the composite factor z-score as follows:

$$Final\ Factor\ Score = \begin{cases} 1 + Z, & Z \geq 0 \\ (1 - Z)^{-1}, & Z < 0 \end{cases}$$

Where Z is the composite factor z-score determined in the previous step.

2.3 SECURITY SELECTION & WEIGHTING SCHEME

The LibertyQ International Equity Index is constructed with a fixed number of securities approach. All the constituents of the Parent Index are ranked based on their Composite Factor Z-Score and 250 securities with the highest rank are selected.

The LibertyQ Europe Index and the LibertyQ AC Asia ex Japan Index target 25% of the number of securities from their corresponding Parent Indexes. All the constituents of the Parent Index are ranked based on their Composite Factor Z-Score and target number of securities with the highest rank, are selected.

The securities included in the LibertyQ International Equity Index, the LibertyQ Europe Index and the LibertyQ AC Asia ex Japan Index are assigned weights in the proportion of Market Cap Weight*Final Factor Score.

3 MAINTAINING THE INDEX

3.1 SEMI-ANNUAL INDEX REVIEWS

The LibertyQ International Equity Index, LibertyQ Europe Index and the LibertyQ AC Asia ex Japan Index are rebalanced on a semi-annual basis, usually as of the close of the last business day of May and November, coinciding with the May and November Semi-Annual Index Reviews (SAIRs) of the MSCI Global Investable Market Indexes. Descriptor data as of the end of April and October are used respectively. The pro forma Index is typically announced nine business days before the effective date.

At each rebalancing, a constraint factor (CF) is calculated for each constituent in the Index. The constraint factor is defined as the weight in the Index at the time of the rebalancing divided by the weight in the Parent Index. The constraint factor as well as the constituents in the Index remains constant between index reviews except in case of corporate events as described in the section 3.2.

3.1.1 BUFFER RULES

To reduce turnover and enhance Index stability, buffer rules are applied as follows:

Security Selection Buffer
A security selection buffer of 50% is applied at each index review.

The LibertyQ International Equity Index targets 250 securities and the buffers are applied between rank 126 and 375. The securities in the Parent Index with a final factor score rank at or below 125 will be added to the Index on a priority basis. Existing constituents that have a final factor score rank between 126 and 375 are then successively added until the number of securities reaches 250. If the number of securities is below 250 after this step, the remaining securities in the Parent Index with the highest final factor score rank are added until the number of securities in the Index reaches 250.

The LibertyQ Europe Index and the LibertyQ AC Asia ex Japan Index target 25% of the number of securities in the Parent Index. For example, if 25% of the number of securities in the Parent Index equals 'x' number of securities, then buffers are applied between rank ((x/2)+1) and x+(x/2). The securities in the Parent Index with a final factor score rank at or below x/2 will be added to the Index on a priority basis. Existing constituents that have a final factor score between ((x/2)+1) and x+(x/2) are then successively added until the number of securities reaches x. If the number of the securities is below x after this step, the remaining securities in the Parent Index with the highest final factor score rank are added until the number of securities in the Index reaches x.

Turnover Buffer

A turnover buffer of 50% is applied at each Index Review. For example, if the ongoing rebalancing results in changing the weight of a security from x% to y% in the Index, then the effective change in weight will be:

Effective pro forma constituent weight = x + (y-x)/2

The turnover buffer is applied on the uncapped weights of existing and pro forma constituents and is not applied on deletions. After the turnover buffers are applied, weight capping of 2% is applied at the issuer level.

3.2 ONGOING EVENT RELATED CHANGES

The general treatment of corporate events in the LibertyQ International Equity Index, LibertyQ Europe Index and the LibertyQ AC Asia ex Japan Index aims to minimize turnover outside of Index Reviews. The methodology aims to appropriately represent an investor's participation in an event based on relevant deal terms and pre-event weighting of the index constituents that are involved. Further, changes in index market capitalization that occur as a result of corporate event implementation will be offset by a corresponding change in the Variable Weighting Factor (VWF) of the constituent.

Additionally, if the frequency of Index Reviews in the Parent Index is greater than the frequency of Index Reviews in the Index, the changes made to the Parent Index during intermediate Index Reviews will be neutralized in Index.

The following section briefly describes the treatment of common corporate events within the LibertyQ International Equity Index, LibertyQ Europe Index and the LibertyQ AC Asia ex Japan Index.

No new securities will be added (except where noted below) to the Indexes between Index Reviews. Parent Index deletions will be reflected simultaneously.

EVENT TYPE	EVENT DETAILS
New additions to the Parent Index	A new security added to the parent index (such as IPO and other early inclusions) will not be added to the index.
Spin-Offs	All securities created as a result of the spin-off of an existing Index constituent will be added to the Index at the time of event implementation. Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.
Merger/Acquisition	For Mergers and Acquisitions, the acquirer's post event weight will account for the proportionate amount of shares involved in deal consideration, while cash proceeds will be invested across the Index. If an existing Index constituent is acquired by a non-Index constituent, the existing constituent will be deleted from the Index

	and the acquiring non-constituent will not be added to the Index.
Changes in Security Characteristics	A security will continue to be an Index constituent if there are changes in characteristics (country, sector, size segment, etc.) Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.

Further detail and illustration regarding specific treatment of corporate events relevant to this Index can be found in the MSCI Corporate Events Methodology book under the sections detailing the treatment of events in Capped Weighted and Non-Market Capitalization Weighted indexes.

The MSCI Corporate Events methodology book is available at:
https://www.msci.com/index-methodology

APPENDIX I: METHODOLOGY FOR THE LIBERTYQ INTERNATIONAL EQUITY HEDGED INDEX

LibertyQ International Equity Hedged Index is a hedged version of the LibertyQ International Equity Index and is 100% Hedged to USD. It is rebalanced and maintained based on the MSCI Hedged Indexes methodology, applying the following parameters:

- Home Currency: USD
- Hedging Ratio: 100%

For more details on the methodology for applying the hedge, please refer to the MSCI Hedged Indexes methodology book at

https://www.msci.com/index-methodology

APPENDIX II: REGION/COUNTRY DEFINITIONS

1. LibertyQ International Equity Index

The Parent Index is composed of the developed market countries from the Pacific and Europe & Middle East. Currently, this includes the following countries, under each defined region

Europe & Middle East	Pacific
AUSTRIA	AUSTRALIA
BELGIUM	HONG KONG
DENMARK	JAPAN
FINLAND	NEW ZEALAND
FRANCE	SINGAPORE
GERMANY	
IRELAND	
ISRAEL	
ITALY	
NETHERLANDS	
NORWAY	
PORTUGAL	
SPAIN	
SWEDEN	
SWITZERLAND	
UNITED KINGDOM	

2. LibertyQ Europe Index

The Parent Index is composed of the European countries. Currently, this includes the following countries, under each defined region

Europe ex UK	UK
AUSTRIA	UK
BELGIUM	

DENMARK	
FINLAND	
FRANCE	
GERMANY	
IRELAND	
ITALY	
NETHERLANDS	
NORWAY	
PORTUGAL	
SPAIN	
SWEDEN	
SWITZERLAND	

3. LibertyQ AC Asia ex Japan Index

The Parent Index is composed of the Asian countries except Japan. Currently, this includes the following countries, under each defined region

EM Asia ex China	Asia ex Japan	China
INDIA	HONG KONG	CHINA
INDONESIA	SINGAPORE	
KOREA		
MALAYSIA		
PAKISTAN		
PHILIPPINES		
TAIWAN		
THAILAND		

Whenever MSCI changes the country constituents of the Parent Index, the constituent countries of the Index will change accordingly. Changes in the constituent companies of the MSCI Standard Country Indexes that comprise the Index will also be reflected in the Index.

APPENDIX III: CALCULATION OF VARIABLES

Factor	Descriptor	Computation Details
Quality	Return on Equity (ROE)	$\frac{\text{Trailing 12 months earnings per share}}{\text{Latest book value per share}}$
	Earnings Variability	Earnings variability is defined as the standard deviation of y-o-y earnings per share growth over the last five fiscal years
	Cash ROA	$\frac{\text{Latest Fiscal Year Net Operating Cash Flow}}{\text{Latest Fiscal Year Total Assets}}$
	Leverage	Leverage is defined as the average of Market Leverage, Book Leverage and Debt to Assets. Market Leverage = (ME + PE + LD)/ME, Book Leverage = (BE + PE + LD)/BE, Debt to Assets = TD/TA Where ME = Market Value of Equity on the Last Trading day, PE = Book Value of the Preferred Equity, LD = Most recent Book Value of the Long-Term Debt, BE = Book Value of the Equity, TD = Total Debt, TA is most recent Book Value of Total Assets
Value	Price to Earnings (P/E)	$\frac{\text{Current security price}}{\text{Trailing 12-month earnings per share}}$
	Price to Earnings (P/E fwd)	$\frac{\text{Current security price}}{\text{12-month forward earnings per share}}$
	Price to Book Value (P/B)	$\frac{\text{Current security price}}{\text{Latest book value per share}}$
	Dividend Yield (DY)	Trailing 12-months dividend per share/current security price

Momentum	6-month Risk-adjusted Price Momentum 12-month Risk-adjusted Price Momentum	6-month Price Momentum = ((PT-1/PT-7)-1) – (Local Risk-free rate) 12-month Price Momentum = ((PT-1/PT-13)-1) - (Local Risk-free rate) Where, PT-1 = Security Local Price one month prior to the rebalancing date (T) PT-7 = Security Local Price seven months prior to the rebalancing date (T) PT-13 = Security Local Price thirteen months prior to the rebalancing date (T) Risk-adjusted Price Momentum = Price Momentum/σ Where σ = Annualized Standard Deviation of weekly local price returns over the period of 3 years. Local risk free rates are the short-term rates in local currency of the country, typically the 3M LIBOR rate or short-term deposit rate. The price performance is computed excluding recent 1-month. If 12-month Price Momentum is missing, only 6-month Price Momentum is used for computation of Momentum value. Momentum value is not computed if 6-month Price Momentum is not available and the respective universe average z-score is used.
Volatility	Historical Beta (β)	Computed as the slope coefficient in a time-series regression of local excess stock returns r against the cap-weighted local excess returns of the estimation universe R, $r = \alpha + \beta R + e$ The regression coefficients are estimated on the trailing 104 weeks of returns.

The following sections have been modified since May 2016:

- Section 2.2.1: Included GICS Real Estate Sector in methodology to reflect changes to the GICS structure effective September 01, 2016

The following sections have been modified since August 2016:

- Appendix III in the previous version of the methodology book describing the Corporate Events treatment has been deleted. The details on the Corporate Events treatment are now included in Section 3.2.

The following sections have been modified since June 2017:

- Update to include the index construction parameters for the LibertyQ Europe Index and the LibertyQ AC Asia Index

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