

LIBERTYQ EMERGING MARKETS INDEX

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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 Emerging Markets Index. The LibertyQ Emerging Markets Index (“Index”) is 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 includes all the constituents of the MSCI Emerging Markets Index (herein, the “Parent Index”).

2.2 DETERMINATION OF FACTOR SCORE

2.2.1 CALCULATING THE Z-SCORE FOR EACH INDIVIDUAL FACTOR

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

The three sector groups defined to apply sector 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®) respectively)
- c.) Securities belonging to all the other GICS sectors except “Financials” and “Real Estate” Sectors

$$Z_{\text{sec_rel}} = \frac{(Z - \mu_{\text{sec_rel}})}{\sigma_{\text{sec_rel}}}$$

Where:

- $Z_{\text{sec_rel}}$ is the sector relative z-score for a descriptor
- Z is the individual descriptor z-score for a given security within a sector group
- $\mu_{\text{sec_rel}}$ is the equal weighted mean of the descriptor z-scores of all the securities included in a sector group
- $\sigma_{\text{sec_rel}}$ is the equal weighted standard deviation of the descriptor z-scores of all the securities included a sector group

A sector 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 sector 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 sector 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 sector 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.) Sector Relative z-score of Negative of Historical Beta estimated over the trailing 104 weekly returns

Please refer to Appendix II 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.

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

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 Emerging Markets 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 200 securities with the highest rank are selected.

The securities included 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 Emerging Markets Index is 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 Appendix I.

3.1.1 BUFFER RULES:

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

Security Selection Buffer

A security selection buffer of 50% is applied at each Index Review.

For example, the Index targets 200 securities and the buffers are applied between rank 101 and 300. The securities in the Parent Index with a final factor score rank at or above 100 will be added to the Index on a priority basis. The existing constituents that have a final factor score rank between 101 and 300 are then successively added until the number of securities reaches 200. If the number of securities is below 200 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 200.

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:

$$\text{Effective pro forma constituent weight} = x + (y-x)/2$$

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 1% is applied at the issuer level.

3.2 ONGOING EVENT RELATED CHANGES

The Index follows the event maintenance of the Parent Index.

3.2.1 IPOs AND OTHER EARLY INCLUSIONS

IPOs and other newly listed securities will only be considered for inclusion at the next SAIR, even if they qualify for early inclusion in the Parent Index.

3.2.2 ADDITIONS AND DELETIONS DUE TO CORPORATE EVENTS

A constituent deleted from the Parent Index following a corporate event will be simultaneously deleted from the Index.

Additions to the Index are only made at the SAIR.

Please refer to Appendix I for more details on the treatment of corporate events.

APPENDIX I: CORPORATE EVENTS TREATMENT

This appendix describes the treatment of the corporate events in the LibertyQ Emerging Markets Index. Details regarding the treatment of all other corporate events not covered in this appendix can be found in the MSCI Corporate Events Methodology book, available at

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

In case of merger or acquisition aggregate CF (Constraint Factor) at Index level is calculated using the CF using the following formula:

$$CF = \frac{(CF_{a1} * W_{a1} + CF_{a2} * W_{a2})}{(W_{a1} + W_{a2})}$$

Where, CF_{a1} is the constraint factor of constituent 1 in the LibertyQ Emerging Markets Index, W_{a1} is the weight of constituent 1 in the Parent Index, CF_{a2} is the constraint factor of the constituent 2 in the Index, W_{a2} is the weight of the constituent 2 in the Parent Index.

Event	Event details	Action
Acquisition	LibertyQ Emerging Markets Index constituent acquires another LibertyQ Emerging Markets Index constituent	Maintain acquiring company with a constraint factor that is weighted average of the two constituents as mentioned above.
	LibertyQ Emerging Markets Index constituent acquires non constituent. Non constituent is in Parent Index.	Maintain acquiring company with a constraint factor that is weighted average of the two constituents. Constraint factor of acquired non constituent company would be zero.
	LibertyQ Emerging Markets Index constituent acquires non constituent. Non constituent is not in the Parent Index.	Maintain acquiring company with a constraint factor that is weighted average of the two constituents. Constraint factor and weight of the acquired non constituent company would be zero.
	Non LibertyQ Emerging Markets Index constituent acquires constituent	Acquired constituent would be removed regardless of type of acquisition by non constituent. The acquiring company would not be added to the Index.
Merger	LibertyQ Emerging Markets Index constituent merges with another LibertyQ Emerging Markets Index constituent	Add new company with a constraint factor that is the weighted average of the two constituents.

Event	Event details	Action
	LibertyQ Emerging Markets Index constituent merges with non constituent. Non constituent is in Parent Index. Price history is linked with constituent.	Add new company with a constraint factor that is the weighted average of the two constituents. Constraint factor of non constituent company would be zero.
	LibertyQ Emerging Markets Index constituent merges with non constituent. Non constituent is not in the Parent Index. Price history is linked with constituent.	Add new company with a constraint factor that is the weighted average of the two constituents. Constraint factor and weight of non constituent company would be zero.
	LibertyQ Emerging Markets Index constituent merges with non constituent. Non constituent is not in the Parent Index. Price history is linked with non constituent.	New company would not be added.
IPO	IPO added to the Parent Index	Security will be considered for the inclusion in the LibertyQ Emerging Markets Index at the next SAIR.
Spin-off	LibertyQ Emerging Markets Index constituent spins off security	Add spun-off security to the Index with the constraint factor of the spinning security, if it is included in the Parent Index
Conversion	Security A converted to B, A deleted from Parent Index, B added	B inherits constraint factors from A.
Country Reclassification	Domicile of company reviewed: Security A deleted from country A, security B added to country B	B inherits constraint factors from A if it is added to the Parent Index.
Stock exchange reclassification	Stock exchange (price source) of company reviewed: Security A deleted, security B added	B inherits constraint factors from A if it is added to the Parent Index.
Other Events Resulting in Changes in Number of Shares and FIFs	Changes in number of shares and subsequent FIF resulting from other events such as share placements and offerings, and debt-to-equity-swaps	No change in constraint factor

APPENDIX II: 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	<p>Leverage is defined as the average of Market Leverage, Book Leverage and Debt to Assets.</p> <p>Market Leverage = $(ME + PE + LD)/ME$,</p> <p>Book Leverage = $(BE + PE + LD)/BE$,</p> <p>Debt to Assets = TD/TA</p> <p>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</p>
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	<p>6-month Risk-adjusted Price Momentum</p> <p>12-month Risk-adjusted Price Momentum</p>	<p>6-month Price Momentum = $((PT-1/PT-7)-1) - (\text{Local Risk-free rate})$</p> <p>12-month Price Momentum = $((PT-1/PT-13)-1) - (\text{Local Risk-free rate})$</p> <p>Where, PT-1 = Security Local Price one month prior to the rebalancing date (T)</p> <p>PT-7 = Security Local Price seven months prior to the rebalancing date (T)</p> <p>PT-13 = Security Local Price thirteen months prior to the rebalancing date (T)</p> <p>Risk-adjusted Price Momentum = Price Momentum/σ</p> <p>Where σ = Annualized Standard Deviation of weekly local price returns over the period of 3 years.</p> <p>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.</p> <p>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.</p>
Volatility	Historical Beta (β)	<p>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,</p> $r = \alpha + \beta R + e$ <p>The regression coefficients are estimated on the trailing 104 weeks of returns.</p>

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

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