

# **MSCI GLOBAL INVESTABLE MARKET VALUE AND GROWTH INDEX METHODOLOGY**

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**CONTENTS**

**1 MSCI Global Investable Market Value and Growth Indexes Methodology Overview ..... 4**

    1.1 Introduction..... 4

        Partition of the MSCI Global Investable Market Indexes.....4

    1.2 Defining the Value and Growth Investment Styles and Indexes ..... 5

        1.2.1 Multi-Factor Approach.....5

        1.2.2 Two-Dimensional Framework.....5

        1.2.3 Index Design.....7

        1.2.4 Universe and Approach for Style Segmentation.....7

        1.2.5 Construction of the MSCI Global Investable Market Value and Growth Indexes .....8

**2 Constructing the MSCI Global Investable Market Value and Growth Indexes..... 9**

    2.1 Variables Used to Specify Value and Growth Characteristics ..... 9

    2.2 Calculating the Z-Scores ..... 10

        2.2.1 Winsorizing the Variable..... 10

        2.2.2 Calculating the Z-Scores..... 10

    2.3 Aggregating the Style Z-Scores..... 12

        2.3.1 Calculating the Value Z-Score ..... 12

        2.3.2 Calculating the Growth Z-Score ..... 13

        2.3.3 Identifying the Overall Style Characteristics ..... 14

    2.4 Assigning Initial Style Inclusion Factors..... 15

        2.4.1 Initial Style Inclusion Factors for Securities with Both Value and Growth or Non-Value and Non-Growth Characteristics ..... 15

    2.5 Allocating Securities to the Value and Growth Indexes..... 18

        2.5.1 Sorting Securities by Distance from the Origin ..... 18

        2.5.2 Applying Buffer Rules..... 19



2.5.3 Allocating Securities to Reach 50% Target..... 20

**3 Maintaining MSCI Global Investable Market Value and Growth Indexes ..... 23**

3.1 Semi-Annual Style Index Review ..... 23

3.2 Eligibility Criteria ..... 23

3.3 Ongoing Event-related maintenance ..... 24

Appendix I: Variable Definitions and Computations..... 26

Appendix II: Calculation of Market Mean and Standard Deviation... 33



# 1 MSCI GLOBAL INVESTABLE MARKET VALUE AND GROWTH INDEXES METHODOLOGY OVERVIEW

## 1.1 INTRODUCTION

For over 30 years, MSCI has been constructing global equity benchmark indexes that contribute to the international investment management process. These indexes serve as relevant and precise performance benchmarks, effective research and asset allocation tools, and are licensed as the basis for various investment vehicles designed to gain and/or manage exposure to international markets. As such, the MSCI Equity Index Series assists the investment process of a wide variety of international investors. In constructing its equity indexes, MSCI consistently applies its equity index construction and maintenance methodology across developed and emerging markets. This consistency of approach makes it possible to aggregate individual country and industry indexes to create meaningful regional and composite benchmark indexes for international investors.

Since 1997, MSCI has been assisting the investment process of international style investors with its Global Value and Growth Index Series. From 1997 to May 2003, the value and growth indexes were constructed based on a single-dimensional framework that allocated securities in an MSCI Standard Country Index into either value or growth based on their Price to Book Value ratios (P/BV).

As views on style definition and segmentation continued to develop, MSCI's methodology also evolved to ensure that its value and growth indexes remain reflective of the philosophy and state-of-the-art thinking in international style investing. Effective as of the close of May 30, 2003, MSCI began applying a two-dimensional framework for style segmentation in which value and growth securities are categorized using different attributes. In addition, multiple factors are used to identify value and growth characteristics.

This enhanced methodology better reflects investors' views on style definition and segmentation and provides a more precise representation of the opportunity sets of global style managers.

### PARTITION OF THE MSCI GLOBAL INVESTABLE MARKET INDEXES

The MSCI Global Investable Market Value and Growth Indexes is constructed from the constituents of the MSCI Global Investable Market Indexes on a country-by-country basis for each of the countries included in the MSCI All Country World Index (ACWI), except DM Europe where the style indexes are constructed on a regional basis. The MSCI Global Investable Market Value and Growth Indexes is a subset of the MSCI Global Investable Market Indexes. Therefore, common index attributes such as free float estimation, number



of shares and industry classification are identical for constituents of the two index series. Consequently, changes in the underlying MSCI Global Investable Market Indexes will have an impact on the MSCI Global Investable Market Value and Growth Indexes. The changes include additions, deletions, changes in Foreign Inclusion Factors (FIFs), updates in number of shares and changes in industry classification.

## 1.2 DEFINING THE VALUE AND GROWTH INVESTMENT STYLES AND INDEXES

In constructing the MSCI Global Investable Market Value and Growth Indexes, MSCI has adopted a two-dimensional framework for style segmentation in which value and growth securities are categorized using different attributes. In addition, multiple factors are used to identify value and growth characteristics.

### 1.2.1 MULTI-FACTOR APPROACH

The value investment style characteristics for index construction are defined using the following three variables:

- Book value to price ratio (BV / P)
- 12-month forward earnings to price ratio (E fwd / P)
- Dividend yield (D / P)

The growth investment style characteristics for index construction are defined using the following five variables:

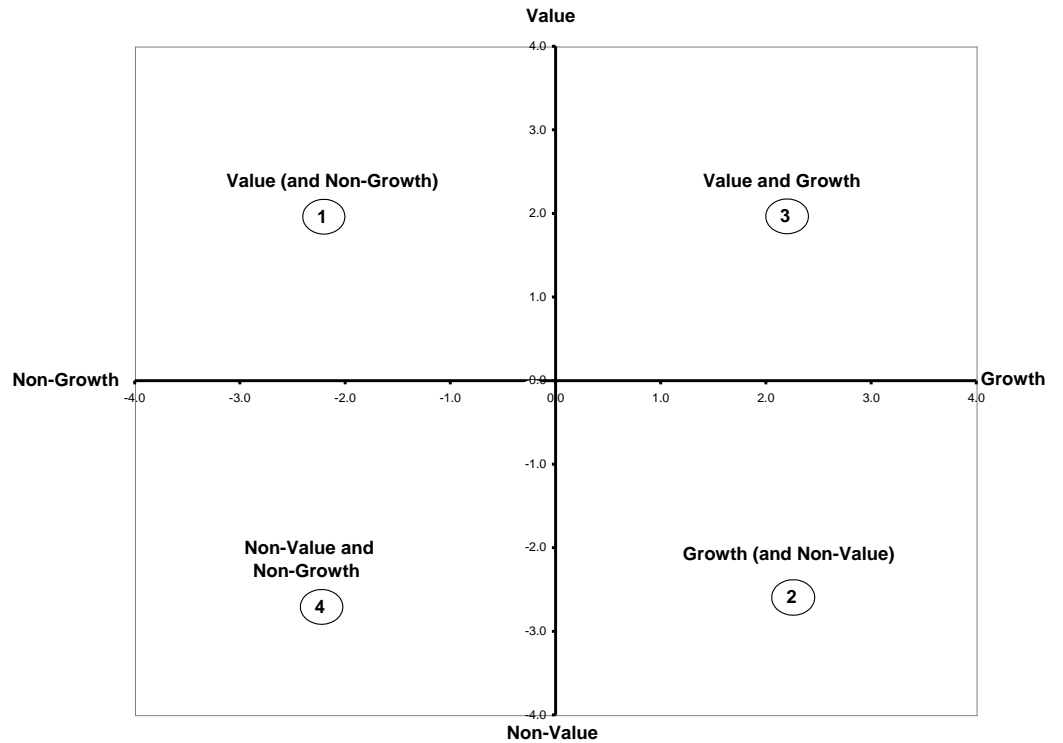
- Long-term forward earnings per share (EPS) growth rate (LT fwd EPS G)
- Short-term forward EPS growth rate (ST fwd EPS G)
- Current Internal Growth Rate (g)
- Long-term historical EPS growth trend (LT his EPS G)
- Long-term historical sales per share (SPS) growth trend (LT his SPS G)

### 1.2.2 TWO-DIMENSIONAL FRAMEWORK

Using the variables mentioned above, value z-scores and growth z-scores are calculated as described in Section 2 and used to determine the overall style characteristics of each security in the MSCI value and growth style space, as depicted in Exhibit 1. In the two-dimensional framework, non-value does not necessarily mean growth, and vice versa.

Additionally, some securities can exhibit both value and growth characteristics, while others may exhibit neither.

*Exhibit 1 – MSCI Value and Growth Style Space*



Note: The values on the axes are z-scores. The point where the value and non-value axis intersects the growth and non-growth axis, i.e., the origin, is located at a z-score of zero for each axis.

Hence, under the two-dimensional framework for style segmentation, a security can have the following four style characteristics:

1. A security with a positive value z-score and a negative or zero growth z-score is situated in the Value (and Non-Growth) quadrant as it exhibits clear value characteristics.
2. A security with a negative or zero value z-score and a positive growth z-score is situated in the Growth (and Non-Value) quadrant as it exhibits clear growth characteristics.



3. A security with a positive value z-score and a positive growth z-score is situated in the Value and Growth quadrant as it exhibits both value and growth characteristics.
4. A security with a negative or zero value z-score and a negative or zero growth z-score is situated in the Non-Value and Non-Growth quadrant as it exhibits both non-value and non-growth characteristics.

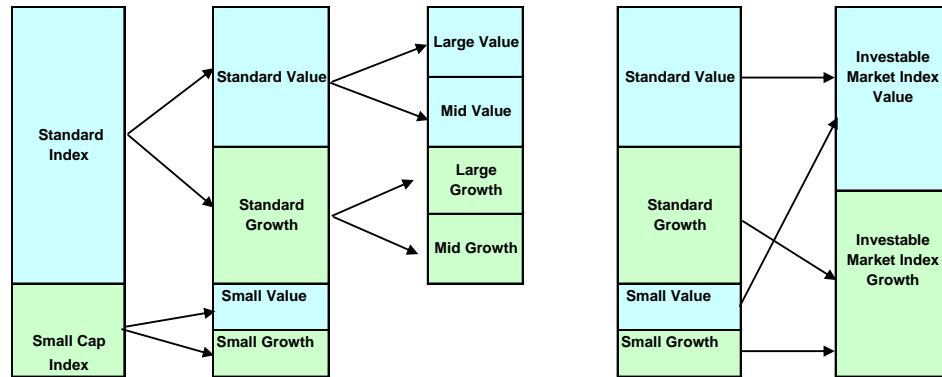
### 1.2.3 INDEX DESIGN

The objective of the MSCI Value and Growth Indexes design is to divide constituents of an underlying market capitalization index into a value index and a growth index, each targeting 50% of the free float-adjusted market capitalization of the underlying index. The market capitalization of each constituent should be fully represented in the combination of the value index and the growth index, and, at the same time, should not be “double-counted”. One security may, however, be represented in both the value index and the growth index at a partial weight.

### 1.2.4 UNIVERSE AND APPROACH FOR STYLE SEGMENTATION

The MSCI Global Investable Market Value and Growth methodology is applied to the Standard and Small Cap Indexes on a market by market basis. In defining markets, MSCI adopts a country approach in conducting the style segmentation of the value and growth indexes, except for DM Europe where a region approach is adopted. The large Cap and Mid Cap Value and Growth Indexes are derived using the Value and Growth Inclusion Factors from the Standard Value and Growth Indexes. The Investable Market Value and Growth Indexes are created by aggregating the Value and Growth segments of the Standard and Small Cap Indexes.

Securities in each MSCI Global Investable Market Index are allocated to the appropriate value and growth indexes. The same style segmentation process is applied independently and consistently across all MSCI Global Investable Market Indexes.



The consistent application of index methodology to all countries also makes it possible to apply a “building block” approach in the construction of regional and composite style indexes. Under this approach, individual value and growth indexes can be aggregated to create various meaningful and comparable regional and composite benchmark style indexes.

Please note that the value and growth style classification and allocation is applied at the security level rather than at the company level.

**1.2.5 CONSTRUCTION OF THE MSCI GLOBAL INVESTABLE MARKET VALUE AND GROWTH INDEXES**

In order to achieve the above-mentioned index design objective, MSCI constructs and maintains the value and growth indexes by allocating securities and their free float-adjusted market capitalizations to the appropriate value and growth indexes, during the semi-annual style index reviews that take place each May and November.

MSCI’s construction of the value and growth indexes for each country index involves the following five steps:

- Determining the values of the variables used to specify value and growth characteristics for each security.
- Calculating the z-scores of each variable for each security.
- Aggregating the style z-scores for each security to determine the security’s overall style characteristics.
- Assigning initial style inclusion factors for each security.
- Achieving the 50% free float-adjusted market capitalization target by allocating securities to the value and growth indexes after applying buffer rules.

In the next section, we review each of these steps in detail.





## 2 CONSTRUCTING THE MSCI GLOBAL INVESTABLE MARKET VALUE AND GROWTH INDEXES

### 2.1 VARIABLES USED TO SPECIFY VALUE AND GROWTH CHARACTERISTICS

The value and growth indexes construction process begins by determining the values of the variables used to specify value and growth characteristics.

The value investment style characteristics for index construction are defined using the following three variables:

- Book value to price ratio (BV / P)
- 12-month forward earnings to price ratio (E fwd / P)
- Dividend yield (D / P)

For The growth investment style characteristics for index construction are defined using the following five variables:

- Long-term forward earnings per share (EPS) growth rate (LT fwd EPS G)
- Short-term forward EPS growth rate (ST fwd EPS G)
- Current Internal Growth Rate (g)
- Long-term historical EPS growth trend (LT his EPS G)
- Long-term historical sales per share (SPS) growth trend (LT his SPS G)

For these variables, all securities of the same company have the same variable values for each of the five variables used to define growth investment style characteristics for index construction unless there is a difference in dividend payout, which will result in a difference in the Current Internal Growth Rate (g).<sup>1</sup>

The long-term forward EPS growth rate is not taken into account for the Small Cap Global Value and Growth Indexes.

No long-term historical SPS growth trend is calculated for securities classified in the Banks (4010) and Diversified Financials (4020) industry groups, other than securities classified in

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<sup>1</sup> For a detailed description of the variables, please refer to the MSCI Fundamental Data Methodology, available at <https://www.msci.com/index-methodology>



the Multi-Sector Holdings (40201030) and Financial Exchanges & Data (40203040) sub-industries, under the Global Industry Classification Standard (GICS).

For further details on definitions and computations of the variables, see Appendix I, entitled “Variable Definitions and Computations”.

## 2.2 CALCULATING THE Z-SCORES

After computing the eight variable values for each security, each of the eight variable values are standardized within each individual MSCI Market Standard and Small Cap Index and assigned a z-score. Standardization ensures that the variables are comparable to each other and that the combination of the variables is meaningful.

### 2.2.1 WINSORIZING THE VARIABLE

As part of the standardization process, outlier variable values are winsorized to ensure that the market average values used to standardize the variables are less affected by extreme values.

To do this, for a given variable, the values for all securities are first ranked by ascending order within each MSCI Market Index. Missing values are excluded from the ranking. Then, for values that lie in the bottom 5th percentile rank or in the top 95th percentile rank, their value is set equal to the value of the 5th percentile ranked or 95th percentile ranked security, as applicable. This process is repeated for each of the eight variables.

Example:

Winsorization:

Suppose there are 200 securities ranked by ascending order. For all securities ranked from 1 through 9, their values become equal to the value of the 10th ranked security. Meanwhile, for all securities ranked from 192 through 200, their values become equal to the value of the 191st ranked security.

### 2.2.2 CALCULATING THE Z-SCORES

After winsorizing all the eight variables within each MSCI Market Index, the z-score for each of the eight variables for each security can be calculated using the free float-adjusted market capitalization weighted market mean and standard deviation of the relevant variable within each MSCI Market Index.

Computing a z-score is a widely used method of standardizing a variable in order to combine it with other variables that may have a different unit of measurement or a different scale. Because it has a mean value of zero and a standard deviation of 1, the value of a z-score shows how many standard deviations a given value lies from the mean. The z-score is defined as follows:

$$Z = \frac{(x - \mu_{mcap-weighted})}{\sigma_{mcap-weighted}}$$

Where:

- $x$  is the winsorized variable value for a given security
- $\mu$  is the free float-adjusted market capitalization weighted market mean using winsorized variables in the MSCI Market Index
- $\sigma$  is the free float-adjusted market capitalization weighted market standard deviation using winsorized variables in the MSCI Market Index

For further details on the calculation of the market mean and the standard deviation, see Appendix II, entitled “Calculation of Market Mean and Standard Deviation”.

Example:

*Calculating Dividend Yield Z-Scores:*

	Index	Security A	Security B	Security C
<b>Mean dividend yield for the country index</b>	<b>2.50</b>			
<b>Standard deviation of dividend yield for the country index</b>	<b>1.38</b>			
<b>Dividend yield</b>		<b>3.50</b>	<b>0.90</b>	<b>2.50</b>
<b>Dividend yield z-score</b>		<b>0.72</b>	<b>-1.16</b>	<b>0.00</b>

Security A has a positive dividend yield z-score. This implies that based on dividend yield, Security A exhibits clear value characteristics, as its dividend yield value of 3.5 is 0.72 standard deviation above the market dividend yield of 2.5. On the other hand, a dividend yield z-score of -1.16 for Security B implies that its dividend yield value of 0.9 is 1.16



standard deviations below the market dividend yield. In other words, Security B exhibits clear non-value characteristics, based on dividend yield. As for Security C, a z-score of 0 implies that the security has the same dividend yield value as the market mean.

## 2.3 AGGREGATING THE STYLE Z-SCORES

After standardizing each of the eight variable values for each security, MSCI calculates a value z-score and a growth z-score for each security. Value z-scores are computed by averaging the three value variable z-scores while growth z-scores are calculated by averaging the five growth variable z-scores. The value z-score and the growth z-score of a security define its overall style characteristics and its positioning within the value and growth style space.

### 2.3.1 CALCULATING THE VALUE Z-SCORE

To compute a value z-score, an equally weighted average of the three value variables' z-scores is calculated. Only available variable z-scores are used and missing variable z-scores are excluded from the calculation.

The value z-score is calculated as follows:

$$\text{Value Z-Score} = \frac{1}{3}(Z_{BV/P} + Z_{E\text{ fwd}/P} + Z_{D/P})$$

For instance, if the E fwd /P variable is missing:

$$\text{Value Z-Score} = \frac{1}{2}(Z_{BV/P} + Z_{D/P})$$

Example:

*Calculating the Value Z-Score:*

	Security A	Security B	Security C
<b>Book value to price z-score</b>	<b>0.90</b>	<b>0.80</b>	<b>-1.60</b>
<b>12-month forward earnings to price z-score</b>	<b>0.78</b>	<b>1.86</b>	<b>-2.0</b>
<b>Dividend yield z-score</b>	<b>0.72</b>	<b>-1.16</b>	<b>0.00</b>
<b>Value Z-Score</b>	<b>0.80</b>	<b>0.50</b>	<b>-1.20</b>



**2.3.2 CALCULATING THE GROWTH Z-SCORE**

For the calculation of the growth z-score, the z-score for long-term forward EPS growth rate is given a double weight for the Standard Global Value and Growth Indexes, as it is the most systematically associated with the concept of growth and it captures growth style attributes relatively more effectively than other variables. As a reminder, the z-score for long-term forward EPS growth rate is not calculated and therefore is not taken into account for the Small Cap Global Value and Growth Indexes.

When computing the growth z-score, missing variable z-scores are excluded from the calculation.

The long-term historical SPS growth trend is not used to specify growth characteristics for securities classified in the Banks (4010) and Diversified Financials (4020) industry groups, other than securities classified in the Multi-Sector Holdings (40201030) and Financial Exchanges & Data (40203040) sub-industries, under the Global Industry Classification Standard (GICS). In this case, only five variables are averaged, rather than replacing the sales growth trend with a zero value.

The growth z-score is calculated as follows:

$$Growth\ Z-Score = \frac{1}{6} (2 * Z_{LT\ fwd\ EPS\ G} + Z_{ST\ fwd\ EPS\ G} + Z_g + Z_{LT\ his\ EPS\ G} + Z_{LT\ his\ SPS\ G} )$$

For instance, if the long-term forward EPS growth rate variable is missing:

$$Growth\ Z-Score = \frac{1}{4} (Z_{ST\ fwd\ EPS\ G} + Z_g + Z_{LT\ his\ EPS\ G} + Z_{LT\ his\ SPS\ G} )$$

For a financial company:

$$Growth\ Z-Score = \frac{1}{5} (2 * Z_{LT\ fwd\ EPS\ G} + Z_{ST\ fwd\ EPS\ G} + Z_g + Z_{LT\ his\ EPS\ G} )$$

For the Small Cap Value and Growth Indexes, the z-score for the long-term forward EPS growth rate is not taken into account:

$$Growth\ Z-Score = \frac{1}{4} (Z_{STfwd\ EPS\ G} + Z_g + Z_{LT\ his\ EPS\ G} + Z_{LT\ his\ SPS\ G})$$

**Example**

*Calculating the Growth Z-Score:*

	Security A	Security B	Security C
<b>Long-term forward EPS growth rate z-score Available</b>	<b>-0.19</b>	<b>0.68</b>	<b>Not</b>
<b>Short-term forward EPS growth rate z-score</b>	<b>0.25</b>	<b>0.50</b>	<b>-0.20</b>
<b>Current Internal Growth Rate z-score</b>	<b>0.72</b>	<b>-1.16</b>	<b>-0.40</b>
<b>Long-term historical EPS growth trend z-score</b>	<b>0.30</b>	<b>1.00</b>	<b>-1.20</b>
<b>Long-term historical SPS growth trend z-score</b>	<b>0.10</b>	<b>Not Relevant</b>	<b>0.50</b> <b>(Financial Company)</b>
<b>Growth Z-Score</b>	<b>0.17</b>	<b>0.34</b>	<b>-0.33</b>

Security A has all 5 variables available. Its growth z-score is the sum of the 5 variables with a double weight on the long-term forward EPS growth divided by 6. Security B is a financial company. Therefore, no long-term historical SPS growth trend is used and its growth z-score is computed using a 5 as the denominator. Finally, the long-term forward EPS growth rate variable is missing for Security C and the denominator will be 4.

**2.3.3 IDENTIFYING THE OVERALL STYLE CHARACTERISTICS**

After calculating the value and growth z-scores for each security, each security’s overall style characteristics and position within the value and growth style space can be determined based on the table below.

Value Z-Score	Growth Z-Score	Style Characteristics
Positive	Negative or Zero	Value
Negative or Zero	Positive	Growth
Positive	Positive	Both Value and Growth
Negative or Zero	Negative or Zero	Neither Value nor Growth



**2.4 ASSIGNING INITIAL STYLE INCLUSION FACTORS**

Based on the overall style characteristics, securities are assigned initial style inclusion factors. At this time, securities that exhibit both value and growth or neither value nor growth characteristics are also adjusted for dominant style.

Each security has two style inclusion factors, one for value, defined as the Value Inclusion Factor (VIF), and the other for growth, defined as the Growth Inclusion Factor (GIF), and they represent the proportion of a security’s free float-adjusted market capitalization that should be allocated to the value and/or growth indexes. The sum of the VIF and the GIF is always equal to one. There are five possible values for the style inclusion factors: 1, 0.65, 0.5, 0.35 and 0.

For instance, a VIF of 1 implies that the security’s free float-adjusted market capitalization is fully allocated to the value index, while a VIF of 0.35 implies that only 35% of the security’s free float-adjusted market capitalization is allocated to the value index. The sum of VIF and GIF is always equal to one. For example, a VIF of 0.35 will result in a GIF of 0.65. Exhibit 2 on the next page shows the various style inclusion factors within the value and growth style space, which will be described in detail in the following paragraphs.

**2.4.1 INITIAL STYLE INCLUSION FACTORS FOR SECURITIES WITH BOTH VALUE AND GROWTH OR NON-VALUE AND NON-GROWTH CHARACTERISTICS**

For securities with style characteristics of both value and growth or neither value nor growth, their initial VIF and GIF can range between 0 and 1, depending on the contribution of the value (or non-growth, if the growth z-score is negative) and growth (or non-value, if the value z-score is negative) z-scores to the distance of a security from the origin.

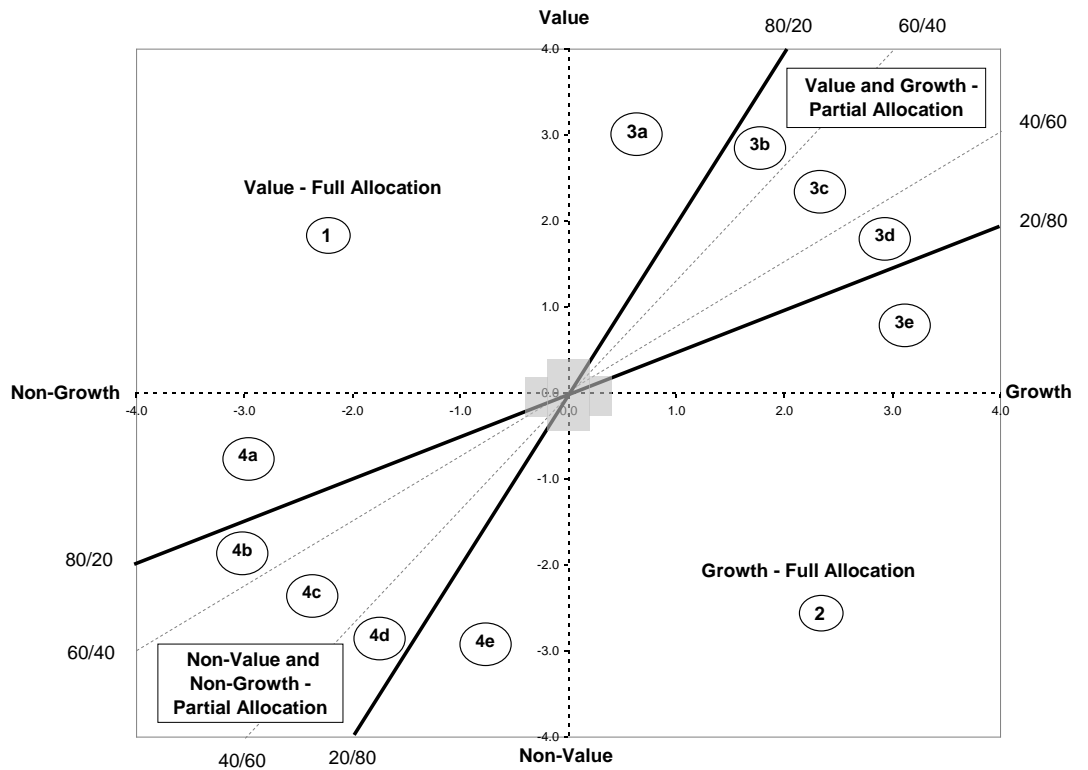
The contribution of each style z-score to the distance from the origin is calculated as follows:

$$\begin{aligned}
 \text{value contribution} &= \frac{\text{value z-score}^2}{\text{distance}^2} = \frac{\text{value z-score}^2}{\text{value z-score}^2 + \text{growth z-score}^2} \\
 \text{growth contribution} &= \frac{\text{growth z-score}^2}{\text{distance}^2} = \frac{\text{growth z-score}^2}{\text{value z-score}^2 + \text{growth z-score}^2} \\
 \text{value contribution} + \text{growth contribution} &= 1
 \end{aligned}$$

For securities where a style contribution of a positive style z-score (a negative style z-score) is at least 80% (less than 20%), that style is deemed to clearly dominate the other style. Such securities are allocated with an initial VIF or GIF of 1, depending on whether value (non-growth) or growth (non-value) contributed at least 80% (less than 20%) to the distance respectively. This is represented by the 80/20 line (20/80) in Exhibit 2, which corresponds to the value z-score (growth z-score) representing twice the growth z-score (value z-score), i.e., representing a contribution of 80% of the total distance from the origin.

Otherwise, if a style contribution ranges between more than 20% and less than 80%, the VIF and GIF are determined using the table below.

Exhibit 2 – MSCI Value and Growth Style Space, Allocating Initial VIF & GIF





Note: The values on the axes are z-scores. The point where the value and non-value axis intersects the growth and non-growth axis, i.e., the origin, is located at a z-score of zero for each axis.

Zone	1	2	3a	3b	3c	3d	3e	4a	4b	4c	4d	4e
Style Characteristics	Value	Growth	Value/Growth	Value/Growth	Value/Growth	Value/Growth	Value/Growth	Non-Value/Non-Growth	Non-Value/Non-Growth	Non-Value/Non-Growth	Non-Value/Non-Growth	Non-Value/Non-Growth
Style Bias	Value	Growth	Value	Value-Bias	No Bias	Growth-Bias	Growth	Value	Value-Bias	No Bias	Growth-Bias	Growth
<b>Initial VIF</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0.65</b>	<b>0.5</b>	<b>0.35</b>	<b>0</b>	<b>1</b>	<b>0.65</b>	<b>0.5</b>	<b>0.35</b>	<b>0</b>
<b>Initial GIF</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0.35</b>	<b>0.5</b>	<b>0.65</b>	<b>1</b>	<b>0</b>	<b>0.35</b>	<b>0.5</b>	<b>0.65</b>	<b>1</b>

Example:

*Calculating the Distance and the Style Contribution:*

	Security A	Security B	Security C
<b>Value z-score</b>	<b>0.80</b>	<b>0.50</b>	<b>-1.20</b>
<b>Growth z-score</b>	<b>0.20</b>	<b>0.50</b>	<b>-0.50</b>
<b>Value z-score squared</b>	<b>0.64</b>	<b>0.25</b>	<b>1.44</b>
<b>Growth z-score squared</b>	<b>0.04</b>	<b>0.25</b>	<b>0.25</b>
<b>Distance from the origin squared</b>	<b>0.68</b>	<b>0.50</b>	<b>1.69</b>
<b>Value contribution to the distance</b>	<b>94%</b>	<b>50%</b>	<b>85%</b>
<b>Growth contribution to the distance</b>	<b>6%</b>	<b>50%</b>	<b>15%</b>
<b>Initial VIF</b>	<b>1</b>	<b>0.5</b>	<b>0</b>
<b>Initial GIF</b>	<b>0</b>	<b>0.5</b>	<b>1</b>

Security A's value contributes 94% of its overall style characteristics. Hence, the value z-score clearly dominates the growth z-score and a VIF of 1 is allocated to Security A. As for Security B, no style clearly dominates, as the contribution of the two style z-scores is equal at 50%. Therefore, a VIF and GIF of 0.5 is allocated to security B. For Security C, its value z-score and growth z-score are both negative. Hence, the non-value z-score contributes 85%



and the non-growth z-score contributes 15%. This means that the growth z-score clearly dominates the value z-score, and as a result, a GIF of 1 is assigned to Security C.

**2.5 ALLOCATING SECURITIES TO THE VALUE AND GROWTH INDEXES**

The value and growth indexes target a 50% free float-adjusted market capitalization representation for each of the value and growth indexes in each MSCI Market Index. In order to achieve the 50% target, the style allocation process involves the following three steps:

- Sorting securities by distance from the origin in the style space.
- Applying buffer rules and reassigning initial VIF and GIF, as appropriate.
- Achieving the 50% free float-adjusted market capitalization target by allocating securities to the value and growth indexes.

**2.5.1 SORTING SECURITIES BY DISTANCE FROM THE ORIGIN**

In the allocation process, first all securities are sorted by distance from the origin. The strength of the security style characteristics is measured by the distance from the origin. Therefore, the security with the strongest style characteristics is the one with the greatest distance from the origin.

The distance from the origin (d) is computed as follows:

$$d = \sqrt{\text{value } z\text{-score}^2 + \text{growth } z\text{-score}^2}$$

*Calculating the Distance:*

	Security A	Security B	Security C
<b>Value z-score</b>	<b>0.80</b>	<b>0.50</b>	<b>-1.20</b>
<b>Growth z-score</b>	<b>0.20</b>	<b>0.50</b>	<b>-0.50</b>
<b>Value z-score squared</b>	<b>0.64</b>	<b>0.25</b>	<b>1.44</b>
<b>Growth z-score squared</b>	<b>0.04</b>	<b>0.25</b>	<b>0.25</b>
<b>Distance from the origin</b>	<b>0.82</b>	<b>0.71</b>	<b>1.30</b>



Security C is the furthest away from the origin among the three securities. Therefore, it has the strongest style characteristics and is allocated to its appropriate style index first.

**2.5.2 APPLYING BUFFER RULES**

Next, the initial style inclusion factors for all existing constituents are reviewed based on buffer rules. According to the buffer rules, all securities that fall in the buffers will not change their current style inclusion factors and remain in their current index or indexes, unless they need to be reassigned, if required, to meet the 50% target. Buffer rules help limit the index turnover caused by temporary migration of securities from one style index to the other and come into effect only at the semi-annual style index reviews.

The buffers are represented by a cross resulting from the overlap of a horizontal rectangle around the growth axis and a vertical rectangle around the value axis. The horizontal rectangle is defined by a value z-score between +/- 0.2 and a growth z-score between +/- 0.4 and the vertical rectangle is defined by a value z-score between +/- 0.4 and a growth z-score between +/- 0.2, as shown in the shaded area in Exhibit 2.

Example:

*Reassigning Style Inclusion Factors Based on Buffer Rule*

	Security A	Security B	Security C
<b>Value z-score</b>	<b>0.10</b>	<b>-0.07</b>	<b>0.15</b>
<b>Growth z-score</b>	<b>0.80</b>	<b>-0.05</b>	<b>-0.05</b>
<b>Falls in the buffers</b>	<b>no</b>	<b>yes</b>	<b>yes</b>
<b>Current VIF</b>	<b>1</b>	<b>0.5</b>	<b>0</b>
<b>Initial VIF</b>	<b>0</b>	<b>0.35</b>	<b>1</b>
<b>Post buffer VIF</b>	<b>0</b>	<b>0.5</b>	<b>0</b>

Security A is not impacted by the buffer rules as its pro forma value and growth z-scores do not fall within the buffers. Hence, its initial style inclusion factors remain unchanged. Securities B and C are impacted by the buffer rules and, therefore, their style inclusion factors are reassigned to the current style inclusion factors.



### 2.5.3 ALLOCATING SECURITIES TO REACH 50% TARGET

The allocation process starts by assigning to the appropriate style index the security that is the greatest distance away from the origin and hence possesses the strongest style characteristics, based on its initial VIF and GIF modified for buffers.

Allocating securities starting with those that are furthest away from the origin ensures that securities with the strongest style characteristics are allocated to their appropriate styles first. During the style allocation process, if two securities have the same distance, the security with a larger free float-adjusted market capitalization is allocated to its appropriate style index first.

The allocation process is stopped when adding a security to a particular style index results in the cumulative weight of that index exceeding the 50% free float-adjusted market capitalization representation target.

The security that stopped the allocation process is defined as the “middle security”. In this step, the allocation of the middle security is reviewed to determine how to best approximate the 50% target. If the middle security has a free float-adjusted market capitalization weight of less than 5% in the MSCI Market Index, its free float-adjusted market capitalization is allocated to the value or growth index that comes closest to the 50% target. If the middle security has a free float-adjusted market capitalization weight of more than 5% in the MSCI Market Index, its free float-adjusted market capitalization can be partially allocated to the value and growth indexes in order to be closer to the 50% target. The VIF and GIF for a middle security can be either 1, 0.65, 0.5, 0.35 or 0. Depending on the outcome of the attribution of this middle security, neither index may reach the 50% target and therefore the attribution process may continue.

Once the 50% target is reached, all remaining securities are allocated or reallocated to the index that has not yet reached the 50% target.

Therefore, some securities may be allocated to a style index that is different from their initial style classification. However, as the allocation process starts with securities having the strongest style characteristics and the remaining securities that are reassigned have relatively less pronounced style characteristics, the impact on the style indexes is expected to be modest.

Example:

Reallocating Securities with a Weight of Less than 5% to Reach 50% Target:

Securities	Distance	Security	Cumulative Index Weight		Post Buffer	Final VIF
		Weights	Value	Growth	VIF	
A	3.74	0.1%	0.1%	0.0%	1.00	1.00
B	2.63	0.2%	0.3%	0.0%	1.00	1.00
C	2.49	0.1%	0.4%	0.0%	1.00	1.00
...	...	...	...	...	...	...
...	...	...	...	...	...	...
<b>X</b>	<b>0.33</b>	<b>1.3%</b>	<b>46.5%</b>	<b>50.2%</b>	<b>0.00</b>	<b>0.00</b>
Y	0.32	0.9%	47.4%	50.2%	<b>0.00</b>	Reallocated <b>1.00</b>
...	...	...	...	...	...	...

Security A is the first security to be allocated as it is the furthest away from the origin and therefore has the strongest style characteristics. This security is assigned to the value index as its post buffer VIF is 1. As a result, the cumulative value index weight increases from 0% to 0.1%. The process continues until Security X is allocated. This security is allocated to the growth index according to its post buffer VIF and as a result, the cumulative growth index weight reaches 50.2%, above the 50% target. Security X is the “middle security”. Securities starting from Security Y are fully reallocated to the value index.

Example:

Reallocating Securities with a Weight of More than 5% to Reach 50% Target:

Securities	Distance	Security Weights	Cumulative Index Weight		Post Buffer		Final VIF
			Value	Growth	VIF		
A	3.74	0.1%	0.1%	0.0	1.00		1.00
B	2.63	0.2%	0.3%	0.0	1.00		1.00
C	2.49	0.1%	0.4%	0.0	1.00		1.00
...	...	...	...	...	...		...
...	...	...	...	...	...		...
<b>X</b>	<b>0.33</b>	<b>5.3%</b>	<b>48.5%</b>	<b>50.6%</b>	<b>0.00</b>	Reallocated	<b>0.35</b>
Y	0.32	0.9%	49.4%	50.2%	<b>0.00</b>	Reallocated	<b>1.00</b>
...	...	...	...	...	...		...

In this example, Security X is the “middle security”. It has a free float-adjusted market capitalization weight of more than 5% in the MSCI Market Index. According to its post buffer VIF, it should have been allocated to the growth index, resulting in a weight of 52.5% representation, above the 50% target. In this case, the security is partially allocated in order to most closely approximate the 50% target. As a result, 35% of the security’s weight is reallocated from the growth index to the value index and its final VIF is 0.35.



### **3 MAINTAINING MSCI GLOBAL INVESTABLE MARKET VALUE AND GROWTH INDEXES**

The value and growth indexes are maintained with the objective of reflecting the evolution of style segments within each country universe on a timely basis. In maintaining the indexes, emphasis is also placed on their continuity and on minimizing unnecessary index turnover. Maintaining the MSCI Global Investable Market Value and Growth Indexes involves two main dimensions. The first is the style maintenance of constituents resulting from the review of the Global Investable Market Value and Growth Indexes, which takes place on a semi-annual basis. The second aspect involves changes driven by the underlying MSCI Global Investable Market Country Indexes, which include additions to and deletions from the MSCI Global Investable Market Country Index, changes in Foreign Inclusion Factors (FIFs), updates in number of shares and changes in industry classification, as a result of quarterly index reviews, annual full country index reviews and ongoing event-related changes.

#### **3.1 SEMI-ANNUAL STYLE INDEX REVIEW**

The style review of the value and growth indexes is conducted at the end of May and November, coinciding with the May annual full country index review and the November quarterly index review of the underlying MSCI Global Investable Market Country Indexes.

During the style review, new value and growth z-scores are calculated for the pro forma MSCI Global Investable Market Country Index constituents and, after applying the buffer rules, securities are allocated to the value and growth indexes, targeting 50% of the free float-adjusted market capitalization within each MSCI Market Index as outlined in Section 2.

Values of the fundamental data used to determine style characteristics are maintained on a monthly basis. For the May and the November semi-annual style index reviews, fundamental and forward looking data as of the end of March and the end of September are used respectively. The review date for market capitalization and prices is generally any one of the last 10 business days of April and October for the May and the November semi-annual style index reviews respectively. The prices from that same date are used for the calculation of the three price based ratios used to determine value style characteristics.

#### **3.2 ELIGIBILITY CRITERIA**

Style reviews outside the semi-annual style index reviews are conducted for new securities in cases of additions to the underlying MSCI Global Investable Market Country Indexes.



For these securities, the style review involves the following:

- Determining the values of the eight variables used to specify value and growth characteristics of affected securities using the latest available underlying fundamental and forward looking data.
- Calculating the z-scores of each variable for affected securities using the previous daily free float-adjusted market capitalization weighted mean and standard deviation of the relevant variables.
- Aggregating the style z-scores for the affected securities to determine their overall style characteristics.
- Allocating the affected securities with the appropriate style inclusion factors without considering the buffer rules or the 50% free float-adjusted market capitalization target.

Additions of constituents to the value and growth indexes outside the regular index reviews can result from:

- Inclusions to the underlying MSCI Global Investable Market Country Indexes during the February and August quarterly index reviews for the MSCI Global Investable Market Indexes, or
- Inclusions to the underlying MSCI Global Investable Market Index Country Indexes due to M&As, spin-offs, large IPOs and other early inclusions as described in the MSCI Global Investable Market Indexes Methodology Book.

### 3.3 ONGOING EVENT-RELATED MAINTENANCE

Style reviews are conducted for new index constituents except in the following cases:

- When a non-constituent company acquires a constituent company and the constituent company's securities are replaced by the securities of the acquiring company, the securities of the acquiring company will keep the style of the securities of the acquired company.
- When a constituent company merges with a non-constituent company and the merged company replaces the constituent company, the securities of the merged company will keep the style of the constituent securities before the merger.
- When two constituent companies merge and the merged company replaces the two constituent companies, the securities of the merged company will keep the style of the constituent securities to which it is historically linked.





- When securities spun-off from existing constituents are considered for early inclusion at the time of the event and the spinning-off security is not deleted from the Global Investable Market Index, the spun-off securities will keep the style of the spinning-off security.



## APPENDIX I: VARIABLE DEFINITIONS AND COMPUTATIONS

This appendix provides details on the definitions and computations of the eight variables used to define the value and growth investment style characteristics for index construction.

All forward variables are based on consensus analysts' estimates are provided by specialized data vendors. Currently, the primary vendor for forward variables is Thomson I/B/E/S. For Japan, Toyo Kezai is used as secondary source for securities which are not covered by Thomson I/B/E/S. For all other fundamental data, MSCI data are used. As a general rule, in order to avoid inconsistencies of data between the different providers, the fundamental data used in the forward variable calculations are also provided by Thomson I/B/E/S.

Thomson I/B/E/S provides data at the company level. Hence, MSCI propagates the company level Thomson I/B/E/S data to all securities of the same company when combining it with security level prices. In case of par value difference between multiple securities of the same company, MSCI adjusts Thomson I/B/E/S data accordingly.

In certain circumstances, such as for securities recently listed or undergoing significant events where forward-looking data is not yet available from I/B/E/S and Toyo Kezai, MSCI is using an average of analyst estimates available from other sources.

### VARIABLES USED TO DEFINE VALUE INVESTMENT STYLE CHARACTERISTICS

#### Book Value to Price Ratio (BV / P)

The BV / P calculation is as follows:

$$BV / P = \text{book value per share} / \text{price of security}$$

The most recently reported book value is used to estimate book value per share.

#### 12-month Forward Earnings to Price Ratio (E fwd / P)

The E fwd / P is calculated as follows:

$$E \text{ fwd} / P = EPS_{12F} / \text{price of security}$$

Where:

$EPS_{12F}$  is the 12-month forward EPS estimate and is derived on a rolling basis from the consensus of analysts' earnings estimates for fiscal year 1 and fiscal year 2.

$$EPS_{12F} = \frac{M * EPS_1 + (12 - M) * EPS_2}{12}$$

Where

- $EPS_1$  is the consensus of analysts' earnings estimates for fiscal year 1
- $EPS_2$  is the consensus of analysts' earnings estimates for fiscal year 2
- M is the number of months remaining before the fiscal year end
- The fiscal year 1 corresponds to the fiscal year following the last fiscal year for which the company has made its results publicly available

For cases where  $EPS_2$  is not available and M is greater than or equal to 8,  $EPS_1$  is used as an approximation of  $EPS_{12F}$

Example:

*Calculating the 12-month forward earnings as of January 20, 2005:*

	<i>Security A</i>	<i>Security B</i>	<i>Security C</i>
Latest reported Fiscal Year	Dec 31, 2004	Mar 31, 2004	Dec 31, 2003
<b>M</b>	<b>11</b>	<b>2</b>	<b>11</b>
<b>EPS<sub>1</sub></b>	<b>0.64</b>	<b>1.04</b>	<b>1.04</b>
<b>EPS<sub>1</sub> date</b>	<b>Dec 31, 2005</b>	<b>Mar 31, 2005</b>	<b>Dec 31, 2004</b>
<b>EPS<sub>2</sub></b>	<b>0.74</b>	<b>1.52</b>	<b>1.52</b>
<b>EPS<sub>2</sub> date</b>	<b>Dec 31, 2006</b>	<b>Mar 31, 2006</b>	<b>Dec 31, 2005</b>
<b>EPS<sub>3</sub></b>			<b>1.72</b>
<b>EPS<sub>3</sub> date</b>			<b>Dec 31, 2006</b>
<b>EPS<sub>12F</sub></b>	<b>0.65</b>	<b>1.44</b>	<b>1.54</b>

For Security C, the results for the fiscal year ending December 31, 2004 are not yet available. As a result, the  $EPS_1$  estimates still pertain to the fiscal year ending December 31, 2004.



Therefore, in order to have meaningful 12-month forward earnings, the  $EPS_2$  and the  $EPS_3$  are used instead of the  $EPS_1$  and  $EPS_2$ .

Example:

*Calculating the 12-month forward earnings as of January 20, 2005 when  $EPS_2$  is missing:*

	Security A	Security B	Security C
Latest reported Fiscal Year	Sep 30, 2004	Jun 30, 2004	Dec 31, 2004
<b>M</b>	<b>8</b>	<b>5</b>	<b>11</b>
$EPS_1$	<b>0.64</b>	<b>1.04</b>	<b>1.04</b>
$EPS_1$ date	<b>Sep 30, 2005</b>	<b>Jun 30, 2005</b>	<b>Dec 31, 2005</b>
$EPS_2$	<b>0.74</b>		
$EPS_2$ date	<b>Sep 30, 2006</b>		
$EPS_{12F}$	<b>0.67</b>	<b>N/A</b>	<b>1.04</b>

For security B, estimates for June 30, 2006 are not available. Since M is smaller than 8,  $EPS_{12F}$  is not available. In the case of Security C, estimates for December 31, 2006 are not available but as M is greater than 8,  $EPS_1$  is used as  $EPS_{12F}$ .

### Dividend yield (D / P)

$$D / P = \text{Current Annualized Dividend per Share} / \text{Price of Security}$$

The current annualized dividend per share is the sum of all the latest declared dividends representing one year of dividends. For the USA and Canada, the current annualized dividend per share is calculated by annualizing the latest published quarterly dividend.

Yields are gross, before withholding tax, and take into account special tax credits when applicable.

### VARIABLES USED TO DEFINE GROWTH INVESTMENT STYLE CHARACTERISTICS

#### Long-term Forward Earnings per Share Growth Rate (LT fwd EPS G)

The LT fwd EPS G is the consensus of analysts’ earnings growth rate estimates typically provided for the next 3 to 5 years. LT fwd EPS G with values above 50 or below -33 are not taken into account and considered as missing if contributed by only one analyst.

**Short-term Forward Earnings per Share Growth Rate (ST fwd EPS G)**

The ST fwd EPS G is a growth rate between the 12-month backward earnings per share and the 12-month forward earnings per share.

The ST fwd EPS G is computed as follows:

$$\text{ST forward EPS G} = \frac{EPS_{12F} - EPS_{12B}}{|EPS_{12B}|}$$

Where

EPS<sub>12B</sub> = 12-month backward EPS is derived in a similar fashion as the EPS<sub>12F</sub> but from the last reported fiscal year and the consensus of analysts’ earnings estimates for fiscal year 1

$$EPS_{12B} = \frac{M * EPS_0 + (12 - M) * EPS_1}{12}$$

Where

EPS<sub>0</sub> is last fiscal year end reported earnings per share

For cases where EPS<sub>1</sub> is used as an approximation of EPS<sub>12F</sub>, EPS<sub>0</sub> is used as the value for EPS<sub>12B</sub>.

Example:



*Calculating the Short-term forward EPS growth rate as of the January 20, 2005:*

	Security A	Security B	Security C
Fiscal Year End	Dec 31, 2004	Nov 30, 2004	Mar 31, 2004
<b>M</b>	<b>11</b>	<b>10</b>	<b>2</b>
<b>EPS<sub>0</sub></b>	<b>0.50</b>	<b>-0.30</b>	<b>0.89</b>
<b>EPS<sub>1</sub></b>	<b>0.64</b>	<b>-0.15</b>	<b>1.04</b>
<b>EPS<sub>2</sub></b>	<b>0.74</b>	<b>0.25</b>	<b>1.52</b>
<b>EPS<sub>12F</sub></b>	<b>0.65</b>	<b>-0.08</b>	<b>1.44</b>
<b>EPS<sub>12B</sub></b>	<b>0.51</b>	<b>-0.28</b>	<b>1.02</b>
<b>ST fwd EPS G</b>	<b>26.7%</b>	<b>69.7%</b>	<b>41.9%</b>

### Current Internal Growth Rate (g)

The Current Internal Growth Rate is calculated as follows:

$$g = ROE * (1 - PO)$$

Return on Equity (ROE) is calculated using the trailing 12-month EPS divided by the most recently reported book value. The ROE is considered meaningful and is calculated if the following conditions are met:

- the book value is positive and
- the difference between the book value and earnings date is less than 18 months and
- the book value's date is older than the earnings date and
- the issuer results are consolidated or not consolidated for both book value and earnings.

Otherwise, the ROE value is considered missing.

Payout ratio (PO) is calculated using the current annualized dividend per share divided by the trailing 12-month EPS.

In the event of a missing value for either the payout ratio or the ROE, the g value is considered to be missing.

**Long-term Historical EPS Growth Trend (LT his EPS G) and  
Long-term Historical Sales per Share (SPS) Growth Trend (LT his SPS G)**

For the calculation of the LT his EPS G and LT his SPS G, first a regression (ordinary least square method) is applied to the last 5 yearly restated EPS and SPS respectively.

$$EPS_t = a \times t + b$$

Where:

- a, the slope coefficient,
- b, the intercept,
- t, the year expressed in number of months.

Then, an average absolute EPS or SPS is estimated:

$$\tilde{EPS} = \sum_{i=1}^n \frac{|EPS_i|}{n}$$

$$\tilde{SPS} = \sum_{i=1}^n \frac{|SPS_i|}{n}$$

The growth trend is finally obtained as follows:

$$LT \text{ his } EPS \text{ G} = \frac{a_{EPS}}{|\tilde{EPS}|}$$

$$LT \text{ his } SPS \text{ G} = \frac{a_{SPS}}{|\tilde{SPS}|}$$

In order to compute a meaningful long-term historical growth trend for the EPS and SPS, 5 years of comparable data are required. In the event that comparable restated pro forma data are unavailable, MSCI may restate the data using adjustments. A minimum of the last four EPS or SPS values are needed to compute their historical growth trends. Growth trends for securities without sufficient EPS or SPS values are considered to be missing.

Example:

*Calculating Long-term historical EPS and SPS growth trend January 20, 2003:*

	Years	t	EPS	SPS
<b>Fiscal Year End 0</b>	<b>Dec 31, 1998</b>	<b>0</b>	<b>-1.11</b>	<b>7.71</b>
<b>Fiscal Year End 1</b>	<b>Dec 31, 1999</b>	<b>12</b>	<b>-0.51</b>	<b>8.19</b>
<b>Fiscal Year End 2</b>	<b>Dec 31, 2000</b>	<b>24</b>	<b>0.29</b>	<b>8.57</b>
<b>Fiscal Year End 3</b>	<b>Dec 31, 2001</b>	<b>36</b>	<b>0.92</b>	<b>8.87</b>
<b>Fiscal Year End 4</b>	<b>Dec 31, 2002</b>	<b>48</b>	<b>1.41</b>	<b>11.50</b>
<b>a</b>			<b>0.05</b>	<b>0.07</b>
<b>a, annualized</b>			<b>0.60</b>	<b>0.84</b>
<b><math>\tilde{E}PS</math> &amp; <math>\tilde{S}PS</math></b>			<b>0.85</b>	<b>8.97</b>
<b>Growth Trend</b>			<b>70.6%</b>	<b>9.36%</b>



## APPENDIX II: CALCULATION OF MARKET MEAN AND STANDARD DEVIATION

This appendix explains the calculation of the market mean and Standard deviation used in the determination of the z-score.

The calculation involves the following three steps:

- First, the variable values are winsorized using the 5th and 95th percentile cut-off.
- Second, the winsorized per share values are used to compute the market mean.
- Third, the market standard deviation is computed.

The market mean is the market capitalization weighted average of the variable and is computed as follows:

$$\mu_{\text{variable}} = \sum_i \left[ \left( \frac{\text{Shares}_i \times P_i \times FIF_i}{\sum_i \text{Shares}_i \times P_i \times FIF_i} \right) \times \text{Variable}_i^{\text{winsorized}} \right]$$

The market standard deviation is computed as follows:

$$\sigma_{\text{variable}} = \sqrt{\sum_i \left( \frac{\text{Shares}_i \times P_i \times FIF_i}{\sum_i \text{Shares}_i \times P_i \times FIF_i} \right) \times \left( \text{Variable}_i^{\text{winsorized}} - \mu_{\text{variable}} \right)^2}$$

For example, the market mean and the market standard deviation for BV/P is calculated as follows:

$$\mu_{BV/P} = \sum_i \left[ \left( \frac{\text{Shares}_i \times P_i \times FIF_i}{\sum_i \text{Shares}_i \times P_i \times FIF_i} \right) \times \left( \frac{BV}{P} \right)_i^{\text{winsorized}} \right]$$

$$\sigma_{BV/P} = \sqrt{\sum_i \left( \frac{\text{Shares}_i \times P_i \times FIF_i}{\sum_i \text{Shares}_i \times P_i \times FIF_i} \right) \times \left( \left( \frac{BV}{P} \right)_i^{\text{winsorized}} - \mu_{BV/P} \right)^2}$$

Please note that only securities with non-missing variables are included in the market mean and standard deviation.

**The following sections have been modified since Dec 2007**

## Section 2.1 Variables used to specify Value and Growth characteristics

- Clarification of treatment for the newly created Financial Exchanges & Data sub-industry (40203040)

## Section 2.3.2 Calculating the Growth Z-Score

- Clarification of treatment for the newly created Financial Exchanges & Data sub-industry (40203040)

**The following sections have been modified since August 2016**

## Section 1:

- Updates to the description

## Section 1.2.2:

- Updates to the description

## Section 2.1:

- Added link to the MSCI Fundamental Data Methodology

## Section 3:

- Structural changes

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