S&P Dow Jones Indices

A Division of S&P Global

S&P U.S. Indices
Methodology

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Table of Contents

Introduction

Index Objective

The S&P U.S. Indices are a family of equity indices designed to measure the market performance of U.S. domiciled stocks trading on U.S. exchanges. The family is composed of a wide range of indices based on size, sector, and style. The indices are weighted by float-adjusted market capitalization (FMC). In addition, equal weighted and capped market capitalization weighted indices are also available as detailed below.

Highlights and Index Family

Float-Adjusted Market Capitalization Weighted Indices:

S&P Total Market Index. The index measures the performance of the broad U.S. market and includes all eligible U.S. common equities.

S&P 500. The index measures the performance of the large-cap segment of the U.S. market. Considered to be a proxy of the U.S. equity market, the index is composed of 500 constituent companies.

S&P MidCap 400. The index measures the performance of the mid-cap segment of the U.S. market. The index is composed of 400 constituent companies.

S&P SmallCap 600. The index measures the performance of the small-cap segment of the U.S. market. The index is composed of 600 constituent companies.

S&P Composite Indices. The indices include the S&P Composite 1500, S&P 900, and S&P 1000. The S&P Composite 1500 is a combination of the S&P 500, S&P MidCap 400, and S&P SmallCap 600 and measures the performance of all three market size segments. The S&P 900 is a combination of the S&P 500 and S&P MidCap 400 and measures the performance of the mid- and large-cap market size segments. The S&P 1000 is a combination of the S&P MidCap 400 and S&P SmallCap 600 and measures the performance of the mid- and small-cap market size segments.

S&P Completion Index. The index is a sub-index of the S&P Total Market Index and measures the performance of all constituents in the S&P Total Market Index that are not also constituents of the S&P 500. The Index is constituted at the company level, not at the share line level. If one company listing is in the S&P 500, all other company listings are excluded from the S&P Completion Index.

S&P 500 Top 10. The index measures the performance of 10 of the largest, by FMC, companies in the S&P 500.

S&P 500 Top 50. The index measures the performance of 50 of the largest, by FMC, companies in the S&P 500.

S&P 100. The index measures the performance of 100 companies selected from the S&P 500. Generally, the largest companies in the S&P 500 that have listed options are selected for index inclusion. Sector balance is also considered in the selection of companies for the S&P 100.

See Appendix B for additional details on the following indices:

S&P Composite 1500 / S&P TMI (Spliced as of EOD Dec-18-2015) Index. The index is a replica of the S&P Total Market Index and follows the S&P Total Market Index methodology with the exception that for

index history prior to December 18, 2015, the index was a replica of the S&P Composite 1500 and followed that index's methodology.

S&P 500 Ex-Sector Indices. The indices measure the performance of all companies in the S&P 500, excluding those companies in one or more defined sector(s). Company classifications are based on the Global Industry Classification Standard (GICS®).

S&P 500 Ex-Financials, Real Estate, Utilities and Transportation Index. The index measures the performance of all companies in the S&P 500, excluding those belonging to the Financials sector, Real Estate sector, Utilities sector or Transportation industry group. Company classifications are based on GICS.

S&P 500 Communication Services & Information Technology Index. The index[1] measures the performance of companies in the S&P 500 classified as part of the Communication Services and Information Technology sectors. Company classifications are based on GICS.

For more information on GICS, please refer to S&P Dow Jones Indices' Global Industry Classification Standard (GICS) Methodology.

Equal Weight Indices:

S&P Equal Weight U.S. Indices. The indices include the S&P 500 Top 50 Equal Weight Index, S&P 100 Equal Weight Index, S&P 500 Equal Weight Index, S&P 500 Equal Weight Sector Indices, S&P MidCap 400 Equal Weight Index, S&P MidCap 400 Equal Weight Sector Indices, S&P SmallCap 600 Equal Weight Index, S&P SmallCap 600 Equal Weight Sector Indices, S&P Composite 1500 Equal Weight Index, and S&P Composite 1500 Equal Weight Sector Indices. Index composition for these indices is the same as that of their respective underlying index. Each company is equally weighted as of the respective rebalance reference date, rather than weighted by float-adjusted market capitalization. Unless otherwise noted in *Index Construction*, index constituents for the Equal Weight Sector Indices are drawn from their respective parent indices and selected for index inclusion based on their GICS classification.

Capped Market Capitalization Weighted Indices:

S&P Capped Market Capitalization Weighted U.S. Indices. The indices include the Select Sector Indices, S&P Select Sector Capped 20% Indices, S&P Select Sector Daily Capped 25/20 Indices, S&P Select Sector 15/60 Capped Indices, S&P 500 Capped 35/20 Indices, S&P MidCap 400 Capped Sector Indices, and S&P SmallCap 600 Capped Sector Indices. Index constituents are drawn from their respective underlying index (i.e., the S&P 500, S&P MidCap 400 or S&P SmallCap 600) and selected for index inclusion based on their GICS classification. Instead of weighting by float-adjusted market capitalization, the indices employ a capped market capitalization weighting scheme and specific capping methodology.

[1] S&P Dow Jones has created back calculated history for the index based on the securities in the headline S&P 500 that would have hypothetically been classified as GICS Code 50 and 45 under this new structure effective September 24, 2018.

Supporting Documents

This methodology is meant to be read in conjunction with supporting documents providing greater detail with respect to the policies, procedures and calculations described herein. References throughout the methodology direct the reader to the relevant supporting document for further information on a specific topic. The list of the main supplemental documents for this methodology and the hyperlinks to those documents is as follows:

Supporting Document	URL
S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology	Equity Indices Policies & Practices
S&P Dow Jones Indices' Index Mathematics Methodology	Index Mathematics Methodology
S&P Dow Jones Indices' Float Adjustment Methodology	Float Adjustment Methodology
S&P Dow Jones Indices' Global Industry Classification Standard (GICS) Methodology	GICS Methodology

This methodology was created by S&P Dow Jones Indices to achieve the aforementioned objective of measuring the underlying interest of each index governed by this methodology document. Any changes to or deviations from this methodology are made in the sole judgment and discretion of S&P Dow Jones Indices so that the index continues to achieve its objective.

Eligibility Criteria

Securities must meet the following eligibility factors to be considered eligible for index consideration. As applicable, the measurement date for determining whether all eligibility criteria are met for the S&P Composite 1500 is the open of trading on the day prior to the announcement date:

Eligibility Factors

Domicile. Must be a U.S.-domiciled company.

For more information on domiciles, please refer to the Domiciles section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Security Filing Type. The company issuing the security satisfies the U.S. Securities Exchange Act's periodic reporting obligations by filing certain required forms for domestic issuers, such as but not limited to: Form 10-K annual reports, Form 10-Q quarterly reports, and Form 8-K current reports.

Exchange Listing. Must have a primary listing on one of the following U.S. exchanges:

- NYSE
- NYSE Arca
- NYSE American
- Nasdaq Global Select Market
- Nasdaq Global Market
- Nasdaq Capital Market
- Cboe BZX
- Cboe BYX
- Cboe EDGA
- Cboe EDGX

Ineligible exchanges include:

- Over-the-counter (OTC) Markets including Pink Open Market

Organizational Structure and Share type. The issuing company must have the following organizational structure and share type:

- Corporations (including equity and mortgage REITs)
- Common stock (i.e., shares)

Ineligible organizational structures and share types include, but are not limited to the following:

- Business development companies (BDCs)
- Limited partnerships (LPs)
- Master limited partnerships (MLPs)
- Limited liability companies (LLCs)
- Closed-end funds
- ETFs
- ETNs
- Royalty trusts
- Special purpose acquisition companies (SPAC)
- Preferred stock
- Convertible preferred stock
- Unit trusts
- Equity warrants
- Convertible bonds
- Investment trusts
- Rights
- American Depositary Receipts (ADRs)

Tracking Stocks. Eligibility is index dependent:

- **S&P Total Market Index.** Tracking stocks are eligible.
- **S&P Composite 1500 & Component Indices.** Tracking stocks are ineligible .

Multiple Share Classes. S&P DJI includes all publicly listed multiple share class lines separately in FMC weighted indices, subject to the eligibility requirements for each index. Index membership eligibility for a company with multiple share class lines is based on the total market capitalization (TMC) at the company level. Each publicly listed share class is evaluated separately to determine index inclusion, with the weight of each line reflecting only that line's FMC, not the combined FMC of all company share class lines. For example, one listed share class line may be included in an S&P Composite 1500 component index while a second listed share class line of the same company is excluded. Unlisted share class lines are not combined with any listed share class lines, but unlisted share class lines are included when calculating company TMC.

For companies that issue a second publicly traded share class to index share class holders, the newly issued share class line is considered for inclusion provided 1) the event is mandatory, and 2) the market capitalization of the distributed class is not considered to be de minimis.

For S&P 1500 constituents, multiple share class lines not currently in the index must satisfy the liquidity and FMC requirements defined in *Eligibility Criteria* (but not the market capitalization criteria, which is only considered at the company level). Any excluded listed secondary lines are reviewed annually in September for potential index inclusion. Multiple share class line deletions from the S&P Composite 1500 are at the discretion of the Index Committee, and, as a result, a multiple share class line may continue to be included in an index even if the share class line subsequently fails to meet the addition criteria.

Market Capitalization. Eligibility differs by index:

- **S&P Total Market Index.** No minimum market capitalization requirement.
- **S&P Composite 1500.** Requires total company level market capitalizations of:
    - **S&P 500:** US$ 18.0 billion or more
    - **S&P MidCap 400:** US$ 6.7 billion to US$ 18.0 billion
    - **S&P SmallCap 600:** US$ 1.0 billion to US$ 6.7 billion.

The minimum market capitalization guidelines are designed to capture the three-month average cumulative total company level market capitalization of the S&P Total Market Index ("TMI") universe at approximately the following cumulative percentiles:

- **S&P 500:** 85th percentile
- **S&P MidCap 400:** 85th-93rd percentile
- **S&P SmallCap 600:** 93rd-99th percentile

- The market capitalization guideline ranges are expressed in dollar ranges. The ranges are reviewed at the beginning of each calendar quarter and updated as needed to ensure the ranges reflect current market conditions. At the quarterly review, if the new market capitalization ranges for any of the Composite 1500 indices deviate by 10% or more from the current range, the index committee will consider a market capitalization range update for all the underlying indices. Updates, if needed, are announced with immediate effect.
- Companies passing the total company level market capitalization criteria are also required to have a security level float-adjusted market capitalization (FMC) that is at least 50% of the respective index's total company level minimum market capitalization threshold.

Investable Weight Factor (IWF). S&P TMI and S&P Composite 1500 constituents must have an IWF of at least 0.10 as of the rebalancing effective date.

Please refer to S&P Dow Jones Indices' Float Adjustment Methodology more information on IWFs.

Liquidity. A float-adjusted liquidity ratio (FALR), defined as the annual dollar value traded divided by the float-adjusted market capitalization (FMC), is used to measure liquidity. Using composite pricing and U.S. consolidated volume (excluding dark pools), annual dollar value traded is defined as the average closing price multiplied by the historical volume over the 365 calendar days prior to the evaluation date. This is reduced to the available trading period for IPOs, spin-offs or public companies considered to be U.S. domiciled for index purposes that do not have 365 calendar days of trading history on a U.S. exchange. In these cases, the dollar value traded available as of the evaluation date is annualized. Eligibility differs depending on the index:

- **S&P Total Market Index**
    - Liquidity requirements are reviewed during the quarterly rebalancings.
    - The price (corporate action adjusted) as of the evaluation date, and the shares outstanding and IWF as of the rebalancing effective date are used to calculate the FMC.
    - The evaluation date is five weeks prior to the rebalancing effective date.
    - FALR must be greater than or equal to 0.1.
    - Current constituents have no minimum requirement.
- **S&P Composite 1500**
    - The price, shares outstanding, and IWF as of the evaluation date are used to calculate the FMC.
    - The evaluation date is the open of trading on the day prior to the announcement date.
    - The stock should trade a minimum of 250,000 shares in each of the six months leading up to the evaluation date.
    - FALR must be greater than or equal to 0.75 at the time of addition to the Composite 1500.
    - Current constituents have no minimum requirement.

Financial Viability. Eligibility differs depending on the index:

- **S&P Total Market Index.** There is no financial viability requirement for index eligibility.
- **S&P Composite 1500.** The sum of the most recent four consecutive quarters' Generally Accepted Accounting Principles (GAAP) earnings (net income excluding discontinued operations) should be positive as should the most recent quarter. For equity real estate investment trusts (REITs), financial viability is based on GAAP earnings and/or Funds From Operations (FFO), if reported. FFO is a measure commonly used in equity REIT analysis.

Initial Public Offerings (IPOs). Eligibility differs depending on the index:

- **S&P Total Market Index.** Eligible IPOs are added to the index at the next rebalancing, subject to the reference date (defined in *Index Maintenance*). Certain large IPOs may be eligible for S&P TMI **fast track entry**, subject to the following conditions:
    - Only newly public IPOs and IPO direct placement listings are considered eligible for fast track entry. Formerly bankrupt companies that switch from an Over-the-Counter Exchange ("OTC") or a non-covered exchange to an S&P Dow Jones Indices covered exchange are not eligible for fast track entry.
    - Fast track traditional IPO additions must meet a minimum FMC threshold of US$ 2 billion, calculated using the shares offered (excluding over-allotment options) and the closing price on the first day of trading on an eligible exchange. The threshold level is reviewed from time to time and updated as needed to assure consistency with market conditions.
    - Fast track direct placement listing IPO additions must meet a minimum FMC threshold of US$ 2 billion, calculated using the shares available to the public as determined by its

investable weight factor, and the closing price on the first day of trading on an eligible exchange.

- In addition, an IPO will need to meet all other applicable index eligibility rules except for the liquidity requirement. If all necessary public information is available, S&P Dow Jones Indices verifies that the fast track conditions have been met. Once S&P Dow Jones Indices announces that the IPO is eligible for fast track addition, it is added to the index with five business days lead time. At the discretion of the Index Committee, fast track IPO additions eligible to be added during a quarterly rebalancing freeze period may instead be added on the rebalancing effective date.

- **S&P Composite 1500.**
  - IPOs should be traded on an eligible exchange for at least 12 months before being considered for addition to an index. There is no IPO fast track entry allowed for S&P Composite 1500 candidates.
  - For former SPACs, S&P Dow Jones Indices considers the de-SPAC transaction to be an event equivalent to an IPO, and 12 months of trading post the de-SPAC event are required before a former SPAC can be considered for S&P Composite 1500 indices.
  - Spin-offs or in-specie distributions from existing constituents are not required to have 12 months of trading prior to their inclusion in the S&P Composite 1500.

Please note that companies that migrate from an ineligible exchange, emerge from bankruptcy, are newly designated to be domiciled in the U.S. for index purposes by S&P Dow Jones Indices, or convert from an ineligible share or organizational type to an eligible type do not need to trade on an eligible U.S. exchange for 12 months before being considered for addition to a S&P Composite 1500 index.

Rule Exceptions. Exceptions to the above criteria include:

- **Non-S&P Composite 1500 Companies that Acquire S&P Composite 1500 Index Constituents.** Non-S&P Composite 1500 companies that acquire S&P Composite 1500 index constituents, but do not fully meet all of the eligibility criteria, may still be added to an S&P Composite 1500 index at the discretion of the Index Committee if the merger consideration includes the acquiring company issuing stock to target company shareholders, and the Committee determines that the addition could mitigate turnover and enhance the representativeness of the index as a market benchmark.
- **S&P Composite 1500 Migrations.** Current S&P Composite 1500 constituents can be migrated from one S&P Composite 1500 component index (S&P 500, S&P MidCap 400, or S&P SmallCap 600) to another provided they meet the total company level market capitalization eligibility criteria for the new index. Migrations from one S&P Composite 1500 index to another do not need to meet the financial viability, liquidity, or 50% of the respective index's total company level minimum market capitalization threshold criteria.
- **Spin-offs from Current S&P Composite 1500 Index Constituents.** Companies that are spun-off from current S&P Composite 1500 constituents do not need to meet the outside addition criteria, but they should be considered U.S. domiciled for index purposes. For spin-offs, index membership eligibility is determined using when-issued prices, if available. At the discretion of the Index Committee, a spin-off company may be retained in the parent stock's index if the Committee determines it has a total market capitalization representative of the parent index. If the spin-off company's estimated market capitalization is below the minimum defined in the outside addition criteria but there are other constituent companies in the parent index that have a significantly lower total market capitalization than the spin-off company, the Committee may decide to retain the spin-off company in the parent index. Prior to their spin-off, these companies were part of the parent index and keeping them in the S&P Composite 1500 and the parent index, where appropriate, mitigates turnover.
- **Berkshire Hathaway Inc.** Due to turnover and liquidity concerns, S&P 100 & 500 constituent Berkshire Hathaway Inc. (NYSE:BRK.B) is an exception to the Multiple Share Classes rules as

detailed in *S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology*. S&P Dow Jones Indices will continue to consolidate the share count for this company under the B share class line.

S&P Dow Jones Indices believes turnover in index membership should be avoided when possible. At times a stock may appear to temporarily violate one or more of the addition criteria. However, the eligibility criteria are for addition to an index, not for continued membership. As a result, an index constituent that appears to violate criteria for addition to that index is not deleted unless ongoing conditions warrant an index change. When a stock is removed from an index, S&P Dow Jones Indices explains the basis for the removal.

Index Construction

S&P Total Market Index

Index Construction. At each annual reconstitution, all eligible securities are selected and form the index.

At each quarterly rebalancing, securities that have undergone a change in the past quarter are eligible to be added to the index subject to a reference date that is five weeks prior to the rebalancing effective date. These securities include:

- Initial Public Offerings (IPOs) (including direct offerings)
- New listings on eligible exchanges
- Securities that moved to an eligible exchange
- Securities that emerged from Bankruptcy Status
- Companies whose domicile has changed to the U.S. as determined by S&P Dow Jones Indices
- Companies converting from an ineligible organization type to an eligible organization type
- Securities converting from an ineligible share type to an eligible share type
- Former SPACs that transition to an operating company via a de-SPAC transaction

Current index constituents are not evaluated for continued inclusion during the quarterly rebalances. A stock previously excluded due to failing the IWF or liquidity criteria is not reviewed again until the following annual reconstitution.

Weighting. The index is weighted by FMC.

S&P 500, S&P MidCap 400 and S&P SmallCap 600

Index Universe. Index constituents are selected from the S&P Total Market Index

Constituent Selection. Constituent selection is at the discretion of the Index Committee and is based on the eligibility criteria. The indices have a fixed constituent company count of 500, 400, and 600, respectively. Sector balance, as measured by a comparison of each GICS sector's weight in an index with its weight in the S&P Total Market Index, in the relevant market capitalization range, is also considered in the selection of companies for the indices.

Weighting. Each index is weighted by FMC.

S&P Composite Indices

Index Construction. Each index is constructed by combining the respective underlying index constituents as follows:

- **S&P Composite 1500.** The index combines all constituents of the S&P 500, S&P MidCap 400, and S&P SmallCap 600.
- **S&P 900.** The index combines all constituents of the S&P 500 and S&P MidCap 400.
- **S&P 1000.** The index combines all constituents of the S&P MidCap 400 and S&P SmallCap 600.

Weighting. Each index is weighted by FMC.

S&P 100

Index Universe. Index constituents are drawn from the S&P 500.

Constituent Selection. Constituent selection is at the discretion of the Index Committee. Generally, the largest companies in the S&P 500 that have listed options are selected for index inclusion. Sector balance is also considered in the selection of companies for the S&P 100.

Weighting. The index is weighted by FMC.

S&P 500 Top 50

Index Universe. Index constituents are drawn from the S&P 500.

Constituent Selection. At each annual reconstitution, the top 50 companies in the S&P 500, based on FMC, are selected for index inclusion. A buffer rule is applied to the constituent selection process at each rebalancing in order to reduce turnover:

1. All companies ranked in the top 45 by FMC are automatically selected for index inclusion.
2. Next, any current constituent companies remaining within the top 55 are re-selected for index inclusion, in order by rank, until the 50 company target count has been reached.
3. If the target count still has not been reached, the highest-ranking non-constituents are selected until 50 companies are included.

Weighting. The index is weighted by FMC.

S&P 500 Top 10

Index Universe. Index constituents are drawn from the S&P 500.

Constituent Selection. At each annual reconstitution, the top 10 companies in the S&P 500, based on FMC, are selected for index inclusion. A buffer rule is applied to the constituent selection process at each rebalancing in order to reduce turnover:

1. All companies ranked in the top 9 by FMC are automatically selected for index inclusion.
2. Next, any current constituent companies remaining within the top 11 are re-selected for index inclusion, in order by rank, until the 10 company target count has been reached.
3. If the target count still has not been reached, the highest-ranking non-constituents are selected until 10 companies are included.

Weighting. The index is weighted by FMC.

S&P Completion Index

Index Universe. Index constituents are drawn from the S&P Total Market Index.

Constituent Selection. All constituents of the S&P Total Market Index excluding constituents of the S&P 500 are selected and form the index.

Weighting. The index is weighted by FMC.

Select Sector Indices

Index Construction. Companies in the S&P 500 are classified based on GICS. Each index is made up of all stocks in the GICS sector unless otherwise noted in the table below.

Select Sector Index[2]	GICS Sector Classification
Communication Services Select Sector Index	Communications Services (GICS Code 50)[3]
Consumer Discretionary Select Sector Index	Consumer Discretionary (GICS Code 25)
Consumer Staples Select Sector Index	Consumer Staples (GICS Code 30)
Energy Select Sector Index	Energy (GICS Code 10)
Financial Select Sector Index	Financials (GICS Code 40)
Health Care Select Sector Index	Health Care (GICS Code 35)
Industrials Select Sector Index	Industrials (GICS Code 20)
Materials Select Sector Index	Materials (GICS Code 15)
Real Estate Select Sector Index	Real Estate (GICS Code 60)
Technology Select Sector Index	Information Technology (GICS Code 45)
Utilities Select Sector Index	Utilities (GICS Code 55)

For more information on GICS, please refer to S&P Dow Jones Indices' GICS Methodology.

The methodology for capped indices follows an identical approach to market cap weighted indices except that the indices apply an additional weight factor, or "AWF", to adjust the float-adjusted market capitalization to a value such that the index weight constraints are satisfied.

Please note that any intra-quarter addition will be added to the relevant Select Sector Index with an AWF of 1.

For more information on AWF, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

Weighting. Each index is capped market capitalization weighted. For capping purposes, the indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December using the following procedures:

1. The rebalancing reference date is the second Friday of March, June, September, and December.
2. With prices reflected on the rebalancing reference date, adjusted for any applicable corporate actions, and membership, shares outstanding and IWFs as of the rebalancing effective date, each company is weighted by FMC. Modifications are made as defined below.
3. If any company has an FMC weight greater than 24%, the company's weight is capped at 23%, which allows for a 2% buffer. This buffer is meant to mitigate against any company exceeding 25% as of the quarter-end diversification requirement date.
4. All excess weight is proportionally redistributed to all uncapped companies within the relevant index.
5. After this redistribution, if the FMC weight of any other company breaches 23%, the process is repeated iteratively until no company breaches the 23% weight cap.
6. The sum of the companies with weights greater than 4.8% cannot exceed 50% of the total index weight. These caps are set to allow for a buffer below the 5% limit.
7. If the rule in step 6 is breached, rank all companies in descending order by FMC weight, and reduce the weight of the smallest company whose weight is greater than 4.8% that causes the step 6 breach to 4.5%. This process continues iteratively until step 6 is satisfied.
8. Index share amounts are assigned to each constituent to arrive at the weights calculated above. Since index shares are assigned based on prices one week prior to rebalancing, the actual weight of each constituent at the rebalancing differs somewhat from these weights due to market movements.

[2] GICS sub-industry indices calculate for the Energy Select Sector Index. Constituents' weight adjustment factors flow through from the underlying index.

[3] S&P Dow Jones Indices created back calculated history for the Communication Services Select Sector Index based on the securities in the headline S&P 500 that would have hypothetically been classified as GICS Code 50 under this new structure effective September 24, 2018.

9. If, on the second to last business day of March, June, September, or December a company has a weight greater than 24% or the sum of the companies with weights greater than 4.8% exceeds 50%, a secondary rebalancing will be triggered with the rebalancing effective date being after the close of the last business day of the month. This secondary rebalancing will use the closing prices as of the second to last business day of March, June, September, or December, and membership, shares outstanding, and IWFs as of the rebalancing effective date.

For more information on the index calculation methodology, please refer to the Capped Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

At times, companies may be represented in the Select Sector Indices by multiple share class lines. Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

For more information on the capping thresholds, please refer to the Regulatory Capping Requirements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Index Calculations

Approaches

The indices are calculated by means of the divisor methodology used in all S&P Dow Jones Indices' equity indices.

Please refer to the Capitalization Weighted Indices section, Equal Weighted Indices section, and Capped Market Capitalization Weighted Indices sections in S&P Dow Jones Indices' Index Mathematics Methodology for more information on the index calculation methodology for float-adjusted market capitalization weighted indices, equal weighted indices, and capped market capitalization weighted indices, respectively.

Shares Outstanding

The shares counted for index calculation are shares outstanding and are essentially "basic shares" as defined by The Financial Accounting Standards Board (FASB) in Generally Accepted Accounting Principles (GAAP). This count is float-adjusted to reflect only available shares.

For float adjustment methodology, please see S&P Dow Jones Indices' Float Adjustment Methodology.

Index Maintenance

Timing of Changes

Quarterly Update. Share counts are updated to the latest publicly available filings on a quarterly basis. IWF changes are only made at the quarterly review if the change represents at least 5% of total current shares outstanding and is related to a single corporate action as described in the *Equity Indices Policies and Practices* methodology.

S&P Total Market Index. The index is reconstituted annually, after the close of the third Friday in September. The index also rebalances quarterly on the third Friday of each calendar quarter as detailed in the index construction section. For both the annual reconstitution and quarterly rebalancing, the reference date to meet the eligibility criteria is five weeks prior to the effective date.

S&P 1500 Composite Indices. Changes to index composition are made on an as-needed basis. There is no scheduled reconstitution. Rather, changes in response to corporate actions and market developments can be made at any time. Index additions and deletions are announced with at least three business days advance notice. Less than three business days' notice may be given at the discretion of the Index Committee.

Announcements are available to the public via our Web site, *www.spglobal.com/spdji/*, before or at the same time they are available to clients or the affected companies.

S&P Completion Index. A company is immediately added to the S&P Completion Index if it is dropped from the S&P 500 for a reason other than acquisition, delisting from a major exchange, change in domicile, or bankruptcy. Likewise, all companies added to the S&P 500 are immediately removed from the S&P Completion Index. Please note the S&P Completion Index is constituted at the company level, not at the share line level. If one company listing is in the S&P 500, all other company listings are excluded from the S&P Completion Index.

S&P 500 Top 50 and S&P 500 Top 10. The index is reconstituted annually, after the close of the third Friday in June, using a reference date of the last business day of May. Share counts are updated quarterly and reflected in the index weights, in line with S&P 500 share counts. Constituents that are dropped from the S&P 500 are concurrently dropped from the index and are not replaced until the next annual reconstitution.

S&P Equal Weight U.S. Indices. The indices are rebalanced after the market close on the third Friday of the quarter-ending month with weights set to 1/N for each company in the index where N equals the number of companies in the index at rebalancing. At each quarterly rebalancing, companies are equal weighted using closing prices as of the second Friday of the quarter-ending month as the reference price. For those companies having multiple share class lines in the index, each share class line is assigned a weight that is proportional to its FMC as of the second Friday pricing reference date. Since index shares are assigned based on prices one week prior to the rebalancing, the actual weight of each company at the rebalancing differs from the target equal weights due to market movements.

S&P Capped Market Cap Weighted U.S. Indices. The indices are rebalanced for reweighting purposes quarterly after the close of business on the third Friday of March, June, September, and December. The rebalancing reference date is the second Friday of March, June, September, and December respectively.

Sector Index Reclassifications. A sector index constituent may move from one GICS sub-index to another when a GICS reclassification is made. For any sector index, the company is deleted from the

relevant GICS index and added to the other at the time this reclassification occurs for the underlying index.

Deletions

Deletions occur as follows:

- A company is deleted from the index if it is involved in a merger, acquisition, or significant restructuring such that it no longer meets the eligibility criteria:
    - A company delisted as a result of a merger, acquisition or other corporate action is removed at a time announced by S&P Dow Jones Indices, normally at the close of the last day of trading or expiration of a tender offer. Constituents that are halted from trading may be kept in the index until trading resumes, at the discretion of the Index Committee. If a stock is moved to the pink sheets or the bulletin board, the stock is removed.
- A company that substantially violates one or more of the eligibility criteria for the S&P Composite 1500 may be deleted from the respective component index at the Index Committee's discretion.

Any company that is removed from an S&P Composite 1500 component index (including discretionary and bankruptcy/exchange delistings) must wait a minimum of one year from its index removal date before being screened for the eligibility criteria.

Share and IWF Updates

For information on standard treatment of share and IWF updates, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Corporate Actions & Rebalancing Guidelines

Except for the S&P Equal Weight U.S. Indices, for information on corporate actions and rebalancing guidelines, please refer to the Market Capitalization Indices section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology. For the S&P Equal Weight U.S. Indices, please refer to the Equal Weighted Indices section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Other Adjustments

In cases where there is no achievable market price for a stock being deleted, it can be removed at a zero or minimal price at the Index Committee's discretion.

Currency of Calculation and Additional Index Return Series

The indices calculate in U.S. dollars. In addition, the S&P 500 JPY (TTM) and S&P 500 Top 10 Index (TTM) (JPY) calculate in Japanese Yen using TTM (Telegraphic Transfer Midrate) foreign exchange rates from the Bank of Tokyo Mitsubishi.

In addition to the indices detailed in this methodology, additional return series versions of the indices may be available, including, but not limited to the following: currency, currency hedged, decrement, fair value, inverse, leveraged, and risk control versions. For a list of available indices, please refer to the *S&P DJI Methodology & Regulatory Status Database*.

For more information on these types of indices, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

For the inputs necessary to calculate certain types of indices, including decrement, dynamic hedged, fair value, and risk control indices, please refer to the Parameters documents available at www.spglobal.com/spdji/.

Base Dates and History Availability

Index history availability, base dates, and base values are shown in the table below.

Index	Launch Date	First Value Date	Base Date	Base Value
S&P Total Market Index	03/27/2006	12/31/2004	05/31/2005	1200
S&P Completion Index	03/27/2006	12/31/2004	05/31/2005	1200
S&P 500	03/04/1957	01/03/1928	1941-1943	10
S&P MidCap 400	06/19/1991	07/01/1991	06/28/1991	100
S&P SmallCap 600	10/28/1994	12/30/1994	12/31/1993	100
S&P 900	06/19/1991	07/01/1991	06/30/1995	1000
S&P 1000	10/28/1994	12/30/2004	12/30/1994	1000
S&P Composite 1500	05/18/1995	12/30/2004	12/30/1994	100
S&P 100	06/15/1983	09/11/1989	12/29/2000	686.45
S&P 500 Equal Weight Index	01/08/2003	12/31/1970	12/29/1989	353.4
S&P 500 Equal Weight Communication Services Plus Index	08/06/2018	12/17/1999	12/17/1999	100
S&P 500 Equal Weight Consumer Discretionary Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Consumer Staples Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Energy Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Energy Plus Index	11/15/2021	12/29/1989	12/29/1989	100
S&P 500 Equal Weight Financials Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Health Care Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Industrials Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Information Technology Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Materials Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Real Estate Index	06/08/2015	03/18/2005	03/18/2005	1000
S&P 500 Equal Weight Communication Services Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Utilities Index	06/20/2006	12/29/1989	12/29/1989	353.4
S&P 500 Equal Weight Utilities Plus Index	06/20/2006	12/29/1989	12/29/1989	100
S&P MidCap 400 Equal Weight Index	08/23/2010	07/01/1991	07/01/1991	100
S&P SmallCap 600 Equal Weight Index	08/23/2010	12/30/1994	12/30/1994	100
S&P 500 Top 50 Equal Weight Index	04/09/2024	06/30/2005	06/30/2005	1000
S&P 100 Equal Weight Index	08/25/2009	12/29/2000	12/29/2000	1000
S&P Composite 1500 Equal Weight Index	03/04/2019	12/30/1994	12/30/1994	100
S&P 500 Top 50	11/30/2015	12/31/1970	06/30/2005	1000
S&P 500 Top 10	07/14/2023	06/30/2005	06/30/2005	1000
S&P Select Sector Capped 20% Indices[A]	11/30/2009	12/17/1999	12/17/1999	100
S&P Communication Services Select Sector Daily Capped 25/20 Index	07/23/2018	12/17/1999	12/17/1999	100
S&P 500 Capped 35/20 Sector Indices	07/06/2016	12/17/1999	12/17/1999	100
S&P 500 Capped 35/20 Communication Services Index	04/30/2018	12/21/2007	12/21/2007	100
S&P MidCap 400 Capped Sector Indices	02/22/2016	12/30/1994	12/30/1994	100
S&P SmallCap 600 Capped Sector Indices	03/08/2010	12/30/1994	12/30/1994	100
S&P 900 Banks (Industry) 7/4 Capped Index (USD)	03/02/2018	12/16/2011	12/16/2011	100
S&P 500 Communication Services & Information Technology Index	09/19/2018	12/29/2017	12/29/2017	100
S&P 500 3% Capped Index	04/19/2024	12/17/1999	12/17/1999	1000

[A] The S&P Select Sector Capped 20% Real Estate Index launched 09/19/2016 and has a base date of 09/19/2003 with a base value of 100. The S&P Select Sector Capped 20% Communication Services Index launched 06/25/2018 and has a base date of 12/21/2007 with a base value of 100.

Select Sector Indices. Launch dates and launch values for the indices are shown in the following table.

Index (Price Return)	Launch Date	Launch Value
Consumer Discretionary Select Sector	12/16/1998[A]	245.12
Communication Services Select Sector	04/30/2018	234.41
Consumer Staples Select Sector	12/16/1998[A]	260.64
Energy Select Sector	12/16/1998[A]	235.88
Financial Select Sector	12/16/1998[A]	220.20
Health Care Select Sector	12/16/1998[A]	239.74
Industrials Select Sector	12/16/1998[A]	226.56
Materials Select Sector	12/16/1998[A]	207.17
Real Estate Select Sector	08/17/2015[B]	146.86
Technology Select Sector	12/16/1998[A]	300.86
Utilities Select Sector	12/16/1998[A]	290.60

[A] S&P Dow Jones Indices initiated calculation of the Select Sector Indices as of January 28, 2011. Prior to that date, the indices were calculated by affiliates of the New York Stock Exchange. The total return versions were launch on 1/28/2011 with a launch value of 1000.
[B] The total return version was launched on 08/17/2015 with a launch value of 163.96.

Index Data

Calculation Return Types

S&P Dow Jones Indices calculates multiple return types which vary based on the treatment of regular cash dividends. The classification of regular cash dividends is determined by S&P Dow Jones Indices.

- Price Return (PR) versions are calculated without adjustments for regular cash dividends.
- Gross Total Return (TR) versions reinvest regular cash dividends at the close on the ex-date without consideration for withholding taxes.
- Net Total Return (NTR) versions, if available, reinvest regular cash dividends at the close on the ex-date after the deduction of applicable withholding taxes.

In the event there are no regular cash dividends on the ex-date, the daily performance of all three indices will be identical.

For a complete list of indices available, please refer to the daily index levels file (".SDL").

For more information on the classification of regular versus special cash dividends as well as the tax rates used in the calculation of net return, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

For more information on the calculation of return types, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

Dividend Points Indices

For information on Dividend Points Indices, including the index calculation methodology, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

Index Governance

Index Committee

An Index Committee maintains the indices. All committee members are full-time professional members of S&P Dow Jones Indices' staff. The committee meets monthly. At each meeting, the Index Committee reviews pending corporate actions that may affect index constituents, statistics comparing the composition of the indices to the market, companies that are being considered as candidates for addition to an index, and any significant market events. In addition, the Index Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.

S&P Dow Jones Indices considers information about changes to its indices and related matters to be potentially market moving and material. Therefore, all Index Committee discussions are confidential.

S&P Dow Jones Indices' Index Committees reserve the right to make exceptions when applying the methodology if the need arises. In any scenario where the treatment differs from the general rules stated in this document or supplemental documents, clients will receive sufficient notice, whenever possible.

In addition to its daily governance of indices and maintenance of index methodologies, at least once within any 12-month period, the Index Committee reviews this methodology to ensure the indices continue to achieve the stated objectives, and that the data and methodology remain effective. In certain instances, S&P Dow Jones Indices may publish a consultation inviting comments from external parties.

For information on Quality Assurance and Internal Reviews of Methodology, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Index Policy

Announcements

Announcements of additions and deletions for the S&P 500, S&P MidCap 400, and S&P SmallCap 600 are made at 05:15 PM Eastern Time. Press releases are posted on our Web site, www.spglobal.com/spdji/, and are released to major news services.

Holiday Schedule

Except for the indices listed below, the indices calculate when the U.S. equity market is open.

- **S&P 500 JPY (TTM).** The index calculates when the Japanese equity market is open.
- **S&P 500 Top 10 Index (TTM) (JPY).** The index calculates when the Japanese equity market is open.
- **S&P 500 (Global Calendar) (JPY).** The index calculates Monday through Friday throughout the entire calendar year.

A complete holiday schedule for the year is available on the S&P Dow Jones Indices' Web site at www.spglobal.com/spdji/.

Rebalancing

The Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any such change will be announced with proper advance notice where possible.

Unexpected Exchange Closures

For information on Unexpected Exchange Closures, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Recalculation Policy

For information on the recalculation policy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Real-Time Calculation

Real-time indices are not restated.

For information on Calculations and Pricing Disruptions, Expert Judgment and Data Hierarchy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Contact Information

For questions regarding an index, please contact: index_services@spglobal.com.

Index Dissemination

Index levels are available through S&P Dow Jones Indices' Web site at *www.spglobal.com/spdji/*, major quote vendors (see codes below), numerous investment-oriented Web sites, and various print and electronic media. S&P Dow Jones Indices' Web site also provides an archive of recent index announcements and press releases, as well as a monthly release giving total returns for S&P Dow Jones Indices' headline indices.

Tickers

The table below lists headline indices covered by this document. All versions of the below indices that may exist are also covered by this document. Please refer to the *S&P DJI Methodology & Regulatory Status Database* for a complete list of indices covered by this document.

Index	BBG	RIC
S&P 500	SPX	.SPX
S&P MidCap 400	MID	.MID
S&P SmallCap 600	SML	.SML
S&P Composite 1500	SPR	.SPSUP
S&P 900	SPLGMID	.SPLGMID
S&P 1000	SPK	.SPMIDSM
S&P 100	OEX	.SPOEX
S&P 500 Equal Weight Index	SPW	.SPXEW
S&P 500 Equal Weight Index TR	SPXEWTR	.SPXEWTR
S&P 500 Equal Weight Index NTR	SPXEWNTR	.SPXEWNTR
S&P 500 Equal Weight Communication Services Plus Index	SPXEW4UP	--
S&P 500 Equal Weight Communication Services Plus Index TR	SPXEW4UT	--
S&P 500 Equal Weight Communication Services Plus Index NTR	SPXEW4UN	--
S&P 500 Equal Weight Consumer Discretionary Index	S25	.SPXEW25
S&P 500 Equal Weight Consumer Discretionary Index TR	SPXEWCD	.SPXEW25TR
S&P 500 Equal Weight Consumer Staples Index	S30	.SPXEW30
S&P 500 Equal Weight Consumer Staples Index TR	SPXEWCS	.SPXEW30TR
S&P 500 Equal Weight Energy Index	S10	.SPXEW10
S&P 500 Equal Weight Energy Index TR	SPXEWEN	.SPXEW10TR
S&P 500 Equal Weight Energy Plus Index	SPXEWEUP	.SPXEWEUP
S&P 500 Equal Weight Energy Plus Index TR	SPXEWEUT	.SPXEWEUT
S&P 500 Equal Weight Financials Index	S40	.SPXEW40
S&P 500 Equal Weight Financials Index TR	SPXEWFN	.SPXEW40TR
S&P 500 Equal Weight Health Care Index	S35	.SPXEW35
S&P 500 Equal Weight Health Care Index TR	SPXEWHC	.SPXEW35TR
S&P 500 Equal Weight Industrials Index	S20	.SPXEW20
S&P 500 Equal Weight Industrials Index TR	SPXEWIN	.SPXEW20TR
S&P 500 Equal Weight Information Technology Index	S45	.SPXEW45
S&P 500 Equal Weight Information Technology Index TR	SPXEWIT	.SPXEW45TR
S&P 500 Equal Weight Materials Index	S15	.SPXEW15
S&P 500 Equal Weight Materials Index TR	SPXEWMA	.SPXEW15TR
S&P 500 Equal Weight Real Estate Index	SPXEREUP	.SPXEREUP
S&P 500 Equal Weight Real Estate Index TR	SPXEREUT	.SPXEREUT
S&P 500 Equal Weight Communication Services Index	S50	.SPXEW50
S&P 500 Equal Weight Communication Services Index TR	SPXEWTS	.SPXEW50TR
S&P 500 Equal Weight Utilities Index	S55	.SPXEW55
S&P 500 Equal Weight Utilities Index TR	SPXEWUT	.SPXEW55TR
S&P 500 Equal Weight Utilities Plus Index	SPXEWC	.SPXEWC
S&P 500 Equal Weight Utilities Plus Index TR	SPXEWCTR	.SPXEWCTR
S&P MidCap 400 Equal Weight Index	MIDEWI	.MIDEWI
S&P SmallCap 600 Equal Weight Index	SMLEWI	.SMLEWI
S&P 500 Top 50 Equal Weight Index	SP5T5EUP	.SP5T5EUP
S&P 100 Equal Weight Index	SPOEXEUP	.SPOEXEUP
S&P Composite 1500 Equal Weight Index	SPRCEWUP	--

Index	BBG	RIC
S&P Total Market Index	SPTMI	.SPTMI
S&P Completion Index	SPCMI	.SPCMI
Communication Services Select Sector TR	IXCTR	.IXCTR
Communication Services Select Sector NTR	IXCNTR	.IXCNTR
Consumer Discretionary Select Sector Index	IXY	.IXY
Consumer Staples Select Sector Index	IXR	.IXR
Energy Select Sector Index	IXE	.IXE
Financial Select Sector Index	IXM	.IXM
Health Care Select Sector Index	IXV	.IXV
Industrial Select Sector Index	IXI	.IXI2
Materials Select Sector Index	IXB	.IXB2
Real Estate Select Sector Index	IXRE	.IXRE
Technology Select Sector Index	IXT	.IXT
Utilities Select Sector Index	IXU	.IXU
S&P 500 Ex-Communication Services TR[4]	SPXXCMUT	.SPXXCMUT
S&P 500 Ex-Communication Services NTR[3]	SPXXCMUN	.SPXXCMUN
S&P 500 Ex-Consumer Discretionary	SPXXCDP	--
S&P 500 Ex-Consumer Discretionary TR	SPXXCDT	--
S&P 500 Ex-Consumer Staples	SPXXCSP	--
S&P 500 Ex-Consumer Staples TR	SPXXCST	--
S&P 500 Ex-Energy	SPXXEGP	--
S&P 500 Ex-Energy TR	SPXXEGT	--
S&P 500 Ex-Financials	SPXXFISP	--
S&P 500 Ex-Financials TR	SPXXFIST	--
S&P 500 Ex-Financials & Real Estate	SPXXFINP	--
S&P 500 Ex-Financials & Real Estate TR	SPXXFINT	--
S&P 500 Ex-Health Care	SPXXHCP	--
S&P 500 Ex-Health Care TR	SPXXHCT	--
S&P 500 Ex-Industrials	SPXXINDP	--
S&P 500 Ex-Industrials TR	SPXXINDT	--
S&P 500 Ex-Information Technology TR[3]	SPXXTSUT	.SPXXTSUT
S&P 500 Ex-Information Technology NTR[3]	SPXXTSUN	.SPXXTSUN
S&P 500 Ex-Information Technology & Communication Services	SPXXTTSP	--
S&P 500 Ex-Information Technology & Communication Services TR	SPXXTTST	--
S&P 500 Ex-Materials	SPXXMP	--
S&P 500 Ex-Materials TR	SPXXMT	--
S&P 500 Ex-Real Estate	SPXXRETP	--
S&P 500 Ex-Real Estate TR	SPXXRETT	--
S&P 500 Ex-Utilities	SPXXUTIP	--
S&P 500 Ex-Utilities TR	SPXXUTIT	--
S&P 500 Capped 35/20 Communication Services Index NTR	SPSVCN	.SPSVCN
S&P 900 Banks (Industry) 7/4 Capped Index (USD) TR	SP9BKCUT	.SP9BKCUT
S&P 900 Banks (Industry) 7/4 Capped Index (USD) NTR	SP9BKCUN	.SP9BKCUN
S&P 500 Communication Services & Information Technology Index	SPX450UP	--
S&P 500 Communication Services & Information Technology Index TR	SPX450UT	--
S&P 500 Communication Services & Information Technology Index NTR	SPX450UN	--
S&P 500 Sectors Equal Allocation Index (USD)	SPXSEAUP	.SPXSEAUP
S&P 500 Sectors Equal Allocation Index (USD) TR	SPXSEAUT	.SPXSEAUT
S&P 500 Sectors Equal Allocation Index (USD) NTR	SPXSEAUN	.SPXSEAUN
S&P 500 3% Capped Index (USD)	SPXCW3UP	--
S&P 500 3% Capped Index (USD) TR	SPXCW3UT	--
S&P 500 3% Capped Index (USD) NTR	SPXCW3UN	--
S&P 500 Top 10 25% Capped Index (USD)	SP5T1CUP	.SP5T1CUP
S&P 500 Top 10 25% Capped Index (USD) TR	SP5T1CUT	.SP5T1CUT
S&P 500 Top 10 25% Capped Index (USD) NTR	SP5T1CUN	.SP5T1CUN

Index Alert

Complete data for index replication (including share counts, tickers and data on index levels and returns) are available through S&P Dow Jones Indices' fee-based service, *SPICE (www.spice-indices.com)*.

[4] S&P Dow Jones Indices has created back calculated history for the S&P 500 Ex-Communication Services and S&P 500 Ex-Information Technology indices based on the securities in the headline S&P 500 that would have hypothetically been classified under the GICS structure effective September 24, 2018.

Index Data

Daily constituent and index level data are available via subscription.

For product information, please contact S&P Dow Jones Indices, www.spglobal.com/spdji/en/contact-us.

Web site

For further information, please refer to S&P Dow Jones Indices' Web site at *www.spglobal.com/spdji/*.

Appendix A

Historical Market Capitalization Guidelines

Market capitalization guidelines since July 18, 2007, for the component indices of the S&P Composite 1500 are as follows:

Effective Date (After Close)[5]	Market Capitalization Guidelines (US$)		
	S&P 500	S&P MidCap 400	S&P SmallCap 600
04/01/2024	At least $18.0 billion	$6.7 billion to $18.0 billion	$1.0 billion to $6.7 billion
01/02/2024	At least $15.8 billion	$5.8 billion to $15.8 billion	$900 million to $5.8 billion
07/05/2023	At least $14.5 billion	$5.2 billion to $14.5 billion	$850 million to $5.2 billion
01/04/2023	At least $12.7 billion	$4.6 billion to $12.7 billion	$750 million to $4.6 billion
03/04/2022	At least $14.6 billion	$3.7 billion to $14.6 billion	$850 million to $3.7 billion
06/03/2021	At least $13.1 billion	$3.6 billion to $13.1 billion	$850 million to $3.6 billion
03/17/2021	At least $11.8 billion	$3.3 billion to $11.8 billion	$750 million to $3.3 billion
12/08/2020	At least $9.8 billion	$3.2 billion to $9.8 billion	$700 million to $3.2 billion
02/20/2019	At least $8.2 billion	$2.4 billion to $8.2 billion	$600 million to $2.4 billion
03/10/2017	At least $6.1 billion	$1.6 billion to $6.8 billion	$450 million to $2.1 billion
07/16/2014	At least $5.3 billion	$1.4 billion to $5.9 billion	$400 million to $1.8 billion
06/19/2013	At least $4.6 billion	$1.2 billion to $5.1 billion	$350 million to $1.6 billion
02/16/2011	At least $4.0 billion	$1.0 billion to $4.4 billion	$300 million to $1.4 billion
12/09/2009	At least $3.5 billion	$850 million to $3.8 billion	$250 million to $1.2 billion
12/18/2008	At least $3.0 billion	$750 million to $3.3 billion	$200 million to $1.0 billion
09/25/2008	At least $4.0 billion	$1.0 billion to $4.5 billion	$250 million to $1.5 billion
07/18/2007	At least $5.0 billion	$1.5 billion to $5.5 billion	$300 million to $2.0 billion

[5] Effective May 1, 2019, security level FMC must be at least 50% of the respective index's full company level minimum market capitalization threshold.

Appendix B

Index Construction and Weighting Information for Certain Derived Indices

S&P Select Sector Capped 20% Indices

Index Construction. Companies in the S&P 500 are classified based on the GICS. Each index is made up of all stocks in the respective GICS sector unless otherwise noted in the table below.

S&P Select Sector Capped 20% Index	GICS Sector Classification
S&P Select Sector Capped 20% Communication Services Index	Communications Services (GICS Code 50)[6]
S&P Select Sector Capped 20% Consumer Discretionary Index	Consumer Discretionary (GICS Code 25)
S&P Select Sector Capped 20% Consumer Staples Index	Consumer Staples (GICS Code 30)
S&P Select Sector Capped 20% Energy Index	Energy (GICS Code 10)
S&P Select Sector Capped 20% Financials Index	Financials (GICS Code 40)
S&P Select Sector Capped 20% Health Care Index	Health Care (GICS Code 35)
S&P Select Sector Capped 20% Industrials Index	Industrials (GICS Code 20)
S&P Select Sector Capped 20% Materials Index	Materials (GICS Code 15)
S&P Select Sector Capped 20% Real Estate Index	Real Estate (GICS Code 60)
S&P Select Sector Capped 20% Technology Index	Information Technology (GICS Code 45)
S&P Select Sector Capped 20% Utilities Index	Utilities (GICS Code 55)

For more information on GICS, please refer to S&P Dow Jones Indices' GICS Methodology.

Please note that any intra-quarter addition will be added to the relevant S&P Select Sector Capped 20% Index with the largest AWF currently represented in that index.

Weighting. Each index is capped market capitalization weighted. For reweighting purposes, the indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December using the following procedures:

1. The rebalancing reference date is the second Friday of March, June, September, and December.
2. With prices reflected on the rebalancing reference date, adjusted for any applicable corporate actions, and membership, shares outstanding and IWFs as of the rebalancing effective date, each company is weighted by FMC.
3. If any company has a weight greater than 19%, that company has its weight capped at 19%. The cap is set to 19% to allow for a 1% buffer. As the reference date is one week prior to the rebalancing effective date, the buffer mitigates the possibility of any company exceeding 20% on the rebalancing effective date.
4. All excess weight is proportionally redistributed to all uncapped companies within the relevant S&P Select Sector Capped 20% Index.
5. After this redistribution, if the weight of any other company breaches 19%, the process is repeated iteratively until no companies breach the 19% weight cap.
6. Index share amounts are assigned to each constituent to arrive at the weights calculated above. Since index shares are assigned based on prices one week prior to rebalancing, the actual weight of each constituent at the rebalancing differs somewhat from these weights due to market movements.

[6] S&P Dow Jones Indices has created back calculated history for the S&P Select Sector Capped 20% Communication Services Index based on the securities in the headline S&P 500 that would have hypothetically been classified as GICS Code 50 under this new structure effective September 24, 2018.

For more information on the index calculation methodology, please refer to the Capped Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

At times, companies may be represented in the S&P Select Sector Capped 20% Indices by multiple share class lines. Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

For more information on the capping thresholds, please refer to the Regulatory Capping Requirements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

S&P Select Sector Daily Capped 25/20 Indices

Index Construction. Companies in the S&P 500 are classified based on GICS. Each index is made up of all stocks in the respective GICS sector unless otherwise noted in the table below.

S&P Select Sector Daily Capped 25/20 Index	GICS Classification
S&P Communication Services Select Sector Daily Capped 25/20 Index[7]	Communications Services (GICS Code 50)
S&P Consumer Discretionary Select Sector Daily Capped 25/20 Index	Consumer Discretionary (GICS Code 25)
S&P Consumer Staples Select Sector Daily Capped 25/20 Index	Consumer Staples (GICS Code 30)
S&P Energy Select Sector Daily Capped 25/20 Index	Energy (GICS Code 10)
S&P Financials Select Sector Daily Capped 25/20 Index	Financials (GICS Code 40)
S&P Health Care Select Sector Daily Capped 25/20 Index	Health Care (GICS Code 35)
S&P Industrials Select Sector Daily Capped 25/20 Index	Industrials (GICS Code 20)
S&P Materials Select Sector Daily Capped 25/20 Index	Materials (GICS Code 15)
S&P Real Estate Select Sector Daily Capped 25/20 Index	Real Estate (GICS Code 60)
S&P Technology Select Sector Daily Capped 25/20 Index	Information Technology (GICS Code 45)
S&P Utilities Select Sector Daily Capped 25/20 Index	Utilities (GICS Code 55)

For more information on GICS, please refer to S&P Dow Jones Indices' GICS Methodology.

Index composition is the same as the relevant GICS sector of the S&P 500. Constituent changes are incorporated in the S&P Select Sector Daily Capped 25/20 Indices as and when they are made in the relevant GICS sector of the S&P 500. Any addition not coinciding with a reweighting effective date will be added to the relevant Select Sector Daily Capped 25/20 Index with an AWF of 1.

Weighting. Each index is capped market capitalization weighted. For capping purposes, the indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December. Indices are also reviewed daily based on each company's capped market capitalization weight. Daily capping is only performed when either the largest index closing weight exceeds 25% or the second largest index closing weight exceeds 20%. The reference date for quarterly capping is the second Friday of March, June, September, and December with changes effective after the close of the following Friday.

When daily capping is necessary S&P DJI announces the changes in pro-forma files disseminated after the close of the business day on which the daily weight caps are exceeded with a reference date as of after the close of that same business day, and changes are effective after the close of the next trading day. While capping is reviewed daily, the index may be capped less frequently. If daily capping is necessary during a regularly occurring quarterly capping window the impacted index is capped per the normal daily capping procedure with the changes effective after the close of the next trading day. However, the previously assigned AWFs from the quarterly reference date are still implemented, effective after the close of the third Friday of March, June, September, and December, to account for any applicable quarterly share and IWF updates.

If on the second to last business day prior to the quarterly rebalancing implementation, using that day's closing price (adjusted for any applicable corporate actions) and the newly assigned quarterly shares, IWF, and AWFs as of the rebalancing effective date the index breaches the daily capping requirements the index recaps using that day's closing price. The new AWFs replace the originally assigned AWFs, with the new AWFs still effective after the close of the third Friday of March, June, September, and December. Any index requiring daily capping is not assessed on the next business day as the previously performed capping is effective at that day's closing. Both the quarterly and daily capping process are performed according to the following procedures:

[7] S&P Dow Jones Indices has created back calculated history for the S&P Communication Services Select Sector Daily Capped 25/20 Index based on the securities in the headline S&P 500 that would have hypothetically been classified as GICS Code 50 under this new structure effective September 24, 2018.

1. With prices reflected on the rebalancing reference date, adjusted for any applicable corporate actions, and membership, shares outstanding, and IWFs as of the rebalancing effective date, each company is weighted by FMC. Modifications are made as defined below.
2. If the company with the largest weight exceeds 23%, the company's FMC weight is capped at 23%, which allows for a 2% buffer.
3. All excess weight is proportionally redistributed to all remaining uncapped companies within the relevant index.
4. If the company with the second largest weight exceeds 19%, the company's FMC weight is capped at 19%, which allows for a 1% buffer.
5. All excess weight is proportionally redistributed to all remaining uncapped companies within the relevant index.
6. After this redistribution, steps 2 through 5 are repeated iteratively until the weight of the largest company does not exceed 23% and the weight of the second largest company does not exceed 19%.
7. The sum of the companies with weights greater than 4.8% cannot exceed 50% of the total index weight.
8. If the rule in step 7 is breached, all companies are ranked in descending order of their FMC weights. The first company's weight that breaches the 50% limit is reduced to 4.5%.
9. This excess weight is proportionally redistributed to all companies with weights below 4.5%. This is repeated iteratively until step 7 is satisfied.
10. Index share amounts are assigned to each constituent to arrive at the weights calculated above. Since index shares are assigned based on prices on the reference date, the actual weight of each constituent at the rebalancing differs somewhat from these weights due to market movements.

For more information on the index calculation methodology, please refer to the Capped Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

At times, companies may be represented in the S&P Select Sector Daily Capped 25/20 Indices by multiple share class lines. Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

For more information on the capping thresholds, please refer to the Regulatory Capping Requirements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

S&P Select Sector 15/60 Capped Indices

Index Construction. Companies in the S&P 500 are classified based on GICS. Each index is made up of all stocks in the respective GICS sector unless otherwise noted in the table below.

S&P Select Sector Capped 15/60 Index	GICS Classification
S&P Communication Services Select Sector 15/60 Capped Index[8]	Communications Services (GICS Code 50)
S&P Consumer Discretionary Select Sector 15/60 Capped Index	Consumer Discretionary (GICS Code 25)
S&P Consumer Staples Select Sector 15/60 Capped Index	Consumer Staples (GICS Code 30)
S&P Energy Select Sector 15/60 Capped Index	Energy (GICS Code 10)
S&P Financials Select Sector 15/60 Capped Index	Financials (GICS Code 40)
S&P Health Care Select Sector 15/60 Capped Index	Health Care (GICS Code 35)
S&P Industrials Select Sector 15/60 Capped Index	Industrials (GICS Code 20)
S&P Materials Select Sector 15/60 Capped Index	Materials (GICS Code 15)
S&P Real Estate Select Sector 15/60 Capped Index	Real Estate (GICS Code 60)
S&P Technology Select Sector 15/60 Capped Index	Information Technology (GICS Code 45)
S&P Utilities Select Sector 15/60 Capped Index	Utilities (GICS Code 55)

For more information on GICS, please refer to S&P Dow Jones Indices' GICS Methodology.

Index composition is the same as the relevant GICS sector of the S&P 500. Constituent changes are incorporated in the S&P Select Sector 15/60 Capped Indices as and when they are made in the relevant GICS sector of the S&P 500. Any addition not coinciding with a reweighting effective date will be added to the relevant S&P Select Sector 15/60 Capped Index with an AWF of 1.

Weighting. Each index is capped market capitalization weighted. For reweighting purposes, the indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December using the following procedures:

1. The rebalancing reference date is the second Friday of March, June, September, and December.
2. With prices reflected on the rebalancing reference date, adjusted for any applicable corporate actions, and membership, shares outstanding and IWFs as of the rebalancing effective date, each company is weighted by FMC.
3. If the largest company's index weight exceeds 14%, the company's FMC weight is capped at 14%, which allows for a 1% buffer.
4. All excess weight is proportionally redistributed to all remaining uncapped companies within the relevant index.
5. After this redistribution, steps 3 and 4 are repeated iteratively until the weight of any company does not exceed 14%.
6. The sum of the weights of the largest five companies cannot exceed 55% of the total index weight. This allows for a 5% buffer.
7. If more than five companies are capped at 14% after step 5, the largest five companies are selected based on FMC.
8. If the rule in step 6 is breached, the cumulative weight of the largest five companies is reduced to 55%, maintaining the relative proportions among the largest five companies.
9. All excess weight is proportionally redistributed to all remaining companies within the relevant index (rest of the index).
10. The weight of any company in the rest of the index cannot exceed the weight of the fifth largest company from step 8.

[8] S&P Dow Jones Indices has created back calculated history for the S&P Communication Services Select Sector 15/60 Capped Index based on the securities in the headline S&P 500 that would have hypothetically been classified as GICS Code 50 under this new structure effective September 24, 2018.

11. If the rule in step 10 is breached, the weight of the largest company in the rest of the index is capped at the weight of the fifth largest company from step 8.
12. All excess weight is proportionally redistributed to all remaining uncapped companies in the rest of the index.
13. After this redistribution, steps 11 and 12 are repeated iteratively until the weight of any company in the rest of the index does not exceed the weight of the fifth largest company from step 8.
14. Index share amounts are assigned to each constituent to arrive at the weights calculated above. Since index shares are assigned based on prices on the reference date, the actual weight of each constituent at the rebalancing differs somewhat from these weights due to market movements.
15. If no feasible solution is available after following the above steps, the index is float market capitalization weighted.

For more information on the index calculation methodology, please refer to the Capped Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

At times, companies may be represented in the S&P Select Sector 15/60 Capped Indices by multiple share class lines. Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

S&P Select Sector 15/40 Plus Capped Indices

Index Construction. Companies in the S&P 500 are classified based on GICS. Each index is made up of all stocks in the respective GICS sector as noted in the table below.

S&P Select Sector Capped 15/40 Plus Index	GICS Classification
S&P Communication Services Select Sector 15/40 Plus Capped Index	Communications Services (GICS Code 50)[9]
S&P Consumer Discretionary Select Sector 15/40 Plus Capped Index	Consumer Discretionary (GICS Code 25)
S&P Consumer Staples Select Sector 15/40 Plus Capped Index	Consumer Staples (GICS Code 30)
S&P Energy Select Sector 15/40 Plus Capped Index	Energy (GICS Code 10)
S&P Financials Select Sector 15/40 Plus Capped Index	Financials (GICS Code 40)
S&P Health Care Select Sector 15/40 Plus Capped Index	Health Care (GICS Code 35)
S&P Industrials Select Sector 15/40 Plus Capped Index	Industrials (GICS Code 20)
S&P Materials Select Sector 15/40 Plus Capped Index	Materials (GICS Code 15)
S&P Real Estate Select Sector 15/40 Plus Capped Index	Real Estate (GICS Code 60)
S&P Technology Select Sector 15/40 Plus Capped Index	Information Technology (GICS Code 45)
S&P Utilities Select Sector 15/40 Plus Capped Index	Utilities (GICS Code 55)

For more information on GICS, please refer to S&P Dow Jones Indices' GICS Methodology.

Index composition is the same as the relevant GICS sector of the S&P 500. Constituent changes are incorporated in the S&P Select Sector 15/40 Plus Capped Indices as and when they are made in the relevant GICS sector of the S&P 500. If the index's stock count falls below 25, the index will also contain supplementary companies. Any addition not coinciding with a reweighting effective date will be added to the relevant S&P Select Sector 15/40 Plus Capped Index with an AWF of 1.

At the quarterly rebalancing, in the event that fewer than 25 stocks are selected for the relevant S&P Select Sector 15/40 Plus Capped Index, the index will be supplemented with the largest company based on FMC in the S&P MidCap 400 within the eligible GICS Sector until the 25-stock minimum is reached. If intra-quarter additions to the S&P 500 in the eligible GICS Sector result in the index reaching the required minimum count, the supplementary companies will remain in the index until the next quarterly rebalancing, at which point they will be reviewed. In the event that supplementary companies are required and at least one supplementary company is a current constituent, a buffer is applied at the quarterly rebalancing such that a supplementary company being added must have an FMC greater than 1.2 times (or 20% higher than) the supplementary company it is replacing.

This buffer is evaluated on each supplementary company addition relative to the current supplementary company it is replacing. For example, the largest non-index supplementary company by FMC is evaluated against the smallest supplementary index constituent, the second largest non-index supplementary company is evaluated against the second smallest supplementary index constituent, etc. This process is repeated until no supplementary additions exceed the buffer.

Weighting. Each index is capped market capitalization weighted and must have a constituent count of at least 25 stocks. For reweighting purposes, the indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December. The rebalancing reference date is the Wednesday prior to the second Friday of March, June, September, and December, respectively. The weighting process is as follows:

1. With prices reflected on the rebalancing reference date, adjusted for any applicable corporate actions, and membership, shares outstanding and IWFs as of the rebalancing effective date, each company is weighted by FMC.
2. If the largest company's index weight exceeds 14%, the company's FMC weight is capped at 14% (which allows for a 1% buffer), with the excess weight proportionally redistributed to the

[9] S&P Dow Jones Indices created back calculated history for the Communication Services Select Sector Index based on the securities in the headline S&P 500 that would have hypothetically been classified as GICS Code 50 under this new structure effective September 24, 2018.

remaining uncapped companies in the index. This process is repeated iteratively until no company's weight is greater than 14%.

3. If more than five companies are capped at 14% after step 2, the largest five companies are selected based on FMC.
4. The sum of the weights of the largest five companies cannot exceed 35% of the total index weight (which allows for a 5% buffer). If a breach occurs, the cumulative weight of the largest five companies is capped at 35% (maintaining the relative proportions among the largest five companies), with the excess weight proportionally redistributed to the remaining companies in the index.
5. No remaining company's weight can exceed the weight of the fifth largest company from step 4. If a breach occurs, the weight of the largest remaining company is capped at the weight of the fifth largest company from step 4, with the excess weight proportionally redistributed to the remaining uncapped companies. This process is repeated iteratively until no remaining company's weight exceeds the weight of the fifth largest company from step 4.
6. If, after Step 5, all the remaining companies reach the same weight as the fifth largest company without 100% of the excess weight being allocated, the residual excess weight is allocated equally among all the remaining constituents (i.e., outside of the five largest companies from step 4). All companies in the index, outside of the five largest companies, will now be equally weighted, with weights greater than the fifth largest company.
7. The weight of any of the largest five companies from step 4 cannot be smaller than the weight of the remaining companies. If this rule is breached, the company with the smallest weight among the largest five companies from step 4 is floored at the weight of the remaining companies (i.e., outside of the five largest companies).
8. All weight additions are proportionately deducted from the unfloored companies among the largest five companies. This process is repeated iteratively until the weight of any company among the five largest is not smaller than the weight of the remaining companies.
9. If, on the second to last business day of June or December a company has a weight greater than 15% or the sum of the top five companies' weights exceeds 40%, a secondary rebalancing will be triggered with the rebalancing effective date being after the close of the last business day of the month. This secondary rebalancing will use the closing prices as of the second to last business day of June or December, and membership, shares outstanding, and IWFs as of the rebalancing effective date.

For more information on the index calculation methodology, please refer to the Capped Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

At times, companies may be represented in the S&P Select Sector 15/40 Plus Capped Indices by multiple share class lines. Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

For more information on the capping thresholds, please refer to the Regulatory Capping Requirements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

S&P 500 Consumer Select 15/60 Index

Index Universe. At each rebalancing, the index universe consists of all companies that are constituents of the S&P 500 Consumer Discretionary Select Sector Index or S&P 500 Consumer Staples Select Sector Index.

Index Construction. At each rebalancing, rank companies in the index universe in descending order by FMC, selecting the largest 50 for index inclusion, subject to the following selection buffer:

1. Automatically select the largest 45 companies.
2. Select existing constituents ranked in the top 55 until the target company count is reached.
3. If at this point the target company count is not met, select the largest non-constituents until the target company count is met.

Constituent Weightings. At each rebalancing, weight constituents according to the following:

1. The rebalancing reference date is the Wednesday prior to the second Friday of March, June, September, and December.
2. Using prices as of the rebalancing reference date, adjusted for any applicable corporate actions, and membership, shares outstanding and IWFs as of the rebalancing effective date, FMC weight each constituent company.
3. If the largest company's index weight exceeds 14%, cap the company's FMC weight at 14%, which allows for a 1% buffer.
4. Proportionally redistribute any excess weight to the uncapped companies in the index.
5. After the redistribution, iteratively repeat steps 3 and 4 until no company violates the 14% cap.
6. The sum of the weights of the largest five companies cannot exceed 55% of the total index weight. This allows for a 5% buffer.
7. If more than five companies are capped at 14% after step 5, the largest five companies are selected based on FMC.
8. If the rule in step 6 is breached, cap the cumulative weight of the largest five companies at 55% while maintaining the relative weight proportions among those companies.
9. Proportionally redistribute any excess weight to the uncapped constituents.
10. The weight of the remaining constituent companies cannot exceed the weight of the smallest company from step 8.
11. If step 10 is breached, cap the weight of the largest remaining company at the weight of the smallest company from step 8.
12. Proportionally redistribute any excess weight to all remaining uncapped companies.
13. After the redistribution, iteratively repeat steps 11 and 12 until no constituent company's weight exceeds the weight of the smallest company from step 8.
14. If no feasible solution is available after following the above steps, the index is float market capitalization weighted.

For more information on index calculation, please refer to the Capped Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

Multiple Share Classes. All publicly listed multiple share class lines are eligible for index inclusion, subject to meeting the eligibility criteria. For more information regarding the treatment of multiple share classes in these indices, please refer to Approach A within the Multiple Share Classes section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

At times, companies may be represented in the S&P 500 Consumer Select 15/60 Index by multiple share class lines. Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

Index Maintenance. All index adjustments and corporate action treatments follow the underlying indices.

Rebalancing. The index rebalances quarterly, effective after the close on the third Friday of March, June, September, and December. The rebalancing reference date is the Wednesday prior to the second Friday of March, June, September, and December. Prices used in the weighting process are as of the reference date, while membership, shares outstanding, and IWFs are as of the rebalancing effective date. Index share amounts are assigned to each constituent to arrive at the weights calculated above. Since index shares are assigned based on prices on the reference date, the actual weight of each constituent at the rebalancing differs somewhat from these weights due to market movements.

Additions. Except for spin-offs, there are no additions intra-rebalancing. Spin-offs follow the treatment of the underlying index.

Deletions. Constituents removed from the index universe are removed from the index simultaneously. These deletions may be caused by companies being removed from the S&P 500 or by changes to companies' GICS sector classifications.

GICS Reclassifications. Changes as a result of a constituent's GICS reclassification are made simultaneously with the classification change in the underlying index.

For more information on GICS, please refer to S&P Dow Jones Indices' GICS Methodology.

S&P 500 Capped 35/20 Indices

Index Construction. Companies in the S&P 500 are classified based GICS. Each index is made up of all stocks in the relevant GICS classification unless otherwise noted in the table below.

S&P 500 Capped 35/20 Index	GICS Classification
S&P 500 Capped 35/20 Communication Services Index	Communications Services (GICS Code 50)[10]
S&P 500 Capped 35/20 Consumer Discretionary Index	Consumer Discretionary (GICS Code 25)
S&P 500 Capped 35/20 Consumer Staples Index	Consumer Staples (GICS Code 30)
S&P 500 Capped 35/20 Energy Index	Energy (GICS Code 10)
S&P 500 Capped 35/20 Financials Index	Financials (GICS Code 40)
S&P 500 Capped 35/20 Health Care Index	Health Care (GICS Code 35)
S&P 500 Capped 35/20 Industrials Index	Industrials (GICS Code 20)
S&P 500 Capped 35/20 Information Technology Index	Information Technology (GICS Code 45)
S&P 500 Capped 35/20 Materials Index	Materials (GICS Code 15)
S&P 500 Capped 35/20 Real Estate Index	Real Estate (GICS Code 60)
S&P 500 Capped 35/20 Utilities Index	Utilities (GICS Code 55)
S&P 500 Capped 35/20 Utilities & Telecommunication Services Index	Utilities (GICS Code 55) Telecommunication Services (GICS Code 5010)
S&P 500 Capped 35/20 Banks and Diversified Financials Select Index	Regional Banks (Code: 40101015) Diversified Banks (Code: 40101010) Asset Management & Custody Banks (Code: 40203010) Consumer Finance (Code: 40202010) Investment Banking & Brokerage (Code: 40203020)

For more information on GICS, please refer to S&P Dow Jones Indices' GICS Methodology.

Index composition is the same as the relevant GICS sector of the S&P 500. Constituent changes are incorporated in the S&P 500 Capped 35/20 Indices as and when they are made in the relevant GICS sector of the S&P 500. Please note any addition not coinciding with a reweighting effective date will be added to the relevant S&P 500 Capped 35/20 Index with the largest AWF currently represented in that index.

Weighting. Each index is capped market capitalization weighted. For capping purposes, the indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December. Indices are also reviewed on the 2nd Friday of all other months based on each company's capped market capitalization weight. Monthly capping is only performed when either the largest index weight exceeds 35% or the second largest index weight exceeds 20%. The reference date for capping is the second Friday of the reweighting month and changes are effective after the close of the following Friday using prices as of the reweighting reference date, adjusted for any applicable corporate actions, and membership, shares outstanding, and IWFs as of the reweighting effective date. The reference date is the second Friday of each reweighting month. While capping is reviewed monthly, the index may be capped on a less frequent basis. Both the quarterly and monthly capping are performed for each index, as necessary, based on the scenarios in the table on the following page.

Scenario	Steps
1. At least one company in the index has a FMC weight exceeding 33%.	1. The company with the largest weight is capped at 33%. All excess weight is proportionally redistributed to the remaining uncapped companies in the index. 2. If the weight of any remaining uncapped company exceeds 19%, its weight is capped at 19% and the excess weight is proportionally redistributed to all remaining uncapped companies. 3. Step 2 is repeated until the weight of all uncapped companies does not exceed 19%.

[10] S&P Dow Jones Indices has created back calculated history for the S&P 500 Capped 35/20 Communication Services Index based on the securities in the headline S&P 500 that would have hypothetically been classified as GICS Code 50 under this new structure effective September 24, 2018.

Scenario	Steps
2. The weight of more than one company exceeds 19%, but the company with the largest weight does not exceed 33%.	1. The company with the largest weight is capped at its FMC weight. 2. If the weight of any remaining uncapped company exceeds 19%, its weight is capped at 19% and the excess weight is proportionally redistributed to all remaining uncapped companies in the index. 3. Step 2 is repeated until the weight of all uncapped companies does not exceed 19%.

In each of the above scenarios, index share amounts are assigned to each constituent to arrive at the target weights. Since index shares are assigned based on prices one week prior to rebalancing, the actual weight of each constituent at the rebalancing may differ from the target weights due to price movements.

For more information on the index calculation methodology, please refer to the Capped Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

At times, companies may be represented in the S&P 500 Capped 35/20 Indices by multiple share class lines. Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

For more information on the capping thresholds, please refer to the Regulatory Capping Requirements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

S&P MidCap 400 Capped Sector Indices

Index Construction. Companies in the S&P MidCap 400 are classified based on GICS. Each index is made up of all stocks in the GICS sector unless otherwise noted in the table below.

S&P MidCap 400 Capped Sector Index	GICS Sector Classification
S&P MidCap 400 Capped Consumer Discretionary (Sector) Index	Consumer Discretionary (GICS Code 25)
S&P MidCap 400 Capped Consumer Staples (Sector) Index	Consumer Staples (GICS Code 30)
S&P MidCap 400 Capped Energy (Sector) Index	Energy (GICS Code 10)
S&P MidCap 400 Capped Financials (Sector) Index	Financials (GICS Code 40)
S&P MidCap 400 Capped Financials & Real Estate (Sector) Index	Financials (GICS Code 40) Real Estate (GICS Code 60)
S&P MidCap 400 Capped Health Care (Sector) Index	Health Care (GICS Code 35)
S&P MidCap 400 Capped Industrials (Sector) Index	Industrials (GICS Code 20)
S&P MidCap 400 Capped Information Technology (Sector) Index	Information Technology (GICS Code 45)
S&P MidCap 400 Capped Materials (Sector) Index	Materials (GICS Code 15)
S&P MidCap 400 Capped Real Estate (Sector) Index	Real Estate (GICS Code 60)
S&P MidCap 400 Capped Utilities & Communication Services (Sector) Index[11]	Utilities (GICS Code 55) Communication Services (GICS Code 50)

For more information on GICS, please refer to S&P Dow Jones Indices' GICS Methodology.

Please note that any intra-quarter addition will be added to the relevant S&P MidCap 400 Capped Sector Index with the largest AWF currently represented in that index.

If the largest AWF in the index is not shared by multiple index constituents, the new addition will be added to the index with index shares that are commensurate with the index shares of the stock in a hypothetical rebalancing using the closing prices on the date the addition is announced. In such cases of commensurate weighting, the index shares for all current constituents will remain constant.

Weighting. Each index is capped market capitalization weighted. For reweighting purposes, the indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December using the following procedures:

1. The rebalancing reference date is the second Friday of March, June, September and December.
2. With prices reflected on the rebalancing reference date, adjusted for any applicable corporate actions, and membership, shares outstanding and IWFs as of the rebalancing effective date, each company is weighted by FMC.
3. If any company has a weight greater than 22.5%, that company has its weight capped at 22.5%. The cap is set to allow for a buffer below a 25% limit.
4. All excess weight is proportionally redistributed to all uncapped companies within the relevant index.
5. After this redistribution, if the weight of any other company breaches 22.5%, the process is repeated iteratively until no company breaches the 22.5% weight cap.
6. The sum of the companies with weight greater than 4.5% cannot exceed 45% of the total weight. These caps are set to allow for a buffer below 5% and 50% limits, respectively.
7. If the rule in step 6 is breached, all the companies are ranked in descending order of their weights and the company with the lowest weight that causes the 45% limit to be breached is identified. The weight of this company is, then, reduced to 4.5%.
8. This excess weight is proportionally redistributed to all companies with weights below 4.5%. Any stock that receives weight cannot breach the 4.5% cap. This process is repeated iteratively until

[11] Please note this is a slight modification from the official GICS Sectors in that this sub-set of indices combines the Utilities and Communication Services Sectors into one.

step 6 is satisfied or until all stocks are greater than or equal to 4.5%. If the rule in step 6 is still breached and all stocks are greater than or equal to 4.5%, the company with the lowest weight that causes the 45% limit to be breached is identified. The weight of this company is, then, reduced to 4.5%.

9. This excess weight is proportionally redistributed to all companies with weights greater than 4.5%. Any stock that receives weight cannot breach the 22.5% stock cap. This process is repeated iteratively until step 6 is satisfied.
10. Index share amounts are assigned to each constituent to arrive at the weights calculated above. Since index shares are assigned based on prices one week prior to rebalancing, the actual weight of each constituent at the rebalancing differs somewhat from these weights due to market movements.

At times, an index's company count may require the capping rules to be relaxed. Please refer to the table below for an overview of the process followed, when necessary. Each subsequent row is a relaxation of the previous row's weight caps.

Number of Constituents	Single Company Weight Cap[12]	Threshold for Aggregate Company Weight Capping[13]	Aggregate Company Weight Cap[9]
12-14	25.0%	5.0%	50%
11	27.5%	5.5%	55%
9-10	30.0%	6.0%	60%
8	32.5%	6.5%	65%
7	35.0%	7.0%	70%
6	37.5%	7.5%	75%
5	40.0%	8.0%	80%
4	42.5%	8.5%	85%
3	50.0%	9.5%	95%

For more information on the index calculation methodology, please refer to the Capped Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

At times, companies may be represented in the S&P MidCap 400 Capped Sector Indices by multiple share class lines. Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

For more information on the capping thresholds, please refer to the Regulatory Capping Requirements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

[12] Individual companies are capped at the single company weight cap.
[13] The sum of all companies with weights exceeding the threshold for aggregate company weight capping are capped at the aggregate company weight cap.

S&P SmallCap 600 Capped Sector Indices

Index Construction. Companies in the S&P SmallCap 600 are classified based on GICS. Each index is made up of all stocks in the GICS sector unless otherwise noted in the table below.

S&P SmallCap 600 Capped Sector Index	GICS Sector Classification
S&P SmallCap 600 Capped Consumer Discretionary (Sector) Index	Consumer Discretionary (GICS Code 25)
S&P SmallCap 600 Capped Consumer Staples (Sector) Index	Consumer Staples (GICS Code 30)
S&P SmallCap 600 Capped Energy (Sector) Index	Energy (GICS Code 10)
S&P SmallCap 600 Capped Financials (Sector) Index	Financials (GICS Code 40)
S&P SmallCap 600 Capped Financials & Real Estate (Sector) Index	Financials (GICS Code 40) Real Estate (GICS Code 60)
S&P SmallCap 600 Capped Health Care (Sector) Index	Health Care (GICS Code 35)
S&P SmallCap 600 Capped Industrials (Sector) Index	Industrials (GICS Code 20)
S&P SmallCap 600 Capped Information Technology (Sector) Index	Information Technology (GICS Code 45)
S&P SmallCap 600 Capped Materials (Sector) Index	Materials (GICS Code 15)
S&P SmallCap 600 Capped Real Estate (Sector) Index	Real Estate (GICS Code 60)
S&P SmallCap 600 Capped Utilities & Communication Services (Sector) Index[14]	Utilities (GICS Code 55) Communication Services (GICS Code 50)

For more information on GICS, please refer to S&P Dow Jones Indices' GICS Methodology.

Please note that any intra-quarter addition will be added to the relevant S&P SmallCap 600 Capped Sector Index with the largest AWF currently represented in that index.

If the largest AWF in the index is not shared by multiple index constituents, the new addition will be added to the index with index shares that are commensurate with the index shares of the stock in a hypothetical rebalancing using the closing prices on the date the addition is announced. In such cases of commensurate weighting, the index shares for all current constituents will remain constant.

Weighting. Each index is capped market capitalization weighted. For reweighting purposes, the indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December using the following procedures:

1. The rebalancing reference date is the second Friday of March, June, September, and December.
2. With prices reflected on the rebalancing reference date, adjusted for any applicable corporate actions, and membership, shares outstanding and IWFs as of the rebalancing effective date, each company is weighted by FMC.
3. If any company has a weight greater than 22.5%, that company has its weight capped at 22.5%. The cap is set to allow for a buffer below a 25% limit.
4. All excess weight is proportionally redistributed to all uncapped companies within the relevant index.
5. After this redistribution, if the weight of any other company breaches 22.5%, the process is repeated iteratively until no company breaches the 22.5% weight cap.
6. The sum of the companies with weight greater than 4.5% cannot exceed 45% of the total weight. These caps are set to allow for a buffer below 5% and 50% limits, respectively.
7. If the rule in step 6 is breached, all the companies are ranked in descending order of their weights and the company with the lowest weight that causes the 45% limit to be breached is identified. The weight of this company is, then, reduced to 4.5%.
8. This excess weight is proportionally redistributed to all companies with weights below 4.5%. Any stock that receives weight cannot breach the 4.5% cap. This process is repeated iteratively until

[14] Please note this is a slight modification from the official GICS Sectors in that this sub-set of indices combines the Utilities and Communication Services Sectors into one.

step 6 is satisfied or until all stocks are greater than or equal to 4.5%. If the rule in step 6 is still breached and all stocks are greater than or equal to 4.5%, the company with the lowest weight that causes the 45% limit to be breached is identified. The weight of this company is, then, reduced to 4.5%.

9. This excess weight is proportionally redistributed to all companies with weights greater than 4.5%. Any stock that receives weight cannot breach the 22.5% stock cap. This process is repeated iteratively until step 6 is satisfied.
10. Index share amounts are assigned to each constituent to arrive at the weights calculated above. Since index shares are assigned based on prices one week prior to rebalancing, the actual weight of each constituent at the rebalancing differs somewhat from these weights due to market movements.

At times, an index's company count may require the capping rules to be relaxed. Please refer to the table below for an overview of the process followed, when necessary. Each subsequent row is a relaxation of the previous row's weight caps.

Number of Constituents	Single Company Weight Cap[15]	Threshold for Aggregate Company Weight Capping[16]	Aggregate Company Weight Cap[12]
12-14	25.0%	5.0%	50%
11	27.5%	5.5%	55%
9-10	30.0%	6.0%	60%
8	32.5%	6.5%	65%
7	35.0%	7.0%	70%
6	37.5%	7.5%	75%
5	40.0%	8.0%	80%
4	42.5%	8.5%	85%
3	50.0%	9.5%	95%

For more information on the index calculation methodology, please refer to the Capped Market Capitalization Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

At times, companies may be represented in the S&P SmallCap 600 Capped Sector Indices by multiple share class lines. Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

For more information on the capping thresholds, please refer to the Regulatory Capping Requirements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

[15] Individual companies are capped at the single company weight cap.
[16] The sum of all companies with weights exceeding the threshold for aggregate company weight capping are capped at the aggregate company weight cap.

S&P 500 Ex-Sector Indices

Index Universe. Index constituents are drawn from the S&P 500.

Constituent Selection. All companies in the S&P 500 are classified based GICS. All companies in the S&P 500 that are classified in the defined excluded sector(s) are removed. The remaining constituents of the S&P 500 are then selected and form the ex-sector index.

Weighting. Each index is weighted by FMC.

S&P Composite 1500 / S&P TMI (Spliced as of EOD Dec-18-2015) Index

Index Construction. The index is a spliced version of two indices. Prior to December 18, 2015, the index was a replica of the S&P Composite 1500 and followed that index's methodology. Effective December 18, 2015, the index became a replica of the S&P Total Market Index (TMI) and follows the S&P TMI methodology.

Weighting. The index is weighted by FMC.

S&P 500 Ex-Financials, Real Estate, Utilities and Transportation Index

Index Universe. Index constituents are drawn from the S&P 500.

Constituent Selection. All companies in the S&P 500 are classified based on GICS. All companies in the S&P 500 that are classified in the Financials, Real Estate, and Utilities sectors, as well as those classified in the Transportation industry group are excluded. The remaining constituents of the S&P 500 are then selected and form the index.

Weighting. The index is weighted by FMC.

S&P Equal Weight U.S. Indices

Index Construction. Each index is an equal weighted version of an underlying index as detailed in the table below. Index composition is the same as the underlying index. Constituent changes are incorporated in the equal weight index, as and when they are made in the underlying index.

S&P Equal Weight U.S. Index	Underlying Index
S&P 100 Equal Weight Index	S&P 100
S&P 500 Equal Weight Index	S&P 500
S&P MidCap 400 Equal Weight Index	S&P MidCap 400
S&P SmallCap 600 Equal Weight Index	S&P SmallCap 600
S&P Composite 1500 Equal Weight Index	S&P Composite 1500
S&P 500 Top 50 Equal Weight Index	S&P 500 Top 50

When a company is added to an index in the middle of the quarter, it takes the weight of the company that it replaced. The one exception is when a company is removed from an index at a price of $0.00. In such a case, the company's replacement is added to the index at the weight using the previous day's closing value, or the most immediate prior business day that the deleted company was not valued at $0.00.

S&P 500 Equal Weight Sector Indices. Companies in the S&P 500 are classified based on GICS. Each index is made up of all stocks in the GICS sector unless otherwise noted in the table below.

S&P 500 Equal Weight Sector Index	GICS Sector Classification
S&P 500 Equal Weight Consumer Discretionary Index	Consumer Discretionary (GICS Code 25)
S&P 500 Equal Weight Consumer Staples Index	Consumer Staples (GICS Code 30)
S&P 500 Equal Weight Energy Index	Energy (GICS Code 10)
S&P 500 Equal Weight Energy Plus Index	Energy (GICS Code 10)
S&P 500 Equal Weight Financials Index	Financials (GICS Code 40)
S&P 500 Equal Weight Health Care Index	Health Care (GICS Code 35)
S&P 500 Equal Weight Industrials Index	Industrials (GICS Code 20)
S&P 500 Equal Weight Information Technology Index	Information Technology (GICS Code 45)
S&P 500 Equal Weight Materials Index	Materials (GICS Code 15)
S&P 500 Equal Weight Real Estate Index	Real Estate (GICS Code 60)
S&P 500 Equal Weight Communication Services Index	Communication Services (GICS Code 50)
S&P 500 Equal Weight Utilities Index	Utilities (GICS Code 55)
S&P 500 Equal Weight Utilities Plus Index	Utilities (GICS Code 55)
S&P 500 Equal Weight Communication Services Plus Index[17]	Communication Services (GICS Code 50)

Index composition is the same as the relevant GICS sector of the S&P 500. Constituent changes are incorporated in the S&P Equal Weight Sector Indices, as and when they are made in the relevant GICS sector of the S&P 500, except for the S&P 500 Equal Weight Plus Indices which may also contain supplementary stocks. The company maintains its modified index shares if it is moved to a new S&P 500 Equal Weight Sector Index upon reclassification. This results in a divisor adjustment to both the S&P 500 Equal Weight Sector Index the company is leaving and the S&P 500 Equal Weight Sector Index the company is joining.

At the quarterly rebalancing, in the event that fewer than 22 companies are selected for the S&P 500 Equal Weight Plus Indices, the index will be supplemented with the largest company based on FMC in the S&P MidCap 400 within the eligible GICS Sector until the 22 company minimum is reached. If intra-quarter additions to the S&P 500 in the eligible GICS Sector result in the index reaching the required minimum count, the supplementary companies will remain in the index until the next quarterly rebalance, at which point they will be reviewed. If supplementary stocks are required, and at least one supplementary stock is a current constituent, a buffer is applied at the quarterly rebalancing such that a supplementary stock being added must have an FMC greater than 1.2 times (or 20% higher than) the supplementary stock it is replacing. This buffer is evaluated on each supplementary stock addition relative to the current supplementary stock it is replacing. For example, the largest non-index supplementary stock by FMC is evaluated against the smallest supplementary index constituent, the second largest non-index supplementary stock is evaluated against the second smallest supplementary index constituent, etc. This process is repeated until no supplementary additions exceed the buffer.

Weighting. The indices are reset to equal weight quarterly after the close of business on the third Friday of March, June, September, and December. The reference date for weighting is the second Friday of the reweighting month and changes are effective after the close of the following Friday using prices as of the reweighting reference date, and membership, shares outstanding, and IWFs as of the reweighting effective date.

The closing weight of any company removed from the headline S&P 500 Equal Weighted Index at the close of business on the day prior to the effective date determines the new AWF and Index Shares of the replacement company.

For more information on the index calculation methodology, please refer to the Equal Weighted Indices section of S&P Dow Jones Indices' Index Mathematics Methodology.

[17] S&P Dow Jones Indices created back calculated history for the index based on the securities in the headline S&P 500 that would have hypothetically been classified as GICS Code 50 under this new structure effective September 24, 2018.

S&P 500 Sectors Equal Allocation Index

Index Objective. The index is a weighted return index measuring the equal weighted performance of the FMC weighted S&P 500 Sector Indices (the component indices).

Component Indices. Please see the table below.

S&P 500 Sector Index	GICS Sector Classification
S&P 500 Consumer Discretionary Index	Consumer Discretionary (GICS Code 25)
S&P 500 Consumer Staples Index	Consumer Staples (GICS Code 30)
S&P 500 Energy Index	Energy (GICS Code 10)
S&P 500 Financials Index	Financials (GICS Code 40)
S&P 500 Health Care Index	Health Care (GICS Code 35)
S&P 500 Industrials Index	Industrials (GICS Code 20)
S&P 500 Information Technology Index	Information Technology (GICS Code 45)
S&P 500 Materials Index	Materials (GICS Code 15)
S&P 500 Real Estate Index[18]	Real Estate (GICS Code 60)
S&P 500 Communication Services Index	Communication Services (GICS Code 50)
S&P 500 Utilities Index	Utilities (GICS Code 55)

Index Eligibility. See *Index Construction*.

Index Construction. At each rebalancing, the index selects the component indices.

Index Weighting. At each rebalancing, the index equal weights the component indices. Each component index FMC weights its constituents.

Index Calculation. For information on the index calculation, please refer to the Weighted Return section of *S&P Dow Jones Indices' Index Mathematics Methodology*.

Reweighting. The index reweights quarterly, effective after the close of business on the third Friday of March, June, September, and December, using a reference date for weighting as of after the close on the second Friday of the reweighting month.

Index Maintenance. Except for rebalancings, all index adjustments and corporate action treatments follow the component indices.

[18] For history prior to September 2016, the index did not include the S&P 500 Real Estate Sector Index.

S&P 900 Banks (Industry) 7/4 Capped Index (USD)

Index Objective. The index measures the performance of the constituents of the underlying index classified as part of two GICS Banks industries, defined below.

Underlying Index. S&P 900.

Index Eligibility. Constituents of the underlying index classified as part of the following GICS sub-industries are eligible:

- Diversified Banks (Code: 40101010)
- Regional Banks (Code: 40101015)

Index Construction. See Index Eligibility.

Additions. Companies added to the underlying index with an eligible GICS code or current constituents of the underlying index whose GICS code changes to that of an eligible sub-industry are added to the index simultaneously. Any addition is added at the lesser of 4% index weight or commensurate with the weight of the stock in a hypothetical rebalancing. Index shares of the addition are determined based on closing prices as of the addition announcement date. The index shares for all current constituents will remain constant.

Deletions. Constituents removed from the underlying index or whose GICS code changes to an ineligible sub-industry are removed from the index simultaneously.

Constituent Weightings. The index is weighted by FMC, subject to weight caps, if necessary. The individual weights of the largest five index companies are each capped at a maximum 7% index weight. Then, the remaining companies are each capped at a maximum 4% index weight. Weight is redistributed proportionally across all uncapped components.

Maximum weight capping is based on company FMC, with the weight of multiple class companies allocated proportionally to each share class line based on its FMC as of the rebalancing reference date. If no capping is required, both share classes remain in the index at their natural FMC.

For more information on the capping thresholds, please refer to the Regulatory Capping Requirements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Multiple Share Classes. All publicly listed multiple share class lines are eligible for index inclusion, subject to meeting the eligibility criteria. For more information regarding the treatment of multiple share classes, please refer to Approach A within the Multiple Share Classes section of the S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Rebalancing. The index is rebalanced on a quarterly basis, effective after the close on the third Friday of March, June, September, and December. The reference date is the second Friday of each rebalancing month. Prices used in the weighting process are as of the reference date, while membership, shares outstanding, and IWFs are as of the rebalancing effective date.

Index Maintenance. All index adjustments and corporate action treatments follow the underlying index.

S&P 500 in TTM Rates JPY Hedged Index

Index Objective. The index measures the performance of the underlying index hedged against currency fluctuations.

Underlying Index. S&P 500 (Index Code: 500).

Currency of Calculation. The index calculates in Japanese yen.

Exchange Rate. Index values calculate using TTM (Telegraphic Transfer Midrate) foreign exchange rates from the Bank of Tokyo Mitsubishi, with index values published on the calculation date using TTM rates of *T+1*.

Holiday Schedule. The index calculates when the Japan equity markets are open. A complete holiday schedule for the year is available at www.spglobal.com/spdji.

Rebalancing. The index rebalances monthly. The index determines the required hedged amount using the TTM rate on the most recent Japanese trading day (*T*) and the underlying index value on the preceding date (*T-1*). If there is no underlying index value on *T-1*, the calculation uses the most recent index value.

Hedging. The index daily return series calculate by interpolating between the spot price and the forward price.

For each hedge month m, there are $d = 1,2,3 \ldots D$ business days.

md is day d for hedge month m and $m0$ is the last business day of the hedge month $m-1$.

F_I_{md} = The interpolated forward rate as of day d of month m.

S_m = The spot rate in U.S. dollar per Japanese yen (USD/JPY).

F_m = The forward rate in U.S. dollar per Japanese yen (USD/JPY).

HR_{md} = The hedge return (%).

SPI_E_m = The underlying index level in Japanese yen.

SPI_EH_m = the hedged index level.

$$F\_I_{md} = S_{md} + \left(\frac{D-d}{D}\right) * (F_{md} - S_{md})$$

$$HR_{md} = \frac{S_{m0}}{F_{m0}} - \frac{S_{m0}}{F\_I_{md}}$$

$$SPI\_EH_{md} = SPI\_EH_{m0} * \left(\frac{SPI\_E_{md}}{SPI\_E_{m0}} + HR_{md}\right)$$

S&P 500 Top 10 Index (TTM) (JPY)

Index Objective. The index measures the performance of the underlying index in Japanese yen (JPY) using TTM (Telegraphic Transfer Midrate) foreign exchange rates from the Bank of Tokyo Mitsubishi.

Underlying Index. S&P 500 Top 10 Index (Index Code: SP5T1).

Currency of Calculation. The index calculates in JPY.

Exchange Rate. Index values calculate using TTM foreign exchange rates from the Bank of Tokyo Mitsubishi, with index values published on the calculation date using TTM rates of *T+1*.

Holiday Schedule. The index calculates when the Japan equity markets are open. A complete holiday schedule for the year is available at *www.spglobal.com/spdji*.

S&P 500 3% Capped Index (USD)

Index Objective. The index measures the performance of companies in the underlying index, subject to a 3% weight cap.

Underlying Index. S&P 500 (Index Code: 500).

Index Eligibility. The index comprises the constituents of the underlying index.

Additions. Any intra-quarter addition is added to the index with the largest AWF currently represented in the index. If the largest AWF in the index is not shared by multiple index constituents, the new addition is added to the index with index shares that are commensurate with the index shares of the stock in a hypothetical rebalancing using the closing prices on the date the addition is announced. In such cases of commensurate weighting, the index shares for all current constituents remain constant.

Deletions. Constituents removed from the underlying index are removed from the index simultaneously.

Constituent Weightings. At each rebalancing, the index is capped market capitalization weighted. If any company has a weight greater than 3%, cap that company's weight at 3%. Proportionally redistribute all excess weight to all uncapped companies. After this redistribution, if the weight of any other company breaches 3%, repeat the process iteratively until no company breaches the 3% cap.

Rebalancing. The index rebalances quarterly, effective after the close on the third Friday of March, June, September, and December. The reference date is the second Friday of each rebalancing month. Prices used in the weighting process are as of the reference date, while membership, shares outstanding, and IWFs are as of the rebalancing effective date.

Index Maintenance. All index adjustments and corporate action treatments follow the underlying index.

S&P 500 Top 10 25% Capped Index (USD)

Index Objective. The index measures the performance of companies in the underlying index, subject to a 25% single company cap.

Underlying Index. S&P 500 Top 10 (Index Code: SP5T1).

Index Eligibility. The index comprises the constituents of the underlying index.

Index Additions. Additions to the underlying index are added to the index simultaneously.

Index Deletions. Constituents removed from the underlying index are removed from the index simultaneously.

Constituent Weightings. At each rebalancing, the index FMC weights companies. If any company has a weight greater than 25%, cap that company's weight at 25%. Proportionally redistribute all excess weight to all uncapped companies within the index. After this redistribution, if the weight of any other company breaches 25%, repeat the process iteratively until no company breaches the 25% cap.

Rebalancing. The index rebalances quarterly, effective after the close on the third Friday of March, June, September, and December. The reference date is the second Friday of each rebalancing month. Prices used in the weighting process are as of the reference date, while membership, shares outstanding, and IWFs are as of the rebalancing effective date.

Index Maintenance. All index adjustments and corporate action treatments follow the underlying index.

Appendix C

Methodology Changes

Methodology changes since January 1, 2015, are as follows:

Change	Effective Date (After Close)	Methodology	
		Previous	Updated
Multiple Share Classes: S&P Composite 1500 Indices	04/17/2023	Companies with multiple share class structures are not eligible for inclusion in the S&P Composite 1500 and its component indices. Existing constituents with multiple share class structures are grandfathered in.	All companies with multiple share class structures are considered eligible candidates for the S&P Composite 1500 Indices.
Market Capitalization: S&P Composite 1500	01/04/2023	Market Capitalization guidelines expressed in dollar ranges only.	The market capitalization guidelines are designed to capture the three-month average cumulative total company level market capitalization of the S&P Total Market Index ("TMI") universe at approximately the following cumulative percentiles: 1. S&P 500: 85th percentile 2. S&P MidCap 400: 85th-93rd percentile 3. S&P SmallCap 600: 93rd-99th percentile
FALR Liquidity Measurement: S&P Composite 1500	01/04/2023	FALR must be greater than or equal to 1.00 at the time of addition to the Composite 1500.	FALR must be greater than or equal to 0.75 at the time of addition to the Composite 1500.
Index Name: INDUSTRIALS	02/08/2022	INDUSTRIALS	S&P 500 Ex-Financials, Real Estate, Utilities and Transportation Index
Former SPAC Eligibility: S&P Total Market Index, S&P Completion Index, and S&P Composite 1500 Indices	02/04/2022	--	For the S&P Total Market Index (TMI) and S&P Completion Index (CI), SPACs that transition to an operating company via a de-SPAC transaction are eligible for index addition, subject to a reference date that is five weeks prior to the rebalancing effective date. For the S&P Composite 1500 and its related flow-through indices, S&P DJI considers the de-SPAC transaction to be an event equivalent to an IPO, and 12 months of trading post the de-SPAC event are required before a former SPAC can be considered for the S&P Composite 1500 indices.
Liquidity Measurement: S&P Total Market Index	12/07/2020	Using composite pricing and volume, the ratio of annual dollar value traded (defined as average closing price over the period multiplied by historical volume) to float-adjusted market capitalization should be at least 0.10.	Using composite pricing and volume, the ratio of annual dollar value traded (defined as average closing price multiplied by historical volume over the last 365 calendar days) to float-adjusted market capitalization should be at least 0.10.
Eligibility Criteria Measurement Date:	12/07/2020	The measurement date for determining whether all eligibility	The measurement date for determining whether all eligibility

Change	Effective Date (After Close)	Methodology	
		Previous	Updated
S&P Composite 1500		criteria are met is the open of trading on the announcement date.	criteria are met is the day prior to the announcement date.
Constituent Migrations: S&P Composite 1500	12/07/2020	Current S&P Composite 1500 constituents can be migrated from one S&P Composite 1500 component index (i.e., S&P 500, S&P MidCap 400, or S&P SmallCap 600) to another without meeting the financial viability or liquidity eligibility criteria if the Index Committee decides that such a move will enhance the representativeness of the index as a market benchmark.	Current S&P Composite 1500 constituents can be migrated from one S&P Composite 1500 component index (i.e., S&P 500, S&P MidCap 400, or S&P SmallCap 600) to another as long as they meet the total company level market capitalization eligibility criteria for the new index. Migrations from one S&P Composite 1500 index to another do not need to meet the financial viability, liquidity or 50% of the respective index's total company level minimum market capitalization threshold criteria.
Secondary Quarter-end Rebalancing and Reference Date Schedule: Select Sector Indices	08/31/2020	If, on the third to last business day of March, June, September, or December a company has a weight greater than 24% or the sum of the companies with weights greater than 4.8% exceeds 50%, a secondary rebalancing will be triggered with the rebalancing effective date being the opening of the last business day of the month. This secondary rebalancing will use the closing prices as of the third to last business day of March, June, September, or December, and membership, shares outstanding, and IWFs as of the rebalancing effective date.	If, on the second to last business day of March, June, September, or December a company has a weight greater than 24% or the sum of the companies with weights greater than 4.8% exceeds 50%, a secondary rebalancing will be triggered with the rebalancing effective date being after the close of the last business day of the month. This secondary rebalancing will use the closing prices as of the second to last business day of March, June, September, or December, and membership, shares outstanding, and IWFs as of the rebalancing effective date.
Treatment of Secondary Offerings: S&P Composite 1500	03/27/2020	**5% Rule.** S&P Composite 1500 constituent share changes resulting from public offerings (also known as follow-on offerings or secondary offerings) that equal 5% or more of the total shares outstanding are eligible for next day implementation if they satisfy the following conditions: • Must be underwritten. • Must have a publicly available prospectus or prospectus summary filed with the SEC. • Must have a publicly available confirmation from an official source that the offering has been completed. Block trades and spot secondaries must meet the above criteria in order to be eligible for next day implementation. Next day implementation will include a review of the company's IWF using the latest publicly available ownership data. Any change in the IWF of at least five percentage points resulting from the review is implemented with the share update.	Please refer to the Accelerated Implementation Rule described in *S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology*.
Market Capitalization Criteria for Index Eligibility:	04/30/2019	Total company market capitalizations of US$ 8.2 billion or more for the S&P 500, US$ 2.4	Total company market capitalizations of US$ 8.2 billion or more for the S&P 500, US$ 2.4

Change	Effective Date (After Close)	Methodology	
		Previous	Updated
S&P Composite 1500		billion to US$ 8.2 billion for the S&P MidCap 400, and US$ 600 million to US$ 2.4 billion for the S&P SmallCap 600 are required. These ranges are reviewed from time to time to assure consistency with market conditions.	billion to US$ 8.2 billion for the S&P MidCap 400, and US$ 600 million to US$ 2.4 billion for the S&P SmallCap 600 are required. These ranges are reviewed from time to time to assure consistency with market conditions. A company meeting the total company market capitalization criteria is also required to have a security level float-adjusted market capitalization that is at least 50% of the respective index's total company level minimum market capitalization threshold.
IPO Fast Track Eligibility	04/30/2019	--	Certain large IPOs may be eligible for fast track entry, subject to the following conditions: • Only newly public IPOs and direct placement listings will be considered eligible for fast-track entry. Formerly bankrupt companies that switch from Over-the-Counter Exchange ("OTC") or a non-covered exchange to an S&P Dow Jones Indices covered exchange are ineligible. • Fast-track IPO additions must meet a minimum float-adjusted market capitalization ("FMC") threshold of US$ 2 billion, calculated using the shares offered (excluding over-allotment options) and the closing price on the first day of trading on an eligible exchange. The threshold level is reviewed from time to time and updated as needed to assure consistency with market conditions. In addition, the IPO will need to meet all other applicable index eligibility rules except for the liquidity requirement. If all necessary public information is available, S&P Dow Jones Indices verifies that the fast-track conditions have been met. Once S&P Dow Jones Indices announces that the IPO is eligible for fast-track addition, it is added to the index with five business days lead time. At the discretion of the Index Committee, fast-track IPO additions eligible to be added during a quarterly rebalancing freeze period may instead be added on the rebalancing effective date.
Investable Weight Factors (IWFs) Criteria for Index Eligibility: S&P Composite 1500	04/30/2019	An IWF of 0.50 is required.	An IWF of at least 0.10 is required.
Secondary Rebalancing:	04/30/2019	If necessary, the reweighting process may take place more than	If, on the third to last business day of March, June, September, or

Change	Effective Date (After Close)	Methodology	
		Previous	Updated
Select Sector Indices		once prior to the close on the last business day of March, June, September, or December to ensure the Select Sector Indices conform to all diversification requirements.	December, a company has a weight greater than 24% or the sum of the companies with weights greater than 4.8% exceeds 50%, a secondary rebalancing will be triggered with the rebalancing effective date being the opening of the last business day of the month. This secondary rebalancing will use the closing prices as of the third to last business day of March, June, September, or December, and membership, shares outstanding, and IWFs as of the rebalancing effective date.
Index Eligibility: S&P 500 Capped 35/20 Utilities & Telecommunication Services Index	09/24/2018	Companies in the S&P 500 classified as Utilities (GICS Code 55) and Telecommunication Services (GICS Code 50).	Companies in the S&P 500 classified as Utilities sector (GICS Code 55) and Telecommunication Services industry group (GICS Code 5010).
Index Name: 1. S&P 500 Equal Weight Telecommunications Index 2. S&P MidCap 400 Capped Utilities & Telecom Services Index 3. S&P SmallCap 600 Capped Utilities & Telecom Services (Sector) Index	09/24/2018	The index names were: 1. S&P 500 Equal Weight Telecommunications Index 2. S&P MidCap 400 Capped Utilities & Telecom Services Index 3. S&P SmallCap 600 Capped Utilities & Telecom Services (Sector) Index	The index names are: 1. S&P 500 Equal Weight Communication Services Index 2. S&P MidCap 400 Capped Utilities & Communication Services Index 3. S&P SmallCap 600 Capped Utilities & Communication Services (Sector) Index
Index Name/Eligibility: S&P 500 Equal Weight Utilities & Telecommunications Index	09/24/2018	Companies in the S&P 500 classified as Utilities (GICS Code 55) and Telecommunication Services (GICS Code 50).	The index name is the S&P 500 Equal Weight Utilities Plus Index and contains companies in the S&P 500 classified as Utilities (GICS Code 55) with a 22 company minimum count.
Index Eligibility: S&P Select Sector Capped 20% Technology Index	09/24/2018	Companies in the S&P 500 classified as Information Technology (GICS Code 45) and Telecommunication Services (GICS Code 50).	Companies in the S&P 500 classified as Information Technology (GICS Code 45).
Index Eligibility: Technology Select Sector Index	09/24/2018	Companies in the S&P 500 classified as Information Technology (GICS Code 45) and Telecommunication Services (GICS Code 50).	Companies in the S&P 500 classified as Information Technology (GICS Code 45).
Spin-off Market Cap Eligibility: S&P Composite 1500	06/30/2018	A spin-off company must have an estimated market capitalization that meets the minimum market capitalization addition criteria for the index to which it is being added.	If the spin-off company's estimated market capitalization is below the minimum defined in the outside addition criteria but there are other constituent companies in the parent index that have a significantly lower total market capitalization than the spin-off company, the Committee may decide to retain the spin-off company in the parent index
Rebalancing Schedule: S&P 500 Capped 35/20 Indices	06/25/2018	For reweighting purposes, the indices are rebalanced quarterly after the close of business on the third Friday of March, June, September, and December.	For reweighting purposes, the indices are rebalanced monthly after the close of business on the third Friday of the month.
Rebalancing schedule and capping frequency for Select Sector Indices	03/08/2018	The indices are rebalanced quarterly after the close on the second to last business day of March, June, September, and December. Capping is only performed when a company's modified market	The indices are rebalanced quarterly after the close on the third Friday of March, June, September, and December. At each rebalancing, capping is performed using closing prices from

Change	Effective Date (After Close)	Methodology	
		Previous	Updated
		capitalization weight breaches the maximum allowable limits in the index methodology using closing prices from two business days prior to the last business day of the rebalancing month.	the second Friday of the rebalancing month.
Capping buffer for Select Sector Indices	03/08/2018	As part of the capping process, all companies are ranked in descending order of their float-adjusted market capitalization weights. The first company that causes the 50% limit to be breached has its weight reduced to 4.6%.	As part of the capping process, all companies are ranked in descending order of their float-adjusted market capitalization weights. The first company that causes the 50% limit to be breached has its weight reduced to 4.5%.
Excess weight distribution for Select Sector Indices	03/08/2018	All excess weight is equally redistributed to all uncapped companies within the relevant Select Sector Index.	All excess weight is proportionally redistributed to all uncapped companies within the relevant Select Sector Index.
Merger related IWF change	01/19/2018	Any merger related IWF change resulting in an IWF of 0.96 or greater is rounded up to 1.00 on the merger effective date.	A merger-related IWF change, which results in an IWF of 0.96 or greater, is rounded up to 1.00 at the next annual IWF review.
Exclusion of companies with multiple share class structures from the S&P Composite 1500 and its component indices	07/31/2017	Companies with multiple share class structures are eligible for inclusion in the S&P Composite 1500 and its component indices.	Companies with multiple share class structures are not eligible for inclusion in the S&P Composite 1500 and its component indices. Existing constituents with multiple share class structures are grandfathered in.
Migrations among S&P Composite 1500 component indices	07/31/2017	--	Current S&P Composite 1500 constituents can be migrated from one S&P Composite 1500 component index (i.e., S&P 500, S&P MidCap 400, or S&P SmallCap 600) to another without meeting the financial viability, public float and/or liquidity eligibility criteria if the Index Committee decides that such a move will enhance the representativeness of the index as a market benchmark. Companies that are spun-off from current S&P Composite 1500 constituents do not need to meet the outside addition criteria.
Waiting period for index addition to the S&P Composite 1500 of previously deleted companies	07/31/2017	--	Any company that is removed from an S&P Composite 1500 index (including discretionary and bankruptcy/exchange delistings) must wait a minimum of one year from its index removal date before being reconsidered as a replacement candidate.
Elimination of the Corporate Governance Structure criterion from the Domicile criteria	07/31/2017	For index purposes, a U.S. company must have a corporate governance structure consistent with U.S. practice.	--
Primary listing for S&P Composite 1500 index eligibility	07/31/2017	Eligible securities include all U.S. common equities listed on NYSE, NYSE Arca, NYSE American (formerly NYSE MKT), NASDAQ Global Select Market, NASDAQ Select Market, NASDAQ Capital Market, Bats BZX, Bats BYX, Bats EDGA, and Bats EDGX exchanges.	Eligible securities include all U.S. common equities listed on NYSE, NYSE Arca, NYSE American, NASDAQ Global Select Market, NASDAQ Select Market, NASDAQ Capital Market, Bats BZX, Bats BYX, Bats EDGA, Bats EDGX, and IEX exchanges.
Market Capitalization Thresholds:	03/10/2017	1.S&P 500: At least US$ 5.3 billion.	4.S&P 500: At least US$ 6.1 billion.

Change	Effective Date (After Close)	Methodology	
		Previous	Updated
1.S&P 500 2.S&P MidCap 400 3.S&P SmallCap 600		2.S&P MidCap 400: US$ 1.4 billion to US$ 5.9 billion. 3.S&P SmallCap 600: US$ 400 million to US$ 1.8 billion.	5.S&P MidCap 400: US$ 1.6 billion to US$ 6.8 billion. 6.S&P SmallCap 600: US$ 450 million to US$ 2.1 billion.
IPO seasoning	03/10/2017	Initial public offerings should be seasoned for six to 12 months before being considered for addition to an index.	Initial public offerings should be traded on an eligible exchange for at least 12 months before being considered for addition to an index.
Index composition for the following indices: 1.INDUSTRIALS 2.Real Estate Select Sector Index 3.S&P Select Sector Capped 20% Real Estate Index 4.S&P 500 Capped 35/20 Real Estate Index 5.S&P 500 Equal Weight Real Estate Index 6.S&P MidCap 400 Capped Financials & Real Estate (sector) Index 7.S&P SmallCap 600 Capped Financials & Real Estate (sector) Index	09/16/2016	1.The index consists of all companies in the S&P 500, excluding those belonging to the Financials sector, Utilities sector or Transportation industry group. 2.GICS Real Estate Industry Group excluding Mortgage REITs. 3.GICS Real Estate Industry Group excluding Mortgage REITs. 4.GICS Real Estate Industry Group excluding Mortgage REITs. 5.GICS Real Estate Industry Group excluding Mortgage REITs. 6.GICS Financials Sector. 7.GICS Financials Sector.	1.The index consists of all companies in the S&P 500, excluding those belonging to the Financials sector, Real Estate sector, Utilities sector or Transportation industry group. 2.GICS Real Estate Sector. 3.GICS Real Estate Sector. 4.GICS Real Estate Sector. 5.GICS Real Estate Sector. 6.GICS Financials Sector & GICS Real Estate Sector. 7.GICS Financials Sector & GICS Real Estate Sector.
Index names for the following indices: 1.S&P MidCap 400 Capped Financials (sector) Index 2.S&P SmallCap 600 Capped Financials (sector) Index 3.S&P 500 Ex-Financials 4.S&P 500 Ex-Financials TR	09/16/2016	1.S&P MidCap 400 Capped Financials (sector) Index 2.S&P SmallCap 600 Capped Financials (sector) Index 3.S&P 500 Ex-Financials 4.S&P 500 Ex-Financials TR	1.S&P MidCap 400 Capped Financials & Real Estate (sector) Index 2.S&P SmallCap 600 Capped Financials& Real Estate (sector) Index 3.S&P 500 Ex-Financials & Real Estate 4.S&P 500 Ex-Financials & Real Estate TR
Rebalancing Reference Date: S&P Total Market Index	09/16/2016	The rebalancing reference date is the last trading day of the month prior to the rebalancing effective date.	The rebalancing reference date is five weeks prior to the rebalancing effective date.
Eligibility of tracking stocks	07/29/2016	Tracking stocks are ineligible for the S&P U.S. Indices.	Tracking stocks are eligible for the S&P Total Market Index but are ineligible for the S&P Composite 1500 and its component indices.
Share/IWF Freeze Period	07/29/2016	A share freeze is implemented the week leading up to the rebalancing effective date.	A share/IWF freeze period is implemented during each quarterly rebalancing. The freeze period begins after the market close on the Tuesday preceding the second Friday of each rebalancing month (i.e., March, June, September, and December) and ends after the market close on the third Friday of the rebalancing month.
Treatment of voluntary exchange offers, Dutch auctions, & tender offers	07/29/2016	Changes in a company's total shares outstanding of 5% or more due to exchange offers, Dutch auctions & tender offers are made as soon as reasonably possible.	Changes in a company's total shares outstanding of 5% or more due to voluntary exchange offers, Dutch auctions & tender offers are made weekly.
Primary listing for S&P Composite 1500 index eligibility	06/17/2016	Eligible securities include all U.S. common equities listed on NYSE, NYSE Arca, NYSE MKT, NASDAQ Global Select Market, NASDAQ Select Market and NASDAQ Capital Market.	Eligible securities include all U.S. common equities listed on NYSE, NYSE Arca, NYSE MKT, NASDAQ Global Select Market, NASDAQ Select Market, NASDAQ Capital Market, Bats BZX, Bats BYX, Bats EDGA, and Bats EDGX exchanges.

Change	Effective Date (After Close)	Methodology	
		Previous	Updated
Clarification of the capping rules for the S&P SmallCap 600 Capped Sector Indices	03/21/2016	In the event an index count falls to a level that renders the general capping rules unworkable, S&P Dow Jones Indices may relax the 4.5%/45% rule.	S&P Dow Jones has provided a detailed process for capping in the event an index count falls to a level that renders the general capping rules unworkable.
Multiple Share Class	09/18/2015	Companies that have more than one class of common stock outstanding are represented only once in an index. The stock price is based on one class, and the share count is based on the total shares outstanding of all classes.	There will no longer be consolidated lines in the S&P Float Market Cap (FMC) indices. Instead, all multiple share class companies that have listed share class lines will be adjusted for shares and float such that each share class line will only represent that line's shares and float. All multiple share class companies that have an unlisted class line will also be adjusted.
Clarification for recognizing next day secondary offerings in the S&P Composite 1500	01/21/2015	--	All public offerings (also known as follow-on offerings) eligible for next day share implementation must be underwritten, must have a publicly available prospectus or prospectus summary filed with the SEC, and must include a public confirmation that the offering has been completed. Block trades and spot secondaries must meet the above criteria in order to be eligible for next day implementation.

Appendix D

ESG Disclosures

EXPLANATION OF HOW ENVIRONMENTAL, SOCIAL & GOVERNANCE (ESG) FACTORS ARE REFLECTED IN THE KEY ELEMENTS OF THE BENCHMARK METHODOLOGY[19]		
1.	**Name of the benchmark administrator.**	S&P Dow Jones Indices LLC.
2.	**Underlying asset class of the ESG benchmark.[20]**	N/A
3.	**Name of the S&P Dow Jones Indices benchmark or family of benchmarks.**	S&P DJI Equity Indices Benchmark Statement
4.	**Do any of the indices maintained by this methodology take into account ESG factors?**	No
Appendix latest update:		January 2021
Appendix first publication:		January 2021

[19] The information contained in this Appendix is intended to meet the requirements of the European Union Commission Delegated Regulation (EU) 2020/1817 supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards the minimum content of the explanation of how environmental, social and governance factors are reflected in the benchmark methodology and the retained EU law in the UK [The Benchmarks (amendment and Transitional Provision) (EU Exit) Regulations 2019].

[20] The 'underlying assets' are defined in European Union Commission Delegated Regulation (EU) 2020/1816 supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards the explanation in the benchmark statement of how environmental, social and governance factors are reflected in each benchmark provided and published.

Disclaimer

Performance Disclosure/Back-Tested Data

Where applicable, S&P Dow Jones Indices and its index-related affiliates ("S&P DJI") defines various dates to assist our clients by providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the index is set to a fixed value for calculation purposes. The Launch Date designates the date when the values of an index are first considered live: index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P DJI defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public website or its data feed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Information presented prior to an index's launch date is hypothetical back-tested performance, not actual performance, and is based on the index methodology in effect on the launch date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. In addition, forks have not been factored into the back-test data with respect to the S&P Cryptocurrency Indices. For the S&P Cryptocurrency Top 5 & 10 Equal Weight Indices, the custody element of the methodology was not considered; the back-test history is based on the index constituents that meet the custody element as of the Launch Date. Also, the treatment of corporate actions in back-tested performance may differ from treatment for live indices due to limitations in replicating index management decisions. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results.

Typically, when S&P DJI creates back-tested index data, S&P DJI uses actual historical constituent-level data (e.g., historical price, market capitalization, and corporate action data) in its calculations. As ESG investing is still in early stages of development, certain datapoints used to calculate certain ESG indices may not be available for the entire desired period of back-tested history. The same data availability issue could be true for other indices as well. In cases when actual data is not available for all relevant historical periods, S&P DJI may employ a process of using "Backward Data Assumption" (or pulling back) of ESG data for the calculation of back-tested historical performance. "Backward Data Assumption" is a process that applies the earliest actual live data point available for an index constituent company to all prior historical instances in the index performance. For example, Backward Data Assumption inherently assumes that companies currently not involved in a specific business activity (also known as "product involvement") were never involved historically and similarly also assumes that companies currently involved in a specific business activity were involved historically too. The Backward Data Assumption allows the hypothetical back-test to be extended over more historical years than would be feasible using only actual data. For more information on "Backward Data Assumption" please refer to the FAQ. The methodology and factsheets of any index that employs backward assumption in the back-tested history

will explicitly state so. The methodology will include an Appendix with a table setting forth the specific data points and relevant time period for which backward projected data was used. Index returns shown do not represent the results of actual trading of investable assets/securities. S&P DJI maintains the index and calculates the index levels and performance shown or discussed but does not manage any assets.

Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US $100,000 investment for a 12-month period (or US $10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US $1,650), the net return would be 8.35% (or US $8,350) for the year. Over a three-year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US $5,375, and a cumulative net return of 27.2% (or US $27,200).

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S&P Dow Jones Indices

A Division of S&P Global

Index Mathematics
Methodology

March 2024

Table of Contents

Introduction

This document covers the mathematics of equity index and other quantitative rules-based calculations and assumes some acquaintance with mathematical notation and simple operations. The calculations are presented principally as equations, which have largely been excluded from the individual index methodologies, with examples or tables of results to demonstrate the calculations.

Different Varieties of Equity Indices

S&P Dow Jones Indices' (S&P DJI) index calculation and corporate action treatments vary according to the categorization of the indices. At a broad level, indices are defined into two categorizations; Market Capitalization Weighted and Non-Market Capitalization Weighted Indices.

A majority of S&P DJI's equity indices are market capitalization weighted and float-adjusted, where each stock's weight in the index is proportional to its float-adjusted market value. S&P DJI also offers capped versions of a market capitalization weighted index where single index constituents or defined groups of index constituents, such as sector or geographical groups, are confined to a maximum weight.

Non-market capitalization weighted indices include those that are not weighted by float-adjusted market capitalization and generally are not affected by notional market capitalization changes resulting from corporate events. Examples include indices that apply equal weighting, factor weighting such as dividend yield or volatility, strategic tilts, thematic weighting, or other alternative weighting schemes.

S&P DJI offers a variety of indices and index attribute data calculated according to various methodologies which are covered in this document:

- Market Capitalization Indices:
    - Market-capitalization indices – where constituent weights are determined either by total or float-adjusted market capitalization.
    - Capped market-capitalization indices − where single index constituents or defined groups of index constituents, such as sector or geographical groups, are confined to a maximum index weight.
- Non-Market Capitalization Indices:
    - Price weighted indices − where constituent weights are determined solely by the prices of the constituent stocks in the index.
    - Equal weighted indices − where each stock is weighted equally in the index.
- Derived Indices:
    - Total return indices − index level reflect both movements in stock prices and the reinvestment of dividend income.
    - Leveraged and inverse indices − which return positive or negative multiples of their respective underlying indices.
    - Weighted return indices − commonly known as index of indices, where each underlying index is a component with an assigned weight to calculate the overall index of indices level.
    - Indices that operate on an index as a whole rather than on the individual stocks − these include calculations of various total return methodologies and index fundamentals.
    - Dividend Point indices − which track the total dividend payments of index constituents.

- Risk control, decrement, excess return, currency, currency hedged, domestic currency return, special opening quotation, turnover and fundamental data calculations.

The Index Divisor

The purpose of the index divisor is to maintain the continuity of an index level following the implementation of corporate actions, index rebalancing events, or other non-market driven actions.

The simplest capitalization weighted index can be thought of as a portfolio consisting of all available shares of the stocks in the index. While one might track this portfolio's value in dollar terms, it would probably be an unwieldy number – for example, the S&P 500 float-adjusted market value is a figure in the trillions of dollars. Rather than deal with ten or more digits, the figure is scaled to a more easily handled number (e.g., 2000). Dividing the portfolio market value by a factor, usually called the divisor, does the scaling.

An index is not exactly the same as a portfolio. For instance, when a stock is added to or deleted from an index, the index level should not jump up or drop down; while a portfolio's value would usually change as stocks are swapped in and out. To assure that the index's value, or level, does not change when stocks are added or deleted, the divisor is adjusted to offset the change in market value of the index. Thus, the divisor plays a critical role in the index's ability to provide a continuous measure of market valuation when faced with changes to the stocks included in the index. In a similar manner, some corporate actions that cause changes in the market value of the stocks in an index should not be reflected in the index level. Adjustments are made to the divisor to eliminate the impact of these corporate actions on the index value.

Supporting Documents

This methodology is meant to be read in conjunction with supporting documents providing greater detail with respect to the policies, procedures and calculations described herein. References throughout the methodology direct the reader to the relevant supporting document for further information on a specific topic. The list of the main supplemental documents for this methodology and the hyperlinks to those documents is as follows:

Supporting Document	URL
S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology	Equity Indices Policies & Practices
S&P Dow Jones Indices' Float Adjustment Methodology	Float Adjustment Methodology

Capitalization Weighted Indices

Many of S&P DJI's equity indices are capitalization-weighted indices. Sometimes these are called value-weighted, or market cap weighted, instead of capitalization weighted. Examples include the S&P 500, the S&P Global 1200 and the S&P BMI indices.

In the discussion below most of the examples refer to the S&P 500 but apply equally to a long list of S&P DJI's cap-weighted indices.

Definition

The formula to calculate the S&P 500 is:

$$Index\ Level = \frac{\sum_i P_i * Q_i}{Divisor} \quad (1)$$

The numerator on the right hand side is the price of each stock in the index multiplied by the number of shares used in the index calculation. This is summed across all the stocks in the index. The denominator is the divisor. If the sum in the numerator is US$ 20 trillion and the divisor is US$ 10 billion, the index level would be 2000.

This index formula is sometimes called a "base-weighted aggregative" method.[1] The formula is created by a modification of a *LasPeyres* index, which uses base period quantities (share counts) to calculate the price change. A *LasPeyres* index would be:

$$Index = \frac{\sum_i P_{i,1} * Q_{i,o}}{\sum_i P_{i,0} * Q_{i,o}} \quad (2)$$

In the modification to (2), the quantity measure in the numerator, Q_0, is replaced by Q_1, so the numerator becomes a measure of the current market value, and the product in the denominator is replaced by the divisor which both represents the initial market value and sets the base value for the index. The result of these modifications is equation (1) above.

Adjustments to Share Counts

S&P DJI's market cap-weighted indices are float-adjusted – the number of shares outstanding is reduced to exclude closely held shares from the index calculation because such shares are not available to investors.

For more information on shares outstanding, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

S&P DJI's rules for float adjustment are described in more detail in *S&P Dow Jones Indices' Float Adjustment Methodology* or in some of the individual index methodology documents. As discussed there,

[1] This term is used in one of the earlier and more complete descriptions of S&P Dow Jones Indices' index calculations in Alfred Cowles, *Common Stock Indices*, Principia Press for the Cowles Commission of Research in Economics, 1939. The book refers to the "Standard Statistics Company Formula;" S&P was formed by the merger of Standard Statistics Corporation and Poor's Publishing in 1941.

for each stock S&P DJI calculates an Investable Weight Factor (IWF) which is the percentage of total shares outstanding that are included in the index calculation.
When the index is calculated using equation (1), the variable Q_i is replaced by the product of outstanding shares and the IWF:

$$Q_i = IWF_i * Total\ Shares_i \quad (3)$$

At times there are other adjustments made to the share count to reflect foreign ownership restrictions or to adjust the weight of a stock in an index. These are combined into a single multiplier in place of the IWF in equation (3). In combining restrictions, it is important to avoid unwanted double counting. Let FA represent the fraction of shares eliminated due to float adjustment, FR represent the fraction of shares excluded for foreign ownership restrictions and IS represent the fraction of total shares to be excluded based on the combination of FA and FR.

If FA > FR then IS = 1- FA

If FA < FR then IS = 1-FR

and equation (3) can be written as:

$$Q_i = IS_i * Total\ Shares_i$$

Note that any time the share count or the IWF is changed, it will be necessary to adjust the index divisor to keep the level of the index unchanged.

Divisor Adjustments

The key to index maintenance is the adjustment of the divisor. Index maintenance – reflecting changes in shares outstanding, corporate actions, addition or deletion of stocks to the index – should not change the level of the index. If the S&P 500 closes at 2000 and one stock is replaced by another, after the market close, the index should open at 2000 the next morning if all of the opening prices are the same as the previous day's closing prices. This is accomplished with an adjustment to the divisor.

Any change to the stocks in the index that alters the total market value of the index while holding stock prices constant will require a divisor adjustment. This section explains how the divisor adjustment is made given the change in total market value. The next section discusses what index changes and corporate actions lead to changes in total market value and the divisor.

Equation (1) is expanded to show the stock being removed, stock *r*, separately from the stocks that will remain in the index:

$$Index\ Level_{t-1} = \frac{(\sum_i P_i * Q_i) + P_r Q_r}{Divisor_{t-1}} \quad (4)$$

Note that the index level and the divisor are now labeled for the time period *t-1* and, to simplify this example, that we are ignoring any possible IWF and adjustments to share counts. After stock *r* is replaced with stock *s*, the equation will read:

$$Index\ Level_t = \frac{(\sum_i P_i * Q_i) + P_s Q_s}{Divisor_t} \quad (5)$$

In equations (4) and (5) *t-1* is the moment right before company *r* is removed from and *s* is added to the index; *t* is the moment right after the event. By design, $Index\ Level_{t-1}$ is equal to $Index\ Level_t$. Combining (4) and (5) and re-arranging, the adjustment to the Divisor can be determined from the index market value before and after the change:

$$\frac{(\sum_i P_i * Q_i) + P_r Q_r}{Divisor_{t-1}} = Index\ Level = \frac{(\sum_i P_i * Q_i) + P_s Q_s}{Divisor_t}$$

Let the numerator of the left hand fraction be called MV_{t-l}, for the index market value at (*t-1*), and the numerator of the right hand fraction be called MV_t, for the index market value at time *t*. Now, MV_{t-1}, MV_t and $Divisor_{t-1}$ are all known quantities. Given these, it is easy to determine the new divisor that will keep the index level constant when stock *r* is replaced by stock *s*:

$$Divisor_t = (Divisor_{t-1}) * \frac{MV_t}{MV_{t-1}} \quad (6)$$

As discussed below, various index adjustments result in changes to the index market value. When these adjustments occur, the divisor is adjusted as shown in equation (6).

In some implementations, including the computer programs used in S&P DJI's index calculations, the divisor adjustment is calculated in a slightly different, but equivalent, format where the divisor change is calculated by addition rather than multiplication. This alternative format is defined here. Rearranging equation (1) and using the term *MV* (market value) to replace the summation gives:

$$Divisor = \frac{MV}{Index\ Level}$$

When stocks are added to or deleted from an index there is an increase or decrease in the index's market value. This increase or decrease is the market value of the stocks being added less the market value of those stocks deleted; define *CMV* as the Change in Market Value. Recalling that the index level does not change, the new divisor is defined as:

$$Divisor_{New} = \frac{MV + CMV}{Index\ Level}$$

or

$$Divisor_{New} = \frac{MV}{IndexLevel} + \frac{CMV}{IndexLevel}$$

However, the first term on the right hand side is simply the Divisor value before the addition or deletion of the stocks. This yields the following:

$$Divisor_{New} = Divisor_{Old} + \frac{CMV}{IndexLevel} \quad (7)$$

Note that this form is more versatile for computer implementations. With this additive form, the second term (*CMV/Index Level*) can be calculated for each stock or other adjustment independently and then all the adjustments can be combined into one change to the Divisor.

Necessary Divisor Adjustments

Divisor adjustments are made "after the close" meaning that after the close of trading the closing prices are used to calculate the new divisor based on whatever changes are being made. It is, then, possible to provide two complete descriptions of the index – one as it existed at the close of trading and one as it will exist at the next opening of trading. If the same stock prices are used to calculate the index level for these two descriptions, the index levels are the same.

With prices constant, any change that changes the total market value included in the index will require a divisor change. For cataloging changes, it is useful to separate changes caused by the management of the index from those stemming from corporate actions of the constituent companies. Among those changes driven by index management are adding or deleting companies, adjusting share counts and changes to IWFs and other factors affecting share counts.

Index Management Related Changes. When a company is added to or deleted from the index, the net change in the market value of the index is calculated and this is used to calculate the new divisor. The market values of stocks being added or deleted are based on the prices, shares outstanding, IWFs and any other share count adjustments. Specifically, if a company being added has a total market cap of US$ 1 billion, an IWF of 85% and, therefore, a float-adjusted market cap of US$ 850 million, the market value for the added company used is US$ 850 million. The calculations would be based on either equation (6) or equation (7) above.

For most S&P DJI equity indices, IWFs and share counts updates are applied throughout the year based on rules defined in the methodology. Typically, small changes in shares outstanding are reflected in indices once a quarter to avoid excessive changes to an index. The revisions to the divisor resulting from these are calculated and a new divisor is determined. Equation (7) shows how the impact of a series of share count changes can be combined to determine the new divisor.

Corporate Action Related Changes.

For information on the treatment of corporate actions, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document. For more information on the specific treatment within an index family, please refer to that index methodology.

Capped Market Capitalization Indices

Definition

A capped market capitalization weighted index (also referred to as a capped market cap index, capped index or capped weighted index) is one where single index constituents or defined groups of index constituents are confined to a maximum weight and the excess weight is distributed proportionately among the remaining index constituents. As stock prices move the weights will shift and the modified weights will change. Therefore, a capped market cap weighted index must be rebalanced from time to time to re-establish the proper weighting. The methodology for capped indices follows an identical approach to market cap weighted indices except that the indices apply an additional weight factor, or "AWF", to adjust the float-adjusted market capitalization to a value such that the index weight constraints are satisfied. For capped indices, no AWF change is made due to corporate actions between rebalancings except for daily capped indices where the corporate action may trigger a capping. Therefore, the weights of stocks in the index as well as the index divisor will change due to notional market capitalization changes resulting from corporate events.

The overall approach to calculate capped market cap weighted indices is the same as in the pure market-cap weighted indices; however, the constituents' market values are re-defined to be values that will meet the particular capping rules of the index in question.

$$Index\ Level = \frac{Index\ Market\ Value}{Divisor} \quad (1)$$

and

$$IndexMarketValue = \sum_i P_i * Shares_i * IWFi * FxRatei$$

To calculate a capped market cap index, the market capitalization for each stock used in the calculation of the index is redefined so that each index constituent has the appropriate weight in the index at each rebalancing date.

In addition to being the product of the stock price, the stock's shares outstanding, and the stock's float factor (IWF), as written above – and the exchange rate when applicable – a new adjustment factor is also introduced in the market capitalization calculation to establish the appropriate weighting.

$$Adjusted Stock\ Market\ Value_i = P_i * Shares_i * IWF_i * FxRate_i * AWF_i$$

where AWF_i is the adjustment factor of stock *i* assigned at each index rebalancing date, *t,* which adjusts the market capitalization for all index constituents to achieve the user-defined weight, while maintaining the total market value of the overall index.

The *AWF* for each index constituent, *i*, on rebalancing date, *t*, is calculated by:

$$AWF_{i,t} = \frac{CW_{i,t}}{W_{i,t}}$$

where $W_{i,t}$ is the uncapped weight of stock *i* on rebalancing date *t* based on the float-adjusted market capitalization of all index constituents; and $CW_{i,t}$ is the capped weight of stock *i* on rebalancing date *t* as determined by the capping rule of the index in question and the process for determining capped weights as described in Different Capping Methods below.

The index divisor is defined based on the index level and market value from equation (1). The index level is not altered by index rebalancings. However, since prices and outstanding shares will have changed since the last rebalancing, the divisor will change at the rebalancing.

So:

$$(Divisor)_{\text{after rebalancing}} = \frac{(\text{Index Market Value})_{\text{after rebalancing}}}{(\text{Index Value})_{\text{before rebalancing}}}$$

where:

$$\text{Index Market Value} = \sum_i P_i * Shares_i * IWF_i * FxRate_i * AWF_i$$

Corporate Actions and Index Adjustments

All corporate actions for capped indices affect the index in the same manner as in market capitalization weighted indices.

For more information on the treatment of corporate actions, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document.

Different Capping Methods

Capped indices arise due to the need for benchmarks which facilitate diversification rules. Capping may apply to single stock concentration limits or concentration limits on a defined group of stocks. At times, companies may also be represented in an index by multiple share class lines. In these instances, maximum weight capping will be based on company float-adjusted market capitalization, with the weight of multiple class companies allocated proportionally to each share class line based on its float-adjusted market capitalization as of the rebalancing reference date. Some common, but not an exhaustive list of, examples of the standard S&P DJI methodologies for determining the weights of capped indices using the most popular capping methods are described below.

Single Company Capping. In a single company capping methodology, no company in an index is allowed to breach a certain pre-determined weight as of each rebalancing period. The procedure for assigning capped weights to each company at each rebalancing is as follows:

1. With data reflected on the rebalancing reference date, each company is weighted by float-adjusted market capitalization.
2. If any company has a weight greater than X% (where X% is the maximum weight allowed in the index), that company has its weight capped at X%.
3. All excess weight is proportionally redistributed to all uncapped companies within the index.
4. After this redistribution, if the weight of any other company(s) then breaches X%, the process is repeated iteratively until no companies breach the X% weight cap.

Single Company and Concentration Limit Capping. In a single company and concentration limit capping methodology, no company in an index is allowed to breach a certain pre-determined weight and all companies with a weight greater than a certain amount are not allowed, as a group, to exceed a pre-determined total weight. One example of this is 4.5%/22.5%/45% capping (B/A/C in the following example). No single company is allowed to exceed 22.5% of the index and all companies with a weight greater than 4.5% of the index cannot exceed, as a group, 45% of the index.

Method 1:

The procedure for assigning capped weights to each company at each rebalancing is as follows:

1. With data reflected on the rebalancing reference date, each company is weighted by float-adjusted market capitalization.
2. If any company has a weight greater than A% (where A% is the maximum weight allowed in the index), that company has its weight capped at A%.
3. All excess weight is proportionally redistributed to all uncapped companies within the index.
4. After this redistribution, if the weight of any other company(s) then breaches A%, the process is repeated iteratively until no companies breach the A% weight cap.
5. The sum of the companies with weight greater than B% cannot exceed C% of the total weight.
6. If the rule in step 5 is breached, all the companies are ranked in descending order of their weights and the company with the lowest weight that causes the C% limit to be breached is identified. The weight of this company is, then, reduced either until the rule in step 5 is satisfied or it reaches B%.
7. This excess weight is proportionally redistributed to all companies with weights below B%. Any stock that receives weight cannot breach the B% cap. This process is repeated iteratively until step 5 is satisfied or until all stocks are greater than or equal to B%.
8. If the rule in step 5 is still breached and all stocks are greater than or equal to B%, the company with the lowest weight that causes the C% limit to be breached is identified. The weight of this company is, then, reduced either until the rule in step 5 is satisfied or it reaches B%.
9. This excess weight is proportionally redistributed to all companies with weights greater than B%. Any stock that receives weight cannot breach the A% stock cap. This process is repeated iteratively until step 5 is satisfied.

For indices that use capping rules across more than one attribute, S&P DJI will utilize an optimization program to satisfy the capping rules. The stated objective for the optimization will be to minimize the difference between the pre-capped weights of the stocks in the index and the final capped weights. This is done by using an optimization procedure that chooses final weights in such a way to minimize the sum of the squared difference of capped weight and uncapped weight, divided by uncapped weight for each stock.

Method 2:

A second method of single company and concentration limit capping utilized by S&P DJI for assigning capped weights to each company at each rebalancing is as follows:

1. With data reflected on the rebalancing reference date, each company is weighted by float-adjusted market capitalization.
2. If either of the defined single-company or concentration-index-weight limits is breached, the float-adjusted market capitalization of all components is raised to a power such as the following:

   $$Index\ Market\ Cap_t = W_t^{1-0.01n}$$

   where:

   W_t = Float-adjusted market capitalization of component *t*.

   n = Number of capping iterations.
3. This process is repeated iteratively until the first iteration where the capping constraints are satisfied.

Non-Market Capitalization Weighted Indices

Definition

A non-market capitalization weighted index (also referred to as a non-market cap or modified market cap index) is one where index constituents have a user-defined weight in the index. Between index rebalancings, most corporate actions generally have no effect on index weights, as they are fixed through the processes defined below. As stock prices move, the weights will shift, and the modified weights will change. Therefore, a non-market cap weighted index must be rebalanced from time to time to re-establish the proper weighting.

The overall approach to calculate non-market cap weighted indices is the same as in the cap-weighted indices; however, the constituents' market values are set to a value to achieve a specific weight at each rebalancing that is divergent from a purely free-float-adjusted market capitalization weighting. Recall two basic formulae:

$$Index\ Level = \frac{Index\ Market\ Value}{Divisor} \tag{1}$$

and

$$IndexMarketValue = \sum_i P_i * Shares_i * IWFi * FxRatei$$

To calculate a non-market cap weighted index, the market capitalization for each stock used in the calculation of the index is redefined so that each index constituent has the appropriate user-defined weight in the index at each rebalancing date.

In addition to being the product of the stock price, the stock's shares outstanding, and the stock's float factor (IWF), as written above – and the exchange rate when applicable – a new adjustment factor is also introduced in the market capitalization calculation to establish the appropriate weighting.

$$AdjustedStock\ Market\ Value_i = P_i * Shares_i * IWF_i * FxRate_i * AWF_i$$

where AWF_i is the adjustment factor of stock *i* assigned at each index rebalancing date, *t,* which adjusts the market capitalization for all index constituents to achieve the user-defined weight, while maintaining the total market value of the overall index.

The *AWF* for each index constituent, *i*, on rebalancing date, *t*, is calculated by:

$$AWF_{i,t} = \frac{Z}{FloatAdjustedMarketValue_{i,t}} * W_{i,t} \tag{2}$$

where *Z* is an index specific constant set for the purpose of deriving the *AWF* and, therefore, each stock's share count used in the index calculation (often referred to as modified index shares). $W_{i,t}$ is the user-defined weight of stock *i* on rebalancing date *t*.

The index divisor is defined based on the index level and market value from equation (1). The index level is not altered by index rebalancings. However, since prices and outstanding shares will have changed since the last rebalancing, the divisor will change at the rebalancing.

So:

$$(Divisor)_{\text{after rebalancing}} = \frac{(\text{Index Market Value})_{\text{after rebalancing}}}{(\text{Index Value})_{\text{before rebalancing}}}$$

where:

$$\text{Index Market Value} = \sum_i P_i * Shares_i * IWF_i * FxRate_i * AWF_i$$

Corporate Actions and Index Adjustments

For information on the treatment of corporate actions, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document. For more information on the specific treatment within an index family, please refer to that index methodology.

Price Weighted Indices

Definition

In a price weighted index, such as the Dow Jones Industrial Average, constituent weights are determined solely by the prices of the constituent stocks. Shares outstanding are set to a uniform number throughout the index. Indices using this methodology will adjust the index divisor for any price impacting corporate action on one of its member stocks; this includes price adjustments, special dividends, stock splits and rights offerings. The index divisor will also adjust in the event of an addition to or deletion from the index.

All other index calculation details follow the standard divisor-based calculation methodology detailed in the previous *Capitalization Weighted Indices* section.

For information on the treatment of corporate actions, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Equal Weighted Indices

Definition

An equal weighted index is one where every stock, or company, has the same weight in the index, and a portfolio that tracks the index will invest an equal dollar amount in each applicable instrument. As stock prices move, the weights will shift, and exact equality will be lost. Therefore, an equal weighted index must be rebalanced from time to time to re-establish the proper weighting.[2]

The overall approach to calculate equal weighted indices is the same as in the cap-weighted indices; however, the constituents' market values are re-defined to be values that will achieve equal weighting at each rebalancing. Recall two basic formulae:

$$Index\ Level = \frac{Index\ Market\ Value}{Divisor} \tag{1}$$

and

$$IndexMarketValue = \sum_i P_i * Shares_i * IWFi * FxRatei$$

To calculate an equal weighted index, the market capitalization for each stock used in the calculation of the index is redefined so that each index constituent has an equal weight in the index at each rebalancing date. In addition to being the product of the stock price, the stock's shares outstanding, and the stock's float factor (IWF), as written above – and the exchange rate when applicable – a new adjustment factor is also introduced in the market capitalization calculation to establish equal weighting.

$$AdjustedStockMarketValuei = P_i * Shares_i * IWFi * FxRatei * AWFi \tag{2}$$

where AWF_i (Additional Weight Factor) is the adjustment factor of stock *i* assigned at each index rebalancing date, *t,* which makes all index constituents modified market capitalization equal (and, therefore, equal weight), while maintaining the total market value of the overall index. The *AWF* for each index constituent, *i*, at rebalancing date, *t*, is calculated by:

$$AWF_{i,t} = \frac{Z}{N * FloatAdjustedMarketValue_{i,t}} \tag{3}$$

where *N* is the number of stocks in the index and *Z* is an index specific constant set for the purpose of deriving the *AWF* and, therefore, each stock's share count used in the index calculation (often referred to as modified index shares).

The index divisor is defined based on the index level and market value from equation (1). The index level is not altered by index rebalancings. However, since prices and outstanding shares will have changed since the last rebalancing, the divisor will change at the rebalancing.

[2] In contrast, a cap-weighted index requires no rebalancing as long as there aren't any changes to share counts, IWFs, returns of capital, or stocks added or deleted.

So:

$$(Divisor)_{\text{after rebalancing}} = \frac{(\text{Index Market Value})_{\text{after rebalancing}}}{(\text{Index Value})_{\text{before rebalancing}}}$$

where:

$$\text{Index Market Value} = \sum_i P_i * Shares_i * IWF_i * FxRate_i * AWF_i$$

Modified Equal Weighted Indices

There are some equal weighted indices that place further restrictions on stocks included in the index. An example restriction might be a cap on the weight allocated to one sector or a cap on the weight of a single country or region in the index. The rules could also stipulate a maximum weight for a stock if the index applies additional liquidity factors (e.g., basket liquidity) when determining the index weights. In any of these situations, if a cap is applied to satisfy the restrictions, the excess weight leftover by the cap would be distributed equally amongst the uncapped companies.

Corporate Actions and Index Adjustments

For more information on the treatment of corporate actions, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices document. For more information on the specific treatment within an index family, please refer to that index methodology.

Multi-Day Rebalancing

A multi-day rebalancing allows indices to transition from the current index constituent weights to a set of target weights over a pre-determined number of days. The weight increments/decrements from day to day within the rebalancing period (i.e., smoothed weights) will be equal in size unless the exchange for a security is closed while it is still an index business day. Day 1 of the rebalancing period will be the standard effective rebalancing date as stated in the index methodology.

The formula to calculate the **smoothed weight** for each stock is:

$$smoothed\ weight_{t,i} = \left(\frac{\left(target\ weight_{r,i} - reference\ weight_{r,i}\right)}{rebalancing\ length} \times number\ rebalancing\ day_t\right) + reference\ weight_{r,i}$$

where:

smoothed weight$_{t,i}$ = The weight for stock *i* on day *t.*

target weight$_{i,r}$ = The weight of stock *i* that corresponds to the weighting determined by rebalancing *r*. If stock *i* is dropping out of the index due to the selection criteria during rebalancing *r* then *target weight*$_{i,r}$ is 0.

reference weight$_{i,r}$ = The weight for stock *i* for the reference date for rebalancing *r*. If stock *i* is not part of the composition of the index on the reference date, then *reference weight*$_{i,r}$ is 0.

rebalancing length = The number of days in a multi-day rebalancing. This number is variable, and is defined by the index methodology.

number rebalancing day$_t$ = The number of rebalancing days on day *t* from 1 to *rebalancing length.*

After the set of smoothed weights for each stock on each rebalancing date is calculated, index shares are set for each stock by utilizing a standard AWF calculation that accounts for forward looking corporate actions throughout the rebalancing period:

$$AWF_{i,t} = \frac{\left(smoothed\ weight_{t,i} * z\ factor\right)}{\left(stock\ price_{r,i} * fx\ rate_{r,i} * shares\ outstanding_{t,i} * IWF_{r,i} * Price\ Adjustment\ Factor\right)}$$

The $Price\ Adjustment\ Factor_{t,i}$ will account for any corporate actions for $stock_i$ between the reference date and the rebalance date in question. For example, if there is a 2 for 1 stock split on rebalance day 3 of a 5-day rebalancing period, the AWF calculated for the stock on the reference date will use an adjustment factor of .5. The AWF calculated for days 1 and 2 of the rebalance will use an adjustment factor of 1.

Day to day calculation of multi-day rebalancings will be conducted using the standard calculation methodology for weighted indices.

Index shares and AWFs will remain static at their originally announced values throughout the pro-forma period unless there are corporate actions announced after the pro-forma date and effective prior to the end of the rebalancing period.

Exchange Holidays

Except for the first and penultimate days of the rebalancing period, exchange holidays occurring during the rebalancing period that do NOT result in an index closure will adjust the individual smoothed weights

of each individual security on holiday. Stocks on holiday on day *t* will have their smoothed weight frozen on day *t*+1. On the first day, stocks will always carry the first smoothed weight of the rebalancing period. If there is a holiday on the penultimate day of the rebalancing, impacted stocks will smooth to their target weight a day early and carry that weight over to the final day unless they are being removed from the index. In the case of a stock removal with an exchange holiday on the penultimate day of the rebalancing period, the stock weight will be smoothed over the remaining trading days. Similarly, if there are multiple exchange holidays towards the close of the rebalancing period, the smoothing period will be further condensed to the remaining trading days within the rebalancing period. If an exchange holiday is announced after the reference date or there is an unexpected exchange closure, the glide path will be re-established for the remaining days according to examples 2 and 3 below.

Please see the examples below. All weights in the example are as of the open on the effective date.

Example 1:

Index Weight on Reference Date = 1.2%; Target weight = 1.7%; No. of Rebalancing Days = 5; Weight Delta = 0.5%; Daily Increment = 0.1%; **Day 2** is an exchange holiday.

1. Day 1 weight = 1.2%+0.1%*1 = 1.3%
2. Day 2 weight = 1.2%+0.1%*2 = 1.4%
3. Day 3 weight = Day 2 weight
4. Day 4 weight = 1.2%+0.1%*4 = 1.6%
5. Day 5 weight = 1.2%+0.1%*5 = 1.7%

Example 2:

Index Weight on Reference Date = 1.2%; Target weight = 1.7%; No. of Rebalance Days = 5; Weight Delta = 0.5%; Daily Increment = 0.1%; **Day 4** is an exchange holiday.

1. Day 1 weight = 1.2%+0.1%*1 = 1.3%
2. Day 2 weight = 1.2%+0.1%*2 = 1.4%
3. Day 3 weight = 1.2%+0.1%*3 = 1.5%
4. Day 4 weight = 1.2%+0.1%*5 = 1.7%
5. Day 5 weight = Day 4 weight

Example 3:

Index Weight on Reference Date = 1.2%; Target weight = 0.0% (stock removal); No. of Rebalance Days = 5; Weight Delta = -1.2%; Daily Increment = -0.3%; **Day 4** is an exchange holiday.

1. Day 1 weight = 1.2%-0.3%*1 = 0.9%
2. Day 2 weight = 1.2%-0.3%*2 = 0.6%
3. Day 3 weight = 1.2%-0.3%*3 = 0.3%
4. Day 4 weight = 1.2%-0.3%*4 = 0.0% = Removed from index
5. Day 5 weight = Removed from index

Freeze Date

A multi-day rebalancing process may be put on hold on any given day by utilizing a ***Freeze Date***. On a freeze date, the target weights for a given day in the rebalancing period are carried over from the previous day. If a freeze date occurs, the rebalancing period is extended by the total number of freeze

dates during the rebalancing period. A freeze date will not increase the *rebalance length*, it will only move the rebalancing end date.

Multi-day rebalancing capabilities are compatible with standard weighted and equal weighted methodologies.

Total Return Calculations

The preceding discussions were related to price indices where changes in the index level reflect changes in stock prices. In a total return index changes in the index level reflect both movements in stock prices and the reinvestment of dividend income. A total return index represents the total return earned in a portfolio that tracks the underlying price index and reinvests dividend income in the overall index, not in the specific stock paying the dividend.

The total return construction differs from the price index and builds the index from the price index and daily total dividend returns. The first step is to calculate the total dividend paid on a given day and convert this figure into points of the price index:

$$TotalDailyDividend = \sum_{i} Dividend_i * Shares_i \quad (1)$$

Where *Dividend* is the dividend per share paid for stock *i* and *Shares* are the index specific shares. This is done for each trading day. $Dividend_i$ is generally zero except when it goes ex-dividend for a dividend payment.[3] Stocks may commonly issue dividends on a monthly, quarterly, semi-annual, or annual basis. Some stocks do not pay a dividend and *Dividend* is always zero. *TotalDailyDividend* is measured in dollars. This is converted to index points by dividing by the divisor for the underlying price index:

$$IndexDividend = \frac{TotalDailyDividend}{Divisor} \quad (2)$$

The next step is to apply the usual definition of a total return from a financial instrument to the price index. Equation (1) gives the definition, and equation (2) applies it to the index:

$$TotalReturn = (\frac{P_t + D_t}{P_{t-1}}) - 1$$

and

$$DTR_t = (\frac{IndexLevel_t + IndexDividend_t}{IndexLevel_{t-1}} - 1)$$

where the *TotalReturn* and the daily total return for the index (*DTR*) is stated as a decimal. The *DTR* is used to update the total return index from one day to the next:

$$Total\ Return\ Index_t = (Total\ Return\ Index_{t-1}) * (1 + DTR_t)$$

The Index Value for the Total Return Index can also be calculated as follows:

$Total\ Return\ Index_t = (Total\ Return\ Index_{t-1}) * (Price\ Return\ Index_t + Index\ Dividend) / Price\ Return\ Index_{t-1}$

[3] $Dividend_i$ can be negative if a dividend correction is applied to a particular stock. In such cases, a total return can have a value lower than the price return. For more information on dividend corrections please refer to *S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology*.

Net Total Return Calculations

To account for tax withheld from dividends, a net total return calculation is used. The calculation is identical to the calculations detailed in the previous Total Return section, except each dividend is adjusted to account for the tax taken out of the payment.

Inserting the withholding rate into the calculation at the first step is all that needs to be done − the calculation can follow identically from that point forward:

$$TotalDailyDividend = \sum_{i} Dividend_i * Shares_i * (1 - WithholdingRate_i)$$

The tax rates used for S&P DJI's global indices are from the perspective of a Luxembourg investor. However, in domestic index families, tax rates from the perspective of a domestic investor will be applied.

For more information on the Withholding Rates used for Net Total Return Calculations, please refer to the Withholding Tax Rates by Markets document, available at www.spglobal.com/spdji.

Post Ex-Dividend Adjustment: Total and Net Total Return Calculation

When S&P DJI recognizes a regular dividend different than the final dividend amount confirmed by the company, or for specific markets where companies do not typically confirm cash dividend amounts prior to the ex-dates, S&P DJI may recognize a post ex-date dividend adjustment.

First, an estimated dividend is reinvested into the index on the dividend's Ex-Date, following the process defined in the *Total and Net Total Return Calculation* section, where is the dividend is converted to index dividend points by dividing by the divisor for the underlying price index.

Second, a Post-Ex Dividend Adjustment is applied, determined by S&P DJI calculating the difference between the dividend amount recognized on the original ex-date and the actual dividend amount announced by the company. Once determined, the adjustment amount is applied, in dividend points, to all relevant indices using the following formula:

$$\textit{Index Dividend Point Adjustment} = (D_{dt} * S_{at}) / \textit{Divisor}_{\textit{Ex-Date}}$$

where:

D_{dt} = the difference between the original and actual dividend amounts. Foreign exchange conversion, if applicable, is based on the exchange rate on the ex-date, calculated as:

$$\textit{Correction Amount} * \textit{FX}_{\textit{on the Reference Ex-Date}}$$

where:

Correction Amount[4] = the dividend amounts relative to all the data as of the original dividend ex-date

S_{at} = Index shares on the Reference Ex-Date

The adjustment is added to the calculation of the Total Return and Net Total Return indices on the dividend's effective date. If there are multiple dividend payments with an ex-date of the current day and/or multiple dividend adjustments, separate index dividend points are calculated for each dividend payment and aggregated on Index Dividend as follows:

$$\textit{TotalDailyDividend} = \sum \textit{IndexDividendPointAdjustment} + \textit{IndexDividend } t$$

For currency indices, the Index Dividend point adjustment calculated for the headline index is converted to the corresponding currency in the index calculation, using the foreign exchange rate on the effective date.

[4] For the Index Dividend Point Adjustment, D_{dt} must be as indicated in the Index Corporate Events – .SDE file for the Index, where the *Reference Date* column shows the date of the original dividend ex-date.

Franking Credit Adjusted Total Return Indices

Additional total return indices are available for a number of S&P/ASX Indices that adjust for the tax effect of franking credits attached to cash dividends. The indices utilize tax rates relevant to two segments of investors: one version incorporates a 0% tax rate relevant for tax-exempt investors and a second version uses a 15% tax rate relevant for superannuation funds. The franking credits attached to both regular and special cash dividends are included in the respective calculations.

To calculate the gross dividend points reinvested in the Franking Credit Adjusted Total Return Indices:

*Grossed-up Dividend = [As Reported Dividend * (1 – % Franked) + (As Reported Dividend * % Franked / (1 – Company Tax Rate))]*

The Net Tax Effect of the franking credit is then calculated based on the investor tax rate (i.e. 0% for tax-exempt investors and 15% for superannuation funds).

*Net Tax Effect = [Grossed-up Dividend * (1 – Investor Tax Rate)] – As Reported Dividend*

The Net Tax Effect of each dividend is then multiplied by the index shares of that company to calculate the gross dividend market capitalization.

*Gross Dividend Market Cap = Net Tax Effect * Index Shares*

*Tax – Exempt = [(Grossed-Up Dividend - Dividend Amount) * Index Shares $_t$]*

*Superannuation = [(Grossed-Up Dividend Superannuation - Dividend Amount) * Index Shares $_t$]*

Grossed-Up Dividend and *Gross Dividend Market Cap* must be calculated for all dividend payments effective on date *T*.

These are then summed for all dividends going ex on that date and converted to dividend points by dividing by the index divisor.

The only difference between *Tax Exempt* and *Superannuation* is the incorporation of tax rates relevant for superannuation funds (currently 15%), hence only the steps detailed above differ in each Index Calculation. Once the *Gross Dividend Market Cap* is calculated, the following steps are exactly the same for both *Tax-Exempt* and *Superannuation* versions.

Gross Dividend Points = Sum of Gross Dividend Market Caps / Underlying Index Close Divisor

Gross Dividend Points calculate daily, to account for the impact of dividends issued by constituents with an ex-date of date *T*.

Franking Credit Adjusted Annual Total Return Indices. This index series accrues a pool of gross dividend points on a daily basis and reinvests them across the index annually after the end of the financial year. Reinvestment occurs at market close on the first trading day after June 30th. The gross dividend points are derived by taking the value of the gross dividend market capitalization (less the as reported dividend market capitalization) and dividing it by the index divisor effective on the ex-date of the respective dividend.

Annual Total Return Index Level is calculated as follows:

1. FCA Index Dividend:

On the first trading day after June 30th =

$$(Accrued\ Gross\ Dividend_{t-1} + Underlying\ Index\ Dividend_t)$$

The Accrued Gross Dividend comes from the S&P Franking Credit Adjusted Annual Total Return Index on day *T-1*, for the corresponding version, either Tax-Exempt or Superannuation.[5]

On any other trading day = *Underlying Index Dividend* $_t$

2. FCA Annual Total Return Index $_t$ =

$$\frac{\left(FCA\ Annual\ Total\ Return\ Index_{t-1} * (Underlying\ Index\ _t + FCA\ Index\ Dividend_t)\right)}{Underlying\ Index_{t-1}}$$

The annual series accrues a pool of gross dividend points (adjusted for the net tax effect of franking credits) on a daily basis, but only reinvests the gross dividend points annually, after the end of the financial year.

Therefore, provided it is not the first trading day after June 30th, the Index Dividend for the Franking Credit Adjusted Daily Total Return Indices is the same as the Index Dividend of the Underlying Index.

Franking Credit Adjusted Daily Total Return Indices. Rather than allowing a separate accrual of gross dividend points, this index series reinvests the gross dividend amount across the index at the close of the ex-date on a daily basis.

Daily Total Return Index Level is calculated as follows:

1. FCA Daily Total Return Index t =

$$\frac{\left(FCA\ Daily\ Total\ Return\ Index_{t-1} * (Underlying\ Index_t + Underlying\ Index\ Dividend_t + Grossed\ Dividend\ Points_t)\right)}{Underlying\ Index_{t-1}}$$

The net tax effect of franking credits compounds daily over the entire calendar year, therefore, the Index Dividends for the Franking Credit Adjusted Daily Total Return Indices differ from the Index Dividends of the Underlying Index on a daily basis.

[5] The accrued value of gross dividend points is provided on the corresponding Franking Index Levels File.

Currency and Currency Hedged Indices

A currency-hedged index is designed to represent returns for those global index investment strategies that involve hedging currency risk, but not the underlying constituent risk.[6]

Investors employing a currency-hedged strategy seek to eliminate the risk of currency fluctuations and are willing to sacrifice potential currency gains. By selling foreign exchange forward contracts, global investors are able to lock in current exchange forward rates and manage their currency risk. Profits (losses) from the forward contracts are offset by losses (profits) in the value of the currency, thereby negating exposure to the currency.

Return Definitions

S&P DJI's standard currency hedged indices are calculated by hedging beginning-of-period balances using rolling one-month forward contracts. The amount hedged is adjusted on a monthly basis.

Returns are defined as follows:

$$\textit{Currency Return} = \left(\textit{End Spot Rate} \Big/ \textit{Beginning Spot Rate}\right) - 1$$

$$\textit{Unhedged Return} = (1 + \textit{Local Total Return}) * (1 + \textit{Currency Return}) - 1$$

$$\textit{Currency Return on Unhedged Local Total Return} = (\textit{Currency Return}) * (1 + \textit{Local Total Return})$$

$$\textit{Forward Return} = \left(\textit{Beginning one - month Forward Rate} \Big/ \textit{Beginning Spot Rate}\right) - 1$$

$$\textit{Hedge Return} = \textit{HedgeRatio} * (\textit{Forward Return} - \textit{Currency Return})$$

Hedged Index Return = Local Total Return + Currency Return on Unhedged Local Total Return + Hedge Return

*Hedged Index Level = Beginning Hedged Index Level * (1 + Hedged Index Return)*

To facilitate index replication, S&P DJI determines the amount of foreign exchange forward contracts sold using an index rebalance reference date.[7] On the index reference date, which occurs one business day prior to the last business day of prior month, the rebalance forward amounts and currency weights are determined. As a result of the forward amounts and currency weights determination occurring one business day prior to the month end rebalance, an adjustment factor is utilized in the calculation of the hedge return to account for the performance of the S&P Dow Jones Indices Currency-Hedged Index on the last business day of the month. Please refer to the index computation section for further details.

[6] By currency risk, we simply mean the risk attributable to the security trading in a currency different from the investor's home currency. This definition does not incorporate risks that exchange rate changes can have on an underlying security's price performance.

[7] Prior to March 1, 2015 S&P Dow Jones Indices' Currency-Hedged Indices utilized the month-end for both index reference and index rebalance date.

For the standard single-currency monthly currency hedged indices that are on holiday on the last business day of the month, this holiday treatment is functionally equivalent to months when the last day of the month falls on a weekend.

If the hedging currency market is on holiday on the last business day of the month and the S&P DJI Underlying Index is not, as long as the spot rate in foreign currency per local currency (Sm) and one month forward spread used to calculate the forward rate (1MF) are not on holiday, the currency and currency hedged indices will calculate with no changes to the relevant dates used for Currency Hedged Calculation.

Currency weights are established based on the composition of the underlying index as of the reference date. Any changes to the currency weights due to composition changes are not reflected until the calculation of currency weights on the next reference date. If Reference Date is a holiday, the calculation uses *T-1* values for both underlying index levels and the Spot and One Month Forward Rates.

S&P DJI also offers daily currency hedged indices for clients who require benchmarks with more frequent currency hedging. The daily currency hedged indices differ from the standard currency hedged indices by adjusting the amount of the forward contracts that mature at the end of month, on a daily basis, according to the performance of the underlying index. This further reduces the currency risk from under-hedging or over-hedging resulting from index movement between two monthly rolling periods.

Details of the formulae used in computing S&P DJI's currency-hedged indices are below.

The Hedge Ratio

The hedge ratio is simply the proportion of the portfolio's currency exposure that is hedged.

- **Standard Currency-Hedged Index.** In a standard currency-hedged index, we simply wish to eliminate the currency risk of the portfolio. Therefore, the hedge ratio used is 100%.
- **No Hedging.** An investor who expects upside potential for the local currency of the index portfolio versus the home currency, or does not wish to eliminate the currency risk of the portfolio, will use an unhedged index. In this case, the hedge ratio is 0, and the index simply becomes the standard index calculated in the investor's home currency. Such indices are available in major currencies as standard indices for many of S&P Dow Jones Indices' indices.

  In contrast to a 100% currency-hedged standard index, which seeks to eliminate currency risk and has passive equity exposure, over- or under-hedged portfolios seek to take active currency risks to varying degrees based on the portfolio manager's view of future currency movements.
- **Over Hedging.** An investor who expects significant upside potential for the home currency versus the local currency of the index portfolio might choose to double the currency exposure. In this case, the hedge ratio will be 200%.
- **Under Hedging.** An investor who expects some upside potential for the local currency of the index portfolio versus the home currency, but wishes to eliminate some of the currency risk, might choose to have half the currency exposure hedged using a 50% hedge ratio.

S&P Dow Jones Indices calculates indices with hedge ratios different from 100% as custom indices.

Calculating a Currency-Hedged Index

Using the returns definitions on prior pages, the Hedged Index Return can be expressed as:

$$\textit{Hedged Index Return} = \textit{Local Total Return} + \textit{Currency Return}*(1 + \textit{Local Total Return}) + \textit{Hedge Return}$$

Rearranging yields:

*Hedged Index Return = (1 + Local Return) * (1 + Currency Return) -1 + Hedge Return*

Again, using the returns definitions on prior pages with a hedge ratio of 1 (100%), the expression yields:

Hedged Index Return = Unhedged Index Return + Hedge Return

Hedged Index Return = Unhedged Index Return + Forward Return - Currency Return

This equation is more intuitive since when you do a 100% currency hedge of a portfolio, the investor sacrifices the gains (or losses) on currency in return for gains (or losses) in a forward contract.

From the equation above, we can see that the volatility of the hedged index is a function of the volatility of the unhedged index return, the forward return, and the currency return, and their pair-wise correlations. These variables will determine whether the hedged index return series' volatility is greater than, equal to, or less than the volatility of the unhedged index return series.

Currency Hedging Outcomes

The results of a currency-hedged index strategy versus that of an unhedged strategy vary depending upon the movement of the exchange rate between the local currency and home currency of the investor.

S&P Dow Jones Indices' standard currency hedging process involves eliminating currency exposure using a hedge ratio of 1 (100%).

1. The currency-hedged index does not necessarily give a return exactly equal to the return of the index available to local market investor. This is because there are two additional returns − currency return on the local total return and hedge return. These two variables usually add to a non-zero value because the monthly rolling of forward contracts does not result in a perfect hedge. Further, the local total return between two readjustment periods remains unhedged. However, hedging does ensure that these two returns remain fairly close.
2. The results of a currency-hedged index strategy versus that of an unhedged strategy varies depending upon the movement of the exchange rate between the local currency and home currency of the investor. For example, a depreciating euro in 1999 resulted in an unhedged S&P 500 return of 40.0% for European investors, while those European investors who hedged their U.S. dollar exposure experienced a return of 17.3%. Conversely, in 2003 an appreciating euro in 2003 resulted in an unhedged S&P 500 return of 5.1% for European investors, while those European investors who hedged their U.S. dollar exposure experienced a return of 27.3%.

Index Computation

Monthly Return Series (For Monthly Currency Hedged Indices)

m = The month in the calculation, represented as 0, 1, 2, etc.

m-1 = The last business day of the prior month.

mr-1 = Reference Date. S&P DJI's standard index reference date for hedged indices is one business day prior to the last business day of the prior month.

d = Day *d* for month *m*.

D = The number of days in month *m*, counted as calendar days to the last business day.

SPI_EH_d = The S&P DJI Currency-Hedged Index level on day *t*, where *t* can be defined as *d*, *m-1*, or *mr-1*.

SPI_MAF = Monthly Index Adjustment Factor to account for the performance of the S&P Dow Jones Indices Currency-Hedged Index between the index reference and month end rebalance dates. It is calculated as the ratio of the S&P Dow Jones Indices Currency-Hedged Index level on the reference date and the S&P Dow Jones Indices Currency-Hedged Index level at the end of the month.

$$SPI\_MAF = \left(\frac{SPI\_EH_{mr-1}}{SPI\_EH_{m-1}} \right)$$

SPI_EM_d = The S&P Dow Jones Indices Index level, in foreign currency, on day *t*, where *t* can be defined as *d* or *m-1*.

HR_d = The hedge return (%) over month *m.*

S_d = The spot rate in foreign currency per local currency (*FC/LC*), on day *t,* where *t* can be defined as *d* or *mr-1*.

$1MF_d$ = The one-month forward spread used to calculate the forward rate, at day *t* of month *d*.

F_d = The first front-month forward rate in foreign currency per local currency (*FC/LC*), on day *t*, where *t* can be defined as *d* or *m-1*; calculated as $S_d + 1MF_d$.

Monthly Hedged Calculation for day *t* of month *m*:

1. HR_d = The hedge return (%) over month m for Monthly Currency Indices

USD to Currency (FX):

$$HR_d = \left(\frac{S_{mr-1}}{F_{m-1}} - \frac{S_{mr-1}}{S_d + \left(\frac{D-d}{D}\right) * (F_d - S_d)} \right) * (SPI\_MAF)$$

Currency to USD (FX):

$$HR_d = \left(\frac{F_{m-1}}{S_{mr-1}} - \frac{S_d + \left(\frac{D-d}{D}\right) * (F_d - S_d)}{S_{mr-1}} \right) * (SPI\_MAF)$$

2. SPI_EH_d = S&P Dow Jones Indices Currency-Hedged Index level

$$SPI\_EH_d = SPI\_EH_{m-1} * \left(\frac{SPI\_EM_d}{SPI\_EM_{m-1}} + HR_d \right)$$

Monthly Return Series (For Monthly Multi - Currency Hedged Indices)

S&P DJI indices can be composed of securities listed on multiple exchanges using multiple foreign exchange rates for daily index calculation.

Monthly Multi - Currency Hedged Indices follow a standard Monthly Hedged Calculation, following the main differences listed below:

- The spot rate (S_d) used for the currency return and the first front-month forward rate (F_d) used to hedge the currency position need to be converted from each of the currencies included in the underlying index to the hedging currency, i.e., EUR.

The Hedged Return (HR_d) is calculated following the same procedure detailed above, but the hedged return is weighted based on the Adjusted Currency Weights of the underlying index as of the Reference Date.

1. HR_d = The hedge return (%) over month *m* for Monthly Currency Indices, for each of the currencies on underlying Index.

USD to Currency (FX):

$$HR_d = \left(\frac{S_{mr-1}}{F_{m-1}} - \frac{S_{mr-1}}{S_d + \left(\frac{D-d}{D}\right) * (F_d - S_d)} \right)$$

Currency to USD (FX):

$$HR_{d,Currency} = \left(\frac{F_{m-1}}{S_{mr-1}} - \frac{S_d + \left(\frac{D-d}{D}\right) * (F_d - S_d)}{S_{mr-1}} \right)$$

2. Weighted Hedged Return for Monthly Multi - Currency Indices:

$$WHR_m = \sum \left(W_{mr-1,Currency} \ * \ HR_{d,Currency} \right) \ * SPI\_MAF$$

where:

$W_{mr-1,Currency}$ = Weight for each of the currencies of the underlying S&P DJI Index as of the Reference Date. S&P DJI's standard index reference date for hedged indices is one business day prior to the last business day of the prior month.

$HR_{d,Currency}$ = The hedge return (%) over month *m* for Monthly Currency, for each of the currencies on the underlying S&P Dow Jones Index.

WHR_m = Weighted Hedged Return for Monthly Multi Currency Indices.

3. SPI_EHd = S&P DJI Currency-Hedged Index level for Multi - Currency Indices:

$$SPI\_EH_d = SPI\_EH_{m-1} * \left(\frac{SPI\_EM_d}{SPI\_EM_{m-1}} + WHR_m \right)$$

For Monthly Multi-Currency Hedged Indices, on any day that is both an underlying index holiday and an index calculation day, the closing price of the constituents on the holiday day is used for index calculation. In this case, there is no change to the last business day of the prior month nor the prior month index reference date.

Daily Return Series (For Monthly Currency Hedged Indices and Daily Currency Hedged Indices)

The daily return series are computed by interpolating between the spot price and the forward price.

For each month *m*, there are *d* = 1, 2, 3…*D* calendar days.

m = The month in the calculation, represented as 0, 1, 2, etc.

m-1 = The last business day of the prior month.

d = Day *d* for month *m*.

d-1 = Previous day for month *m*.

D = The number of days in month *m*, counted as calendar days to the last business day.

SPI_EH_d = The S&P Dow Jones Indices Currency-Hedged Index level on day *t*, where *t* can be defined as *d* or *m-1*.

SPI_EM_d = The S&P DJI Index level, in foreign currency, on day *t*, where t can be defined as *d* or m-1.

SPI_EL_d = The S&P Dow Jones Indices Index level, in local currency, on day *t*, where *t* can be defined as *d-1* or *m-1*.

HR_d = The hedge return (%) from end of month to *day d.*

S_d = The spot rate in foreign currency per local currency (*FC/LC*), on day t, where t can be defined as *d* or *m-1*.

$1MF_d$ = The one month forward spread used to calculate the forward rate, at day *d* of month *m*.

F_d = The first front-month forward rate in foreign currency per local currency (*FC/LC*), on day *t*, where *t* can be defined as *d* or *d-1*, calculated as $S_d + 1MF_d$.

F_I_{md} = The interpolated forward rate on day *t*, where *t* can be defined as *d* or *d-1*.

AF_d = The adjustment factor for daily hedged indices as of day *d* of month *m*

Daily Hedged Calculation for day *T* of month m =

1. The interpolated forward rate as of day d of month m (F_I md)

   When day d is the last business day of month m =

   $$F\_I_{md} = FM_d = (S_d + 1MF_d)$$

2. When day d is other than the last business day of month m =

   $$F\_I_{md} = S_d + \left(\frac{D-d}{D}\right) * (F_d - S_d)$$

3. The adjustment factor for daily hedged indices as of day d of month m (AFmd)

   $$AF_{md} = \frac{SPI\_EL_{d-1}}{SPI\_EL_{m-1}}$$

When day *d* is the first business day of month *m*, *AFmd* = 1

The hedge return for daily currency hedged indices is calculated as follows:

When day *d* is any other day than the first business day of month *m*:

$$HR_d = AF_{md} * \left(\frac{F_{I_{md-1}}}{S_{m-1}} - \frac{F_{I_{md}}}{S_{m-1}}\right) + HR_{d-1}$$

When day *d* the first business day of month *m*:

$$HR_d = AF_{md} * \left(\frac{F_{d-1}}{S_{m-1}} - \frac{F\_I_{md}}{S_{m-1}}\right)$$

S&P DJI Daily Currency Hedged Index Level at day d:

$$SPI\_EH_d = SPI\_EH_{m-1} * \left(\frac{SPI\_EM_d}{SPI\_EM_{m-1}} + HR_d\right)$$

Dynamic Hedged Return Indices

Dynamic hedged return indices are rebalanced at a minimum on a monthly basis as per the monthly series described above, but include a mechanism to ensure that the index does not become over-hedged or under-hedged beyond a certain percentage threshold. This is measured by taking the percent change of the current value of the hedged index versus the value of the hedged index on the previous reference date. If that percentage threshold is crossed during the month an intra-month adjustment is triggered. If triggered, the hedge is reset to the value of the hedged index on the day the threshold is breached, effective after the close on the following business day, using the current interpolated value of the forward expiring at the end of the month. Thus, the formulas for dynamic hedged indices become:

$SPI\_EH_{\boldsymbol{d}}$ = The S&P Dow Jones Indices Currency-Hedged Index level as of day d

SPI_EH_{rb} = The S&P Dow Jones Indices Currency-Hedged Index level at the prior rebalancing date

SPI_EH_{rf} = The S&P Dow Jones Indices Currency-Hedged Index level on the prior reference day. S&P Dow Jones Indices' standard index reference date for hedged indices is one day prior to the rebalancing date.

SPI_AF = Index Adjustment Factor to account for the performance of the S&P Dow Jones Indices Currency-Hedged Index between the index reference date and rebalance date. It is calculated as the ratio of the S&P Dow Jones Indices Currency-Hedged Index level on the reference date and the S&P Dow Jones Indices Currency-Hedged Index level at the rebalancing date.

$SPI\_E_{\boldsymbol{d}}$ = The S&P Dow Jones Indices Index level, in foreign currency, as of date d

$SPI\_E_{\boldsymbol{rb}}$ = The S&P Dow Jones Indices Index level, in foreign currency, at the prior rebalancing date

HR_d = The hedge return (%) as of day d since the prior rebalancing date

S_d = The spot rate in foreign currency per local currency (FC/LC) as of date d

S_{rf} = The spot rate in foreign currency per local currency (FC/LC) as of the prior index reference date

F_d = The forward rate in foreign currency per local currency (FC/LC), as of day d

F_I_d = The interpolated forward rate as of day d

F_I_{rb} = The interpolated forward rate as of the prior rebalancing date

The formula for determining if an intra-month rebalancing is triggered is:

$$If\ (abs((SPI\_EH_{\boldsymbol{d}}\ /SPI\_EH_{rf}\ ) - 1)) > TH$$

where:

TH = Percentage threshold for the index

Then a rebalancing is triggered.[8]

For the purposes of the Dynamic Rebalancing and determining the hedge absolute deviation from notional, when day *d* is a rebalancing date, the hedged index on reference updates on rebalance date *d*.[9]

The interpolated forward rate as of day d is calculated as:

$$F\_I_d = S_d + (F_d - S_d) * \left(\frac{Days(d,nrb)}{Days(d,exp)}\right)$$

where,

$Days(d,nrb)$ = Days between date d and next scheduled rebalancing date

$Days(d,exp)$ = Days between date d and expiry date of the forward rate used

Whenever applicable standard FX market settlement conventions are applied to both the Spot Rate and Forward Rate to determine the exact settlement dates to be used in the interpolation.

[8] Prior to November 30, 2021, a Dynamic Rebalancing cannot be triggered on two consecutive days. If the prior day signaled a dynamic rebalancing, a current day dynamic rebalancing signal was ignored.

[9] Prior to November 30, 2021, for the purposes of the Dynamic Rebalancing and determining the hedge absolute deviation from notional, when day *d* is a rebalancing date the hedged index on reference updates on rebalancing date *d* + 1.

The hedge return for dynamic currency hedged indices is:

$$HR_d = \left(\frac{F\_I_{rb}}{S_{rf}} - \frac{F\_I_d}{S_{rf}}\right) * SPI\_AF$$

For index value on day d is:

$$SPI\_EH_{\boldsymbol{d}} = SPI\_EH_{rb} * \left(\frac{SPI\_E_{\boldsymbol{d}}}{SPI\_E_{\boldsymbol{rb}}} + \boldsymbol{HR_d}\right)$$

Currency Hedged Excess Return Indices

Since an excess return index calculates the return on an investment in an index where the investment was made through the use of borrowed funds, currency risk can be hedged by borrowing funds in the currency of the investment. In this scenario the initial value of the index at each hedge period will not be affected by currency returns, but the amount gained or lost during the period will be affected by returns in the currency.

When the gain and loss at each hedge period is not hedged, returns are defined as follows:

$$Hedged\ Excess\ Return = Local\ Excess\ Return\ + Currency\ Return\ on\ Unhedged\ Local\ Excess\ Return$$

When the gain and loss at each hedge period is hedged, returns are defined as follows:

$$Hedged\ Excess\ Return = Local\ Excess\ Return\ + Currency\ Return\ on\ Unhedged\ Local\ Excess\ Return + Hedge\ Return$$

For non-convertible currencies, currency return on unhedged local excess return is calculated using the current forward rate based on first front-week forward contract rather than a spot rate for some cases. In this case, the returns of daily currency hedged excess return indices are calculated as follows (note that currency rates are quoted in local currency per foreign currency in the case of non-convertible currencies):

$$Hedged\ Excess\ Return = Local\ Excess\ Return\ + \left(Local\ Excess\ Return * \frac{F\_week_{m0}^{NC}}{F\_week_{md}^{NC}}\right) + Hedge\ Return$$

The hedged return for daily currency hedged excess return indices is calculated as follows:

When day *d* is the first business day of month *m*,

$$HR_{md} = 0$$

When day *d* is not the first business day of month *m*,

$$HR_{md} = AF\_ER_{md} * \left(\frac{F\_week_{m0}^{NC}}{F\_I_{md-1}^{NC}} - \frac{F\_week_{m0}^{NC}}{F\_I_{md}^{NC}}\right) + HR_{md-1}$$

where

$F\_week_{md}^{NC}$ = The first front-week forward rate in local currency per foreign currency (*LC/FC*) as of day *d* of month *m*

$F\_week_{m0}^{NC}$ = The first front-week forward rate in local currency per foreign currency (*LC/FC*), at the end of prior month, *m-1*

$F\_I_{md}^{NC}$ = The interpolated forward rate in local currency per foreign currency (*LC/FC*), as of day d of month *m*

$$F\_I_{md}^{NC} = S_{md}^{NC} + \left(\frac{D-d}{D}\right) * (F_{md}^{NC} - S_{md}^{NC})$$

S_{md}^{NC} = The spot rate in local currency per foreign currency (*LC/FC*), as of day *d* of month *m*

F_{md}^{NC} = The first front-month forward rate in local currency per foreign currency (*LC/FC*), as of day *d* of month *m*

D = number of business days in month *m*

AF_ER_{md} = The adjustment factor for daily currency hedged excess return indices as of day *d* of month *m*

$$AF\_ER_{md} = {SPERI\_EL_{md-1}}/{SPERI\_EL_{m0}} - 1$$

where:

$SPERI\_EL_{md}$ = The S&P Dow Jones Excess Return Index level, in local currency, as of day d of month m

$SPERI\_EL_{m0}$ = The S&P Dow Jones Excess Return Index level, in local currency, at the end of the prior month, *m-1*

Quanto Currency Adjusted Index

A quanto currency adjusted index represents the return of an underlying index from the perspective of a foreign party, and incorporates the respective currency pair return with the underlying index return. It differs from simply expressing an index in foreign currency because it represents borrowing in the index currency to fund an investment in assets represented by the index.

For example, suppose a U.S. investor does the following on a daily basis:

1. Borrow 100 GBP in London, secured by the equivalent amount of USD in a U.S. bank
2. Invest 100 GBP in U.K. index stocks in proportion to their index weights

The investor would generate profit or loss equal to the U.K. index return. They would also earn the combined index return and the currency pair return on the profit/loss. The combined index/currency return would not be earned on their principal because the U.K. assets can be sold to satisfy the U.K. loan and close the position.

Arithmetically, a quanto currency adjusted index can be represented as follows:

$$\text{SPI\_QA}(\text{t}+1) = \text{SPI\_QA}(\text{t}) \times \left(\frac{\text{SPI\_E}(\text{t}+1)}{\text{SPI\_E}(\text{t})} + \left(\frac{\text{SPI\_E}(\text{t}+1)}{\text{SPI\_E}(\text{t}-\text{n})} - 1\right) \times \left(\frac{\text{S}(\text{t}+1)}{\text{S}(\text{t})} - 1\right)\right)$$

where:

$SPI\_QA(t+1)$ = Quanto Currency-Adjusted Index level, as of day (t+1)

$SPI\_QA(t)$ = Quanto Currency-Adjusted Index level, as of day (t)

$SPI\_E(t+1)$ = Underlying Index level, as of day (t+1)

$SPI\_E(t)$ = Underlying Index level, as of day (t)

$SPI\_E(t-n)$ = Underlying Index level, as of day (t-n), where n = (0 or 1), corresponding to the difference in trading days between the foreign party and the underlying index[10]

$S(t+1)$ = Spot rate for the currency pair as of date (t+1)

$S(t)$ = Spot rate for the currency pair as of date (t)

[10] For example, for foreign parties in an APAC time zone employing such a strategy to acquire U.S. assets, n=1 to account for the trading day difference between the party and the index.

The index returns can also be expressed as:

$$\text{Quanto Currency Adjusted Index Returns} = \text{Index Returns} + \left(\text{Index Returns}^{'}\right) \times (Currenct\ Returns)$$

Negative/Zero Index Levels. For more information regarding the possibility of negative or zero index levels, refer to the *Negative/Zero Index Levels* section.

Domestic Currency Return Index Calculation

Background

Domestic Currency Return (DCR) calculations are used to calculate the return of an index without taking any exchange rate movements into account. This may be done as a way to perform an attribution on an index containing constituents which do not all trade in the same currency. By comparing the performance of the float-adjusted market capitalization weighted index against the performance of the same index calculated using DCR one can derive the performance due to the exchange rate movements.

In DCR one calculates the period-to-period percentage change of the index from the weighted percentage change of each security's local price and then constructs the index levels from the percentage changes. This is in contrast to a divisor-based index where the process is reversed: the index level is calculated as total market value divided by the divisor and the period-to-period percentage change is calculated from the index levels. Both approaches require an initial base period or divisor value for normalization. For an index where all of the constituents trade in the same currency both approaches give the same results.

In the DCR calculation, we calculate the percentage change in each security price, weight the percentage changes by the security's weight in the index at the start of the period, and then combine the weighted price changes to calculate the index price change for the time period. The change in the index is, then, applied to the index level in the previous period to determine the current period index level.

Equivalence of DCR and Divisor Calculations

The equivalence of the two approaches – DCR and divisor based – can be understood in two ways. First, except for the initial base value of an index, it can be defined by either the index levels or the percentage change from one period to the next. If we defined an index by a time series of index levels (100, 101.2, 103, 105…) we can derive the period to period changes (1.2%, 1.78%, 1.94%...). Given these changes and assuming the index base is a value of 100 allows us to calculate the index levels. Except for the base, the two series are equivalent. DCR calculates the changes; the divisor approach calculates the levels.

This can be shown mathematically:

The divisor calculation approach defines an index as:

$$\frac{\sum_i price_{i,t} * share_i}{divisor}$$

Since the initial divisor is defined by the base value and date of the index, we can replace it with the value of the index market cap at time *t=0*:

$$\frac{\sum_i price_{i,t} * share_i}{\sum_i price_{i,0} * share_i}$$

Now we can multiply and divide the term in the summation in the numerator by the price at time *t=0* without changing its value.

$$\frac{\sum_i \frac{price_t}{price_0} * price_0 * shares_i}{\sum price_{i,o} * shares_i}$$

If we look at the term in the numerator for a single stock in the index (i.e., no summation, as there is only one stock) and rearrange we get:

$$\left(\frac{price_{i,t}}{price_{i,0}}\right) * \frac{price_{i,0} * shares_i}{\sum price_{i,0} * share_i} \quad (1)$$

which is equivalent to the relative price performance for each stock multiplied by its weight in the index. When this is combined across all constituent stocks, the result is the price performance for the index.

The DCR approach uses the summation of equation (1) across all the stocks in the index to calculate the daily price performance of the index. Once the daily index performance is calculated, the index level can be updated from the previous day's index level.

DCR Calculation

$$Index_t = (Index_{t-1}) * \sum_i \frac{P_{i,t}}{P_{i,t-1}} * weight_{i,t-1}$$

where:

$Index_t$ = Index level at date t

P_t = Security price at the close of date t

$weight_t$ = Security weight in the index at close of date t

and

$$weight_{i,t-1} = \frac{P_{i,t-1} * S_{i,t-1} * FX_{i,t-1}}{\sum_i P_{i,t-1} * S_{i,t-1} * FX_{i,t-1}}$$

where:

$S_{i,t-1}$ = Shares of stock i

$FX_{i,t-1}$ = Exchange rate of stock i for currency conversion

Essential Adjustments

The share count ($S_{i,t-1}$) includes the adjustment for float by multiplying by the investable weight factor (*IWF*) and for index weight by multiplying by the additional weight factor (*AWF*) where necessary. Further, when an adjustment to shares is made due to a secondary offering, share buyback or any other corporate action, this adjustment must be included in $S_{i,t-1}$ if the adjusted share count takes effect on date t. A price adjustment due to a corporate action which takes effect on date t should be reflected in $P_{i,t-1}$.

Risk Control Indices

S&P Dow Jones Indices' Risk Control Indices are designed to track the return of a strategy that applies dynamic exposure to an underlying index in an attempt to control the level of volatility.

The index includes a leverage factor that changes based on realized historical volatility. If realized volatility exceeds the target level of volatility, the leverage factor will be less than one; if realized volatility is lower than the target level, the leverage factor may be greater than one, assuming the index allows for a leverage factor of greater than one. A given Risk Control Index may have a maximum leverage factor that cannot be exceeded. There are no guarantees that the index shall achieve its stated targets.

The return of the index consists of two components: (1) the return on the position in the underlying index and (2) the interest cost or gain, depending upon whether the position is leveraged or deleveraged.

A leverage factor greater than one represents a leveraged position, a leverage factor equal to one represents an unleveraged position, and a leverage factor less than one represents a deleveraged position. The leverage factor may change periodically, on a set schedule, or may change when volatility exceeds or falls below predetermined volatility thresholds.

For equity indices, the leverage factor will not change at the close of any index calculation day in which stocks representing 15% or more of the total weight of the underlying index are not trading due to an exchange holiday. At each underlying index's rebalancing, and using each stock's weight at that time, a forward looking calendar of such dates is determined and posted on S&P Dow Jones Indices' Web site at www.spglobal.com/spdji.

For digital asset indices, while digital asset markets trade seven days a week (Monday-Sunday), the underlying index and risk control versions calculate following the standard five business days per week schedule week (Monday-Friday).

The formula for calculating the Risk Control Index is as follows:

$$\textit{Risk Control Index Return}_t = \tag{1}$$

$$K_{rb} * \left(\frac{\textit{Underlying Index}_t}{\textit{Underlying Index}_{rb}} - 1 \right) + (1 - K_{rb}) * \left[\prod_{i=rb+1}^{t} (1 + \textit{InterestRate}_{i-1} * D_{i-1,i} / 360) - 1 \right]$$

The Risk Control Index Value at time *t* can, then, be calculated as:

$$\textit{RiskControlIndexValue}_t = \tag{2}$$

$$(\textit{RiskControlIndex Value}_{rb}) * (1 + \textit{RiskControlIndex Return}_t)$$

Substituting equation (1) into (2) and expanding yields:

$$\textit{Risk Control Index Value}_t =$$

$$\textit{Risk Control Index Value}_{rb} * \left[1+\left[K_{rb} * \left(\frac{\textit{Underlying Index}_{t}}{\textit{Underlying Index}_{rb}}-1\right)+(1-K_{rb}) * \left[\prod_{i=rb+1}^{t}(1+\textit{InterestRate}_{i-1} * D_{i-1,i}/360)-1\right]\right]\right] \quad (3)$$

Excess Return versions of Risk Control Indices are calculated as follow:

Risk Control ER Index Value$_t$ =

$$RiskControl\ ER\ Index\ Value_{rb} * \left[1 + \left[K_{rb} * \left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{t-1}} - 1\right) - K_{rb} * \left[\prod_{i=rb+1}^{t}\left(1 + InterestRate_{t-1} * \frac{D_{i-1,i}}{360}\right) - 1\right]\right]\right]$$

where:

UnderlyingIndex$_t$ = The level of the underlying index on day *t*

UnderlyingIndex$_{rb}$ = The level of the underlying index as of the previous rebalancing date

rb = The last index rebalancing date[11]

K_{rb} = The leverage factor set at the last rebalancing date, calculated as:

Min(Max K, Target Volatility/Realized Volatility$_{rb\text{-}d}$*)*

Max K = The maximum leverage factor allowed in the index

d = The number of days between when volatility is observed and the rebalancing date (e.g., if *d* = 2, the historical volatility of the underlying index as of the close two days prior to the rebalancing date will be used to calculate the leverage factor K_{rb})

Target Volatility = The target level of volatility set for the index

Realized Volatility$_{rb\text{-}d}$ = The historical realized volatility of the underlying index as of the close of *d* trading days prior to the previous rebalancing date, *rb,* where a trading day is defined as a day on which the underlying index is calculated

Interest Rate$_{i\text{-}1}$ = The interest rate set for the index[12]

For indices that replicate a rolling investment in a three-month interest rate the above formula is altered to:

$$\textit{Risk Control Index Value}_t = \textit{Risk Control Index Value}_{rb} * \left[1 + \left[K_{rb} * \left(\frac{\textit{Underlying Index}_t}{\textit{Underlying Index}_{rb}} - 1\right) + (1 - K_{rb}) * \left[\prod_{i=rb+1}^{t}(1 + InterestRate_{i-1}) - 1\right]\right]\right]$$

where:

$$InterestRate_{i-1} = (D_{i-1,t} * IR3M_{i-1} - \left(IR3M_{i-1} - IR3M_{i-2} - D_{i-1,t} * (IR3M_{i-1} - IR2M_{i-1}) * \left(\frac{1}{30}\right)\right) * 90)/360$$

where:

$D_{i\text{-}1,\ t}$ = The number of calendar days between day *i-1* and day *t*

$IR3M_{i\text{-}1}$ = Three-month interest rate on day *i-1*

$IR2M_{i\text{-}1}$ = Two-month interest rate on day *i-1*[13]

For indices that are rebalanced daily, the leverage factor is not recalculated at the close of any index calculation day when stocks representing 15% or more of the total weight of the underlying index are not trading due to an exchange holiday. If *rb* is a holiday, then K_{rb} is calculated as follows:

[11] The inception date of each risk control index is considered the first rebalancing date of that index.

[12] The interest rate may be an overnight rate, such as SOFR or ESTR, or a daily valuation of a rolling investment in a three-month interest rate, or zero. A 360-day year is assumed for the interest calculations in accordance with U.S. banking practices.

[13] Effective 12/03/2018, the interest rate for EUR-based Risk Control indices is a one-month rate instead of a two-month rate. Therefore, those indices' interest rate is depicted as: $IR2M_{i\text{-}1}$ = One-month interest rate on day *i-1*.

$$K_{rb} = K_{rb-1} * \left(\frac{Underlying\ Index_{rb}}{Underlying\ Index_{rb-1}} \right) / \left(\frac{RiskContorlIndexValue_{rb}}{RiskcontrolIndexValue_{rb-1}} \right)$$

This shows what the effect will be on *rb*, given that no adjustment of positions is allowed to occur on such days. The leverage factor will adjust solely to account for market movements on that day.

For periodically rebalanced risk control indices, K_{rb} is calculated at each rebalancing and held constant until the next rebalancing.

For large position moves, some investors like to rebalance risk control indices intra-period, when the periodicity is longer than daily. This feature is incorporated in the risk-control framework by introducing a barrier, K_b, on the leverage factor. Intra-period rebalancing is allowed only if the absolute change of the equity leverage factor K_t, at time *t*, is larger than the barrier K_b from the value at the last rebalancing date.

The equity leverage factor K_t is calculated as:

K_t = *Min(Max K, Target Volatility/Realized Volatility*$_{t-d}$*)*

If no barrier is provided for the index, then intra-period rebalancing is not allowed.

Dynamic Rebalancing Risk Control Index

The index calculates the theoretical leverage factor on daily basis. If the difference between the theoretical leverage factor and the leverage factor on the last rebalancing date is less than the Minimum Daily Allocation Change, the index will not rebalance.

The theoretical leverage factor is determined as:

thK_t = the theoretical leverage factor on day *t*, calculated daily as:

$$thK_t = Min(Max\ K, \frac{Target\ Volaility}{Realized\ Volatility_{t-d}})$$

where:

d = Lag to Rebalancing Date, defined as the number of days between when volatility is observed and the date which the theoretical leverage factor is calculated for (e.g., if *d* = 2, the historical volatility of the underlying index as of the close two days prior to the date which the theoretical leverage factor is calculated for will be used to calculate the leverage factor thK_t)

The trade decision is based on the difference between the theoretical leverage factor and the leverage factor on the last rebalancing date:

If $|thK_t - K_{t-1}| > \theta$,

Then

t is a rebalancing day, and

$K_t = thK_t$

Else

t is not a rebalancing day

$K_t = K_{t-1}$

where:

θ = Minimum Daily Allocation Change

K_t = the actual leverage factor on day *t*

Dynamic rebalancing can be combined with monthly rebalancing. In this case, besides intra-monthly rebalancing triggered by breach of Minimum Daily Allocation Change, the risk control index rebalances after the close of the last business day of the month.

Capped Equity Weight Change

For daily rebalanced or dynamic rebalanced risk control indices, some investors like to control for excessive position change. This feature is incorporated in the risk-control framework by introducing a Maximum Daily Allocation Change , $\bar{\theta}$.

The theoretical leverage factor is determined in the same way as in a Dynamic Rebalanced Risk Control Index. The trade decision is based on the difference between the theoretical leverage factor and the leverage factor on the last rebalancing date:

If $|thK_t - K_{t-1}| > \theta$,

Then:

t is a rebalancing day, and

$$K_t = \begin{cases} Min(K_{t-1} + \bar{\theta}, thK_t), \ if \ thK_t - K_{t-1} > 0 \\ Max(K_{t-1} - \bar{\theta}, thK_t), \ if \ thK_t - K_{t-1} \leq 0 \end{cases}$$

Else

t is not a rebalancing day

$K_t = K_{t-1}$

where:

θ = Minimum Daily Allocation Change (θ >0 for dynamic rebalanced risk control indices, and $\theta = 0$ for daily rebalanced risk control indices).

$\bar{\theta}$ = Maximum Daily Allocation Change

K_t = the actual leverage factor on day t

Dynamic rebalancing can be combined with monthly rebalancing. In this case, besides intra-monthly rebalancing triggered by breach of Minimum Daily Allocation Change, the risk control index rebalances after the close of the last business day of the month.

Excess Return Indices

S&P Dow Jones Indices' Excess Return Indices are designed to track an unfunded investment in an underlying index. In other words, an excess return index calculates the return on an investment in an index where the investment was made through the use of borrowed funds. Thus, the return of an excess return index will be equal to that of the underlying index less the associated borrowing costs. Most S&P Dow Jones Indices calculate an excess return index level to mirror an unfunded position.

The formula for calculating the Excess Return Index is as follows:

$$ExcessReturn = \left(\frac{Underlying\ Index_t}{Underlying\ Index_{t-1}} - 1 \right) - \left(\frac{Borrowing\ Rate}{360} \right) * D_{t,t-1} \quad (4)$$

The Excess Return Index Value at time *t* can be calculated as:

$$ExcessReturn\ IndexValue_t = (ExcessReturn\ Index\ Value_{t-1}) * (1 + Excess\ Return) \quad (5)$$

Substituting (4) into (5) and expanding the right hand side of (5) yields:

$$ExcessReturn\,IndexValue_t =$$

$$ExcessReturn\,IndexValue_{t-1} * \left[1 + \left[\left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{t-1}} - 1\right) - \left[\frac{Borrowing\ Rate}{360}\right] * D_{t,t-1}\right]\right]$$

where:

Borrowing Rate = The investment funds borrowing rates, which will differ for each excess return index[14]

$D_{t,\,t-1}$ = The number of calendar days between date *t* and *t-1*

Exponentially-Weighted Volatility

The realized volatility is calculated as the maximum of two exponentially weighted moving averages, one measuring short-term and one measuring long-term volatility.

$$RealizedVolatility_t = Max\left(RealizedVolatility_{S,t}, RealizedVolatility_{L,t}\right)$$

where:

S,t = The short-term volatility measure at time *t*, calculated as:

(6)

$$RealizedVolatility_{S,t} = \sqrt{\frac{252}{n} * Variance_{S,t}}$$

$$for\ \ t > T_0$$

$$Variance_{S,t} = \lambda_S * Variance_{S,t-1} + (1-\lambda_S) * \left[\ln\left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{t-n}}\right)\right]^2$$

$$for\ \ t = T_0$$

$$Variance_{S,T_0} = \sum_{i=m+1}^{T_0} \frac{\alpha_{S,i,m}}{WeightingFactor_S} * \left[\ln\left(\frac{UnderlyingIndex_i}{UnderlyingIndex_{i-n}}\right)\right]^2$$

L,t = The long-term volatility measure at time *t*, calculated as:

(7)

$$RealizedVolatility_{L,t} = \sqrt{\frac{252}{n} * Variance_{L,t}}$$

$$for\ \ t > T_0$$

$$Variance_{L,t} = \lambda_L * Variance_{L,t-1} + (1-\lambda_L) * \left[\ln\left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{t-n}}\right)\right]^2$$

$$for\ \ t = T_0$$

$$Variance_{L,T_0} = \sum_{i=m+1}^{T_0} \frac{\alpha_{L,i,m}}{WeightingFactor_L} * \left[\ln\left(\frac{UnderlyingIndex_i}{UnderlyingIndex_{i-n}}\right)\right]^2$$

[14] Generally, an overnight rate, such as SOFR overnight in the U.S. or ESTR in Europe, will be used. However, in some cases other interest rates may be used. A 360-day year is assumed for the interest calculations in accordance with U.S. banking practices.

where:

T_0 = The start date for a given risk control index

n = the number of days inherent in the return calculation used for determining volatility[15]

m = the N^{th} trading date prior to T_0

N = the number of trading days observed for calculating the initial variance as of the start date of the index

λ_S = The short-term decay factor used for exponential weighting[16]

λ_L = The long-term decay factor used for exponential weighting[10]

$\alpha_{S,m,i}$ = Weight of date t in the short-term volatility calculation, as calculated based on the following formula:

$$\alpha_{S,t} = (1-\lambda_S) * \lambda_S^{N+m-i}$$

$$WeightingFactor_S = \sum_{i=m+1}^{T_0} \alpha_{S,i,m}$$

$\alpha_{L,m,i}$ = Weight of date t in the long-term volatility calculation, as calculated based on the following formula:

$$\alpha_{L,t} = (1-\lambda_L) * \lambda_L^{N+m-i}$$

$$WeightingFactor_L = \sum_{i=m+1}^{T_0} \alpha_{L,i,m}$$

The interest rate, maximum leverage, target volatility and the lambda decay factors are defined in relation to each index and are generally held constant throughout the life of the index. The leverage position changes at each rebalancing based on changes in realized volatility. There is a two-day lag between the calculation of the leverage factor, based on the ratio of target volatility to realized volatility, and the implementation of that leverage factor in the index.

The above formulae can be used for simpler models by the appropriate choice of parameters. For example, if the short-term and long-term decay factors, λ_S and λ_L are set to the same value (e.g., 5%) than there are no separate considerations for short-term and long-term volatility.

Exponentially-Weighted Volatility Based on Current Allocations

The index calculations are the same as described in the Exponentially Weighted Volatility section above, except that realized volatility is calculated using the returns derived from the levels of hypothetical underlying index based on the current allocations within the underlying index and historical returns of those constituents, rather than the historical levels of the underlying index.

Underlying Index$_t$ = Hypothetical underlying index level on day t, calculated as

$$Underlying\ Index_t = Underlying\ Index_{t-1} * \left(1 + \sum_{i=i}^{K} w_i * r_{i,t}\right)$$

[15] If n = 1 daily returns are used, while if n = 2 two day returns are used, and so forth.

[16] The decay factor is a number greater than zero and less than one that determines the weight of each daily return in the calculation of historical variance.

where:

K = number of constituents in current underlying index as of day t

$r_{i,t}$ = return of the i-th constituent in the underlying index on day t

w_i = weight of the i-th constituent in current underlying index

Simple-Weighted Volatility

The realized volatility is calculated as the maximum of two simple-weighted moving averages, one measuring short-term volatility and one measuring long-term volatility.

$$RealizedVolatility_t = Max\left(RealizedVolatility_{S,t}, RealizedVolatility_{L,t}\right)$$

where:

S,t = The short-term volatility measure at time t, calculated as:

$$RealizedVolatility_{S,t} = \sqrt{\frac{252}{n} * Variance_{S,t}}$$

$$Variance_{S,t} = 1/N_S * \sum_{i=t-Ns+1}^{t} \ln\left(\frac{UnderlyingIndex_i}{UnderlyingIndex_{i-n}}\right)^2$$

L,t = The long-term volatility measure at time t, calculated as:

$$RealizedVolatility_{L,t} = \sqrt{\frac{252}{n} * Variance_{L,t}}$$

$$Variance_{L,t} = 1/N_L * \sum_{i=t-Nl+1}^{t} \ln\left(\frac{UnderlyingIndex_i}{UnderlyingIndex_{i-n}}\right)^2$$

where:

n = The number of days inherent in the return calculation used for determining volatility[17]

N_S = The number of trading days observed for calculating variance for the short-term volatility measure

N_L = The number of trading days observed for calculating variance for the long-term volatility measure

Underlying Index$_t$ is defined as in the "Exponentially-Weighted Average Volatility" section.

[17] If n = 1 daily returns are used, while if n = 2 two day returns are used, and so forth.

Futures-Based Risk Control Indices

When the underlying index is based on futures contracts, most of the Risk Control methodology follows the details on the prior six pages. However, there are some differences as detailed below, particularly as it relates to the cash component of the index.

For such an index, it includes a leverage factor that changes based on realized historical volatility. If realized volatility exceeds the target level of volatility, the leverage factor will be less than one; if realized volatility is lower than the target level, the leverage factor may be greater than one. A given risk control index may have a maximum leverage factor that cannot be exceeded.

For equity risk control indices, the return consists of two components: (1) the return on the position in the underlying S&P Dow Jones Indices index and (2) the interest cost or gain, depending upon whether the position is leveraged or deleveraged. For futures-based risk control indices, there is no borrowing or lending to achieve investment objectives in the underlying index. Therefore, the cash component of the Index does not exist.

Again, a leverage factor greater than one represents a leveraged position, a leverage factor equal to one represents an unleveraged position, and a leverage factor less than one represents a deleveraged position. The leverage factor may change at regular intervals, in response to changes in realized historical volatility, or when the expected volatility exceeds or falls below predetermined volatility thresholds, if such thresholds were in place.

The formula for calculating the Risk Control Excess Return Index largely follows that detailed beginning with equation (1). However, since there is no funding for such indices (as opposed to the case with equity excess return indices, where the initial investment is presumedly borrowed, and excess cash is, likewise, assumed to be invested), the interest rate used in the calculation is eliminated:

$$Risk\ Control\ Excess\ Return\ Index\ Return_t = K_{rb} * \left(\frac{Underlying\ Index_t}{Underlying\ Index_{rb}} - 1 \right) \quad (8)$$

The Risk Control Excess Return Index Value at time *t* can, then, be calculated as:

$$RiskControlExcessReturnIndexValue_t = (RiskControlExcessReturnIndex\ Value_{rb}) * (1 + RiskControlExcessReturnIndex\ Return_t)$$

The formula for calculating the Risk Control Total Return Index, which includes interest earned on Treasury Bills, is as follows:

$$Risk\ Control\ Total\ Return\ Index\ Return_t = K_{rb} * \left(\frac{Underlying\ Index_t}{Underlying\ Index_{rb}} - 1 \right) + \left[\prod_{i=rb+1}^{t} (1 + InterestRate_{i-1} * D_{i-1,i} / 360) - 1 \right] \quad (9)$$

The Risk Control Total Return Index Value at time *t* can, then, be calculated as:

$$RiskControlTotalReturnIndexValue_t = (RiskControlTotalReturnIndex\ Value_{rb}) * (1 + RiskControlTotalReturnIndex\ Return_t) \quad (10)$$

Substituting equation (9) into (10) and expanding yields:

$$Risk\ Control\ Total\ Return\ Index\ Value_t =$$

$$Risk\ Control\ Index\ Value_{rb} * \left[1+\left[K_{rb} * \left(\frac{Underlying\ Index_t}{Underlying\ Index_{rb}}-1\right)+\left[\prod_{i=rb+1}^{t}(1+InterestRate_{i-1} * D_{i-1,i}/360)-1\right]\right]\right] \quad (11)$$

where all variables in equations (8)-(11) are the same as those defined for (1)-(3) except:

Interest Rate$_{i-1}$ = The interest rate set for the index[18]

Exponentially-Weighted Volatility for Futures-Based Risk Control Indices

Please refer to the *Risk Control 2.0 Indices* section of this document for information on Exponentially-Weighted Volatility. However, for futures-based risk control indices there is a three (3)-day lag between the calculation of the leverage factor, based on the ratio of target volatility to realized volatility, and the implementation of that leverage factor in the index.

Dynamic Volatility Risk Control Indices

In dynamic volatility risk control indices, the volatility target is not set as a definition of the index. Rather it is set at various levels based on the moving average of VIX computed over a predetermined number of days (e.g., 30-day moving average).

Variance Based Risk Control Indices

In variance-based risk control indices, a target level of variance is set rather than a target volatility level. This allows for faster leveraging or deleveraging of allocations based on changes in volatility or variance in the market. For these indices:

K_{rb} = Min(Max K, Target Variance/Realized Variance$_{rb-d}$)

where variance is defined as per above.

All other index calculations remain the same.

[18] In accordance with the S&P GSCI approach, the interest rate for these indices is the 91-day U.S. Treasury rate. A 360-day year is assumed for the interest calculations in accordance with U.S. banking practices.

Risk Control 2.0 Indices

S&P Dow Jones Indices' Risk Control 2.0 Indices are Risk Control indices, where the cash portion of the investment in the standard Risk Control strategy is replaced with a liquid bond index.

The index portfolio consists of two assets, the index for a risky asset *A*, with weight *W,* and the corresponding bond index *B*, with weight of (1-*W*). Weight *W* lies between 0 and 100%. There is no shorting or leverage allowed in the strategy.

Constituent Weighting

The formula to assign weights to the underlying indices is determined by the following:

$$W^2 * \sigma_A^2 + (1-W)^2 * \sigma_B^2 + 2 * W * (1-W) * \rho * \sigma_A * \sigma_B = \sigma_{Target}^2 \quad (1)$$

where:

W = The weight of the risky asset *A*

σ_A = The volatility of the risky asset *A*

σ_B = The volatility of the bond index *B*

ρ = The correlation of Index *A* and *B*

σ_{Target} = The target volatility

The calculation of volatility and correlation follows the same procedure and conventions as outlined in the prior section for the standard Risk Control strategy.

The quadratic equation above has two solutions to the weight allocated the index A:

$$W_1 = (-b + \sqrt{b^2 - 4a * c}) / 2a$$

$$W_2 = (-b - \sqrt{b^2 - 4a * c}) / 2a \quad (2)$$

where:

$a = \sigma_A^2 + \sigma_B^2 - 2 * \rho * \sigma_A * \sigma_B$

$b = 2\rho\sigma_A\sigma_B - 2\sigma_B^2$

$c = \sigma_B^2 - \sigma_{Target}^2$

The fallback mechanism for the solutions of weight *W*:

1. If none of the solutions in equation (2) above falls between 0 and 100%, then the strategy falls back to standard Risk Control, where the maximum leverage is capped at 100%.
2. If both solutions to the equation (2) are valid weights that are greater than 0, then the larger of the two, max(*W1*, *W2*), becomes the weight of the risky asset A where the maximum leverage is capped at the level defined by the indices risk control parameters.

The final weights of the underlying assets are determined using the following steps:

Step 1: Determine the weights under the short term parameters

a) Determine the short-term variance for assets A and B using the short term exponential parameter with the same formulae as described in equation (6) under the section *Risk Control Indices*, with the returns for assets A and B used in determining the short-term variance for assets A and B.

b) Determine the short-term covariance for assets A and B using similar formulae as described for short-term covariance calculations in equation (6) under the section *Risk Control Indices*, but replacing the squared equity returns with the product of the returns of risky assets A and B.

c) Determine the short-term volatility measure for the risky assets A and B from their respective variance measures in the same manner as described in equation (6) under the section *Risk Control Indices*.

d) Determine the short-term correlation of A and B from the short-term covariance and the short-term volatility measures.

e) Determine the possible levels for the weights for A and B using equations (1) and (2) above.

Step 2: Determine the weights under the long term parameters

Repeat (*a*) to (*e*) in Step 1 above with long-term parameters as described in equation (7) under the section *Risk-Control Indices*.

Step 3: Determine the final weight W.

The weight for risky asset *A* is set equal to the lower of the weight of *A* as determined in Step 1 and Step 2.

The excess return of the Risk Control 2.0 Indices is calculated as:

$$RiskControl2.0ExcessReturn_t = W * Index_A ExcessReturn + (1 - W) * Index_B ExcessReturn$$

and the Risk Control 2.0 Index value is:

$$RiskControl2.0IndexValue_t = RiskControl2.0IndexValue_{rb} * (1 + RiskControl2.0ExcessReturn_t)$$

where:

$RiskControl2.0IndexValue_{rb}$ = The value of the index at the last rebalancing

Risk Control 2.0 total return indices are calculated in a similar way, where the total return is a weighted sum of total returns of the underlying indices.

Risk Control 2.0 is an extension of standard Risk Control described in detail in the previous section. The parameters used in Risk Control 2.0 follow exactly the way they are calculated in the standard Risk Control methodology.

Risk Control 2.0 with Minimum Variance

In Risk Control 2.0 indices with minimum variance, when the quadratic equation (1) has no real solution for W_A and W_B, the fallback mechanism does not switch to standard Risk Control.

$$W_A^2 * \sigma_A^2 + W_B^2 * \sigma_B^2 + 2 * W_A * W_B * \rho * \sigma_A * \sigma_B = \sigma_{Target}^2 \quad (1)$$

where,

$$W_A + W_B = 1 \quad (2)$$

Instead, the strategy finds the portfolio with minimum variance and then rescales the weight of the risky asset A and risky asset B to reach the target volatility. The remaining weight is allocated to cash in order that total asset weights sum 100%.

If using (1) and (2) for a given asset weight x with standard deviation σ_A, the portfolio variance is defined as a function of x as the following:

$f(x) = x^2 * \sigma_A^2 + (1-x)^2 * \sigma_B^2 + 2 * x * (1-x) * \rho * \sigma_A * \sigma_B$Calculating the first the derivative of (3) results in:

$$\frac{df}{dx} = 2 * x * (\sigma_A^2 + \sigma_B^2 - 2 * \rho * \sigma_A * \sigma_B) + 2 * \rho * \sigma_A * \sigma_B - 2 * \sigma_B^2$$

Equating the first derivative to zero results in:

$$x^* = \frac{\sigma_B^2 - \rho * \sigma_A * \sigma_B}{\sigma_A^2 + \sigma_B^2 - 2 * \rho * \sigma_A * \sigma_B}$$

Deriving again, the second derivative is always positive and hence, the asset weight x^* is a local minimum.

$$\frac{d^2 f}{dx^2} = 2 * (\sigma_A^2 + \sigma_B^2 - 2 * \rho * \sigma_A * \sigma_B) \geq 2 * (\sigma_A - \sigma_B)^2 \geq 0$$

Moreover, given that function (3) is convex over $[0,1]$, x^* is also a global minimum. Therefore, the asset weights of the minimum variance portfolio for two risky assets A and B are:

$$W_A^{Min} = \frac{\sigma_B^2 - \rho * \sigma_A * \sigma_B}{\sigma_A^2 + \sigma_B^2 - 2 * \rho * \sigma_A * \sigma_B} \quad (4)$$

$$W_B^{Min} = 1 - W_A^{Min} \quad (5)$$

However, given that equation (1) had no real solution, the portfolio volatility $\sigma_{Minimum}$ using weights (4) and (5) is greater that the target volatility. Therefore, (4) and (5) must be rescaled to reach the target volatility by a scalar θ as follows:

$$\theta = \frac{\sigma_{Target}}{\sigma_{Minimum}} \quad (6)$$

Then the portfolio asset weights are:

$$W_A = \theta * W_A^{Min}$$
$$W_B = \theta * W_B^{Min}$$

Given that $\theta < 1$, the remaining portfolio weight is allocated to cash to get 100% allocation:

$$W_C = 1 - W_A - W_B$$

Equity with Futures Leverage Risk Control Indices

S&P Dow Jones Indices' Equity with Futures Leverage Risk Control Indices measure the performance of a strategy that combines constant representation of the underlying index with a dynamic weighting to the corresponding Futures Excess Return Index in order to target a specific level of volatility. When the underlying index volatility decreases below the target, futures are added to the risk control index to increase the market exposure and vice versa.

The index includes a leverage factor that represents the target exposure to the underlying index as a result of both the equity and futures positions. Since representation of the equity position remains constant at 100%, the resultant dynamic weighting to the futures index equals the leverage factor minus 100%.

The return of the index consists of two components: (1) the return in the underlying index and (2) the return of a dynamic long or short position in the corresponding Futures Excess Return Index, depending on whether the index is leveraging or deleveraging in an attempt to achieve the target volatility.

The formula for calculating the Equity with Futures Leverage Risk Control Index Return is as follows:

$$Equity\ with\ Futures\ Leverage\ Risk\ Control\ Index\ Return_t =$$

$$\left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{rb}} - 1\right) + (K_{rb} - 100\%) * \left(\frac{FuturesERIndex_t}{FuturesERIndex_{rb}} - 1\right)$$

where:

$FuturesERIndex_t$ = The level of the Futures Excess Return Index on day t

$FuturesERIndex_{rb}$ = The level of the Futures Excess Return Index as of the last rebalancing date

The leverage factor, K_{rb}, changes based on a 20 trading-day realized historical volatility of the underlying index. For details on the calculation of the historical volatility please see formulae as described for short-term, simple-weighted realized volatility under the section *Risk Control Indices.*

All other parameters are as described in the standard *Risk Control Indices* section of this document.

Weighted Return Indices

S&P Dow Jones Indices' Weighted Return Indices combine the returns of two or more underlying indices using a specified set of weighting rules to create a new unique index return series. An index that uses the Weighted Return methodology might also be referred to as an "Index of Indices." Weighted Return indices may include a cash component which for the purposes of these indices is treated as an underlying index. S&P Dow Jones Indices offers both daily and periodic rebalance approaches for weighted return indices.

Based on the specification in the individual index methodologies, weighted return indices will be calculated using one of the below formulas:

Daily Rebalancing:

$$Index_t = Index_{t-1} \times \left(1 + \sum_{i=1}^{N} \left(weight_{i,t} \times \left(\frac{ComponentIndex_{i,t}}{ComponentIndex_{i,t-1}} - 1\right)\right) + CashWeight_t \times InterestReturn_t\right)$$

Periodic Rebalancing, accruing interest:

$$Index_t = Index_r \times \left(1 + \sum_{i=1}^{N} \left(weight_{i,r} \times \left(\frac{ComponentIndex_{i,t}}{ComponentIndex_{i,r}} - 1\right)\right) + CashWeight_r \times \left(\prod_{d=r+1}^{t} (1 + InterestReturn_d) - 1\right)\right)$$

Interest Return Options:

$$InterestReturn_t = \begin{cases} \frac{InterestRate_{t-1}}{AccountingDays} \times ACT(t, t-1), for\ simple\ daily\ accrual \\ \left(\left(1 + \frac{InterestRate_{t-1}}{AccountingDays}\right)^{ACT(t,t-1)} - 1\right), for\ accrual\ compounding\ over\ an\ index\ noncalc\ day \\ \left(\frac{1}{\left(1 - \frac{91}{AccountingDays} \times RiskFree\ Rate_{t-1}\right)}\right)^{\frac{ACT(t,t-1)}{91}} - 1, for\ 3\ month\ RiskFree\ Rate\ accrual \end{cases}$$

where:

$Index_t$	= the value of the top level index on day *t*
$Index_r$	= the value of the top level index at the previous rebalancing date *r*[19]
$weight_{i,t}$	= the weight of component index *i* on day *t*
$weight_{i,r}$	= the weight of component index *i* on the previous rebalancing date *r*
$ComponentIndex_{i,t}$	= the value of the component index *i* on day *t*
$ComponentIndex_{i,r}$	= the value of the component index *i* on the previous rebalancing date *r*[20]
N	= the number of component indices within the top level index
$CashWeight_t$	= the weight of the cash component on day *t*
$CashWeight_r$	= the weight of the cash component on the previous rebalancing date *r*
$InterestReturn_t$	= the return from the interest rate (see *Interest Return Options* above)

[19] Note that the value is as of the close of the rebalancing date.
[20] Note that the value is as of the close of the previous rebalancing date.

InterestReturn$_{t-1}$ = the interest rate from the previous calculation date *t -1*[21]

Accounting Days = the day count convention for *InterestRate*$_{t-1}$. Days counts are typically 252, 360, or 365.

ACT(t, t - 1) = the calendar day between calculation day *t -1* and calculation day *t*, expressed as the day (*t*) – (*t – 1*).

RiskFree Rate$_{t-1}$ = S&P DJI typically uses the three-month (3M) T-Bill rate published weekly by *treasurydirect.gov.*

Component Indices Weightings and Returns:

Daily Rebalancing:

$$Weight_{i,t} = \frac{ADJ\ Weight_{i,t-1} * (1 + Daily\ Return_{i,t})}{(1 + Index\ Return_t)}$$

$$Daily\ Return_{i,t} = \frac{Component\ Index_{i,t}}{Component\ Index_{i,t-1}} - 1$$

$$Index\ Return_t = \frac{Index_t}{Index_{t-1}} - 1$$

Periodic Rebalancing, accruing interest:

$$Weight_{i,t} = \frac{ADJ\ Weight_{i,r} * (1 + Daily\ Return_{i,t})}{(1 + Index\ Return_t)}$$

$$Daily\ Return_{i,t} = \frac{Component\ Index_{i,t}}{Component\ Index_{i,r}} - 1$$

$$Index\ Return_t = \frac{Index_t}{Index_r} - 1$$

where:

Weight $_{i,t}$ = the weight of component index *i* on day *t*

ADJ Weight $_{i,t-1}$ = the Adjusted close weight of component index *i* on day *t-1*

N = the number of component indices within the top-level index

Daily Return $_{i,t}$ = daily return of component index *i* on day

Index Return$_t$ = the return of the weighted return index on day *t*.

[21] Note that this can also be a flat rate.

Leveraged and Inverse Indices

Leveraged Indices for Equities

S&P Dow Jones Indices' Leveraged Indices are designed to generate a multiple of the return of the underlying index in situations where the investor borrows funds to generate index exposure beyond his/her cash position. The approach is to first calculate the underlying index, then calculate the daily returns for the leveraged index and, finally, to calculate the current value of the leveraged index by incrementing the previous value by the daily return. There is no change to the calculation of the underlying index.

The daily return for the leveraged index consists of two components: (1) the return on the total position in the underlying index less (2) the borrowing costs for the leverage.

The formula for calculating the Leveraged Index is as follows:

$$Leveraged\ Index\ \mathrm{Re}turn = K * \left(\frac{Underlying\ Index_t}{Underlying\ Index_{t-1}} - 1 \right) - (K-1) * \left(\frac{Borrowing\ Rate}{360} \right) * D_{t,t-1} \quad (1)$$

In equation (1) the borrowing rate is applied to the leveraged index value because this represents the funds being borrowed. Given this, the Leveraged Index Value at time *t* can be calculated as:

$$Leveraged\ IndexValue_t = (Leveraged\ Index\ Value_{t-1}) * (1 + Leveraged\ Index\ Return) \quad (2)$$

Substituting (1) into (2) and expanding the right hand side of (2) yields:

$$Leveraged\ IndexValue_t =$$

$$Leveraged\ IndexValue_{t-1} * \left[1 + \left[K * \left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{t-1}} - 1 \right) - (K-1) * \left[\frac{Borrowing\ Rate}{360} \right] * D_{t,t-1} \right] \right] \quad (3)$$

where:

K (K $\geq$ 1) = Leverage Ratio

- K = 1, no leverage
- K = 2, Exposure = 200%
- K = 3, Exposure = 300%

Borrowing Rate = SOFR Overnight in the U.S. or EURO SHORT TERM RATE (ESTR) in Europe are two common examples

$D_{t,\ t-1}$ = the number of calendar days between date *t* and *t-1*

In the absence of leverage (K=1),

$$Leveraged\ Index\ Value_t = Leveraged\ Index\ Value_{t-1} * \left[\frac{Underlying\ Index_t}{Underlying\ Index_{t-1}} \right]$$

The leverage position is rebalanced daily. This is consistent with the payoff from futures-based replication.

Leveraged Indices without Borrowing Costs for Equities

In some cases, leveraged indices that do not account for costs incurred to finance the associated leverage are calculated. For these indices, the borrowing rate in formulas (1) and (3) is set to zero and the calculation follows as above.

Inverse Indices for Equities

S&P Dow Jones Indices' Inverse indices are designed to provide the inverse performance of the underlying index; this represents a short position in the underlying index. The calculation follows the same general approach as the leveraged index with certain adjustments: First, the return on the underlying index is reversed. Second, while the costs of borrowing the securities are not included, there is an adjustment to reflect the interest earned on both the initial investment and the proceeds from selling short the securities in the underlying index. These assumptions reflect normal industry practice.[22]

The general formula for the return to the inverse index is

$$Inverse\ Index\ \mathrm{Re}turn = -K * \left(\frac{Underlying\ Index_t}{Underlying\ Index_{t-1}} - 1 \right) + (K+1) * \left(\frac{Lending\ \ Rate}{360} \right) D_{t,t-1} \quad (4)$$

Where the first right hand side term represents the return on the underlying index and the second right hand side term represents the interest earned on the initial investment and the shorting proceeds.

Expanding this as done above for the leveraged index yields:

$$InverseIndexValue_t =$$

$$Inverse\ IndexValue_{t-1} * \left[1 - \left[K * \left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{t-1}} - 1 \right) - (K+1) * \left[\frac{LendingRate}{360} \right] * D_{t,t-1} \right] \right] \quad (5)$$

where:

K (K $\geq$ 1) = Leverage Ratio

- K = 1, Exposure = -100%
- K = 2, Exposure = -200%
- K = 3, Exposure = -300%

Lending Rate = SOFR Overnight in the U.S. or ESTR in Europe are two common examples

$D_{t,\ t-1}$ = the number of calendar days between date *t* and *t-1*

In the absence of leverage (K =1),

$$InverseIndexValue_t =$$

$$Inverse\ IndexValue_{t-1} * \left[1 - \left[\left(\frac{UnderlyingIndex_t}{UnderlyingIndex_{t-1}} - 1 \right) - (2) * \left[\frac{LendingRate}{360} \right] * D_{t,t-1} \right] \right]$$

The inverse position is rebalanced daily. This is consistent with the payoff from futures-based replication.

[22] Straightforward adjustments can be made to either to include the costs of borrowing securities or to exclude the interest earned on the shorting proceeds and the initial investment.

Inverse Indices without Borrowing Costs for Equities

In some cases, inverse indices that do not account for any interest earned are calculated. For these indices, the lending rate in formulas (4) and (5) is set to zero and the calculation follows as above.

Leveraged and Inverse Indices for Futures

S&P Dow Jones Indices' futures-based Leveraged Indices are designed to generate a multiple of the return of the underlying futures index in situations where the investor borrows funds to generate index exposure beyond his/her cash position.

S&P Dow Jones Indices' futures-based Inverse indices are designed to provide the inverse performance of the underlying futures index; this represents a short position in the underlying index.

The approach is to first calculate the underlying index, then calculate the daily returns for the leveraged or inverse index. There is no change to the calculation of the underlying futures index.

The leveraged or inverse index may be rebalanced daily or periodically.

Daily Rebalanced Leverage or Inverse Futures Indices

If the S&P Dow Jones Indices futures-based leveraged or inverse index is rebalanced daily, the index excess return is the multiple of the underlying index's excess return and calculated as follows:

$$IndexER_t = IndexER_{t-1} * \left(1 + \left(K * \left(\frac{UnderlyingIndexER_t}{UnderlyingIndexER_{t-1}} - 1\right)\right)\right)$$

where:

K ($K \neq 0$) = Leverage/Inverse Ratio

- K = 1, no leverage
- K = 2, leverage exposure = 200%
- K = 3, leverage exposure = 300%
- K = -1, inverse exposure = -100%

A total return version of each of the indices is calculated, which includes interest accrual on the notional value of the index based on a specified interest rate (e.g., 91-day U.S. Treasury rate), as follows:

$$IndexTR_t = IndexTR_{t-1} * \left(\left(\frac{IndexER_t}{IndexER_{t-1}}\right) + TBR_t\right) \quad (6)$$

where:

$IndexTR_{t-1}$ = The Index Total Return on the preceding business day

TBR_t = Treasury Bill Return, as determined by the following formula:

$$TBR_t = \left[\frac{1}{1 - \frac{91}{360} * TBAR_{t-1}}\right]^{\frac{Delta_t}{91}} - 1 \quad (7)$$

$Delta_t$ = The number of calendar days between the current and previous business days

$TBAR_{t-1}$ = The most recent weekly high discount rate for 91-day U.S. Treasury bills effective on the preceding business day[23]

Periodically Rebalanced Leverage or Inverse Futures Indices

If the S&P Dow Jones Indices futures-based leveraged or inverse index is rebalanced periodically (e.g., weekly, monthly, or quarterly), the index excess return is the multiple of the underlying index excess return since last rebalancing business day and shall be calculated as follows:

$$IndexER_t = IndexER_{t\_LR} * \left(1 + \left(K * \left(\frac{UnderlyingIndexER_t}{UnderlyingIndexER_{t\_LR}} - 1\right)\right)\right)$$

where:

$IndexER_{t\_LR}$ = The Index Excess Return on the last rebalancing business day, *t_LR*

$UnderlyingIndexER_{t\_LR}$ = The Underlying Index Excess Return value on the last rebalancing business day, *t_LR*

t_LR = The last rebalancing business day

K (K ≠ 0) = Leverage / Inverse Ratio

- K = 1, no leverage
- K = 2, leverage exposure = 200%
- K = 3, leverage exposure = 300%
- K = -1, inverse exposure = -100%

A total return version of each of the indices is calculated, which includes interest accrual on the notional value of the index based on the 91-day U.S. Treasury rate. The formulae are the same as (6) and (7) above.

Negative Index Levels. For more information regarding the possibility of negative or zero index levels, refer to Negative/Zero Index Levels section later in this document.

[23] Generally, the rates are announced by the U.S. Treasury on each Monday. On Mondays that are bank holidays, Friday's rates apply.

Fee Indices/Decrement and Increment Indices

S&P DJI calculates fee indices that are meant to alter the index value of a given underlying index according to a fixed percentage rate or fixed index points that is applied on a daily basis. This alteration can be either positive or negative. Fee reduction indices are often also described as Decrement Indices. Decrement Indices measure the performance of an underlying index with a reduction to the return of the index representing a fixed, pre-determined amount. Fee addition indices can be described as Increment Indices. Increment Indices measure the performance of an underlying index with an addition to the return of the index representing a fixed, pre-determined amount. The pre-determined amount typically represents a synthetic dividend amount, fund fees, or macroeconomic adjustments, such as interest rates or inflation targets.

Fee indices can be calculated in a number of ways. The fee can be applied to the index after the return of the underlying index is calculated, or it can be applied along with the return of the underlying index; this can be done with or without a compounding effect on the fee. The different calculations are as follows:

Fixed Percentage Fee Reduction / Addition. A fixed percentage fee reduction or addition multiplies the index level by a daily portion of an annual fee with no regard for day counts. The formula is as follows:

Decrement Index:

$$IndexValue_t = IndexValue_{t-1} \times \frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} \times \left(1 - \frac{Fee}{N}\right)$$

Increment Index:

$$IndexValue_t = IndexValue_{t-1} \times \frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} \times \left(1 + \frac{Fee}{N}\right)$$

where:

$IndexValue_t$	=	The fee reduced / increased index value on day *t*
$IndexValue_{t-1}$	=	The fee reduced / increased index value on day *t-1*
$ParentIndexValue_t$	=	The index value of the parent index with(out) fees on day *t*
$ParentIndexValue_{t-1}$	=	The index value of the parent index with(out) fees on day *t-1*
Fee	=	The annual fee percentage
N	=	The number of days in a year

Standard Fee Reduction / Addition from the Base Date. A standard fee reduction or addition from the base date multiplies the index level by a pro-rated fee accounting for time since the base date. The formula is as follows:

Decrement Index:

$$IndexValue_t = IndexValue_0 \times \frac{ParentIndexValue_t}{ParentIndexValue_0} \times \left(1 - \frac{Fee}{N} \times ACT(t, t_0)\right)$$

Increment Index:

$$IndexValue_t = IndexValue_0 \times \frac{ParentIndexValue_t}{ParentIndexValue_0} \times \left(1 + \frac{Fee}{N} \times ACT(t, t_0)\right)$$

where:

IndexValue$_t$	=	The fee reduced / increased index value on day *t*
IndexValue$_0$	=	The fee reduced / increased index value on the base date
ParentIndexValue$_t$	=	The index value of the parent index with(out) fees on day *t*
ParentIndexValue$_0$	=	The index value of the parent index with(out) fees on the base date
Fee	=	The annual fee percentage
N	=	The number of days in a year
ACT(*t*,*t$_0$*)	=	The actual calendar days between day *t* (exclusive) and the base date (inclusive)

Standard Fee Reduction / Addition. A standard fee reduction or addition multiplies the index level by a daily fee pro-rated to account for non-calculation days (including weekends and holidays). The formula is as follows:

Decrement:

$$IndexValue_t = IndexValue_{t-1} \times \frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} \times \left(1 - \frac{Fee}{N} \times ACT(t, t-1)\right)$$

Increment:

$$IndexValue_t = IndexValue_{t-1} \times \frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} \times \left(1 + \frac{Fee}{N} \times ACT(t, t-1)\right)$$

where:

IndexValue$_t$	=	The fee reduced / increased index value on day *t*
IndexValue$_{t-1}$	=	The fee reduced / increased index value on day *t-1*
ParentIndexValue$_t$	=	The index value of the parent index with(out) fees on day *t*
ParentIndexValue$_{t-1}$	=	The index value of the parent index with(out) fees on day *t-1*
Fee	=	The annual fee percentage
N	=	The number of days in a year
ACT(*t*,*t-1*)	=	The actual calendar days between day *t* (exclusive) and day *t-1* (inclusive)

Exponentially Compounding Fee Reduction / Addition. An exponentially compounding fee reduction multiplies the index level by a daily fee exponentially pro-rated to account for non-calculation days (including weekends and holidays). The formula is as follows:

Decrement:

$$IndexValue_t = IndexValue_{t-1} \times \frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} \times \left(\left(1 - \frac{Fee}{N}\right)^{ACT(t,t-1)}\right)$$

Increment:

$$IndexValue_t = IndexValue_{t-1} \times \frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} \times \left(\left(1 + \frac{Fee}{N}\right)^{ACT(t,t-1)}\right)$$

where:

$IndexValue_t$	=	The fee reduced / increased index value on day *t*
$IndexValue_{t-1}$	=	The fee reduced / increased index value on day *t-1*
$ParentIndexValue_t$	=	The index value of the parent index with(out) fees on day *t*
$ParentIndexValue_{t-1}$	=	The index value of the parent index with(out) fees on day *t-1*
Fee	=	The annual fee percentage
N	=	The number of days in a year
ACT(*t,t-1*)	=	The actual calendar days between day *t* (exclusive) and day *t-1* (inclusive)

Standard Synthetic Dividend. A standard synthetic dividend multiplies the parent index level by an exponentially pro-rated fee accounting for time since the base date. This fee reduction or addition is a function of the parent index value and necessarily requires the same base value. The formula is as follows:

Decrement:

$$IndexValue_t = ParentIndexValue_t \times \left(\left(1 - \frac{Fee}{N}\right)^{ACT(t,t_0)}\right)$$

Increment:

$$IndexValue_t = ParentIndexValue_t \times \left(\left(1 + \frac{Fee}{N}\right)^{ACT(t,t_0)}\right)$$

where:

$IndexValue_t$	=	The fee reduced / increased index value on day *t*
$ParentIndexValue_t$	=	The index value of the parent index with(out) fees on day *t*
Fee	=	The annual fee percentage
N	=	The number of days in a year
ACT(*t,t*$_0$)	=	The actual calendar days between day *t* (exclusive) and the base date (inclusive)

Standard Fee Subtracted from or Added to Return. The standard fee subtracted from return is a fee reduction that subtracts the fee from the return instead of multiplying the accumulated index level by (1 − *Fee*). The standard fee added to return is a fee addition that adds the fee to the return instead of multiplying the accumulated index level by (1 + *Fee*). The formula is as follows:

Decrement:

$$IndexValue_t = IndexValue_{t-1} \times \left(\frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} - \frac{Fee}{N} \times ACT(t, t-1)\right)$$

Increment:

$$IndexValue_t = IndexValue_{t-1} \times \left(\frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} + \frac{Fee}{N} \times ACT(t, t-1)\right)$$

where:

$IndexValue_t$	=	The fee reduced / increased index value on day *t*

$IndexValue_{t-1}$ = The fee reduced / increased index value on day *t-1*

$ParentIndexValue_t$ = The index value of the parent index with(out) fees on day *t*

$ParentIndexValue_{t-1}$ = The index value of the parent index with(out) fees on day *t-1*

Fee = The annual fee percentage

N = The number of days in a year

ACT(*t,t-1*) = The actual calendar days between day *t* (exclusive) and day *t-1* (inclusive)

Fixed Index Point Subtracted from or Added to Return. The fixed index point subtracted from return subtracts the fee represented as a constant number of index points. The fixed index point added to return adds the fee represented as a constant number of index points. The formula is as follows:

Decrement:

$$IndexValue_t = IndexValue_{t-1} \times \frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} - \frac{Fee}{N} \times ACT(t, t-1) \times IndexValue_0$$

Increment:

$$IndexValue_t = IndexValue_{t-1} \times \frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} + \frac{Fee}{N} \times ACT(t, t-1) \times IndexValue_0$$

where:

$IndexValue_t$ = The fee reduced / increased index value on day *t*

$IndexValue_{t-1}$ = The fee reduced / increased index value on day *t-1*

$ParentIndexValue_t$ = The index value of the parent index with(out) fees on day *t*

$ParentIndexValue_{t-1}$ = The index value of the parent index with(out) fees on day *t-1*

Fee = Percentage of fee reduced / increased index base value corresponding to specified number of index points

N = The number of days in a year

ACT(*t,t-1*) = The actual calendar days between day *t* (exclusive) and day *t-1* (inclusive)

$IndexValue_0$ = The fee reduced / increased index value on the base date

Net of Repo Rate Decrement Indices. Net of Repo Rate Decrement Indices apply an additional variable performance deduction atop a standard fixed percentage or fixed index points decrement index. The modification to the fixed decrement is based on the quoted spread of a specified Total Return Futures (TRF) contract, which represents the implied equity repo rate.

The additional decrement modification is established once per year at the contract expiry based on the ASK value of the TRF with the corresponding maturity of the subsequent year. The additional decrement modification amount is deducted on a daily basis throughout the following 12-month period.

The formula for Standard Fee and Fixed Index Point Subtracted from Returns are as follows:

Standard Fee Subtracted from Return:

$$IndexValue_t = IndexValue_{t-1} \times \left(\frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} - \frac{\left(Fee + TRF_{(r)}\right)}{N} \times ACT(t, t-1) \right)$$

Fixed Index Point Subtracted from Return:

$$IndexValue_t = IndexValue_{t-1} \times \left(\frac{ParentIndexValue_t}{ParentIndexValue_{t-1}} - \frac{(TRF_{(r)})}{N} \times ACT(t, t-1) \right) - \frac{Fee}{N} \times ACT(t, t-1) \times IndexValue_0$$

Cash Accruals Increment Indices with Compounding. The index is an index of indices designed to measure the performance of the parent index, adding a fixed fee per annum using a cash index with a predetermined premium.

$$CashAccrual_t = CashAccrual_{t-1} * \left((1 + Fee)\wedge \left(\frac{D_t - D_{t-1}}{N} \right) \right)$$

$$IndexValue_t = IndexValue_{rb} * \left(1 + \left(\frac{ParentIndexValue_t}{ParentIndexValue_{rb}} - 1 \right) + \left(\frac{CashAccrual_t}{CashAccrual_{rb}} - 1 \right) \right)$$

where:

$IndexValue_t$	=	The fee increased index value on day *t*
$IndexValue_{rb}$	=	The fee increased index value on day *rb*
$ParentIndexValue_t$	=	The index value of the parent index with fees on day *t*
$ParentIndexValue_{rb}$	=	The index value of the parent index with fees on day *rb*
Fee	=	The annual fee percentage
N	=	The number of days in a year
D	=	Date
t	=	The current day
rb	=	The last business day of December

For index specific parameters, please refer to S&P Dow Jones Decrement Indices Parameters document, available at www.spglobal.com/spdji.

Negative/Zero Index Levels. For more information regarding the possibility of negative or zero index levels, please refer to the *Negative/Zero Index Levels* section.

Capped Return Indices

In a capped return index, the index return from the prior rebalancing is capped at a pre-defined level. The overall approach is to first calculate an uncapped index and then compare its return-since-last-rebalancing-day with the return cap. The capped index return takes the smaller value of these two. The approach can be expressed mathematically as:

$$Index\ Level_t = Index\ Level_{LR} * (1 + \min\left(ReturnCap, \frac{Uncapped\ Index\ Level_t}{Uncapped\ Index\ Level_{LR}}\right))$$

where:

index level$_t$ = Index level at date *t*

index level$_{LR}$ = Index level at the last rebalancing business day

ReturnCap = Cap on the index return between rebalance dates

Dividend Points Indices

S&P Dow Jones Indices' Dividend Points Indices are designed to track the total dividend payments from the constituents of an underlying index. They do not include any changes in the market capitalization of index constituents. The index level is based on a running total of dividends of the constituents of the underlying index. Some indices reset to zero on a periodic basis, generally quarterly or annually, while others are cumulative and do not reset periodically. Thus, the index measures the total dividends paid in the underlying index since the previous rebalancing date, or the base date for indices that do not reset on a periodic basis. For quarterly indices, the index resets to zero after the close on the third Thursday or Friday of the last month of the calendar quarter, to coincide with futures and options expiration. For annual indices, the index resets to zero after the close on the third Thursday or Friday of December, to coincide with futures and options expiration. Please refer to the table below for index-specific reset dates.

Dividend Points Index	Reset Date (After the Close)
S&P 500 Dividend Points Index	Third Friday of the last month of the quarter
S&P 500 Dividend Points Index (Annual)	Third Friday of December
S&P/TSX 60 Dividend Points Index	Third Friday of the last month of the quarter
S&P/TSX 60 Dividend Points Index (Annual)	Third Friday of December
S&P 400 Dividend Points Index (Cumulative)	--
S&P 600 Dividend Points Index (Cumulative)	--
Materials Select Sector Dividend Points Index (Cumulative)	--
Industrial Select Sector Dividend Points Index (Cumulative)	--
Technology Select Sector Dividend Points Index (Cumulative)	--
Consumer Staples Select Sector Dividend Points Index (Cumulative)	--
Consumer Discretionary Select Sector Dividend Points Index (Cumulative)	--
S&P MLP Dividend Points Index (Cumulative)	--
Real Estate Select Sector Dividend Points Index (Cumulative)	--
Utilities Select Sector Dividend Points Index (Cumulative)	--
Energy Select Sector Dividend Points Index (Cumulative)	--
Financial Select Sector Dividend Points Index (Cumulative)	--
Health Care Select Sector Dividend Points Index (Cumulative)	--
S&P 500 Dividend Points Index (Cumulative)	--
S&P/ASX 200 Dividend Points Index (Quarterly)	Third Thursday of the last month of the quarter
S&P/ASX 200 Dividend Points Index (Annual)	Third Thursday of December

Except for the S&P/TSX 60 Dividend Points Indices, Dividend Points indices represent regular cash dividend payments paid by index constituents. The S&P/TSX 60 Dividend Points Indices also include stock dividends as defined in the S&P/TSX Canadian Indices Methodology. Special dividends are not included. Dividends are added on the ex-date, which is consistent with the total return version of the underlying index. Since stock prices are adjusted for dividends on the ex-date, this method is much more straightforward than adding dividends on the pay date.

On each trading day, the dividends of all index shares going ex-date are summed up and the total is divided by the underlying index's divisor, which transforms the index currency amount (e.g., US$, CAD, AUD) into index points. Where applicable, dividend payments in another currency are translated into the index currency at the same exchange rate used for the total return version of the underlying index. Except for the reset day where applicable, these index points are added to the cumulative total for the respective period to derive the value of the Dividend Points Index for that day.

The formula for calculating the dividend point index on any date, *t,* for a given underlying index, *x*, is:

$$DividendIndex_{t,x} = \sum_{i=r+1}^{t} ID_{i,x}$$

where:

$ID_{i,x}$ = The index dividend of the underlying index *x* on day *i.*

t = The current date.

r+1 = The trading date immediately following the reset date of the index (or base date if the index does not reset periodically).

The index dividend (*ID*) of the underlying index is calculated on any given day as the total dividend value for all constituents of the index divided by the index divisor. The total dividend value is calculated as the sum of dividends per share multiplied by index shares outstanding for all constituents of the index which have a dividend going ex on the date in question. For more detail concerning the calculation of index dividends please refer to the *Total Return Calculations* section of this methodology.

Alternative Pricing

S&P DJI Indices uses alternative pricing for the calculation and publication of certain indices and data points. Alternative pricing is applied to indices using the approaches outlined below. Details of the pricing type and application of the pricing for index calculation purposes is indicated in the specific index methodology.

1. Official Calculation: The daily official index calculation always leverages the alternative price methodology.
2. Hybrid Calculation: The alternative price is used in certain instances when calculating the official index value (e.g., VWAP pricing used for official daily index calculation on the rebalance implementation while the official close is used for all non-rebalance date calculations)
3. Supplementary Calculation: A supplementary calculation of the index is performed with the alternative price and is published alongside the official closing calculation (e.g., Special Open Quotation).

Alternative pricing may be captured through vendors or calculated internally by S&P DJI. The formulas defined in this section are specific to internally calculated alternative pricing. This approach is more commonly applied to derivative based indices calculated by S&P DJI. S&P DJI leverages exchange provided prices for official end-of-day index calculations. For each exchange, S&P Dow Jones Indices will use the relevant price (e.g. last trade, auction, VWAP, official close) as defined in the S&P Dow Jones Indices' Global Equity Close Prices guide available on https://us.spindices.com/.

Special Opening Quotation (SOQ)

The special opening quotation ("SOQ") is calculated using the same methodology as the underlying index except that the price used for each index constituent is the open price at which the security first trades upon the opening of the exchange on a given trading day. SOQ is calculated using only the opening prices from the primary exchange, which occur at various times, of all stocks in the index and may occur at any point during the day. For any stock that has not traded during the regular trading session, the previous day's closing price is used for the SOQ index calculation. SOQ may be higher than the high, lower than the low and different from the open, as the SOQ is a special calculation with a specific set of parameters. The open, high, low and close values are continuous calculations, while the SOQ waits until all stocks in the index are open.

- **U.S. Markets.** In the case of a market disruption and if the exchange is unable to provide official opening prices, the official closing prices utilized are determined based on SEC Rule 123C as outlined in the *Unexpected Exchange Closures* chapter of *S&P Dow Jones Indices' Equity Indices Policies and Practices document*.
- **Non-U.S. Markets.** In the case of a market disruption and if the exchange is unable to provide official opening prices, the official closing prices are utilized. If the exchange is unable to provide official opening or closing prices, the previous closing price adjusted for corporate actions is used in the calculation of the SOQ.

For M&A target stocks that are suspended or halted from trading on an exchange but are still in indices, S&P Dow Jones Indices will synthetically derive an SOQ for the suspended security using the deal ratio terms and the opening price of the acquiring company if the acquirer is issuing stock as part of the merger. If the acquirer is paying cash only, the lower of the previous official close price and the cash amount are used in the calculation of the SOQ. Similarly, S&P DJI will synthetically derive an SOQ for spun-off stocks that have not yet begun trading.

Fair Value Indices

Fair Value indices are designed to provide an updated valuation for indices that have ceased calculating earlier in a given day. The indices are calculated using fair value adjustment factors applied on a stock by stock basis to each stock in the index. The factors are provided by a pricing service which calculates fair value adjustments. There may be multiple fair value indices for a given underlying index, due to the use of different pricing services for each particular index. S&P Dow Jones currently has indices using ICE Data Services (ICE) and Virtu Financial, Inc. (formerly provided by ITG).

For all stocks in the index, the following are taken from the relevant underlying index: constituents, prices, and index shares effective as of the next trading date (i.e., the adjusted close data for today). The price for each stock is multiplied by the fair value adjustment for that stock to arrive at a fair value price. The index is then calculated in the same fashion as the underlying index, using the same index shares and index divisor as the underlying index. Note that the value of a fair value index on a given day, unlike other indices, is not dependent on the value of that fair value index on the prior day. Rather it is only dependent on the value of the relevant underlying index and on today's fair value adjustments.

Volume-Weighted Average Price (VWAP)

Some indices will use VWAP in a specified time window, instead of reported closing values.

Volume Weighted Pricing uses a weighted average price instead of a single closing value. Prices with bigger trading volumes are assigned higher weights. VWAP is calculated by multiplying the price of trades by their volume, summing that for the applicable time window, and then dividing by the total volume of trades within that time window, as calculated below:

$$VWAP_{i,t} = \frac{\sum_{j=1}^{N} TradeVolume_{i,j} \times TradePrice_{i,j}}{\sum_{j=1}^{N} TradeVolume_{i,j}}$$

where:

$VWAP_{i,t}$	= the VWAP for security *i* on day *t* over the VWAP observation window
N	= the number of trades in the VWAP observation window
$TradeVolume_{i,j}$	= the volume of trade *j*
$TradePrice_{i,j}$	= the price of trade *j*

Time-Weighted Average Price (TWAP)

TWAP indicates the Average Price, or Bid Price or Ask Price, that a security is traded at during a specified time window, rather than its end of day price.

TWAP is calculated by taking a simple average of various snapshots of the price throughout the time window, written formulaically below:

$$TWAP_{i,t} = \frac{\sum_{j=1}^{N} TradePrice_{i,j}}{N}$$

where:

$TWAP_{i,t}$	= the TWAP for security *i* on day *t* over the TWAP observation window
N	= the number of trades in the TWAP observation window
$TradePrice_{i,j}$	= the price of trade *j*

Negative/Zero Index Levels

A negative index level is possible for certain types of indices including hedged, decrement, leveraged, and inverse indices, particularly for inverse indices that apply leverage.

- For indices calculated in real-time, in the event an intraday index calculation results in a zero or negative value, S&P DJI will publish the zero or negative value as calculated.
- In the event an end-of-day index calculation results in a zero or negative value, S&P DJI will publish an official closing index value of zero on that day. Index levels will only be assessed after the close of trading for purposes of this determination and will not take into consideration intraday levels for those indices calculated in real-time.

Any index assigned a level of zero will be reviewed by the Index Committee to determine if the index will be discontinued or the index will be restarted with a new base value. In the event the index is restarted, S&P DJI will announce such action and will treat these indices as two separate series. Until the Index Committee has made this determination, the index level will continue to be published with a value of zero.

Index Turnover

Index turnover is a measure of weight changes to an index resulting from corporate events or rebalancing of an index. Weight changes resulting from market value changes due to market driven price increases or decreases are not accounted for in an index turnover calculation. All turnover figures provided by S&P Dow Jones Indices are one-way turnover figures. One-way turnover only views turnover from the perspective of either buying or selling assets. One-way turnover is therefore limited to a maximum amount of 100% which would be equivalent to the deletion of all current index constituents or the addition of all new constituents. To differentiate between a one-way and two-way turnover approach, a two-way turnover approach would reflect both the buying and selling of assets. Two-way index turnover would be 200% in the above scenario. A formula of index turnover is provided below. All turnover calculations are provided by S&P Dow Jones Indices upon request.

$$Index\ Turnover = \frac{\sum_i Constituent\ Weight\ Change}{2}$$

$$Constituent\ Weight\ Change = |Constituent\ Weight\ CLS - Constituent\ Weight\ ADJ|$$

where:

Constituent Weight CLS = Weight of constituent as of the close of business on day T.

Constituent Weight ADJ = Weight of constituent prior to the open on day T+1. This weight will reflect any adjustments due to corporate events or rebalancing. If the index had no corporate events or rebalancing, the Constituent Weight CLS will be equal to Constituent Weight ADJ.

End-of-Month Global Fundamental Data

The purpose of this section is to give an overview of the End-of-Month ("EOM") Global Fundamental Data filings. This section outlines the file types along with their descriptions, general data information, and formulas used to calculate the ratios present in these data files. EOM fundamentals do not include the U.S. Fundamental Data Package.

Global EOM Fundamental Data is disseminated via the following files:

Frequency	File Type	File Name	File Name Extension
Monthly	Index Level	yyyyMMdd_SPTOURUP_EOM.SDL	.SDL

Monthly Files

File Extensions. The following table details the file extensions:

File Extension	Description
EOM.SDL	End-of-Month S&P Dow Jones Indices Index Level Files

File Delivery. Monthly files are delivered to clients by the third business day of the following month. For example, the file 20171031_SPTOURUP_EOM.SDL is delivered to clients no later than November 3, 2017. Files are generated for the last trading day of the month. Therefore, the file name reflects the last trading day (e.g., October 31, 2017) as shown above.

The EOM.SDL file format details are available in the UFF 2.0 Specifications document available *here*.

About the Data

For calculation of the Global EOM Fundamental Data values, S&P Dow Jones Indices obtains raw data from multiple vendors as of the 25th of every month. The raw data is then validated and used in the calculation of the ratios listed below.

S&P Dow Jones Indices has 10 Index Level Ratios which are reflected in EOM.SDL files:

Ratio[24]	Description	Period
FY0 P/E	Latest reported fiscal year's price-to-earnings ratio	Latest reported fiscal year
1 YR FWD P/E	One-year forward (estimated) price-to-earnings ratio	Latest reported fiscal year + one year
2 YR FWD P/E	Two-year forward (estimated) price-to-earnings ratio	Latest reported fiscal year + two years
12 MO TRAILING P/E	12-month trailing price-to-earnings ratio	12-month trailing
P/BV	Latest reported fiscal year's price-to-book value ratio	Latest reported fiscal year
P/CF	Latest reported fiscal year's price-to-cash flow ratio	Latest reported fiscal year
P/S	Latest reported fiscal year's price-to-sales ratio	Latest reported fiscal year
ROE	Latest reported fiscal year's return on equity	Latest reported fiscal year
DIV YLD	Dividend yield using reported dividend (gross)	As per latest reported
IND YLD	Indicated yield using forward looking dividend (gross)	As per latest reported

[24] Name as per file.

S&P Dow Jones Indices has five Constituent Level Ratios which are reflected in EOM.SDC files:

Ratio[25]	Description	Period
PRICE-EARNINGS RATIO (P/E)	12-month trailing price-to-earnings ratio	12-month trailing
PRICE-BOOK VALUE RATIO (P/BV)	Latest reported fiscal year's price-to-book value ratio	Latest reported fiscal year
P/CF	Latest reported fiscal year's price-to-cash flow ratio	Latest reported fiscal year
PRICE/SALES	Latest reported fiscal year's price-to-sales ratio	Latest reported fiscal year
IND YLD	Indicated yield using forward looking dividend	As per latest reported

Output Files

The file naming convention, templates, and field specifications are described below.

There are five EOM file templates included in the Global Fundamental Data Package:

- EOM.SDL – End-of-month index level file
- EOM.SDC – End-of-month constituent level file
    - NC_EOM.SDC – End-of-month Constituent file (No Cusip)
    - NS_EOM.SDC – End-of-month Constituent file (No Sedol)
    - NCS_EOM.SDC – End-of-month Constituent file (No Cusip or Sedol)

Fundamental Data Points

Underlying data point values used for fundamental index level ratio calculations are described below:[26]

1. **Basic EPS − Continuing Operations (FY0).** This is a given company's basic earnings-per-share excluding extra items for the latest reported fiscal year and is calculated as:

    Basic EPS – Continuing Operations (FY0) = (Net Income − Preferred Dividend and Other Adjustments − Earnings of Discontinued Operations − Extraordinary Item & Accounting Change) / Weighted Average Basic Shares Outstanding

2. **Basic Weighted Average Shares Outstanding (FY0).** This is a given company's basic weighted average shares outstanding for the latest reported fiscal year.
3. **Estimate EPS (FY1).** This is a given company's one year forward estimated earnings-per-share and represents the aggregated mean of all latest reported fiscal year plus one year estimates provided by third-party vendor analysts.
4. **Estimate EPS (FY2).** This is a given company's two year forward estimated earnings-per-share and represents the aggregated mean of all latest reported fiscal year plus two year estimates provided by third-party vendor analysts.
5. **Basic EPS − Continuing Operations (LTM).** This is a given company's basic earnings-per-share excluding extra items over the last 12 months and is calculated as:

    Basic EPS – Continuing Operations (LTM) = (Net Income − Preferred Dividend and Other Adjustments − Earnings of Discontinued Operations − Extraordinary Item & Accounting Change) / Weighted Average Basic Shares Outstanding

6. **Basic Weighted Average Shares Outstanding (LTM).** This is a given company's basic weighted average shares outstanding over the last 12 months.

[25] Name as per file.
[26] All stocks with ADRs are adjusted per the depository receipt ratio except for EPS and Dividend data points.

7. **Total Common Equity (FY0).** This is a given company's total common equity for the latest reported fiscal year and is calculated as:

   Total Common Equity (FY0) = Common Stock & APIC + Retained Earnings + Treasury Stock & Other.

8. **Cash from Operations (FY0).** This is the given company's cash from operations for the latest reported fiscal year and is calculated as:

   Cash from Operations (FY0) = Net Income + Depreciation and Amortization, Total + Amortization of Deferred Charges, Total − (CF) + Other Non-Cash Items, Total + Change in Net Operating Assets

9. **Total Revenue (FY0).** This is the given company's total revenue for the latest reported fiscal year and is calculated as:

   Total Revenue (FY0) = Revenue + Other Revenue

10. **Shares Outstanding.** This is the given company's shares outstanding and provides total company level shares, as reported by stock exchanges, company press releases, and financial documents. Treasury shares are excluded, and the number is adjusted for corporate actions such as splits, merger related share issuances, rights offerings, etc.

11. **Indicated Annualized Dividend.** This is the given company's latest annualized dividend per share. It is a forward looking number and is calculated by multiplying the latest dividend paid per share by the number of dividend payments per year.

Calculations

Monthly calculation of the fundamental data for a given index is done as of the last calendar day of the month.[27]

Terminology. Various terms are used in the calculations below and are defined as follows:

- **AWF.** The Additional Weight Factor (AWF) is the adjustment factor of a stock assigned at each index rebalancing date which adjusts the market capitalization for all index constituents to achieve the user-defined weight, while maintaining the total market value of the overall index.
- **IWF.** A stock's Investable Weight Factor (IWF) is based on its free float. Free float can be defined as the percentage of each company's shares that are freely available for trading in the market. For further details, please refer to *S&P Dow Jones Indices' Float Adjustment Methodology*.
- **SO.** The shares outstanding of a company.
- **Style.** For details, please refer to the S&P U.S. Style Indices Methodology available *here*.

Index Level Ratios. The formulas below are used to calculate index level ratios:[28]

1. **FY0 P/E**

$$Normalized\ Per\ Share\ Data = \frac{Basic\ EPS\ Excl\ (FY0) * Basic\ Weight\ Avg\ SO\ (FY0) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Value = Normalized\ Per\ Share\ Data\ * SO * IWF * FXRate * AWF * Style$$

$$Index\ Price\ to\ Earnings\ = \frac{\sum_i Index\ Market\ Cap}{\sum_i Float\ Adjusted\ Data\ Value}$$

[27] The calculation of fundamental ratios is done based on the index's current composition as of the date of the fundamental ratio calculation.

[28] With the exception of Dividend Yield and Indicated Dividend Yield, any stock which does not have an underlying value is excluded from the index level calculation.

2. **1 YR FWRD P/E**

$$Normalized\ Per\ Share\ Data\ = \frac{Estimate\ EPS\ FY1 * Sharesoutstanding * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Value = Normalized\ Per\ Share\ Data * SO * IWF * FXRate * AWF * Style$$

$$Index\ 1yr\ Fwrd\ Price\ to\ Earnings\ = \frac{\sum_i Index\ Market\ Cap}{\sum_i Float\ Adjusted\ Data\ Value}$$

3. **2 YR FWRD P/E**

$$Normalized\ Per\ Share\ Data\ = \frac{Estimate\ EPS\ FY2 *\ Sharesoutstanding * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Value = Normalized\ Per\ Share\ Data * SO * IWF * FXRate * AWF * Style$$

$$Index\ 2yr\ Fwrd\ Price\ to\ Earnings\ = \frac{\sum_i Index\ Market\ Cap}{\sum_i Float\ Adjusted\ Data\ Value}$$

4. **12 Month Trailing P/E**

$$Normalized\ Per\ Share\ Data = \frac{Basic\ EPS\ Excl\ (LTM) * Basic\ Weight\ Avg\ SO\ (LTM) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Value = Normalized\ Per\ Share\ Data * SO * IWF * FXRate * AWF * Style$$

$$Index\ 12\ Month\ trailing\ Price\ to\ Earnings\ = \frac{\sum_i Index\ Market\ Cap}{\sum_i Float\ Adjusted\ Data\ \text{Value}}$$

5. **Price-Book Value (FY0)**

$$Per\ Share\ Data = \frac{Total\ Common\ Equity\ (FY0) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Value = Per\ Share\ Data\ * SO * IWF * FXRate * AWF * Style$$

$$Index\ Price\ to\ Book\ Value = \frac{\sum_i Index\ Market\ Cap}{\sum_i Float\ Adjusted\ Data\ Value}$$

6. **Price-Cash Flow (FY0)**

$$Per\ Share\ Data = \frac{Cash\ from\ Operations\ (FY0) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Value = Per\ Share\ Data * SO * IWF * FXRate * AWF * Style$$

$$Index\ Price\ to\ Cash\ Flow = \frac{\sum_i Index\ Market\ Cap}{\sum_i Float\ Adjusted\ Data\ Value}$$

7. **Price to Sales (FY0)**

$$Per\ Share\ Data = \frac{Total\ Revenue\ (FY0) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Value = Per\ Share\ Data\ * SO * IWF * FXRate * AWF * Style$$

$$Index\ Price\ to\ Sales = \frac{\sum_i Index\ Market\ Cap}{\sum_i Float\ Adjusted\ Data\ Value}$$

8. **Return on Equity**

$$Normalized\ Per\ Share\ Data = \frac{Basic\ EPS\ Excl\ (FY0) * Basic\ Weight\ Avg\ SO\ (FY0) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Earnings = Normalized\ Per\ Share\ Data\ * SO * IWF * FXRate * AWF * Style$$

$$Per\ Share\ Data = \frac{Total\ Common\ Equity\ (FY0) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Book\ Value = Per\ Share\ Data * SO * IWF * FXRate * AWF * Style$$

$$Index\ ROE = \frac{\sum_i Float\ Adjusted\ Earnings}{\sum_i Float\ Adjusted\ \ Book\ Value}$$

9. **Dividend Yield**

$$Index\ Dividend = \sum_i (Dividend\ of\ a\ stock * Index\ Shares\ of\ a\ stock)$$

$$Price\ Index\ Value = The\ closing\ index\ value\ of\ a\ given\ stock$$

$$DIV\ YLD = \frac{Total\ Index\ Dividend}{Price\ Index\ Value}\ X\ 100$$

10. **Indicated Yield (IND YLD)**

$$Float\ Adjusted\ Data = Indicated\ Annual\ Dividend\ Per\ Share * SO * IWF * FXRate * AWF * Style$$

$$Index\ Indicated\ Yield = \left(\frac{\sum_i Float\ Adjusted\ Data * Dilution\ Factor}{\sum_i Index\ Market\ Cap}\right) * 100$$

Constituent Level Ratios. The formulas below are used to calculate constituent level ratios:

1. **Price-Earnings Ratio (P/E)**

$$Normalized\ Per\ Share\ Data\ Item = \frac{Basic\ EPS\ Excl\ (LTM) * Basic\ Weight\ Avg\ SO\ (LTM) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$P/E = \frac{Close\ Price}{Normalized\ Per\ Share\ Data\ Item\ Value}$$

2. **Price-Book Value Ratio (P/BV)**

$$Per\ Share\ Data\ Item\ Value = \frac{Total\ Common\ Equity(FY0) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Item = Per\ Share\ Data\ Item\ Value * SO * IWF * FXRate * AWF * Style$$

$$Price\ to\ Book\ Value = \frac{Constituent\ Index\ Market\ Cap}{Float\ Adjusted\ Data\ Item\ Value}$$

3. **Price-Cash Flow (P/CF)**

$$Per\ Share\ Data\ Item\ Value = \frac{Cash\ from\ operations\ (FY0) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Item = Per\ Share\ Data\ Item\ Value * SO * IWF * FXRate * AWF * Style$$

$$Price\ to\ Cash\ Flow = \frac{Constituent\ Index\ Market\ Cap}{Float\ Adjusted\ Data\ Item\ Value}$$

4. **Indicated Yield (IND YLD)**

$$Ind\ Yld = \left(\frac{Indicated\ Annual\ Dividend\ Per\ Share * Dilution\ Factor}{Close\ Price}\right) * 100$$

5. **Price to Sales**

$$Per\ Share\ Data\ Item\ Value = \frac{Total\ Revenue\ (FY0) * Multiclass\ factor * 1000000}{S\&P\ Shares\ Outstanding}$$

$$Float\ Adjusted\ Data\ Item = Per\ Share\ Data\ Item\ Value * SO * IWF * FXRate * AWF * Style$$

$$Price\ to\ Sales = \frac{Constituent\ Index\ Market\ Cap}{Float\ Adjusted\ Data\ Item\ Value}$$

Note: Company level data received from vendors is proportionally assigned to each class of stock. For example, Altice SA has two classes of stock (Altice SA A and Altice SA B). In order to proportionally assign company level data to each of these two stock classes, a multiclass factor is used and is determined as follows:

$$Multiclass\ factor\ of\ Stock\ A = \frac{Shares\ of\ stock\ A}{\sum_i Shares\ of\ stocks\ A\ and\ B}$$

$$Multiclass\ factor\ of\ Stock\ B = \frac{Shares\ of\ stock\ B}{\sum_i Shares\ of\ stocks\ A\ and\ B}$$

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Disclaimer

Performance Disclosure/Back-Tested Data

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Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Information presented prior to an index's launch date is hypothetical back-tested performance, not actual performance, and is based on the index methodology in effect on the launch date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. In addition, forks have not been factored into the back-test data with respect to the S&P Cryptocurrency Indices. For the S&P Cryptocurrency Top 5 & 10 Equal Weight Indices, the custody element of the methodology was not considered; the back-test history is based on the index constituents that meet the custody element as of the Launch Date. Also, the treatment of corporate actions in back-tested performance may differ from treatment for live indices due to limitations in replicating index management decisions. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results.

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will explicitly state so. The methodology will include an Appendix with a table setting forth the specific data points and relevant time period for which backward projected data was used. Index returns shown do not represent the results of actual trading of investable assets/securities. S&P DJI maintains the index and calculates the index levels and performance shown or discussed but does not manage any assets.

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