



CRSP[®] INDEXES
METHODOLOGY GUIDE
AUGUST 2020

CRSP[®] | CENTER FOR RESEARCH
IN SECURITY PRICES, LLC
An Affiliate of the University of Chicago Booth School of Business

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CHAPTER 1: INTRODUCTION

Since its launch more than 50 years ago, the Center for Research in Security Prices (CRSP) has continued to fill an important niche within the financial industry by providing research-quality data. From the introduction of its initial historical research indexes in 1966 to present day, CRSP's dedicated team has continued to develop innovative products that provide a strong foundation for economic forecasting, stock market research, and financial analysis. CRSP's data is used by a variety of institutions including, but not limited to, academic organizations, investment banks, brokerage firms, corporations, and government agencies.

Situated within the University of Chicago, Booth School of Business, CRSP is one of 12 research centers that play an integral role in maintaining the University's reputation as one of the leading academic research institutions in the nation. Chicago Booth is renowned for conducting impactful financial and economic research, and for producing ideas and leaders that have shaped the world of business.

CRSP's experience with historical indexes and its commitment to excellence in the development and maintenance of the most complete, accurate, and easy-to-use securities data inspired an extension of its core products at CRSP's 50th anniversary mark. In 2010, CRSP introduced the first product in its series of transparent and investable indexes. The CRSP Indexes are relevant to practitioners, academics, and commercial entities alike. The indexes are used to manage funds, benchmark, and conduct research.

CRSP is committed to the oversight and transparency of its index governance structure. In order to provide the effective review of its processes and procedures; CRSP employees, Chicago Booth faculty advisors, and representatives from the financial services industry serve on its governance committees.

CRSP Governance Committees	
Index Oversight Committee	Reviews and approves material changes to the index methodology, as well as all stages of the index determination process, to ensure that the integrity of all CRSP Indexes is maintained
Index Advisory Council	Provides guidance with respect to the construction, methodology, and maintenance of the indexes. The council is consulted for input and advice to ensure the relevance of the CRSP Indexes, and to ensure that the indexes meet the needs of CRSP's clients
Index Eligibility Committee	Evaluates securities whose eligibility is indeterminate after applying rules both at ranking and following the application of corporate actions
Index Operating Committee	Conducts ad hoc reviews of complex corporate actions and immediate operational issues

CRSP's Governance Committees may exercise discretion to deviate from or amend the published methodology and/or operational processes to mitigate various risks or possible market disruption. In such cases, CRSP, LLC will communicate such information simultaneously to all subscribers and to the public.

CHAPTER 2: INDEX CONSTRUCTION

CRSP's investable, real-time indexes strive to blend advancements in academic research with current commercial practice in a fundamentally sound manner under the premise that an index must reflect the way that money managers actually invest. In order to achieve that goal, CRSP offers market capitalization-based, sector, and style (value and growth) indexes that utilize leading-edge methodology.

CRSP Indexes feature the following characteristics, which place an emphasis on minimizing unnecessary turnover while maintaining style purity:

- Packeting approach to migration
- Emphasis on cost efficiency
- Quarterly transitional reconstitution
- Objective and transparent rule-based methodology
- Breakpoints based on cumulative market capitalization
- Investability screens
- Float-adjusted market capitalization

CRSP's methodology was originally backtested for a 10-year period between January 2, 2001, and March 30, 2011. A subsequent backtest was run using June 29, 2001, as the start date in order to better align the beginning of the value and growth indexes with the availability of estimates data. Additionally, CRSP's sector index methodology was backtested for a six-year period from January 3, 2005, to March 31, 2011.

INDEX CONSTRUCTION PROCESS

All CRSP Indexes begin with the determination of the eligible universe. The index eligibility and investability screening process includes the application of restrictions in listing exchange, incorporation and headquarter location, organization and share types, and the application of investability screens – after which the broadest index, the CRSP US Total Market Index, is formed. Total shares outstanding (TSO) and float shares outstanding (FSO) are determined, total company market capitalizations are calculated, and capitalization-based breakpoints are determined to create the Mega, Mid, Large, Small-Mid, Small, and Micro Cap indexes. Each of these capitalization-based indexes (with the exception of Micro Cap) is then further broken down into value and growth classifications to produce the set of CRSP Value and Growth Indexes. Additionally, the constituents of the CRSP US Total Market Index are subdivided by the industry classification of each member's core business to produce the CRSP Sector Indexes.

CREATING THE INDEX-ELIGIBLE US EQUITY MARKET UNIVERSE

The CRSP Indexes are designed to represent the market of investable US equity securities. They encompass equity securities including common stocks and real estate investment trusts (REITs) of US companies that are listed on a CRSP exchange of interest — NYSE, NYSE American, NYSE ARCA, NASDAQ, Cboe Global Markets, and the Investors Exchange (IEX). The same eligibility rules are applied across all indexes.

The table on [page 3](#) specifies which exchanges, and organization and share types are eligible/ineligible for inclusion in the CRSP US Indexes.

Universe Category	CRSP Index Eligible	Eligible for Market Capitalization Assignment
Primary Exchange Listing		
NYSE	Y	Y
NYSE American	Y	Y
NYSE ARCA	Y	Y
NASDAQ	Y	Y
Cboe Global Markets	Y	Y
The Investors Exchange	Y	Y
OTCCBB	N	Y*
Pink Sheets	N	Y*
Unlisted	N	Y*
Other Consolidated US	N	Y*
International	N	Y*
Organization Types		
Corporation	Y	Y
Real Estate Investment Trust (REIT)	Y	Y
Berkshire Hathaway A & B	Y	Y
Business Development Company (BDC)	N	N
Closed-End Investment Company	N	N
Exchange Traded Fund (ETF) / Exchange Traded Note (ETN)	N	N
Limited Liability Company (LLC)	N	N
Limited Partnership (LP)	N	N
Royalty Trust	N	N
Special Purpose Acquisition Company (SPAC or Blank Check Company)	N	N
Special Purpose Vehicle (SPV)	N	N
Share Types		
Common Shares	Y	Y
American Depository Receipt (ADR)	N	N
Preferred and Convertible Preferred Stock	N	N
Convertible Class B Common Stock	N	Y*
Shares of Beneficial Interest (SBI)	Y (unless a fund)	Y (unless a fund)
Rights	N	N
Warrants	N	N
Participating Preferred Stock	N	N
Redeemable Shares	N	N
Trust Receipts	N	N
Units	N (even if the only trading form of an otherwise eligible share type)	N (even if the only trading form of an otherwise eligible share type)
Non-Restricted Fully Convertible/Exchangeable LLC Partnership Units/Interests	N	Y*

* Only if representing additional common equity of a company already represented as an index-eligible security.

IDENTIFYING US COMPANIES

To determine whether a company is considered a US company, and therefore eligible for indexes, securities are screened based upon the following criteria:

1. **The company's headquarters and incorporation are in the United States:** Companies both incorporated in and with headquarters in the United States are eligible. Others move to criteria 2.
2. **The company is headquartered in the U.S., a U.S. Territory (UST), Domicile of Convenience (DOC), or Tax Haven (TH):** Companies headquartered in the U.S., a U.S. Territory, Domicile of Convenience or Tax Haven move on to Criteria 3. See [Appendix F](#) for list of UST, DOC and TH locations. Others are considered foreign and are not eligible.
3. **The company has an Employer Identification Number:** Companies that have an Employer Identification Number (EIN) move on to criteria 4. Companies that do not have an EIN and thus do not withhold taxes on US wages or file US tax returns are foreign and are not eligible.
4. **Securities are owned by more than 5 percent of US domestic equity funds:** If more than 5 percent of domestic equity funds own a security, as determined by holdings data, US manager sentiment indicates that the security is viewed as US eligible (giving an inclusion bias in criteria 4). Irrespective of manager sentiment, CRSP will collect any information deemed necessary, and may include additional information on US fund sentiment, asset/operation location, tax/regulatory jurisdiction, history, revenue origin, corporate structure/ownership, primary exchange, etc. All securities from criteria 4 are appraised by CRSP's Index Eligibility Committee in criteria 5.
5. **Committee:** The above rules were developed to capture the characteristics of the vast majority of securities. However, when exceptions occur, the Committee will make the final determination of whether or not a security is domestic and included in the CRSP Indexes. For these exceptions, which will include new securities or those that experienced a fundamental change in their characteristics, the Committee will verify by other sources whether a firm actually has notable US assets, revenue, employment, makeup of company executive officers and directors, and other relevant operations, or has obtained an EIN only for nominal visibility purposes. As one of the many aspects, the committee considers the accounting rules used by companies as part of its evaluation process and is more likely to consider a company that follows a US GAAP standard for financial reporting to be a US domestic company. The committee also analyzes company's filing status with SEC, and is less likely to consider a company that files as a Foreign Private Issuer to be a US domestic company. Under certain situations, the committee will not automatically exclude companies incorporated in countries such as UK and Canada. If a company's location is unclear after a corporate event, the Committee may elect to give higher weight to continuing its status and reviewing again at the next ranking. In practice, the Committee may also approve some additional jurisdictions deemed valid for business purposes for a particular company.

These criteria will be reapplied prior to each ranking. Any security that has been included in or removed from the CRSP Indexes based on the Committee's decision will retain that status for one year, unless there is a fundamental change in the security's characteristics. After one year, the security's eligibility status will be reevaluated by the Committee.

INVESTABILITY SCREENS

At ranking, once the index-eligible universe is defined and capitalization-based breakpoints are determined, investability screens are applied to create the pro forma indexes, which reflect the anticipated post-reconstitution index constituents. The chart on [page 5](#) summarizes these screens and also provides threshold criteria that each security must meet.

The investability screens are:

- **Market Capitalization:** The total company market capitalization must be at least \$15 million to be added to an index at ranking. If, at ranking, the total company market capitalization for a security in the index has fallen below \$10 million, the security will be removed from the index.
- **Float Shares:** A security's FSO, or those shares readily available for trading, must be at least 12.5 percent of the TSO in order for it to be added to an index at ranking. If the FSO of a security in the index falls below 10 percent of TSO at

ranking, the security will be removed from the index. For securities qualifying as a fast-track initial public offering (IPO) the minimum float requirement is 10 percent.

- **Trading Volume:** CRSP determines a sparse trading score for each security by calculating the average daily split-adjusted consolidated trading volume over the last 125 trading days divided by the FSO as of the end-of-day five trading days before the ranking day. Trading data used for calculating the average for each security is collected no earlier than its first day of regular way trading on a CRSP exchange of interest. In order for a security to be considered for index inclusion at ranking, this ratio must be at least 0.001. If the ratio of a security that is currently a member of the CRSP Indexes falls below 0.0008 for two consecutive rankings, it is removed from the index. For the small number of organizations with multiple share classes, CRSP may consider the trading volume for all the securities that are represented in the company’s total market capitalization.
- **Trading Gaps:** To be considered for index inclusion at ranking, a security must not have a sequence of 10 or more consecutive nontrading (zero volume) days since the last ranking. If an index constituent fails the 10 day rule the security will be removed from the index at ranking. Days that a security is suspended by the exchange do not count toward this requirement.
- **Suspended Securities:** If a security has been suspended by its listing exchange for at least 40 days on the ranking day, it will be removed.
 - If the security remains suspended for the entire pro forma period, it will be removed at a price of zero.
 - If the security resumes trading during the pro forma period, the security will be removed at its last known closing price.
 - If a security is suspended from trading on the ranking day, it will not be added to the CRSP indexes.
- **Seasoning of New Securities:** New securities are eligible for index inclusion if they fulfill at least one of the two following conditions:
 - The first day of regular way trading on a CRSP exchange of interest was at least 20 trading days before the ranking day.
 - The first day of regular way trading on a CRSP exchange of interest was at least five trading days before the ranking day and the company’s capitalization is greater than or equal to the lower breakpoint of the CRSP US Small Cap Index. These companies are considered to be fast-track IPOs.

Securities created by a corporate action payout are not subject to the seasoning rules. Companies that are identified as “readmitted” to an exchange of interest (e.g. transfers from OTC after previously delisting from NYSE) use the original first day of regular way trading before delisting for purposes of this check. Companies that were not previously tracked (e.g. transfers from OTC with no previous exchange of interest history) use the first day of trading after listing on an exchange of interest.

CRSP INVESTABILITY SCREEN SUMMARY

Investability Screen	Add	Drop
Market Capitalization	\$15 million or greater	Less than \$10 million
Float Shares	12.5% or more of shares outstanding, 10% or more for a fast-track IPO	Less than 10% of shares outstanding
Trading Volume	0.001 or greater sparse trading score	Less than a 0.0008 sparse trading score for two consecutive rankings
Trading Gaps (sequence of 10 or more days with zero volume)	None since the last ranking	At least one since the last ranking
Suspended Securities	Not currently suspended	Suspended at least 40 days
Seasoning of New Securities	20 days trading or greater, or 5 days or greater if satisfying the fast-track IPO rules	n/a

If a security is removed from the CRSP Indexes for failing one of the investability screens (deemed uninvestable) it must pass the below “drop” thresholds for four consecutive rankings before it is considered for reinclusion. Once a security has met the four consecutive rankings requirement for a drop threshold, that requirement is considered met.

- Market capitalization \geq \$10 million
- Float \geq 10 percent
- Sparse trading score \geq .0008
- Consecutive days of zero volume $<$ 10
- Suspended for $<$ 40 trading days

An uninvestable security that has subsequently passed all of the investability drop screens for four consecutive rankings (now considered for reinclusion) must also pass the more restrictive “add” thresholds before it can be readmitted (added back) to the CRSP Indexes.

- Market capitalization \geq \$15 million
- Float \geq 12.5 percent
- Sparse trading score \geq .001
- Consecutive days of zero volume $<$ 10
- Not currently suspended

For example:

1. Security A is removed at the December 2020 rebalance for having a float percentage of less than 10 percent (FSO/TSO $<$ 10 percent).
2. Security A passes all drop thresholds for four consecutive rankings.
3. At the December 2021 rebalance the security may be readmitted to the CRSP indexes if, in addition to passing the drop thresholds for four consecutive rankings, it passes all of the more restrictive add thresholds.

If a security is removed from an index due to delisting from a CRSP exchange of interest and it is later readmitted to that or another exchange of interest, the security cannot be added back to an index earlier than the fourth ranking after it was removed, unless the entity is reconstituted or restructured and treated as an IPO or some form of merger before reentry.

The Market Capitalization and FSO requirement investability screens are also applied between rankings when adding or reevaluating securities after certain corporate actions such as spin-offs or large capitalization mergers.

DIRECT LISTINGS

CRSP will consider for index inclusion companies that IPO via direct listings — and skip the traditional underwriting process — assuming that public disclosures are available related to the company’s eligibility and investability (e.g. share type, organization type, FSO, TSO, location, market capitalization etc.) Given sufficient information, CRSP will not limit its eligible and investable universe based on the initial offering type.

VOTING RIGHTS

CRSP will consider for index inclusion companies that IPO with capital structures that include share classes (common stock) with dissimilar voting rights assuming that public disclosures are available related to the company’s eligibility and investability. The presence of multiple share classes with skewed voting rights is not currently used to restrict CRSPs eligible and investable universe.

UNIVERSE SHARES AND INDEX HOLDINGS

TOTAL AND FLOAT SHARES OUTSTANDING

The CRSP Indexes are free float adjusted capitalization-based indexes. FSO represents the TSO less any restricted shares, which are defined as those held by insiders or stagnant shareholders – including, but not limited to: board members, directors and executives; government holdings, employee share plans, and corporations not actively managing money. CRSP defines a security's float factor as the ratio of FSO to TSO, expressed as a percentage. While float-adjusted market capitalization is used to determine a security's weight within an index, the TSO is used to rank companies by size at ranking. The shares figures used are the last known values as of the close five trading days prior to ranking, unless shares are impacted by a corporate action during this five day period. Holdings are not updated between rankings unless a company undergoes a corporate action. If a non-neutral corporate action occurs, the holdings are calculated using the post-corporate action TSO and float factor. If a neutral corporate action that affects shares occurs, then holdings are adjusted by applying the rate indicated in the corporate action.

EFFECTIVE FLOAT FACTOR

At ranking, CRSP generates an effective float factor (EFF) for all index constituents, defined as the security's float factor rounded to the nearest 5 percent. An EFF will remain in place from the first transition day until the following ranking unless the security is affected by a non-neutral corporate action between rankings, such as a merger, spin-off, or secondary offering. CRSP calculates an EFF when applying non-neutral corporate events between rankings and when new adding securities to indexes as a result of the fast-track IPO process.

INDEX HOLDINGS

Once EFFs are calculated for all securities, index holdings are calculated by multiplying the security's TSO by its EFF as well as index-specific multipliers. These multipliers exist to indicate shared allocation within size and style index families, and limits used to satisfy the US Internal Revenue Service's concentration constraints. Size index family construction is described in the CRSP Capitalization-Based Indexes section. Style index family construction is described in Chapter 5: CRSP US Value and Growth Indexes. Concentration limits are described below under IRS Code 25/50 Concentration.

Like the EFF, index holdings are calculated on the ranking day and remain in place until the following ranking, unless affected by a corporate action between rankings. From index holdings, a security's weight in an index is calculated as (security's index holdings * security's price)/total index market capitalization. While a security's EFF and index holdings will not change on a daily basis, its weight within an index will be affected by fluctuations in its price or fluctuations in index capitalization of other securities in the index.

IRS CODE 25/50 CONCENTRATION CONSTRAINTS

The Internal Revenue Service has established rules for a fund to qualify as a Regulated Investment Company (RIC). In other words, the IRS rules impose limits on the holdings of RICs. These rules state that at the end of each quarter of a RIC's tax year,

- No more than 25 percent of the value of the RIC's assets may be invested in a single issuer
- The sum of the weights of all issuers representing more than 5 percent of the fund's total assets should not exceed 50 percent

When necessary, a CRSP index is constrained to allow a fund tracking the index to comply with the IRS rules, by adjusting the weights of its constituents, with the following goals:

- Meet the diversification requirements
- Minimize the expected tracking error between the constrained index and an implied parent index with no constraints imposed
- Use buffers around the limits so that the typical movement of weights due to price movement and corporate actions do not initiate recurrent index rebalancing and the associated turnover
- Preserve the investability of the index by avoiding the assignment of index weights that represent an excessive stake in any one issuer

There are two types of operations on an index, a check for compliance and an optimization if the check fails. Each of these operations may have different limits based on the situation, described in the following terms:

1. Single Company Limit – the maximum weight that may be represented by a single issuer (e.g. 25%)
2. Large Company Limit – the maximum weight that may be represented by all issuers considered Large (e.g. 50%)
3. Large Company Threshold – the maximum weight of issuers not included in the Large Company Limit (e.g. 5%)

Optimization also allows control over the following variables:

1. Maximum Weight Ratio – the maximum ratio allowed of an issuer's constrained index weight relative to its unconstrained index weight (e.g. 10x)
2. Ideal Weight Target – either the unconstrained state or the current state. The unconstrained state resets all CLMs to 1 before optimizing. The current state utilizes the existing index CLMs when optimizing.

A “least squares” approach minimizes the tracking error between the alternate index and its ideal index, thus reducing any changes to company weights within an index.

The first step in using a least squares approach is to calculate the constrained weights through a non-linear optimization that minimizes the squared difference between each company's ideal weight (\bar{w}_i), or the weight based on the security's holdings before the concentration constraint is applied, and its constrained weight (w_i).

$$\text{Tracking error} = \min \sum_{i=1}^N (\bar{w}_i - w_i)^2,$$

where N is the number of companies in the index,

subject to the following constraints:

1. The summation of all company weights within an index must equal a value of one:

$$\sum_{i=1}^N w_i = 1$$

2. The weight for a specific company must fall between zero and the Single Company Limit:

$$\text{for all } i, 0 \leq w_i \leq \text{Single Company Limit}$$

3. The Maximum Weight Ratio for any company must be satisfied:

$$\text{for all } i, \frac{w_i}{\bar{w}_i} \leq \text{Maximum Weight Ratio}$$

4. The total weight of companies above the Large Company Threshold should not exceed the Large Company Limit:

$$\text{where } w_i > \text{Large Company Threshold}, \sum w_i \leq \text{Large Company Limit}$$

The second step is to calculate the concentration limit multiplier (CLM) that is used to adjust index holdings at the security level. The CLM is defined as the ratio of holdings in the constrained index to the holdings in its unconstrained ideal index. By convention the CLM is set such that the maximum value is one, and all others are adjusted proportionately,

$$\text{CLM}_i = \frac{w_i}{\bar{w}_i} * \min \left(\frac{w_i}{\bar{w}_i} \right)$$

The CLM used for a company at reconstitution to meet compliance remains in effect until the next ranking period, unless there is a corporate action or index event that triggers a full index rebalance as detailed under the Quarterly Maintenance and Daily Maintenance sections. CRSP tests compliance on the ranking and compliance days. In addition, the pro forma indexes are verified for compliance daily during the pro forma period.

Standard combinations of the concentration parameters are used for known situations. These are denoted in the following table.

Situation	(1) Single Company Limit	(2) Large Company Limit	(3) Large Company Threshold	(4) Maximum Weight Ratio	(5) Ideal Weight Target
Ranking Test	22.5%	45%	4.9%		
Ranking Optimization	22.5%	45%	4.9%	10x	Unconstrained
Ranking Test Contingency1*	23.25%	46.5%	4.9%		
Ranking Optimization Contingency1*	23.25%	46.5%	4.9%	10x	Unconstrained
Compliance Test	25%	50%	5%		
Compliance Optimization	24.5%	49%	4.95%	10x	Current

* - If it is not mathematically solvable to optimize an index due to the low number of companies and the wide range of input weights, a smaller buffer is used. If still unsolvable, a solution will be found by reducing the buffers further or by increasing the Maximum Weight Ratio. If it is still not possible to find a viable solution, the Committee will review whether the index should be modified or discontinued.

CRSP CAPITALIZATION-BASED INDEXES

The following capitalization-based indexes are currently offered:

Index Name	NASDAQ Symbol	
	Total Return	Price Return
CRSP US Total Market Index	CRSPTMT	CRSPTM1
CRSP US Mega Cap Index	CRSPMET	CRSPME1
CRSP US Mid Cap Index	CRSPMIT	CRSPMI1
CRSP US Large Cap Index	CRSPLCT	CRSPLC1
CRSP US Small-Mid Cap Index	CRSPSMT	CRSPSM1
CRSP US Small Cap Index	CRSPSCT	CRSPSC1
CRSP US Micro Cap Index	CRSPMCT	CRSPMC1

ASSIGNING COMPANIES TO INDEXES: CAPITALIZATION-BASED BREAKPOINTS AND BANDS

CRSP assigns companies eligible for the US Total Market Index to size-specific capitalization-based indexes using the company's total market capitalization calculated using TSO. Unlike count-based indexes, the CRSP Indexes do not have a limit on the number of index constituents. This feature allows for the CRSP Indexes to better reflect the market's evolution, as the number of listed companies can change substantially over time.

At ranking, companies are sorted from largest to smallest based on each company's total market capitalization. Market capitalization is determined using a security's TSO multiplied by the security's price on a random price day (see [Chapter 3 – Index Maintenance - Quarterly Maintenance](#) section for more details on the Ranking and Reconstitution process). The market capitalizations of all index-eligible securities of a given company are then summed together to determine the company's total market capitalization. Once all index-eligible companies are sorted, each company is then assigned a cumulative market capitalization score, which is equal to the cumulative capitalization of all higher capitalization companies plus half of the capitalization of the company that is being ranked, expressed as a percentage of the market capitalization of all eligible companies. In other words, the score is based on the midpoint of a company's market capitalization in order to ensure it is assigned to the index in which the majority of its market capitalization lies.

Breakpoint targets are then set at 70 percent, 85 percent, and 98 percent of the cumulative market cap of the index-eligible universe. (see the [Breakpoints and Bands](#) section for more information).

At each ranking, the actual market capitalization of the largest company and the smallest company in each index is noted. These sizes determine the ranges for assignment of new additions or of securities impacted by corporate actions.

A company is considered valid for an index if its capitalization is less than or equal to that of the largest company in the index and greater than that of the largest company in the adjacent lower capitalization index.

Companies lying at or near the boundary of market capitalization breakpoints are viewed as being in a transitional area between adjacent capitalization indexes. In order to prevent the premature movement of these “borderline” companies to a new index, CRSP establishes different percentage “bands” around each breakpoint. Movement of companies in or near these bands is restricted and can result in securities being partially held in adjacent indexes. This approach balances the desire to maximize style purity while minimizing index turnover.

CRSP base-level size indexes are Mega, Mid, Small, and Micro. All companies in the Total Market Index will be allocated fully within these four indexes. In addition, CRSP maintains two composite indexes that combine base level indexes; Large is a combination of Mega and Mid, and Small-Mid is a combination of Mid and Small.

BANDING AND MIGRATION WITH PACKETING

In order to prevent the premature movement of companies located near the established breakpoints, CRSP considers different percentage “bands” around each breakpoint. Band percentages can be seen in the diagram on [page 10](#). Movement between indexes is cushioned by introducing the concept of “packeting.” CRSP defines a packet as 50 percent of the index’s total holdings of a company. Movement occurs when a company passes completely through to the other side of a shared band between indexes into the core of the adjacent index.

Once a company crosses the threshold into the adjacent core, one packet (50 percent) is moved. If a company remains in the adjacent core at the next ranking, then the second packet (remaining 50 percent) is moved into the adjacent index.

At ranking, if a company with a 100 percent allocation in an index moves beyond the core of the adjacent index, then the company is moved entirely to the new capitalization-based index. Similarly, if a company with 50 percent allocation in an index moves beyond the core of the adjacent index, then that allocation is moved entirely (100 percent) to the new capitalization-based index.

If the company moves back into the shared band then no further packets are moved (the holdings are kept in the same proportion). No movement is exercised if the company ranks within the band. In other words, a security may remain in a transitional band area indefinitely.

New index constituents (e.g. an IPO), are added fully to the appropriate capitalization-based index based strictly on the breakpoints determined at the most recent quarterly ranking (bands are ignored).

Migration rules related to packeted constituents (e.g. 50% Small/50% Mid), are applied to each packet separately. Final index placement is the sum of the individual post-migration packets.

See [Appendix A](#) for migration examples.

CAPITALIZATION-BASED INDEXES, BREAKPOINTS AND BANDS

CRSP defines the following capitalization-based indexes and their associated bands, which are shown as a chart on the next page:

CRSP US Mega Cap Index:

- Index range: $0 < X_{i,t} \leq 70\%$
- Band range: $64\% < X_{i,t} \leq 76\%$; breakpoint : $X_{i,t} = 70\%$
- Mega Only: $0\% < X_{i,t} \leq 50\%$;
- Adjacent core: $76\% < X_{i,t} \leq 81\%$ (mid core)

CRSP US Mid Cap Index:

- Index range: $70\% < X_{i,t} \leq 85\%$
- Band ranges:
 - $64\% < X_{i,t} \leq 76\%$; breakpoint: $X_{i,t} = 70\%$ and
 - $81\% < X_{i,t} \leq 89\%$; breakpoint: $X_{i,t} = 85\%$
- Adjacent cores:
 - $50 < X_{i,t} \leq 64\%$ and (mega core)
 - $89\% < X_{i,t} \leq 96\%$ (small core)

CRSP US Large Cap Index:

- Index range: $0 < X_{i,t} \leq 85\%$
- Band range: $81\% < X_{i,t} \leq 89\%$; breakpoint: $X_{i,t} = 85\%$
- Adjacent core $89\% < X_{i,t} \leq 96\%$ (small core)

CRSP US Small / Mid Cap Index:

- Index range: $70\% < X_{i,t} \leq 98\%$
- Band ranges:
 - $64\% < X_{i,t} \leq 76\%$; breakpoint: $X_{i,t} = 70\%$ and
 - $96\% < X_{i,t} \leq 99.5$; breakpoint: $X_{i,t} = 98\%$
- Adjacent cores:
 - $50 < X_{i,t} \leq 64\%$ and (mega core)
 - $99.5\% < X_{i,t} \leq 100.0\%$ (micro core)

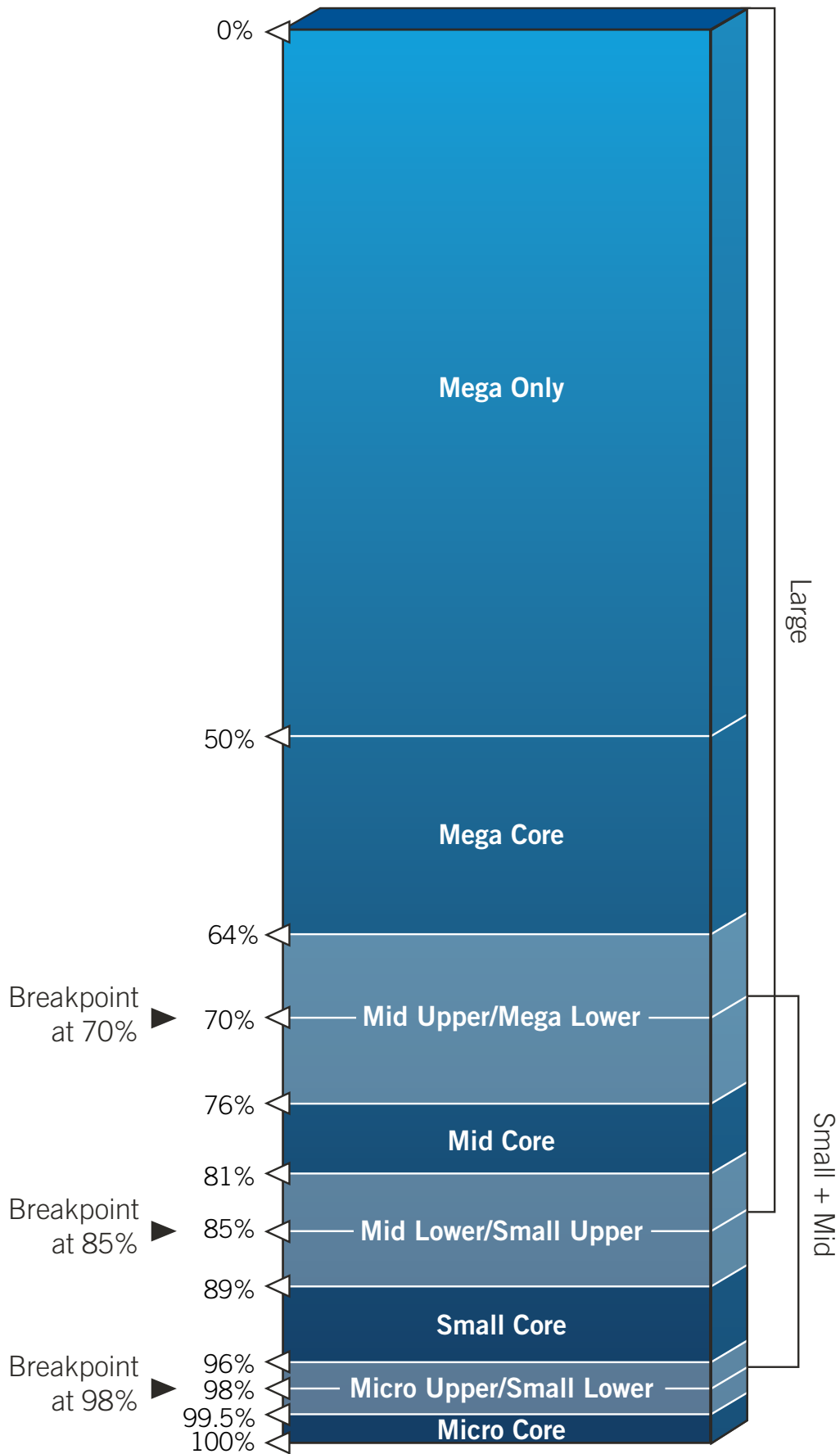
CRSP US Small Cap Index:

- Index range: $85\% < X_{i,t} \leq 98\%$
- Band ranges:
 - $81\% < X_{i,t} \leq 89\%$; breakpoint: $X_{i,t} = 85\%$ and
 - $96\% < X_{i,t} \leq 99.5$; breakpoint: $X_{i,t} = 98\%$
- Adjacent cores:
 - $76\% < X_{i,t} \leq 81\%$ and (mid core)
 - $99.5\% < X_{i,t} \leq 100.0\%$ (micro core)

CRSP US Micro Cap Index:

- Index range: $98\% < X_{i,t} \leq 100\%$
- Band range: $96\% < X_{i,t} \leq 99.5\%$; breakpoint: $X = 98\%$
- Adjacent core $89\% < X_{i,t} \leq 96\%$ (small core)

CAPITALIZATION-BASED BREAKPOINTS AND BANDS DIAGRAM



CHAPTER 3: INDEX MAINTENANCE

QUARTERLY MAINTENANCE

RANKING AND RECONSTITUTION

CRSP Indexes are reviewed on a quarterly basis. The review process consists of reevaluating each security's eligibility, investability, and capitalization. In addition, index construction rules for each index family are applied. [Chapter 2: Index Construction](#) describes the CRSP US Total Market and capitalization based index construction process. Chapters 4 and 5 detail the sector and style based index construction rules.

The review process is completed on the ranking day, after the close of the first Friday of March, June, September, and December. The ranking day initiates the ranking period, or pro forma period. Updated constituents and holdings for each primary index are reported in a separate associated pro forma index.

TRANSITIONAL RECONSTITUTION

Transitional Reconstitution represents a departure from the standard practice of making all of the rebalance changes on a single day. This process better aligns the CRSP Indexes with the investment community's best practices. The conversion from current index membership and holdings to their updated pro forma targets is completed over a five-day transition period. The transition period is generally effective after the close of the second Wednesday after the ranking day.

During the five-day transition period, CRSP will move 20 percent of the change in holdings from the current index to the target pro forma index each day. More precisely, the goal of each transition day is to move the difference in holdings between the current index and the target pro forma index, divided by the number of remaining days in the transition period. On the final transition day the remaining holdings are moved regardless of the past rates during the transition.

By the end of the ranking period, on the final transition day (in most cases effective after close of the first Tuesday after the third Friday of the month of ranking) the indexes are fully reconstituted (converted to the targets maintained in their pro forma indexes) and the pro forma indexes cease to exist.

Both pro forma and primary indexes are maintained on a daily basis. In some cases there are adjustments to the rules for handling specific corporate action types during the pro forma period. These cases are noted on the following pages and in the appropriate daily maintenance chapters.

CRSP may make adjustments to the holdings of individual pro forma constituents. Pro forma holdings adjustments are generally applied during the first week following the ranking day.

The Transitional Reconstitution Calendar ([Appendix H](#)) defines the various segments of the pro forma period. In the case of an unscheduled market closure or a holiday that conflicts with an important segment of the ranking period, the pro forma adjustment period may be shortened, but the transition period will remain five days.

IRS CODE 25/50 COMPLIANCE AT RANKING

At each ranking, CRSP checks for compliance using the Ranking Test limits. If required, security weights are adjusted in the initial pro forma indexes to meet the Ranking Optimization targets, even if the Compliance Test limits are not violated.

If the weights in the pro forma index violate the Compliance Test limits at any time during the pro forma period (i.e., after ranking day but before the final transition day), the pro forma index is rebalanced so as to meet the Ranking Optimization targets.

If the pro forma indexes are rebalanced during a transition period, the primary index will continue transitioning to the new target beginning the day after the index is rebalanced. For example, if the pro forma is rebalanced on Thursday for Friday, then the transition will start moving to the new target beginning on Friday for Monday. If a security in the primary or newly rebalanced pro forma index is constrained, then a new CLM is computed by taking the ratio of the post transition holdings of the constrained index to the post-transition holdings of its parent (unconstrained) index.

Prices used to determine a company's compliance weight at ranking are the start of day prices known after the close of the ranking day. Prices used to validate the daily t+1 compliance of the pro forma indexes are the start-of-day prices known on t. For example, Monday's start-of-day prices are used to verify the compliance of index holdings effective before open Tuesday.

DETERMINING PRICE ON RANDOM PRICE DAY

CRSP uses the closing prices of all eligible securities on the "random price day" to determine the company's total market capitalization used at ranking. The random price day is selected algorithmically from the seven trading days immediately prior to the ranking day using the following criteria:

- The two trading days with the highest aggregate absolute price moves and the two trading days with the lowest aggregate trading volume are excluded. The CRSP US Total Market Index is used as the point of reference
- The random price day is selected from the remaining (non-excluded) trading days

Prices are adjusted for all corporate actions to place companies on the same basis as the ranking day. A security not yet trading (pending listing) on the random price day is valued using its closing price on its first day of trading.

CORPORATE ACTIONS DURING PRO FORMA PERIOD

If a non-capitalization-neutral corporate action that impacts holdings occurs during the pro forma period, CRSP seeks to evaluate and move the resultant entity only once. If the corporate action triggers a reevaluation during this time, the affected company will be migrated from its location in the primary indexes, not the pro forma index. If there is a true-up or reevaluation done when processing a corporate action, even if the event does not normally result in migration, the security will snap to its targeted Pro Forma location as part of the event.

When reevaluating Mergers or Mergers of Equals during the Pro Forma period there is no minimum size requirement before migration is allowed.

Secondary Offerings during the Pro Forma Period

Before the Transition Period

1. If the offering number of shares is greater than or equal to 5 percent of the security's holdings in the US Total Market Index pro forma and primary holdings, CRSP will apply the secondary offering to both pro forma and primary indexes.
2. If the offering number of shares is greater than or equal to 5 percent of the security's holdings in the US Total Market Index pro forma index holdings and less than 5 percent of primary holdings, CRSP will apply the secondary offering to the pro forma index only.
3. If the offering number of shares is greater than or equal to 5 percent of the security's holdings in the US Total Market Index primary index holdings and less than 5 percent of pro forma holdings, CRSP will apply the secondary offering to both pro forma and primary indexes.
4. If the offering number of shares is less than 5 percent of the security's holdings in the US Total Market Index pro forma and primary holdings, CRSP will not apply the secondary offering.

During the Transition Period

If the offering number of shares is greater than or equal to 5 percent of the security's holdings in the US Total Market Index pro forma index holdings and less than 5 percent of primary holdings CRSP will apply the secondary offering to both pro forma and primary indexes (cases 1, 3, and 4 remain the same as above).

Reverse Mergers during the Pro Forma Period

If the new company's size is greater than or equal to the CRSP US Large Cap breakpoint as of the last ranking, then no transition or reconstitution is implemented until the reevaluation of the new entity is complete.

Special Cases:

- If the new company is reevaluated by the final transition day, then it will migrate from the packeting location in the primary index.
- If the new company is reevaluated after the final transition day, then it will migrate from the packeting location that was targeted in the pro forma index. In other words, the reevaluation/rebalance for the new company will be postponed until after the final transition day.

DAILY MAINTENANCE

Changes in the CRSP Indexes occur on a daily basis as a result of numerous factors, including price movements, corporate actions, and security additions and deletions. In order to accurately track and reflect these daily changes, CRSP uses the following price methodology.

START-OF-DAY PRICE

A security's start-of-day price is defined as the previous day's end-of-day price adjusted for all splits and non-ordinary distributions, such as special dividends, returns of capital, and spin-offs. See [Chapter 3: Index Maintenance – Daily Maintenance – Corporate Actions](#) and the [Price Adjustment Table in Appendix B](#) for further information describing the derivation of a security's start-of-day price.

END-OF-DAY PRICE

Closing prices are assigned in the following order of precedence to securities traded on a CRSP exchange of interest:

1. The closing price reported by the primary listing exchange. If no volume on the primary exchange, move to step 2.
2. The last trade price from consolidated price feeds. If no volume on the primary or consolidated tape, move to step 3.
3. The last traded date end-of-day price carried forward. Bid-ask averages are not used to fill in trading gaps. In addition, no adjustments are made to reflect the current level of the market or market segments.
4. CRSP will calculate an end-of-day price adjustment amount from the terms of the corporate action in cases where a security could not be valued accurately at the start of a day.

FINAL CLOSING VALUE FOR DELISTED SECURITIES

A security that delists from an exchange of interest but is still held in indexes (e.g. late primary exchange delist notification, trading halted or suspended on the day prior to the effective date of the delist) carries forward its last known exchange closing price until it can be valued and removed from indexes.

If trading volume is first identified on a secondary exchange by 1:30 p.m. CT on one of nine trading days after the security has been delisted from its primary exchange delist (day one is the effective date of the delisting) it will be removed effective after close of that trading day. If volume is first identified on a secondary exchange after 1:30 p.m. CT on one of the eight trading days after the primary exchange delist, the security will be removed effective after close of the following trading day. If neither of the above cases occurs, the security will be removed effective after the close of the 10th trading day.

In the above cases securities are valued (marked) using the following order of precedence:

1. The latest closing price reported on a secondary exchange. If no volume on the secondary exchange, move to step 2.
2. The closing bid on a secondary exchange on the tenth day after the primary exchange delist. If no closing bid on the 10th day is reported, move to step 3.
3. The security is marked at a price of zero.

PRICE ADJUSTMENTS AS A RESULT OF CORPORATE ACTIONS

If an index constituent is exchanged for cash, shares, or other property as part of a merger, acquisition, or liquidation, the security's value is determined using the following order of precedence:

1. The total value of all distributions (cash and/or stock) received in exchange for the security through the current day.
2. The start-of-day price carried forward. A price can be carried forward no more than 10 trading days after its last day listed on a CRSP exchange of interest.
3. Partial liquidation payments after delisting are applied as they are announced, up through the end of the 10th day after delisting. If no final payment is announced by the tenth day the security is generally removed at a price of zero.

See [Price Adjustment Table in Appendix B](#).

CORPORATE ACTIONS

CRSP adheres to the principles of replicability, consistency, maintaining style purity, and minimizing turnover when implementing corporate actions, with the objective of reflecting changes in the US equity market in a timely and accurate manner. When a corporate action takes place such that the surviving entities' index eligibility cannot be determined with the available information, CRSP will evaluate the security's eligibility at the next regularly scheduled quarterly ranking.

SHARE CHANGES REPORTED IN CORPORATE FILINGS

Changes to TSO or FSO that are not directly attributable to a single corporate event on a specific day (e.g. reported in corporate filings) generally do not immediately affect index holdings. However, the next regularly scheduled quarterly ranking or non-neutral corporate action uses the last confirmed TSO and FSO regardless of source.

MERGERS

A merger is a corporate action in which two or more companies are combined into one, creating a new entity. Shares of the non-surviving entity are exchanged for shares of the surviving entity, cash, or both. In most cases, the surviving entity will be evaluated for index inclusion immediately, and the non-survivor will be removed from the index.

IMPLEMENTATION OF MERGERS

The non-surviving participant(s) of a merger is generally removed from the index after the market close on the day before the effective date. However, if necessary, the non-survivor may remain in an index until the surviving entity can be accurately valued. Assuming both participants are index eligible and investable, a stock merger will result in a change of the surviving company's index holdings applied after the close of the trading day before the effective date (i.e., the first day of trading of the combined entity).

CRSP will reevaluate large mergers intra-quarter if the resultant (combined) entity's market capitalization is at least as large as the lower breakpoint of the CRSP US Large Cap Index as of the last ranking. If CRSP can confirm the merger is complete and is able to acquire the information necessary to determine the company's market capitalization, sector, and value/growth placement by 1:30 p.m. CT on the trading day before the merger's effective date, CRSP will reevaluate the surviving entity. Any changes made will be effective after the close of the trading day before the effective date. Banding and migration rules will apply, with migration originating from the index location of the company with the largest pre-merger market capitalization. If the resulting company does not meet the size requirements for immediate reevaluation, it will remain in its current index and will be reviewed at the next quarterly ranking. In general, no changes will be made at the time of the corporate action if the acquired entity is not index eligible and investable.

CONSTITUENT PURCHASE OF AN INELIGIBLE OR UNINVESTABLE COMPANY

In most cases, if an index constituent issues additional shares to purchase a company that is not a member of the CRSP US Total Market Index due to its failure to meet index eligibility or investability requirements, CRSP will reevaluate and true-up holdings of the combined entity at the next regularly scheduled quarterly ranking or upon the application of the next non-capitalization-neutral corporate event (e.g. secondary offering). In other words, the holdings of the acquirer will not be adjusted on the effective date of the merger.

LATE ANNOUNCEMENT OF COMPLETED MERGERS

If the completion of a merger is confirmed after 1:30 p.m. CT on the trading day before the effective date, then the non-surviving entity (target) may appear in an index on the effective date. Its end-of-day value will be set to the sum of the value of the newly issued shares received plus any cash amounts distributed. The target will be removed on the following trading day (the day after the effective date). Late mergers will be reevaluated if the resultant company meets the same criteria as an on-time merger.

MERGER RESULTING IN A NEWLY LISTED SECURITY

If two (or more) companies combine to form a single new company, (a merger of equals, or other cases where the shareholders of the acquired companies represent all index eligible shares of the new security), the new entity's reevaluation can be effective as early as after the close of the first day of regular way trading of the newly listed shares. There is no minimum size requirement before migration is allowed when reevaluating a Merger of Equals.

If the merger is confirmed before 1:30 p.m. CT on the day before the effective date (or confirmed after 1:30 on the day before the effective date and the merger consideration is stock only) then the new company can be added to the indexes after the close of the day before the effective date as received stock.

A synthetic start of day price for the new security is calculated by subtracting the cash proceeds (if any) from the acquired security's previous closing price divided by the shares payout ratio.

If there is more than one acquired security, the company with the highest security capitalization contribution relative to the newly listed company is used in the above calculation.

The new company will be reevaluated using the synthetic company capitalization known at the time of the announcement. For example, if the merger announcement is disseminated on-time (before 1:30 p.m. CT) the company's capitalization will be computed using the prices known at the start of the day before the effective date. If the merger announcement is delayed (after 1:30 p.m. CT) the company's capitalization will be computed using the prices known on the following trading day.

REEVALUATION AFTER A DISTRIBUTION FROM MULTIPLE PARENT COMPANIES

A primary contributor is assigned for purposes of reevaluation after a corporate event if more than one company contributes to the post-event holdings of the new entity. The company that contributes the highest number of post-event holdings (CRSP US Total Market Index) to the new entity is considered the primary contributor. A company is considered a contributor if it was a constituent of the CRSP US Total Market Index prior to the event. Migration rules apply as if the new security originated from the primary contributor's indexes.

During the pro forma period, holdings in the CRSP US Total Market Pro forma Index are used to determine the primary contributor.

MERGER AND CONCURRENT SPIN-OFF

If a corporate action involves both merger and spin-off characteristics, the spin-off rules take precedence. All affected companies are reevaluated after the close of the first day that all participant securities are trading regular way. As opposed to the large capitalization merger reevaluation methodology, there is no size threshold that bars companies from moving from one index to another.

In most cases, the target company will not trade on the effective date of the merger/ spinoff. The target's pre-event index capitalization is held constant for a day. This is implemented by either continuing the company's existing holdings and valuing as described in the Late Announcement of Completed Mergers section, or if possible, converting the target's existing holdings to an active (currently trading) security at the rate denoted in the corporate action.

If a corporate action involves both reverse merger and spin-off characteristics, the reevaluation is implemented no earlier than effective after the close of the fifth trading day of regular way trading of the new company.

MERGER WITH ELECTION

In cases where the target shareholder's stock or cash entitlement is capped, CRSP will apply a prorated stock/cash payout, taking into account the known merger terms. If the proportion of cash relative to stock cannot be determined prior to the effective date, the merger will be implemented when the final payout ratio is announced.

REVERSE MERGERS

A merger in which the surviving entity originates from outside of CRSP's security universe is treated as a reverse merger. This includes, but is not limited to, cases where the acquiring company is either private, foreign, or does not trade on a CRSP exchange of interest.

Ineligible companies are removed from indexes after the close of trading the day before the effective date of the merger. Otherwise, the target's index holdings will be replaced by an equivalent value of the survivor using the acquisition terms.

CRSP will reevaluate reverse mergers if the resultant company's market capitalization, as of the close of the first day of regular way trading of the new company, is at least as large as the lower breakpoint of the US Large Cap Index as of the last ranking.

If the resultant entity's capitalization is significant enough to warrant moving indexes, CRSP will (effective after the close of the fifth day of regular way trading of the new entity) move the new company to the appropriate market cap, sector and/or style indexes.

Companies that do not qualify for reevaluation will be kept in their current indexes with holdings that reflect the entitlement known as of the effective date of the merger.

EXCHANGES AND CONVERSIONS

An exchange or conversion is a mandatory swap of one security for another security of the same company (e.g. preferred stock converted to common or one class of security being exchanged for another class).

The holdings of the received security are increased by the holdings of the exchanged or converted security multiplied by the conversion rate in each of the exchanged or converted security's indexes. The received security will continue at these holdings until the next ranking or actionable corporate action, regardless of its new size.

If the converted or exchanged security was not a constituent of the US Total Market Index no changes will be made to indexes even if the received security is a constituent. If the converted or exchanged security no longer trades on an exchange of interest it will be removed from all indexes at the time of the exchange.

If the converted or exchanged security is in the US Total Market Index but the payout security is not an eligible share type the payout security will be dropped as soon as possible. If the converted or exchanged security is continuing, then the received security will be removed after the close on the ex-date. If the converted or exchanged security is delisting from exchanges of interest the received security will not be added to the indexes.

TENDER OFFERS

A tender offer is an external public offer made directly to a company's shareholders to buy their stock at a specified price, usually at a premium over the prevailing market price. Generally, the objective of a tender offer is to acquire the target company.

As a guideline, CRSP will consider the tender offer successful if the security being acquired is trading within 10 basis points of the tender price at the time of tender expiration, and either:

1. Ninety-five percent of the company's shares have been tendered, or
2. The initial tender offer has expired and the acquirer seeks to complete the acquisition via a short-form merger.

If a tender offer is successful, it will affect the indexes in the same way as a merger. No action is taken if the tender offer is unsuccessful.

If a security is removed from an index but the tender offer is subsequently declared unsuccessful, the constituent will not be reinstated immediately. Instead, the company will be reconsidered for index inclusion at the next regularly scheduled quarterly ranking.

PARTIAL LIQUIDATIONS

In general, a security that is under a plan of liquidation, but is still listed on an exchange of interest, will be removed from indexes after the close of the trading day before the ex-date of a partial liquidating payment if either of the following is true:

1. The estimated market capitalization of the remaining security is less than \$10 million, or
2. The partial payment includes nontransferable property estimated to be at least 90 percent of the value of the current pre-event market price of the liquidating security.

If a security is removed from the indexes because either of these criteria is met, it will not be reconsidered for index inclusion until the fourth ranking after its removal.

ADDS AND DELISTS

INITIAL PUBLIC OFFERINGS

A new security resulting from an IPO is considered for inclusion after trading regular-way for five days on an exchange of interest. Total company market capitalization is calculated using the closing price and shares known on the first day of trading.

If the offered security's total company market capitalization is at least as large as the breakpoint of the CRSP US Small Cap Index, then it is eligible to be added to the appropriate indexes after the close of the fifth day of trading as a fast-track IPO. The security must also pass the eligibility and investability screens (however, for fast-track IPOs, the minimum FSO requirement is 10 percent, rather than 12.5 percent), as stated in the [Creating the Index-Eligible US Equity Market Universe](#) section of Chapter 2. Otherwise, the security is not immediately added to indexes but is reviewed for inclusion at the next regularly scheduled quarterly ranking.

TRANSFERS FROM THE OVER-THE-COUNTER MARKET

In the absence of a significant liquidity event, transfers from the over-the-counter market (OTCQX, OTCQB, and OTC Pink marketplaces) to an exchange of interest will be considered for index inclusion at the next regularly scheduled quarterly ranking.

DELISTINGS

A security that delists from an exchange of interest is removed from all indexes. Delistings may or may not be related to a specific corporate event.

UNRELATED TO CORPORATE ACTIONS

A company that fails to meet the exchange's continued listing requirements (or delists voluntarily) will be removed from indexes. If the exchange's delisting notice is confirmed by 1:30 p.m. CT on the day before the effective date of the removal (and the security is trading) the constituent will be dropped after close of that day. If not, the security will continue in indexes until it can be valued. See the Final Closing Value for Delisted Securities section on [page 13](#).

MERGERS AND ACQUISITIONS

A security that delists from an exchange of interest due to a merger is removed from all indexes effective after the close of its last day of trading, assuming the event and the associated exchange delisting notice is confirmed before 1:30 p.m. CT on the trading day before the merger's effective date. If the event is confirmed after 1:30 p.m. CT on the trading day before the effective date, the security is kept in its indexes and is removed on the following trading day.

BANKRUPTCY ANNOUNCEMENTS

In the event that a company files for bankruptcy, CRSP will continue to hold its securities in their respective indexes as long as the securities remain listed on a CRSP exchange of interest. The securities' investability and eligibility will be reviewed at the next regularly scheduled quarterly ranking.

However, in most cases, companies that file for bankruptcy do not meet the listing standards of the exchange. If the company fails to meet, the exchange's continued listing requirements the company will be removed from all indexes after

the close of its last day of trading. If the delisting notice is confirmed after 1:30 p.m. CT when the affected security is still trading, or it is suspended on the day before the effective date of the delist, the constituent will remain in all indexes until a final valuation can be assigned. See the Final Closing Value for Delisted Securities section on [page 13](#).

LIQUIDATION

When a company adopts a plan of liquidation and announces its intention to delist from an exchange of interest, the security will be removed from all indexes after the close of its last day of trading. If the delisting notice is confirmed after 1:30 p.m. CT on the last day of trading, the security will be kept in all indexes until a final value can be assigned. See the Final Closing Value for Delisted Securities section on [page 13](#).

These rules may be adjusted if an official final or partial liquidation payment is announced and known before the security is removed. If the final payment amount is disseminated within the period commencing with the first day the security is delisted and ending ten trading days later, the security will be removed from indexes at the announced value as soon as practicable. If partial payment amount(s) are announced on or before day ten, then the security will be removed at the sum of the announced partial payments rather than zero.

CAPITAL RAISING EVENTS

RIGHTS OFFERINGS (DISTRIBUTIONS)

A rights distribution is an event in which shareholders are given the option to purchase, within a certain period of time (subscription period), a specified number of additional shares from the issuing company at a specific price (subscription or strike price). The subscription price is typically set at a discount relative to the price of the underlying security.

RELATIONSHIP BETWEEN THE SUBSCRIPTION PRICE AND THE UNDERLYING SECURITY (EXERCISE DECISION)

If the subscription price of the right is less than the closing price of the underlying security on the trading day before the ex-date of the distribution, the rights are “in-the-money” and are generally assumed to be fully exercised. Accordingly, if the right is in-the-money, the shares of the underlying security are increased after the close of the ex-date as if all of the issued rights are exercised. If the security is an index constituent, its holdings are trued-up based on its new total float and shares outstanding.

If the subscription price of the right is greater than or equal to the closing price of the underlying security on the trading day before the ex-date, the rights are “out-of-the-money” and the company’s index holdings are not adjusted.

On the ex-date the right and the underlying security are represented in the index as a package (common stock plus right). However, only the underlying security is reported as an index constituent. At the constituent level the combined start-of-day capitalization of the security and its associated right is reported.

In general, after the close of the ex-date the right is considered exercised or sold (i.e., not considered a constituent of any CRSP index).

PRICE ADJUSTMENT TO REFLECT THE VALUE OF THE DISTRIBUTION

At the end of the ex-date, the value of the entitlement to the right(s) is added to the issuing company’s security(s) as a “payment value” (end-of-day price adjustment). The payment value is set to the maximum of the right’s “fair market value” (intrinsic value/in-the-money amount) relative to the right’s “market value”. In other words, the value added to the underlying security at the end of the ex-date is the fair market value of the right(s) or the market value of the right(s), whichever is greater.

The “market value” of the distribution (assuming the right is trading by the close of the ex-date) equals:

$$\text{Market Value} = R_r \times P_r$$

R_r = Rights Ratio (number of rights received per share)

P_r = End of Day Price of the Right on the ex-date

The “fair market value” of the distribution is derived using one of the two formulas below.

If the underlying security trades on the ex-date, then the fair market value of the right(s) equals:

$$\text{Fair Market Value} = R_r \times S_r \times \text{Max}(0, U_p - S_p)$$

R_r = Rights Ratio (number of rights received per share)

S_r = Subscription Ratio (number of shares received per right exercised)

U_p = Underlying Security’s Price

S_p = Subscription Price (price paid per share upon exercise)

If the underlying security does not trade on the ex-date, then the fair market value of the right(s) is computed using the most recent closing price of the underlying security as follows:

$$\text{Fair Market Value} = (R_r \times S_r \times \text{Max}(0, U_p - S_p)) / (1 + R_r \times S_r)$$

R_r = Rights Ratio (number of rights received per share)

S_r = Subscription Ratio (number of shares received per right exercised)

U_p = Underlying Security’s Price

S_p = Subscription Price (price paid per share upon exercise)

Rights received in an offering that grant the holder the option to buy securities that are not members of the US Total Market Index (not index eligible or investable, e.g. bonds, preferred stock, foreign equities, unlisted securities) are implemented in the following manner:

The end-of-day (ex-date) price of the issuing company’s securities are adjusted only if the value of the right(s) can be determined on or before the close of the ex-date. The holdings of the issuing company generally remain unchanged.

WARRANT OFFERINGS (DISTRIBUTIONS)

A warrant offering is an event in which shareholders are given the option to purchase, within a certain period of time, a specified number of additional shares from the issuing company at a specific price. Warrants are similar to rights, however they are typically issued out-of-the-money and have a longer time to expiry relative to rights.

Warrants are valued in the same manner as rights. However, warrants are generally assumed to be sold rather than exercised. Therefore, as opposed to in-the-money rights, index holdings are not increased effective after the close of the ex-date.

SECONDARY OFFERINGS (FOLLOW-ON OFFERINGS)

A follow-on offering involves the selling of new (primary) or existing (secondary) shares after the company’s IPO. CRSP makes the following distinction between two types of follow-on offerings:

Primary equity offerings (primary shares) involve the issuance of additional “new” shares of a security. The company will receive the proceeds from the sale. CRSP increases both the TSO and the FSO by the number of additional shares issued, using the most recently available TSO and FSO figures. The EFF and index holdings are then recalculated using these new figures.

Secondary equity offerings (secondary shares) involve the sale of already issued “old” shares. The company will not receive the proceeds from the sale of securities by the selling stockholders. The FSO will be increased by the number of shares sold, using the most recently available share figures, however, since the company did not issue additional shares, the TSO remains unchanged. The EFF and index holdings are then recalculated using these new figures.

IMPLEMENTATION:

Five Percent Threshold and Timing

Changes in index holdings resulting from primary or secondary equity offerings that represent 5 percent or more of a security’s holdings in the US Total Market Index are implemented effective after the close of the day after the issue prices

or the following trading day. The above timing assumes that an announcement of the issues pricing is known before 1:30 p.m. CT on the trading day after the pricing of the offering. Otherwise, the event is implemented at the next regularly scheduled ranking or upon the application of an intra-quarter non-capitalization-neutral corporate action.

Primary or secondary equity offerings that represent less than 5 percent of a security's holdings in the US Total Market Index are implemented at the next quarterly ranking or upon the application of an intra-quarter non-capitalization-neutral corporate action.

Exclusions

In general, CRSP will not update index holdings intra-quarter to reflect the pricing of a registered direct, at-the-market, or forward sale agreement. However, the change in the number of shares will be considered at the next ranking or upon the application of a subsequent non-capitalization-neutral corporate event.

BLOCK TRADES OR SPOT SECONDARIES (STRATEGIC SHAREHOLDER SALES)

CRSP considers a spot secondary or block trade to be a privately-negotiated transaction involving a change in strategic ownership that does not require US Securities & Exchange Commission registration. Unlike a standard follow-on offering, a block trade is generally only made available to institutional investors and is implemented without an underwriter or prospectus. CRSP requires an official press release or news story confirming the terms of the block trade to implement the associated holdings change.

IMPLEMENTATION

Five Percent Threshold and Timing

Changes in index holdings resulting from strategic block trades that represent 5 percent or more of a security's holdings in the US Total Market Index will be implemented on a best-efforts basis. CRSP will increase holdings no later than effective after the close two trading days after the sale is consummated. Otherwise, the event will be implemented at the next regularly scheduled ranking or upon the application of a subsequent intra-quarter non-capitalization-neutral corporate action.

CAPITAL DISTRIBUTION EVENTS

SPIN-OFFS

In a spin-off, the parent company “spins off” its subsidiary/division by distributing all of that subsidiary's stock to the parent's stockholders. Shares of the new organization, the child, are allocated to equity holders of the parent organization at a ratio established by the parent. After the transaction, both parent and child are separate, independent companies.

IMPLEMENTATION OF SPIN-OFFS

Capitalization, style, and sector index placement for the participants in a spin-off are determined based on the latest of:

- The close of the first day of when-issued trading, or
- The ranking day before the ex-date and after the first day of when-issued trading, or
- The effective date of any non-neutral corporate action applied to the parent (e.g. secondary offering) which occurs after the first day of when-issued trading but before the ex-date of the spin off.

Prices and the TSO known on one of the above dates will be used to determine the market capitalization used on the reevaluation date. The post spin-off industry classification codes for both the parent and spun-off company will be used to determine industry sector placement. If no industry classification code is available for the spun-off company, the spun-off company will inherit the parent company's industry sector placement. Both the parent and spun-off companies will be reevaluated for style index placement at this time as well. If no style determination can be made with the available information, the spun-off company will inherit the parent company's style placement.

A received security in a spin-off is added to the indexes of its parent effective after the market close the day before the ex-date of the spin-off. Holdings are calculated by multiplying the parent's holdings by the spin-off ratio. The addition of the

received security preserves the company's previous end-of-day index capitalization.

The parent and received company are reevaluated effective after the close on the ex-date based on their own merits. Companies may move to new indexes, or be dropped altogether.

At reevaluation, effective after the close of the ex-date, both the parent and received company are migrated independently from the parent's index based on each company's capitalization. In most cases, each company's capitalization is established using the shares and closing prices known at the end of the first day of when issued trading. Banding and migration rules are applied, using the breakpoint ranges for each band set at the last ranking. Similar to ranking, all index-eligible securities of a company are combined to determine the company's capitalization. Ineligible securities, or securities that fail the investability rules for float (10 percent) or company capitalization (\$10 million), will be removed from the CRSP Indexes.

The following formulas are used to determine the parent's post spin-off start-of-day price and TSO:

Parent's Start of Day Price

$$PSOD = \left(\frac{P_v}{\text{EventSplitFactor}} \right) - (R_v \times S_r + R_{vi} \times S_{ri} \dots)$$

PSOD = Parent's Start of Day Price

P_v = Parent's Close Price

R_v = Received Security Price (generally a when-issued closing price)

S_r = Spin off Ratio (in post-split terms)

R_{vi} , S_{ri} = Price and Spin-off Ratio of any additional spun-off companies

Parent's Start of Day TSO

$$TSOP = TSO_v \times \text{EventSplitFactor}$$

TSOP = Parent's Start of Day TSO

TSO_v = Total Shares Outstanding (on the valuation day)

Received Price

$$R_v = \text{Closing price of the child on the day before the ex-date (typically a when-issued price)}$$

Received Shares

$$R_s = TSOP \times S_r$$

R_s = Received Shares

TSOP = Parent's TSO

S_r = Spin-off Ratio (in post-split terms)

SPIN-OFFS WITHOUT WHEN-ISSUED TRADING PRIOR TO THE EX-DATE

If a security received in a spin-off does not trade on a when-issued basis before the ex-date, then both the parent and received stock cannot be accurately valued at the start-of-day of the ex-date. In this case, the child is still included in the parent's index(es) as received stock even if it is not yet listed. Initially the parent will show no adjustment for the distribution and the child will be reported with a zero start of day price; that is all index capitalization will be included in the parent. At the end of the ex-date both parent and child starting prices and weights will be retroactively redistributed, attributing movement in price of the parent to the distributed value of the child. The price found for the child will carry forward until the child trades. CRSP uses the following formulas to calculate start-of-day prices for the parent and detached securities:

Parent's Start-of-Day Price (on the ex-date)

$$\text{New Parent Start of Day Price} = \text{Parent End of Day Price}$$

Child Security's Start-of-Day Price

$$\text{CsSOD} = \frac{\text{Max}((\text{OpSOD} - \text{PEOD}), 0.01)}{\text{SpR}}$$

CsSOD = Child Security Start-of-Day Price

OpSOD = Original Parent Start-of-Day Price

PEOD = Parent End-of-Day Price

SpR = Spin off Ratio

The following example illustrates what happens when the parent company (Security A) spins off a new company (Security B). Security B had no trades on or before day T and is trading regular way (RW) on the ex-date (T+1).

Security	SOD (T+1) initial	SOD (T+1) Revised at EOD (T+1)	EOD (T+1)	SOD (T+2)
Parent – Security A	\$40	= EOD (T+1) = \$30	\$30	\$30 (and reevaluated for new index)
Child – Security B	\$0, in A's index	= \$40-\$30 = \$10 from A	\$12 trading RW	\$12 (and reevaluated for new index)

CRSP will not reevaluate companies until there is an opportunity to trade both parent and child securities on a regular way basis. If the child does not trade regular-way by the close of the ex-date then both companies will be reevaluated effective after the close of the second day of regular way trading. At least one day's notice will be provided for any reevaluation results.

If there are multiple parent companies distributing one security, or one parent distributing multiple securities, then all the entities involved will be reevaluated at the same time. Various classes of a company's index eligible securities will be reevaluated as a package. In other words, post reevaluation, securities of the same company will move to (or remain in) the same indexes regardless of whether or not they were involved in the corporate action at hand. If an index ineligible security is distributed as one component of a spin-off and has not traded but can be assigned a derived fair market value, then it can be used to adjust the parent's price and a regular way trade is not needed for reevaluation.

SPIN-OFF SPECIAL CASES

If a company distributes shares of a security already trading in a split-off or partial merger, the event is treated as a spin-off. On the ex-date the holdings received in the parent's index are calculated as in a "standard" spin-off (spin-off terms*parent's holdings). At reevaluation (the business day after the ex-date), the split-off company will migrate from the cap based index with the largest holdings. Note that contrary to the standard migration process, for split-offs CRSP will determine the starting point of migration based on the largest index capitalization (Price of Split-off Entity *Holdings) rather than company capitalization (Price of Split-off Entity*Total Shares Outstanding). For example, Company ABC is currently a constituent of the CRSP US Micro Cap Index with holdings of one million shares. Small Cap Company XYZ splits-off two million shares of ABC. In this case, ABC will migrate from the CRSP US Small Cap Index rather than the CRSP US Micro Cap Index.

EXCHANGE OFFERS

A partial merger or split-off event may be structured as an exchange offer. Shareholders of one company have the option to exchange their current holdings for securities of another company. These securities represent additional capitalization in the case of a partial merger, and additional float shares in the case of a split-off. Price adjustments are not applied to the participant securities.

Constituents may be eligible for reevaluation if changes in either of the company's float shares (shares exchanged via the

offer) represent 5% or more of its holdings in the CRSP US Total Market Index. If either company is at least as large as the lower breakpoint of the CRSP US Large Cap index, then the participants may also migrate to other indexes. Otherwise, companies will true-up within the same capitalization based indexes. Reevaluations are generally implemented effective after the close of the first day of regular way trading of the newly issued shares.

If insufficient notice is provided and/or information is not available, or the float changes are below the 5% threshold specified above, the event will be implemented at the next regularly scheduled ranking or upon the application of an intra-quarter non-capitalization-neutral corporate action.

CASH PAYMENTS

CASH DIVIDENDS

Cash dividends are a proportionate distribution of corporate profits made in the form of a money payment to shareholders. Dividends are paid periodically (typically quarterly) over the course of a year. CRSP does not apply a start-of-day price adjustment to the distributing company's securities.

The following unique situations related to cash dividends are recognized:

- A dividend paid in a foreign currency is converted to US dollars using the spot exchange rate available on or before the ex-date.
- A cash dividend with an ex-date on the same day as a stock split is reported in post-split terms.
- A dividend with a payout amount that is only conditionally approved before the ex-date is not applied.

RETURN OF CAPITAL

Cash received as a return of capital is treated like a non-ordinary distribution. The security's start-of-day price is adjusted by the amount of the payment effective after the close of the trading day before the ex-date.

SPECIAL CASH DIVIDENDS

Cash received as a special dividend is also considered a non-ordinary distribution. The security's start-of-day price is adjusted by the amount of the dividend effective after the close on the trading day before the ex-date.

SPECIAL DIVIDEND (CASH STOCK ELECTION)

A special dividend that allows the shareholder to elect to receive cash and/or stock with the proration determined after the ex-date is handled as follows:

- The security's start-of-day price (ex-date) is adjusted by the cash value of the total special dividend known on the day before the ex-date.
- Index holdings are adjusted as soon as practicable after the stock/cash proration is disseminated via an official company press release

SHARE REPURCHASES (STOCK BUYBACKS)

DUTCH AUCTIONS

Changes in a security's float resulting from Dutch auctions that represent 5 percent or more of the security's holdings in the US Total Market Index will generally be implemented on one of the five trading days following the tender offer results announcement.

If insufficient notice is provided and/or information is not available, the event will be implemented at the next regularly scheduled ranking or upon the application of a non-capitalization-neutral intra-quarter corporate action.

Changes in a security's float resulting from Dutch auctions that represent less than 5 percent of the security's holdings in the US Total Market Index will be implemented at the next quarterly ranking or upon the application of an intra-quarter non-capitalization-neutral corporate action.

When a Dutch tender offer is implemented, the index holdings are true-up to the new post-offer shares of the security.

LIMITED FIXED SELF-TENDER OFFERS

Changes in a security's float resulting from limited fixed self-tender offers that represent 5 percent or more of the security's holdings in the US Total Market Index will generally be implemented on one of the five trading days following the tender offer results announcement.

If insufficient notice is provided and/or information is not available, the event will be implemented at the next regularly scheduled ranking or upon the application of an intra-quarter non-capitalization-neutral corporate action.

Changes in a security's float resulting from limited fixed self-tender offers that represent less than 5 percent of the security's holdings in the US Total Market Index will be implemented at the next quarterly ranking or upon the application of an intra-quarter non-capitalization-neutral corporate action.

When a limited fixed self-tender offer is implemented, the index holdings are trued-up to the new post-offer shares of the security.

LIMITED EXTERNAL TENDER OFFERS

A drop in a security's float resulting from a tender offer from one company that intends to increase its stake in another company will generally be implemented on one of the five trading days following the tender offer results announcement if the change in float represents 5 percent or more of the security's holdings in the US Total Market Index. If insufficient notice is provided and/or information is not available, the event will be implemented at the next regularly scheduled ranking or upon the application of an intra-quarter non-capitalization-neutral corporate action. Changes in a security's float resulting from limited external tender offers that represent less than 5 percent of the security's holdings in the US Total Market Index will be implemented at the next quarterly ranking or upon the application of an intra-quarter non-capitalization-neutral corporate action. When a limited external tender offer is implemented, the index holdings are trued-up to the new post-offer shares of the security.

BUYBACKS ON THE OPEN MARKET

A buyback on the open market is generally applied at the next ranking after the results are published.

NEUTRAL CAPITAL STRUCTURE EVENTS

STOCK DIVIDEND

A stock dividend is a distribution of additional shares of stock to existing stockholders. On the ex-date, total and float shares outstanding of the issuing security are increased by the stock dividend rate and index holdings are adjusted accordingly. In other words, a stock dividend is an increase in a company's total shares outstanding accompanied by a corresponding decrease in the price per share. Stock dividends have no net impact on the company's market capitalization.

FORWARD AND REVERSE STOCK SPLITS

A forward stock split is an increase in a company's total shares outstanding accompanied by a corresponding decrease in the price per share. A reverse stock split is a decrease in a company's total shares accompanied by a corresponding increase in its stock price. On the ex-date, index holdings are increased or decreased by the split factor. Since the change in shares and stock price are proportional and offsetting, they have no net impact on a company's market capitalization and thus both forward and reverse stock splits as well as stock dividends are considered to be capitalization neutral corporate events.

SPECIAL CONSIDERATIONS FOR CONSTRAINED INDEXES

The processing of corporate actions and exchange listing changes are researched and applied consistently across all CRSP Indexes. When corporate events affect the constituents of a constrained index CRSP attempts to preserve the existing CLM. In some cases, a newly added security must be fitted into an existing constrained index.

- Secondary offering or share repurchase — the CLM is preserved and the newly trued up holdings are set to maintain the existing ratio of constrained to unconstrained holdings.

- Splits and reverse splits — the split rate is applied to existing holdings and the CLM is preserved.
- Received stock — if the shares are distributed from one parent security (source), such as in a spin-off, then the CLM is inherited from the source. If the shares originate from multiple sources, such as in a merger of equals or a spin-off with two parents, then the CLM is recomputed to preserve the ratio of constrained to unconstrained holdings.

$$\text{CLM} = \sum_i (\text{holdings}_i * \text{rate}_i) / \sum_i (\text{holdings}_i / \text{CLM}_i * \text{rate}_i) \text{ for each input security } i$$

- Securities added to constrained indexes — a fast-track IPO, spin-off, or merger that creates a company in a different index relative to any of its parents will trigger a review of compliance.
 - Large Cap – If the index company cap of any of the new securities is greater than or equal to the breakpoint of the Large Cap index as of the last ranking, or if the index is a pro forma index, then the index is reoptimized to the Ranking Optimization targets.
 - Small Cap – If all of the new securities have an index company cap less than the breakpoint of the US Large Cap Index as of the last ranking, and if the index is a primary index, then the new securities are fitted into the existing index. Fitting sets the CLM for a security to achieve a target weight, without impacting the holdings of the other constituents.
 - If the primary or pro forma index is already unconstrained, the new securities are added at their full weight.
 - If the primary index is constrained, and the pro forma is active, then the pro forma is reoptimized to Ranking Optimization targets, and the new securities are fitted into the primary index based on their weights in the pro forma.
 - If the pro forma is inactive, then the new securities are fitted into the primary index based on the weights they would be assigned if the primary index was reoptimized to the Ranking Optimization targets.
- Other reevaluated or trued-up securities – if resultant securities of a merger, spin-off, or similar action continue in the same constrained index, the CLM is preserved and applied to the new unconstrained holdings. If the security was added or updated via received stock, then the CLM applied at the time of the action will continue. If there is a reevaluation with no received stock needed, then the CLM is calculated the same as if there was received stock.

COMPLIANCE DAYS

The IRS rules state that regulated investment companies are required to be compliant at their fiscal quarter-end. CRSP has set its compliance dates to the last trading day of March, June, September, and December. Compliance checks are completed by 1:30 p.m. CT on the trading day before the compliance day and are based on the trading day's start-of-day prices adjusted for the compliance day basis and projected compliance day index holdings. Checks are made against the Compliance Test limits.

If an index is out of compliance, a modified holdings adjustment process is used. This process attempts to minimize turnover by using the Compliance Optimization targets.

OPTIMIZATION FREEZE

Concentration tests, and an optimization or fitting, will be completed based on the events known two days prior the effective date of the optimization. Holdings changes projected on the day before the optimization are based on the concentration limit multipliers (CLMs) established on $t - 2$. However, if a significant holdings change (e.g. a large inflow or outflow of index capitalization) is announced on the day before the optimization is effective, the CLM freeze can be moved to 1:30 p.m. CT on the day before the optimization (i.e. $t-1$).

CHAPTER 4: CRSP SECTOR INDEXES

CRSP developed the set of Sector Indexes listed below in order to highlight industry segment-specific characteristics of all companies included in the CRSP US Total Market Index. To accomplish that objective, CRSP uses Enhanced Industry Classification Benchmark (ICB®) codes to assign companies to the appropriate industry

There are 12 sector indexes based on the Enhanced ICB industry level.

CRSP Sector Index	NASDAQ Symbol	
	Total Return	Price Return
CRSP US Technology Index	CRSPITT	CRSPIT1
CRSP US Telecommunications Index	CRSPDET	CRSPTE1
CRSP US Health Care Index	CRSPHCT	CRSPHC1
CRSP US Financials Index	CRSPFNT	CRSPFN1
CRSP US Real Estate Index	CRSPRET	CRSPRE1
CRSP US Consumer Discretionary Index	CRSPCDT	CRSPCDT1
CRSP US Consumer Staples Index	CRSPCST	CRSPCST1
CRSP US Industrials Index	CRSPIDT	CRSPID1
CRSP US Basic Materials Index	CRSPMTT	CRSPMT1
CRSP US Energy Index	CRSPENT	CRSPEN1
CRSP US Utilities Index	CRSPUTT	CRSPUT1
CRSP US Small Cap ex-Real Estate Index	CRSPSXT	CRSPSX1

INDUSTRY LEVEL SECTOR INDEXES

All securities included in the US Total Market Index are assigned to an industry level sector index based on their Enhanced ICB code. Therefore eligibility and investability screens for the sector indexes are consistent with those used for other CRSP Indexes.

Eligible securities are assigned to CRSP Sector Indexes based on their ICB industry code:

ICB Industry Identifier	Industry	CRSP Index
10000000	Technology	CRSP US Technology Index
15000000	Telecommunications	CRSP US Telecommunications Index
20000000	Health Care	CRSP US Health Care Index
30000000	Financials	CRSP US Financials Index
35000000	Real Estate	CRSP US Real Estate Index
40000000	Consumer Discretionary	CRSP US Consumer Discretionary Index
45000000	Consumer Staples	CRSP US Consumer Staples Index
50000000	Industrials	CRSP US Industrials Index
55000000	Basic Materials	CRSP US Basic Materials Index
60000000	Energy	CRSP US Energy Index
65000000	Utilities	CRSP US Utilities Index
all but 35000000-39999999	Small Cap Ex-Real Estate	CRSP US Small Cap ex-Real Estate Index

SMALL CAP EX-REAL ESTATE INDEX

The CRSP US Small Cap ex-Real Estate Index includes all those securities in the CRSP US Small Cap Index except those in the Real Estate sector. For this index all real estate companies, identified by Enhanced ICB codes between 35000000 and 39999999, are excluded.

QUARTERLY MAINTENANCE

RANKING AND RECONSTITUTION

The CRSP Sector Indexes are reviewed quarterly, following the same schedule and process as all CRSP Indexes. See also [Chapter 3: Index Maintenance - Quarterly Maintenance](#) for the ranking schedule and [Chapter 2: Index Construction](#) for more information on the reviews and process undertaken at each ranking. Updates to a company's industry classification intra-quarter not attributed to a corporate event (e.g. merger) will be implemented at ranking. CRSP does not apply the concept of packeting to its Sector Indexes. In other words, If a company is reclassified from one industry sector to another, it is moved 100 percent to its newly assigned sector rather than transferring in smaller increments.

DAILY MAINTENANCE

If a company is reevaluated as part of a corporate action, then it may move entirely to a new sector. If new sector information is not available at the time a company is reevaluated, it will continue in its previous sector if the survivor of a merger, or the sector of its parent if a spin-off.

CHAPTER 5: CRSP US VALUE AND GROWTH INDEXES

CRSP offers 10 Value and Growth Indexes across the market capitalization spectrum. Every company in a capitalization-based Index will be fully allocated to a CRSP US Style Index of that size. Micro Cap companies are not eligible for inclusion in the CRSP US Value and Growth Indexes.

CRSP US Value and Growth Indexes currently offered:

Index Name	NASDAQ Symbol	
	Total Return	Price Return
CRSP US Mega Cap Value Index	CRSPMEVT	CRSPMEV1
CRSP US Large Cap Value Index	CRSPLCVT	CRSPLCV1
CRSP US Mid Cap Value Index	CRSPMIVT	CRSPMIV1
CRSP US Small-Mid Cap Value Index	CRSPSMVT	CRSPSMV1
CRSP US Small Cap Value Index	CRSPSCVT	CRSPSCV1
CRSP US Mega Cap Growth Index	CRSPMEGT	CRSPMEG1
CRSP US Large Cap Growth Index	CRSPLCGT	CRSPLCG1
CRSP US Mid Cap Growth Index	CRSPMIGT	CRSPMIG1
CRSP US Small-Mid Cap Growth Index	CRSPSMGT	CRSPSMG1
CRSP US Small Cap Growth Index	CRSPSCGT	CRSPSCG1

CONSTRUCTING THE CRSP US VALUE AND GROWTH INDEXES

The construction of the CRSP Value and Growth Indexes is tied to the construction of the market capitalization-based indexes. Value and growth style determination involves completing the following three additional steps for each market-cap segment at each quarterly ranking:

1. Calculate the value and growth style factors for each company within a market-cap segment.
2. Combine multiple style factors into a single composite factor (the score that is used to place the company), separately for value and growth. This will be the score used to assign a security to either a value or growth index.
3. Rank scores and assign companies to their appropriate value and growth indexes.

DEFINING VALUE AND GROWTH INDEXES

When classifying companies to their appropriate value or growth indexes, CRSP employs a multi-factor model, that uses five value and six growth factors,. CRSP is the first index provider to use the Current Investment-to-Assets Ratio (INV) and the Return on Assets Ratio (ROA) as style model inputs/factors.

VALUE FACTORS USED IN MULTI-FACTOR MODEL

1. Book-to-Price Ratio (BP)
2. Future Earnings-to-Price Ratio (FEP)
3. Historical Earnings-to-Price Ratio (HEP)
4. Dividend-to-Price Ratio (DP)
5. Sales-to-Price Ratio (SP)

GROWTH FACTORS USED IN MULTI-FACTOR MODEL

1. Future Long-term Growth in Earnings Per Share (FLGE)
2. Future Short-term Growth in Earnings Per Share (FSGE)
3. Three-year Historical Growth in Earnings Per Share (HGE)
4. Three-year Historical Growth in Sales Per Share (HGS)
5. Current Investment-to-Assets Ratio (INV)
6. Return on Assets (ROA)

Refer to [Appendix C](#) for detailed definitions and calculations of each factor

STEPS FOR COMBINING MULTIPLE STYLE FACTORS INTO SINGLE COMPOSITE GROWTH SCORE AND SINGLE COMPOSITE VALUE SCORE

1. For each company, determine values for the various style factors.
2. Winsorize the data for each style factor at the 5th and 95th percentiles.
3. Calculate each style factor's cross-sectional mean and cross-sectional standard deviation.
4. Scale each style factor for each company by finding the factor's z-score using the following formula:

$$\text{z score} = \frac{\text{company factor} - \text{cross sectional mean for factor}}{\text{cross sectional standard deviation for the factor}}$$

The z-score factors are denoted by the presence of a "z" before the factor acronym (e.g. zBP).

5. Compute the single Composite Style Score (CSS) for each company by weighting the z-scores of the underlying factors according to the following methods:

Calculating Value Composite Style Score:

When determining the value CSS, CRSP's model first combines the future and historical earnings-to-price ratios (FEP and HEP) into a single earnings-to-price factor (EP), which is then combined with the book-to-price ratio (BP) to create a primary value superfactor (V1). The sales-to-price ratio (SP) and dividend-to-price ratio (DP) are then combined to create a secondary value superfactor (V2). Merging the two value superfactors together creates a single composite value score (V), as defined below:

$$\text{Value Score (V)} = (2/3 \times \text{V1}) + (1/3 \times \text{V2}), \text{ where:}$$

$$\text{V1} = (2/3 \times \text{zEP}) + (1/3 \times \text{zBP}) \text{ with } \text{zEP} = (2/3 \times \text{zFEP}) + (1/3 \times \text{zHEP})$$

$$\text{V2} = (2/3 \times \text{zSP}) + (1/3 \times \text{zDP})$$

Calculating Growth Composite Style Score:

When determining the growth CSS, CRSP calculates a future growth super-factor (FG) based on analysts' estimates of future long-term growth in earnings (FLGE) and future short-term growth in earnings (FSGE), as well as INV and ROA. Additionally, a historical growth super-factor (HG) is calculated based upon three-year historical growth in earnings (HGE) and three-year historical growth in sales (HGS).

Once determined, these two growth super-factors are combined to create a single composite growth score (G) as defined below:

$$\text{Growth Score (G)} = (2/3 \times \text{FG}) + (1/3 \times \text{HG}), \text{ where:}$$

$$\text{FG} = (1/3 \times \text{zFLGE}) + (1/3 \times \text{zFSGE}) + (1/6 \times \text{zINV}) + (1/6 \times \text{zROA})$$

$$\text{HG} = (2/3 \times \text{zHGS}) + (1/3 \times \text{zHGE})$$

CREATING STYLE-BASED INDEXES USING THE RANK APPROACH

CRSP assigns each composite score a rank value (RV for value and RG for growth) that represents a certain percentage of the cumulative market cap with lower scores. The RG value is inverted and the scores are averaged with the RV value to arrive at an Average Rank (AR) score for each company. A company with a high AR, or mean score above 0.5, is categorized as value, while a company with a low AR, or mean score below 0.5, is categorized as growth.

There is little agreement on the exact definitions of value and growth or when exactly companies switch between value and growth, therefore CRSP applies its rules for packeting and migration to its Value and Growth Indexes, as well. As with the market capitalization-based indexes, band thresholds are set to buffer movement between styles.

DERIVATION OF THE AVERAGE RANK (AR) SCORE:

1. Rank companies separately by both their value composite style scores (CSS = V) and growth composite style scores (CSS = G).
2. Assign a rank composite style score (RCSS) to each company, calculated as follows:

In general, $RCSS = M1/M2$, where:

- o For value (CSS = V), M1 is the total market capitalization of all companies that are constituents of a specific capitalization-based index with a CSS lower than the particular company's CSS, plus half of its own market cap (RCSS = RV).
- o For growth (CSS = G), M1 is the total market capitalization of all companies with a CSS higher than the particular company's CSS, plus half of its own market cap (RCSS = RG).
- o M2 is the total market capitalization of all companies within the companies' cap-based universe.

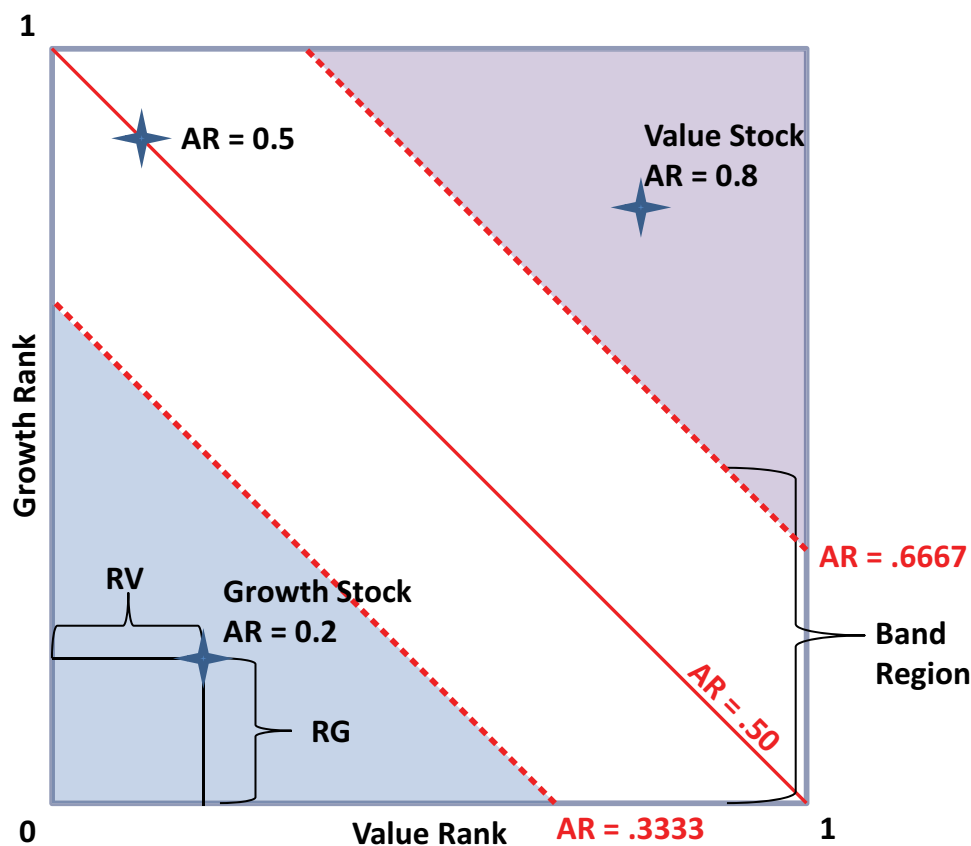
Thus, each company's RCSS corresponds to the market-cap adjusted percentile of its CSS within its cap-based universe. This value falls between 0 and 1. Therefore, for rank value (RV), the security with the highest value will have a score equal to 1 while the security with the lowest value will have a score equal to 0. The reverse is true for rank growth (RG) – the security with the highest growth will have a score equal to 0 and the security with the lowest growth will have a score equal to 1.

3. Compute AR for each company according to the formula below. Average rank scores range from 0 to 1 with higher numbers indicating higher “value” attributes and lower numbers indicating higher “growth” attributes.

$$\text{AR} = \frac{\text{RV} + \text{RG}}{2}$$

4. Assign newly added companies to value or growth categories according to their AR scores:
 - o Companies with an $\text{AR} > 0.5$ are classified as 100 percent value
 - o Companies with an $\text{AR} \leq 0.5$ are classified as 100 percent growth

To visualize this procedure, the following figure plots RV and RG scores for a hypothetical company. Average rank scores greater than 0.5 represent points above the main diagonal while AR scores less than 0.5 represent points below the main diagonal. Also see [Appendix D](#) for an overview of the entire scoring process.



INSUFFICIENT STYLE INPUT DATA

If a composite factor is generated with an underlying factor missing, the weight for the missing data point is distributed proportionally across the remaining factors. A minimum number of non-missing input factors are needed before the composite factor itself is considered missing. There must be at least two value and two growth factors available to generate a style AR score.

All companies present in a size index must be fully represented in style indexes corresponding to that size. For example, if a company is packeted at 50 percent in the CRSP US Small Cap Index, then the 50 percent in the CRSP US Small Cap Index must be allocated between the CRSP US Small Cap Value Index and the CRSP US Small Cap Growth Index. If no AR score is available, then an additional step is applied to fulfill this rule.

STYLE ASSIGNMENT WHEN NO SCORE IS AVAILABLE

If a company is currently assigned to style indexes and a new AR score is unavailable, then its style is carried forward using the following rules:

1. If the company remains in the same size index, then the allocation between value and growth within that market-cap segment does not change. For example, if before a ranking, a company is allocated fully to Mid Value, and the ranking keeps the company in the Mid Cap index but there is no new AR score available, then the company remains fully in Mid Value.
2. If the company is entering a new size index, then the style allocation can be carried forward from the style assignment in other size indexes. Generally only noncomposite capitalization indexes Small, Mid, and Mega are used for this purpose. If only one style is found, then that style is used. If both Value and Growth assignments are found, then the company is assigned half its available holdings in each style. For example, if before a ranking a company is in Mega Cap Value and Mid Cap Growth and it moves to Small Cap with no new AR score available, it is assigned half to Small Cap Value and half to Small Cap Growth.

If a company is not currently assigned to a style index and a new AR score is unavailable, then the company is assigned half to Value and half to Growth. If this is done the company assignment is noted as set by default. The next time this company is evaluated and an AR score is available, the packeting rules will disregard the 50 percent assignment as an initial state and treat the company as if it were new.

QUARTERLY MAINTENANCE

The CRSP US Value and Growth Indexes are fully reviewed on a quarterly basis, following the same schedule and process as all CRSP Equity Indexes. (See also Chapter 3: Index Maintenance – Quarterly Maintenance for ranking schedule and Chapter 2: Index Construction for more information on the reviews and process undertaken at each ranking.)

MIGRATION WITH PACKETING

As with the capitalization-based indexes, CRSP applies its packeting and migration procedures to the CRSP Value and Growth Indexes. CRSP centers the style band around an AR score of 0.5 and sets the threshold bandwidth at an AR of .3333. This means that companies with an AR between .3333 and .6667 are considered to be inside of the band. Once a company crosses through the band between its current style and the adjacent style core, 50 percent of its holdings are moved. If the company stays beyond the threshold in the following ranking period, the remaining 50 percent will be moved. Therefore, a company may be partially held in both a value and a growth index. It is also possible for the same company to be classified differently in different market capitalization-based indexes depending on the characteristics it displays in each segment. In other words, a company may be classified as value in one capitalization-based index and as growth in another capitalization-based index, depending on its AR score within each market capitalization segment.

DAILY MAINTENANCE

IPO METHODOLOGY FOR VALUE AND GROWTH INDEXES

When a newly listed company is added to a capitalization-based index, it is assigned to a corresponding style index. To assign the company to a value and/or growth index, CRSP uses fundamental and estimates data from CRSP's data sources. A minimum of two growth factors are required to generate a growth score and a minimum of two value factors are required to generate a value score. If complete data is not available from CRSP's third-party data sources, CRSP will first use a set of modified calculations that accept annual rather than quarterly data. If third-party data is not available, CRSP will review prospectuses to determine the values necessary to generate value and growth scores.

If a company's capitalization is lower than the Large Cap lower breakpoint (85 percent), or a style cannot be determined for each size index, holdings will be set to 50 percent value and 50 percent growth. As soon as an AR score can be calculated at a ranking, the company will move to the appropriate Value or Growth Index. Banding and migration rules are not applied to newly listed companies.

CORPORATE ACTION METHODOLOGY FOR VALUE AND GROWTH STYLE INDEXES

After the completion of a merger, spin-off, or similar corporate action, the resultant surviving companies may be reevaluated independently and moved, if necessary, to new size indexes. At this time, they are also reevaluated and added to the value and/or growth indexes corresponding to their respective size assignments. Likewise, if they are no longer a constituent of a size index after reevaluation they will be removed from any style index corresponding to that size index.

For style index assignment in reevaluations, CRSP generally carries forward the style of one of the corporate action participants. If there are multiple source companies for a resulting company, one is chosen. The carry-forward rules found in the following paragraph are applied.

The company used as the carry-forward initial state is selected with these rules:

- If a survivor of a merger, then its source is itself, unless the index eligible shares issued to shareholders of a nonsurvivor in the CRSP US Total Market Index are more than the previously existing shares. Then the source is the nonsurviving company with the largest number of shares in the merged company.

- If a spin-off child, its source is its parent.
- If a split-off child, its source is itself.
- If a partial merger, merger of equals, or other case with more than one source of holdings in a resulting company, the source is the largest contributor to the company's holdings in the CRSP US Total Market Index from the event.
If during a ranking period, the company is selected using the above rules based on the holdings in the pro forma index, not the primary index.

Similar to the fast-track IPO process, if there is sufficient information available, CRSP may independently evaluate style factors and apply migration rules based a newly derived AR score and the existing entities' current style placement.

CHAPTER 6: INDEXES REPORTED IN FOREIGN CURRENCIES

CRSP reports the performance of selected index series in foreign currencies. In all cases the constituents of these indexes are the same as an underlying index, but the result is on the basis of the new currency.

There are two methods of measuring the value of an index against a foreign currency.

- A Hedged index is an investable method where a forward contract is used to hedge against fluctuations in the exchange rate.
- A Non-Hedged index is a direct snapshot based on the exchange rate each day.

The Hedged and Non-Hedged indexes supported are shown in the following table.

Index ID	Index Series Name	Index Symbol	Index CUSIP	Index FIGI	Currency (ISO)	Type	Underlying Index Constituents	Underlying Index Series	Rate Time
1001625	CRSP US Total Market Index (CAD-hedged) (TR)	CRSPTCHT	12630Y108	BBG003PZ7F52	CAD	Hedged	CRSP US Total Market Index	CRSP US Total Market Index Tax-Adjusted (TR)	London Close
	CRSP US Total Market Index (CAD-hedged) (PR)	CRSPTCH1	12628G200	BBG003PZ7F34				CRSP US Total Market Index (PR)	
1001617	CRSP US Total Market Index (AUD-hedged) (TR)	CRSPTAHT	12633D200	BBG009J9GN20	AUD	Hedged	CRSP US Total Market Index	CRSP US Total Market Index (TR)	London Close
	CRSP US Total Market Index (AUD-hedged) (PR)	CRSPTAH1	12633D101	BBG009J9GN11				CRSP US Total Market Index (PR)	
1001626	CRSP US Total Market Total Return Index CAD (TR)	CRSPTMCT	12632P204	BBG004MFW5W1	CAD	Non-Hedged	CRSP US Total Market Index	CRSP US Total Market Index Tax-Adjusted (TR)	New York Close
	CRSP US Total Market Index CAD (PR)	CRSPTMC1	12632M201	BBG004MFW5V2				CRSP US Total Market Index (PR)	
1001618	CRSP US Total Market Total Return Index AUD (TR)	CRSPTMAT	12633D408	BBG009J9GN48	AUD	Non-Hedged	CRSP US Total Market Index	CRSP US Total Market Index (TR)	London Close
	CRSP US Total Market Index AUD (PR)	CRSPTMA1	12633D309	BBG009J9GN39				CRSP US Total Market Index (PR)	

NON-HEDGED INDEXES

CRSP Non-Hedged indexes provide benchmarks of the U.S. equity market in terms of foreign currencies. CRSP calculates the index by directly converting the index level each day using the appropriate exchange rate between the U.S. dollar and the target currency. The reported index level and the index return are in terms of the target currency.

CRSP uses the WM/Reuters Spot Rate reported at the appropriate time for the intended users of the index. If the WM/Reuters Spot Rate is missing, CRSP will use the previous business day's Spot Rate. The Spot Rate used is as quoted in foreign exchange markets, but converted if needed to the form of from-USD to-target currency. The midpoint of quotes is used.

INDEX LEVEL FORMULA

CRSP calculates the index in foreign currencies on a daily basis. The level of the index is calculated by multiplying the index by the exchange rate between the US dollar and the foreign currency.

The daily index level is calculated as:

Equation 1

$$\text{TindC}_t = S_t \text{Tind}_t$$

Where

TindC_t the level of the underlying index series in the foreign currency at date **t**

S_t the Spot rate on date **t**, in terms of from-USD to-target currency

Tind_t the Index level of the underlying index series at date **t**

Index Return

Daily index returns can be calculated from the index levels,

$$r_{\text{TindC},t} = (\text{TindC}_t / \text{TindC}_{t-1}) - 1$$

Where

r_{TindC,t} the return of the index in the foreign currency at date **t**

TindC_t the level of the index in a foreign currency at date **t**

TindC_{t-1} the level of the index in a foreign currency on the previous business day

Examples

[Index calculation example](#)

The following example illustrates how CRSP calculates the level and daily return for the CRSP US Total Market Index in Canadian Dollars. Only the relevant data are shown in the table below, and numbers are not shown in full precision.

	Spot Rate	US Total Market Index ,Tind(\$)	US Total Market Index CAD, Tind (C\$)
2/6/2013	0.99675	1174.665	1170.847
2/7/2013	0.99785	1172.823	1170.301

On February 6 and 7, 2013, CRSP US Total Market Index levels are 1174.665 and 1172.823. And the 4 pm EST spot rates for the same dates are C\$ 0.99675/\$ and C\$ 0.99785/\$ correspondingly. Thus, the US Total Market Index in Canadian dollars are:

$$1174.665 \times 0.99675 = 1170.847 \text{ for Feb. 06, 2013}$$

and

$$1172.823 \times 0.99785 = 1170.301 \text{ for Feb. 07, 2013}$$

And the daily return for Feb. 07, 2013 is

$$r_{\text{Feb 07,2013}} = (1170.301 / 1170.847) - 1 = -0.047\%$$

HEDGED INDEXES

CRSP provides hedged indexes for foreign investors who only want exposure to the U.S. equity market by hedging the foreign exchange risk between the US dollar and foreign currencies.

The construction of the hedged indexes closely mimics the hedging process in practice. WM/Reuters is CRSP's source for spot and forward rates. The hedged amount, or the size for the Forward contract, is defined as the end-of-day hedged index level at the second-to-last business day of the previous month. The Forward rate for the contract is the 4 p.m. UK closing rate at the last business day of the previous month. The amount hedged is kept constant for the month. If the WM/Reuters

Spot rate and/or the Forward rate are missing, CRSP will use the previous business day's Spot and Forward rates. All rates used are as quoted in foreign exchange markets, but converted if needed in all formulas to the form of from-USD to-target currency. The midpoint of quotes is used.

The value of the index is driven by two parts: the amount tracking the underlying index and the value of the Forward contract. This is described in detail in the Formula section. The reported level of the index and also the index return are in terms of the foreign currencies

HEDGED INDEX FORMULA

[Index Level](#)

CRSP calculates the levels of the hedged indexes on a daily basis. The levels of the hedged indexes reflects the component that tracks the underlying index and the value of the Forward contract, the hedging part.

Within any month **M**, the daily Hedged index level is calculated as:

Equation 1

$$Y_t = S_t P_0 T_{ind_t} + \tilde{X}_0 [F_{0,T} - S_t - (F_{t,1-month} - S_t) \times (RemD / TD)]$$

Where:

Y_t the Hedged Index level in terms of the foreign currency at date **t**

S_t the Spot rate on date **t**, 4 pm UK closing Spot rate

P₀ the Hedged Level Multiplier for the month; constant for month **M**

T_{ind_t} The index level at date **t**

\tilde{X}_0 the hedged amount, the end-of-day hedged index level at the second-to-last business day of month **M-1**, in terms of U.S. dollars

F_{0,T} the 4 pm UK closing one-month Forward rate at the last business day of month **M-1**

F_{t,1-month} the 4 pm UK closing one-month Forward rate on date **t**

RemD the remaining counted days till the last business day of the month (excluding day **t**)

TD the total number of counted days within the month

As shown in Equation 1, **S_tP₀T_{ind_t}** tracks the performance of the underlying index and **$\tilde{X}_0 [F_{0,T} - S_t - (F_{t,1-month} - S_t) \times (RemD / TD)]$** is the value of the Forward contract at date **t**. The term, **S_t + (F_{t,1-month} - S_t) × (RemD / TD)**, marks to market the value of foreign currencies on the last business day of month **M**.

[Index Return](#)

Daily index returns can be easily calculated from the index levels,

$$r_{Y,t} = (Y_t / Y_{t-1}) - 1$$

Where:

r_{Y,t} the Hedged Index daily return at date **t**

Y_{t-1} the Hedged Index level in terms of the foreign currency at date **t-1**

² All exchange rates are quoted in term of C\$/\$, which is the amount of Canadian dollar(C\$) per 1 US dollar(\$)

³ Counted days include weekends and holidays. Or, in other words, every day counts.

INDEX MAINTENANCE

CRSP maintains the hedged indexes to closely reflect fund managers' hedging activities. CRSP resets the Hedged Level Multiplier (P_0) and the Hedged Amount (\tilde{X}_0) on a monthly basis, consistent with the fact that fund managers roll the Forward contract monthly. For each month, the Hedged Level Multiplier (P_0) is determined by the ratio between the end-of-day Hedged Index level in U.S. dollars and the index level on the last business day of the previous month. The Hedged Amount (\tilde{X}_0) is determined by end-of-day hedged index level, in U.S. dollars, on the second-to-last business day of the previous month.

EXAMPLES

Index calculation example

The following example illustrates how the CRSP Canadian Hedged Index level and daily return was calculated. Only the relevant data are shown in the table below, and numbers are not shown in full precision. The same approach is used to calculate the CRSP Australian Hedged Index level and daily return.

	Spot Rate	Forward Rate 1 Month	Underlying US Total Market Index Tind(\$)	TD	RemD	CRSPTCHT (C\$)
1/30/2013	1.00290					1161.166
1/31/2013	0.99885	0.99945	1163.154			1159.429
2/6/2013						1171.030
2/7/2013	0.99785	0.99846	1172.823	28	21	

For February 2013, CRSP reset the HLM (P_0) and Hedged Amount (\tilde{X}_0) based on relevant information at the end of January 2013. At the close on January 31, 2013, the underlying U.S. Total Market Index level (\$) is 1163.154, the Canadian Hedged Index level is 1159.429, and the spot rate is C\$ 0.99885/\$. Thus, the HLM for February, 2013 is

$$P_0 = 1159.429 / (0.99885 \times 1163.154) = 0.9979$$

The Hedged amount,

$$\tilde{X}_0 = 1161.166 / 1.0029 = 1157.808$$

is the Canadian Hedged Index level on Jan. 30, 2013, in terms of US dollars.

Since the last day of the month, February 28, 2013 is a business day, there are 21 days left on the hedging Forward contract from Feb. 07, 2013. Thus, RemD = 21.

Based on Equation 1, the Canadian Hedged Index level on Feb. 07, 2013 is

$$Y_{\text{Feb.07,2013}} = 0.99785 \times 0.9979 \times 1172.823 + 1157.808 \times [0.99945 - 0.99785 - (0.99846 - 0.99785) (21 / 28)] = 1169.167$$

And the daily return on Feb. 07, 2013 is

$$r_{\text{Feb.07,2013}} = 1169.167 / 1171.030 - 1 = -0.159\%$$

HEDGED AMOUNT AND FORWARD RATE EXAMPLES

Since fund managers roll the forward contract on the last business day of each month, the hedged amount \tilde{X}_0 is calculated based on the end-of-day level of the hedged index on the second-to-last business day before the beginning of the current month. And $F_{0,T}$ is taken as the 4 pm UK closing (11:00 am EST) Forward rate one business day before the beginning of the month.

Several examples illustrate this process:

EXAMPLE 1:

October 01, 2011 is a Saturday. The forward contract will be rolled on Friday, September 30, 2011. \tilde{X}_0 will be calculated

based on the end-of-day hedged index level on September 29, 2011. And $F_{0,T}$ is taken as the 4 pm UK closing (11 am EST) 1-month forward rate on Friday, September 30, 2011.

EXAMPLE 2:

July 01, 2012 is a Sunday. Since June 30, 2012 is a Saturday, the forward contract will be rolled on Friday, June 29, 2012. \tilde{X}_0 will be calculated based on the end-of-day hedged index level on June 28, 2012. And $F_{0,T}$ is taken as the 4 pm UK closing (11 am EST) 1-month forward rate on Friday, June 29, 2012.

EXAMPLE 3:

May 01, 2012 is a Tuesday. The forward contract will be rolled on Monday, April 30, 2012. Since April 28 and 29 are Saturday and Sunday, \tilde{X}_0 will be calculated based on the end-of-day hedged index level on Friday, April 27, 2012. And $F_{0,T}$ is taken as the 4 pm UK closing (11 am EST) 1-month forward rate on Monday, April 30, 2012.

TAX-ADJUSTED INDEXES

An underlying index for a total return series may be tax-adjusted to represent the tax withholding on dividends imposed on foreign investors of securities held in the underlying index. All dividends paid are reduced by 15% when the index returns are calculated.

Index ID	Index Series Name	Index Symbol	Underlying Index Constituents	Rule to Estimate Withholdings	Withholding Rate
1001331	CRSP US Total Market Tax Adjusted Index (TR)	CRSP TTT	CRSP US Total Market Index	Reduce all cash dividends by the withholding rate	15%

TAX ADJUSTED CRSP US TOTAL MARKET HEDGED TO CAD INDEX (TAX ADJUSTED CANADIAN HEDGED INDEX)

There are two components in a Tax Adjusted Canadian hedged US index. The first follows the underlying US index withholding the Canadian tax rate on the daily bases and the second is the Forward contract for the hedging purpose.

The part following the underlying US index is at level X_{t-1} and X_t in dates $t-1$ and t (the corresponding daily return $X_t = X_{t-1} [1 + r_t - (r_t - r_a) r_{twh}]$, all in terms of US \$. And r_t is the CRSP US Total Market daily total return at day t , r_a is the CRSP US Total Market price return at day t and r_{twh} is the Canadian withholding tax rate, The forward contract is for selling the notional amount of \tilde{X}_0 US \$. The level of the Canadian Hedged US Index at day t can be expressed as:

$$S_t X_{t-1} [1 + r_t - (r_t - r_a) r_{twh}] + \tilde{X}_0 (F_{0,T} - \tilde{F}_{t,T})$$

where S_t is the spot rate at day t , $F_{0,T}$ is the day 0 forward rate maturity at date T , and $F_{t,T}$ is the day t forward rate at maturity at date T .² $\tilde{F}_{t,T}$ is estimated by interpolating the one month forward rate on day t .

$$\tilde{F}_{t,T} = S_t + (F_{t,1\text{-month}} - S_t) \times \text{RemD} / \text{TD}$$

Where $F_{t,1\text{-month}}$ is the day t one-month forward rate, **RemD** is the remaining counted days till the last business day of the month (excluding day t), **TD** is the total number of counted days within the month.³

Y and r_Y represent the level and daily return of the Tax Adjusted Canadian Hedged US Index in terms of Canadian \$. The related calculation is summarized in the following table:

Table 1: The Tax Adjusted Canadian Hedged US Index

Index	Unhedged part following US Index (US \$)		Canadian Hedged US Index (Canadian \$)	
Time	$t-1$	t	$t-1$	t
Level	X_{t-1}	X_t	Y_{t-1}	$Y_t = S_t X_t + \tilde{X}_0 (F_{0,T} - \tilde{F}_{t,T})$
Index Daily Return	r_{t-1}	r_t	$r_{Y,t-1}$	$r_{Y,t} = (Y_t / Y_{t-1}) - 1$

These indexes are not reported as standalone indexes, but only as underlying indexes to selected foreign currency indexes.

² All exchange rates are quoted in term of C\$/\$, which is the amount of Canadian dollar(C\$) per 1 US dollar(\$)

³ Counted days include weekends and holidays. Or, in other words, every day counts.

Since fund managers rolling the forward contract by the end of the month, $\tilde{\mathbf{X}}_0$ is taken as the end-of-day level of the hedged index two business days before the beginning of this month. And $\mathbf{F}_{0,T}$ is taken as the 11:00 a.m. EST forward rate one business day before the beginning of the this month.

Several examples illustrate this process:

Example 1:

October 01, 2011 is a Saturday. The forward contract will be rolled on Friday, September 30, 2011. $\tilde{\mathbf{X}}_0$ will be the end-of-day hedged index level on September 29, 2011. And $\mathbf{F}_{0,T}$ is taken as the 11 am EST 1-month forward rate on Friday, September 30, 2011.

Example 2:

July 01, 2012 is a Sunday. Since June 30, 2012 is a Saturday, the forward contract will be rolled on Friday, June 29, 2012. $\tilde{\mathbf{X}}_0$ will be the end-of-day hedged index level on June 28, 2012. And $\mathbf{F}_{0,T}$ is taken as the 11 am EST 1-month forward rate on Friday, June 29, 2012.

Example 3:

May 01, 2012 is a Tuesday. The forward contract will be rolled on Monday, April 30, 2012. Since April 28 and 29 are Saturday and Sunday, $\tilde{\mathbf{X}}_0$ will be the end-of-day hedged index level on Friday, April 27, 2012. And $\mathbf{F}_{0,T}$ is taken as the 11 am EST 1-month forward rate on Monday, April 30, 2012.

CHAPTER 7: ANNOUNCEMENT POLICIES

CRSP, LLC will communicate announcements, and when necessary exceptions to our general policies and processes, to all index subscribers simultaneously, in addition to announcing concurrently to the public as appropriate.

RANKING PROCEDURE AND RANKING RESULTS

Announcements regarding ranking procedures and results are made available to index subscribers via the CRSP secure index website at 6:00 a.m. CT on the first trading day following the ranking day (the first trading day after the first Friday of March, June, September, and December).

Notice will generally be given two months prior to making a change to the ranking schedule.

EXCHANGE CLOSURES

- **Full Day Closures**

If all CRSP exchanges of interest close due to unforeseen circumstances, CRSP will not produce index results for that day. Instead, the index levels will continue from the last complete day of trading.

If the closing is known at least one day in advance, corporate actions originally declared effective after the close of the “closed” day will be made effective after the close of the day that markets reopen. Index holdings will be carried forward from the end of the day prior to the closed date. Scheduled index notifications will be announced on the trading day before the closing.

All corporate actions declared effective on a closed day or the first day after reopening that impact the CRSP security universe will be re-dated to the day after trading resumes. Changes to index holdings will take place after the close of the day trading resumes. If there is an unexpected market closure during the transition period, the transition period will be extended accordingly.

- **Unplanned Early Closures**

If all CRSP exchanges of interest close for the day before their scheduled time due to circuit breaker limits or other exceptional circumstances after valid trading for the day has started, then CRSP will report index levels for the day based on the trades reported up to the time the exchanges closed. If there is limited notice so that normal end of day trading processes are not followed, then CRSP will seek to postpone until the next open trading day, any index actions that were scheduled to be effective after the close of the early closure day.

- **Abbreviated Trading Schedules**

If all CRSP exchanges of interest announce an abbreviated trading schedule before the normal scheduled market open for a day, CRSP will attempt to follow standard rules for processing corporate actions and reporting results. The same number of releases and the same files will be created, but the timing of each may be revised to fit the situation. CRSP will announce any updated times of releases as soon as possible.

- **Individual Exchange Closures**

If one or more, but not all, CRSP Exchanges of interest close for a day, close early, or run an abbreviated trading schedule, CRSP will follow normal schedules, but may adjust pricing rules for securities listed on the offending exchanges. If there are consolidated trading prices available significantly after primary listing prices are frozen, then the consolidated trading prices will be used to value the indexes.

CHAPTER 8: GLOSSARY OF TERMS

Terms	Definition
Bands	Capitalization Bands: Percentage thresholds straddling each capitalization-based breakpoint. Style Bands: Percentage thresholds straddling the value/growth breakpoint. Bands are considered when reevaluating a company's index placement in terms of company capitalization or style.
Capitalization-Based Indexes	Indexes developed to represent capitalization-based (size-specific) characteristics of companies.
Capitalization-Neutral Corporate Action	A corporate action that does not change the capital structure of the company is considered capitalization-neutral. Examples include stock dividends and stock splits.
Cash Dividend	An event in which shareholders receive cash for each share held (payments are typically scheduled at regular intervals).
Compliance Check	Determines whether an index satisfies the IRS's 25/50 portfolio diversification/concentration rules.
Compliance Days	The last trading day of March, June, September, and December. Dates where an index must comply with the IRS's (25/50) portfolio diversification/concentration rules.
Compliance Rebalance	An action that resets the holdings of index constituents using CRSP's concentration optimization rules. All of the securities in the index may be adjusted. Also known as a compliance re-optimization.
Concentration Fitting	An action that applies a concentration adjustment to new securities added to a constrained index. In a fitting, the target weights of the new securities are found as if the entire index was rebalanced, but holdings of already existing securities are not affected.
Concentration Limit Multiplier (CLM)	The ratio between constrained holdings set to satisfy the IRS's (25/50) portfolio diversification/concentration rules and the unconstrained holdings that would be used if no diversification/concentration rules were in effect.
Consolidation	A corporate action where a company combines multiple share classes of stock into one class. A consolidation behaves like a merger but is neutral at the company capitalization level.
Conversion	A corporate action where a company exchanges one of its securities for another type of security.
Constrained Index	An index where the holdings of one or more constituents are adjusted to satisfy IRS's portfolio diversification/concentration rules. At least one security in the index has a concentration limit multiplier (CLM) not equal to one.
Corporate Action	An event initiated by a company that impacts its shareholders. Examples include cash dividends, distributions, mergers, spin-offs, stock buybacks, and stock splits.
CRSP Exchange of Interest	NYSE, NYSE American, NYSE ARCA, NASDAQ, Bats Global Markets, and the Investors Exchange.
Effective Float Factor (EFF)	A security's float factor (FSO/TSO) rounded to the nearest 5 percent at the last ranking or the last time a corporate action caused an index holdings review.
Effective TSO	A security's TSO at the last ranking or the last time a corporate action caused an index holdings review. A neutral corporate action applies the rate to the previous Effective TSO while other actions use the TSO known at the time of the action.
Employee Identification Number (EIN)	A unique nine-digit number assigned by the IRS to business entities operating in the United States. An Employer Identification Number (EIN) is also known as a Federal Tax Identification Number, and is used to identify business entities.
End-of-Day Price	The price used for a security by an index for end-of-day calculations. The End-of-Day Price applies CRSP's price methodology to derive a value based on the available data.
Enhanced ICB	Enhanced ICB – a revision to the Industrial Classification Benchmark (ICB) standard introduced in 2020.
Exchange/Conversion	A mandatory swapping of one security for another type/class of security of the same company. For example, when preferred stock is converted to common stock or one class of security is exchanged for another class.
Ex-Distributed Trading	A period of conditional trading with deferred settlement, when a security is traded without post-event rights before an event is effective. During this time of conditional trading the parent security is trading regular way in its pre-event state.

Terms	Definition
Fast-Track IPO	A newly listed company that passes specific company capitalization and investability thresholds, added to an index prior to ranking.
Final Transition Day/ Reconstitution Day	The last day of the pro forma period. The ranking process is complete and the indexes are converted to the projected holdings established on the ranking day.
Float Factor	The ratio of float shares outstanding (FSO) to total shares outstanding (TSO), expressed as a percentage.
Float Shares Outstanding (FSO)	The number of shares of a security outstanding that are freely available for trading by the public.
Forward Stock Split	An increase in a company's total shares outstanding (TSO) accompanied by a corresponding decrease in the price per share.
Holdings	The number of shares of a security held in an Index. Holdings are calculated according to weighting rules for the index and incorporate all inputs and multipliers into a single value that can be used to derive the weight of the security within the index.
Index Capitalization	A security's capitalization within an index, equal to the security's index holdings multiplied by its price.
Index Company Capitalization	A company capitalization within an index, equal to the sum of the Index Capitalization for all of the company's securities in the index.
Industry Classification Benchmark (ICB)	A classification system that allocates companies to the industry sector whose definition closely describes the nature of its business. The classification is derived from the source of the company's revenue or the source of the majority of its revenue.
Investability	Characteristics of a security in terms of liquidity, defined by CRSP's investability rules.
Issue Split	A corporate action where a company creates a new share class by distributing shares from existing share class(s). Issue splits are neutral at the company capitalization level. An Issue Split can also be described as a Stock Dividend of a new security.
Market Capitalization	The total market value of a company's capitalization-eligible share classes.
Market Impact	The extent to which the buying or selling of a security moves its price.
Merger/Acquisition	An event in which two or more companies are combined into one.
Merger of Equals	A corporate event that occurs when two companies of about the same size merge. In general, shareholders of both companies surrender their holdings for shares of the new company.
Migration	A security's movement between indexes of an index family after reevaluation or ranking, applying CRSP's packeting and migration rules for the family.
Multipliers	Multipliers quantify the allocation of securities shared among members of an index family, such as size (BHM) and style (SSM). Multipliers also show the ratio of holdings in indexes constrained to satisfy the IRS's portfolio diversification rules to their initial unconstrained holdings (CLM).
Non-Capitalization Neutral Corporate Action	A corporate action that changes the capital structure of the company. Examples include mergers, spin-offs, and secondary offerings.
Nontransferable	A security, property or right that cannot be traded, only converted, redeemed, or exercised according to its rules by the shareholder that receives it.
Packet	The minimum change in allocation allowed by migration rules for the index. In general, 50 percent of a company's index holdings.
Packeting	The process of gradually migrating companies to or from specific indexes.
Partial Merger	A corporate action where a company spins off assets (typically a specific business segment) and immediately merges those assets with another company. New shares of the child company are issued by the parent company resulting in a reduction in the parent company's capitalization. Partial Mergers are typically implemented as a mandatory or voluntary exchange. If voluntary, the transaction is structured as an Exchange Offer. Shareholders of the parent company have the right, but not the obligation to tender their shares for shares of the child company.
Price/Market Impact	The correlation between the execution of an order to purchase or sell a security and the subsequent price change.
Primary Index	The current (standard) index as opposed to the pro forma index.

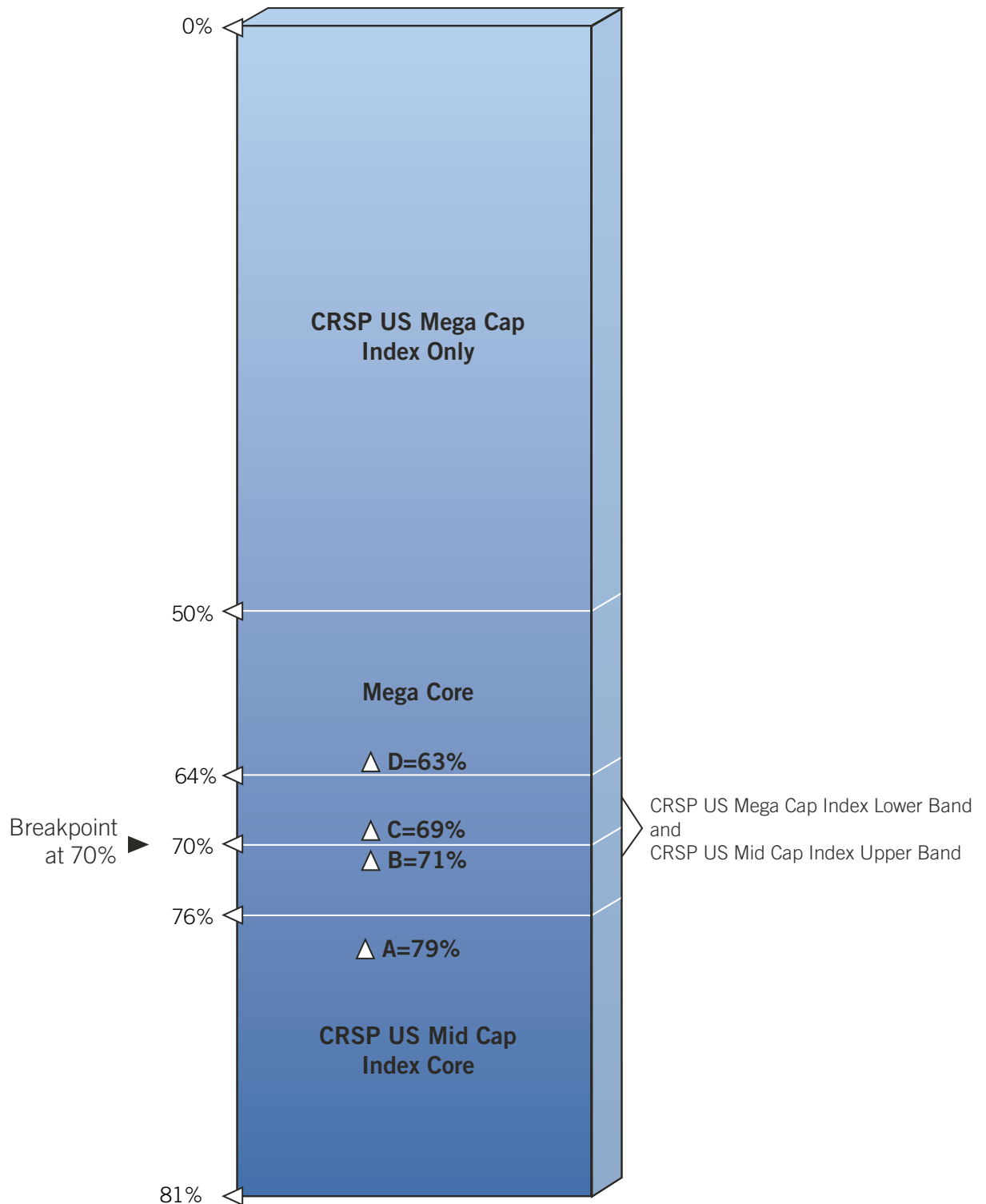
Terms	Definition
Pro forma Adjustment Period	Generally, the first week of the pro forma period during which CRSP reviews questions related to the newly created pro forma indexes.
Pro forma Period	The period between the ranking and reconstitution dates, currently 12 trading days.
Pro forma Index	The projected composition of the post-transition (rebalanced) CRSP indexes established on each quarterly ranking date. On the final transition day, the pro forma index becomes the primary index for the upcoming quarter.
Ranking	The quarterly review of CRSP's index constituents. CRSP's ranking dates are effective after the close of the first Friday of March, June, September, and December.
Rebalance	Another term used to describe the reconstitution process.
Received Stock	Received Stock is a neutral distribution of stock of another security. New holdings of the distributed security are added to the indexes of the distributing security using the rate of the distribution multiplied by the initial holdings of the distributing security. The added holdings either add the security to the index or add to existing holdings of a security already in an index. All spin-offs make use of received stock, on the ex-date. Mergers require received stock only when the acquired security is removed from indexes before a reevaluation is complete.
Reconstitution Day	Another term used to describe the final transition day.
Reevaluation	The intra-quarter application of CRSP's index methodology. Examples include index eligibility, investability, and market capitalization rules. Companies are typically reevaluated after a significant corporate event such as a spin-off or merger.
Regular-way Trading	A type of trade that is settled through the regular settlement cycle (two days after the trade date (T+2)).
Reverse Merger	A merger in which the surviving entity (typically a foreign or private company) originates from outside of CRSP's security universe.
Reverse Stock Split	A decrease in a company's total shares outstanding (TSO) accompanied by a corresponding increase in the price per share.
Rights Distribution	An event in which current shareholders are offered the option to buy, within a certain period of time, a specified number of additional shares from the company at a specific price, typically below the current market price.
Rights Ratio	The entitlement representing the number of rights received per share held of the underlying security.
Secondary Exchange	Stock exchanges excluding NYSE, NYSE American, NYSE ARCA, NASDAQ, Bats Global Markets, and the Investors Exchange. Examples include Pink Sheets, foreign exchanges, or small, regional exchanges.
Secondary Offering	An event where a company or stagnant shareholder sells shares to the public after the company's initial public offering.
Sector Indexes	Indexes developed to represent industry sector-specific characteristics of companies. For example, the financial or oil & gas industry.
Spin-off	The creation of an independent company through the distribution of new shares of an existing business or division/subsidiary.
Split Factor	The ratio of the number of new shares received relative to old shares held typically associated with a forward or reverse stock split.
Split-off	A split-off is initiated when a company distributes shares it holds of another company. The post event parent's capitalization is reduced. The child's capitalization typically remains unchanged. The corporate action can be implemented as a mandatory or voluntary event. If the action is voluntary, the transaction is structured as an exchange offer. Shareholders of the parent company have the right but not the obligation to tender their shares in exchange for the shares of the child company.
Start-of-Day Price	The previous day end-of-day (closing) price of a security adjusted for all splits and non-ordinary distributions, such as special dividends, rights distributions, or spin-offs.
Stock Dividend	A distribution of additional shares of stock to existing stockholders. Otherwise known as an Forward Stock Split.
Style Indexes	Indexes developed to represent the value or growth characteristics of companies, as defined by CRSP's multifactor style model.
Subscription Ratio	The number of shares of the underlying security that can be purchased per right held.

Terms	Definition
Tender Offer	An external or internal offer made directly to a firm's shareholders to buy their stock at a specified price. Offers are typically made at a premium relative to the current market price.
Total Shares Outstanding (TSO)	All of the shares of a specific class of a company's equity securities that are issued and outstanding.
Transition Day	One of the five trading days during the transition period when holdings are partially moved from the primary (current) index to the target pro forma index.
Transitional Reconstitution	The incremental process of moving holdings from the primary index to the pro forma index during the five-day transition period.
When-distributed Trading	A period of conditional trading with deferred settlement, on shares of a security affected by an offer awaiting the final allotment of shares to stakeholders. Prior to the effective date of the distribution, there will typically be two markets a "regular-way" and a "when-distributed" market.
True-up	An update of index holdings utilizing the latest share information. When a company's holdings are "trued-up" the effective float factor (EFF) is recalculated by dividing the FSO by the TSO rounded to the nearest 5 percent. Holdings are then set to the TSO multiplied by the updated EFF and other relevant index multipliers.
Unconstrained Index	An index that has passed the IRS's 25/50 portfolio diversification rules and therefore needs no optimization of its constituents. All of the index constituents have a concentration limit multiplier (CLM) equal to one. Alternatively, an index where IRS's 25/50 rules do not apply.
Unit Split	A corporate action where securities previously trading as a package (unit) begin trading independently. A unit split typically occurs when one of the unit's component securities are called or expire.
When-issued Trading	A period of conditional trading of a new security with deferred settlement. When-issued securities typically trade regular way on the effective date of the corporate event.
Winsorize	A method of limiting extreme values in statistical data to reduce the effect of possibly spurious outliers.

APPENDIX A: MIGRATION EXAMPLES

CAPITALIZATION-BASED MIGRATION EXAMPLES

In the interest of making the CRSP cap-based methodology clear, examples are provided that refer to the diagram below. The diagram makes use of two adjacent indexes: Mega Cap and Mid Cap. The breakpoint is set at 70 percent of cumulative market cap and the band range is from 64 percent to 76 percent. Examples assume a quarterly ranking/reconstitution. In this example, the CRSP US Large Cap Index is ignored for sake of clarity.



EXAMPLE 1: COMPANY MOVES FROM B IN Q1 TO C IN Q2, TO D IN Q3, AND STAYS AT D IN Q4.

Q1 state:

Company is ranked at 71 percent (point B).

It is on the CRSP US Mid Cap Index side of the breakpoint and was not previously in the adjacent CRSP US Mega Cap Index. Therefore, the company is allocated 100 percent to the US Mid Cap Index.

Q2 state:

Company is ranked at 69 percent (point C).

Since the company remains in the band, no movement occurs. Therefore, it is still allocated 100 percent to the US Mid Cap Index.

Q3 state:

Company is ranked at 63 percent (point D).

The company has crossed the 64 percent threshold into the US Mega Cap Index core. Therefore, one 50 percent packet is moved from US Mid Cap to US Mega Cap. Therefore it is now allocated 50 percent to US Mid Cap and 50 percent to US Mega Cap.

Q4 state:

Company is still ranked at 63 percent (point D).

Since the company has remained in the US Mega Cap core for two consecutive quarters, its second 50 percent packet is moved from US Mid Cap to US Mega Cap, resulting in a new 100 percent allocation to the US Mega Cap Index.

EXAMPLE 2: COMPANY MOVES FROM D IN Q1 TO A IN Q2, STAYS AT A IN Q3, THEN MOVES TO B IN Q4, TO D IN Q5, AND TO A IN Q6.

Q1 state:

Company is ranked at 63 percent (point D).

The company originally starts in the US US Mega Cap core and is allocated 100 percent to the US Mega Cap Index.

Q2 state:

Company is ranked at 79 percent (point A).

The company crosses the breakpoint and is now located beyond the band adjacent to the US Mid Cap core. Therefore, one 50 percent packet is moved. As a result, 50 percent of the company is allocated to the US Mega Cap Index and 50 percent is allocated to the US Mid Cap Index.

Q3 state:

Company remains at 79 percent (point A).

Since the company remains in the US Mid Cap core, its second 50 percent packet is moved, resulting in a new 100 percent allocation to the US Mid Cap Index.

Q4 state:

Company is ranked at 71 percent (point B).

Because the company's score is still in the band adjacent to the US Mid Cap core, it maintains its 100 percent allocation in the US Mid Cap Index.

Q5 state:

Company is ranked at 63 percent (point D).

The company crosses beyond the breakpoint and 64 percent threshold of the adjacent band into the US Mega Cap core. Consequently, one 50 percent packet is moved and allocated to the US Mega Cap Index; the other 50 percent packet remains allocated to the US Mid Cap Index.

Q6 state:

Company is ranked at 79 percent (point A).

At 79 percent, the company has moved back across the threshold of US Mid Cap core. It did not remain in the US Mega Cap core for two consecutive quarters, therefore the 50 percent packet that was moved to the US Mega Cap Index during the previous quarter is reallocated to US Mid Cap resulting in a 100 percent allocation to the US Mid Cap Index.

EXAMPLE 3: COMPANY MOVES FROM D IN Q1 TO C IN Q2, TO A IN Q3, TO B IN Q4 AND TO C IN Q5.**Q1 state:**

Company is ranked at 63 percent (point D).

Since the company is located in the US Mega Cap core, it has a 100 percent allocation to that index.

Q2 state:

Company is ranked at 69 percent (point C).

The company moves into the band adjacent to the US Mega Cap core but, since it has not crossed the threshold to the adjacent index core, no movement occurs and the company maintains its 100 percent allocation to US Mega Cap Index.

Q3 state:

Company is ranked at 79 percent (point A).

The company has crossed the breakpoint and has moved beyond the band into the core of the US Mid Cap Index. Therefore, one 50 percent packet is moved out of US Mega Cap and into US Mid Cap. As a result, 50 percent of the company is allocated to US Mega Cap and 50 percent is allocated to US Mid Cap.

Q4 state:

Company is ranked at 71 percent (point B).

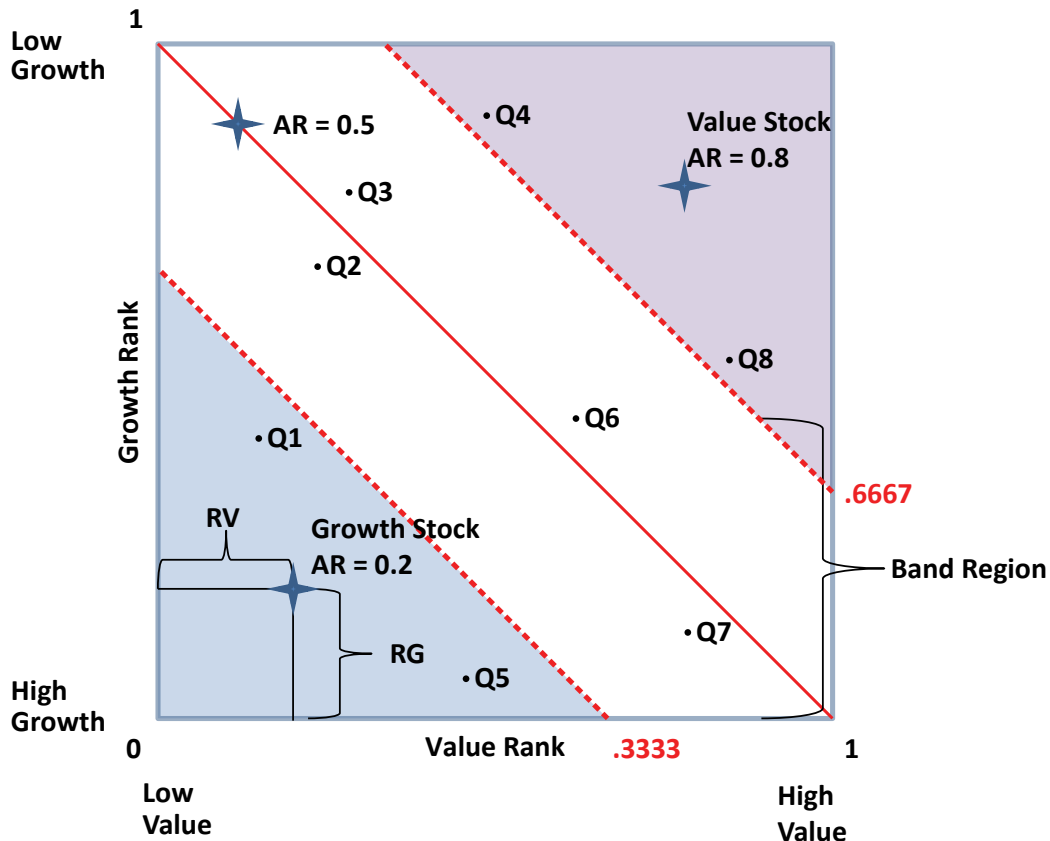
Because the company remains within the band, no movement occurs and the company's allocation remains split (50/50) between the US Mid and US Mega Cap indexes.

Q5 state:

Company is ranked at 69 percent (point C).

Though the company is now located on the US Mega Cap side of the band, since it has not moved beyond the band threshold, it will maintain the allocation from the previous quarter.

VALUE AND GROWTH STYLE MIGRATION EXAMPLES



For the value and growth style indexes, CRSP set the breakpoint to an AR score of 50 percent and the band width to .3333. Therefore, the band range runs from an AR of .3333 to an AR of .6667.

Q1 state:

Company's AR is 23 percent (point Q1).

Initially, the company's AR score is 23 percent and it is, therefore, allocated 100 percent to the growth index for its market segment.

Note: CRSP allocates a company first to the corresponding capitalization-based index. Then, based on its AR score, the security will be assigned to the corresponding value or growth index. Thus, the 100 percent allocation to the growth index corresponds to the total market capitalization that the company was allocated to in this capitalization category. For example, when a company starts with half of its total market cap allocated to the CRSP US Mid Cap Index (e.g., migrating between the Mid Cap Index and the Small Cap Index), with an AR score of 23 percent, CRSP would allocate all of its available market cap in the US Mid Cap index (i.e. 50 percent of its total market cap) to the US Mid Cap Growth Index.

Q2 state:

Company's AR is 45 percent (point Q2).

The company's AR score moves up to 45 percent but, since it is still within the band, it remains allocated 100 percent to the growth index.

Q3 state:

Company's AR is 55 percent (point Q3).

The company's AR score moves up again to 55 percent. Even though this value is above the 50 percent breakpoint, the company has not passed through the upper threshold of 66.67 percent so it will remain in growth.

Q4 state:

Company's AR is 68 percent (point Q4).

Now, the company's AR score is 68 percent which is greater than the upper threshold of 66.67 percent. CRSP will migrate one 50 percent packet to the value index within the company's market capitalization segment, resulting in a 50 percent allocation to value and 50 percent allocation to growth.

Q5 state:

Company's AR is 30 percent (point Q5).

In this quarter, the company's AR score drops down to 30 percent. Since that number is below the lower threshold of 33.33 percent, CRSP will migrate the 50 percent packet moved to value in the previous quarter back to the company's original growth index. The company is once again allocated 100 percent to growth.

Q6 state:

Company's AR is 56 percent (point Q6).

The company's AR score rises to 56 percent but, since this is below the upper threshold, it remains 100 percent allocated to growth.

Q7 state:

Company's AR is 46 percent (point Q7).

The company's AR score decreases to 46 percent but, since this is above the lower threshold, it will remain 100 percent allocated to growth.

Q8 state:

Company's AR is 70 percent (point Q8).

In this quarter, the company's AR score finally moves enough to break through the upper threshold. Therefore, 50 percent will be allocated to growth and 50 percent to value.

APPENDIX B: INDEX CALCULATIONS

INDEX LEVEL

Index Level is the value of an investment relative to its value at one fixed point in time. Index Levels allow for the convenient comparison of the relative performance of the different portfolios or asset classes. For the CRSP U.S. Equity Indexes initial levels were set to 1,000. See [Appendix E](#) for a list of inception dates for all of the CRSP U.S. Equity Indexes.

INDEX LEVELS – PRICE ONLY

$$\text{Index Level}_t = \frac{\text{Index Market Value}_t}{\text{Divisor}_t}$$

INDEX LEVELS INCLUDING DIVIDENDS (TOTAL RETURNS INDEX)

$$\text{Index Level TR}_t = \text{Index Level TR}_{t-1} \left(\frac{\text{Index Level}_t + \text{Dividend Points}_t}{\text{Index Level}_{t-1}} \right)$$

where

$$\text{Dividend Points}_t = \frac{\text{Dividend Amount}_t}{\text{Divisor}_t}$$

DIVISOR

$$\text{Divisor}_{\text{initial}} = \frac{\text{Index Market Value at Inception}}{1,000}$$

$$\text{Divisor}_t = \text{Divisor}_{t-1} \left(\frac{\text{SOD Index Market Value}_t}{\text{EOD Index Market Value}_{t-1}} \right)$$

INDEX RETURNS

INDEX RETURNS – PRICE ONLY

$$\text{Index Return}_t = \left(\frac{\text{Index Level}_t}{\text{Index Level}_{t-1}} \right) - 1$$

INDEX RETURNS INCLUDING DIVIDENDS (TOTAL RETURN)

$$\text{Index Return TR}_t = \left(\frac{\text{Index Level TR}_t}{\text{Index Level TR}_{t-1}} \right) - 1$$

SECURITY RETURNS

The return on a security is equal to the change in the total value of the initial investment over a period of time divided by the amount of the initial investment. A total return takes into account all distributions to shareholders and the reinvestment of cash dividends. Dividends are assumed to be reinvested at the end of the day on the ex-date. A price return, on the other hand, excludes ordinary cash dividends from the return calculation.

Security total returns are calculated according to the following equation:

$$r(t) = \left(\frac{p(t) + n(t) + d(t)}{p(t')} \right) - 1$$

Where:

$r(t)$ = return based on purchase at t' and sale at t

$p(t)$ = end-of-day price

$d(t)$ = dividend amount for t (Total Return only)

$n(t)$ = value of non-ordinary payments not available for start-of-day adjustment

$p(t')$ = start-of-day price on day t

SECURITY START-OF-DAY PRICE

Start-of-day prices are derived by applying all known distribution values and split factors to the previous end-of-day price according to the formula below.

$$p(t') = \left(\frac{p(t-1)}{f(t)} \right) - v(t)$$

Where:

$p(t')$ = start-of-day price on day t

$p(t-1)$ = end-of-day price (closing) on previous trading day

$f(t)$ = split factor applicable on day t

$v(t)$ = value of non-ordinary (split adjusted) payments available for start-of-day adjustment (e.g. special dividends)

If a new security is created by a Merger, Conversion, or similar corporate action, its start-of-day price on the effective date of the corporate action is derived from the price of the securities that the investor held before the event. For each held security that was exchanged for the new security, the derived start-of-day price is calculated as:

New Security derived Start-of-Day Price = (Held Security Start-of-Day Price – Any Cash Distributed) / Ratio of Shares of New Security per each share of Held Security

If more than one held security applies for the new security, the price is set using the result for the held security with the highest security capitalization contribution, calculated as the total shares outstanding multiplied by the quantity of the start-of-day price minus any cash distributed.

TURNOVER

Turnover is a measurement of the overnight activity needed to maintain a weighted holdings match to an index, based on a fixed investment amount. The weight of a security is the ratio of the market value held to the total market value of the index. CRSP calculates daily index turnover number. Annual turnover is calculated as the summation of daily turnover:

$$\text{CRSP Index Daily Turnover}_t = \frac{\sum_{i=1}^N |w_{i,t} - w_{i,t-1}|}{2}$$

where $w_{i,t}$ is the start of day weight for security i in the index and $w_{i,t-1}$ is the end of day weight for security i on day $t-1$. And N is the number of securities in the index.

Thus,

$$\text{CRSP Index Annual Turnover} = \sum_{t=1}^T \text{CRSP Index Daily turnover}_t$$

where T is the total number of trading days in the calendar year.

Since there is no money inflow/outflow, for indexes, the total sales will always equal the total purchases. Thus, the total weight change due to sales will always equal to the total weight change due to purchases.

ADDITIONAL INDEX CALCULATIONS

CRSP calculates additional daily index statistics which may be obtained upon request. A partial listing of additional statistics is provided below:

Daily Index Statistic	Description
Total return	The return on an index, including all distributions.
Capital appreciation return	The return on an index, excluding ordinary dividends.
Income return	The return on ordinary dividends in an index.
Total return index level	The value of an index, including all distributions, relative to its value at inception.
Income return index level	The total return index level minus the capital appreciation return index level.
Count of securities in the index	The total number of securities in an index on the selected trading date.
End-of-day market value	The End-of-day total index capitalization of all index constituents (in thousands of dollars).
Start-of-day market value	The Start-of-day total index capitalization of all index constituents. (in thousands of dollars).
Concentration ratio – one	Weight of the largest company in the portfolio at the start-of-day.
Concentration ratio – ten	Sum of the weights of the largest ten companies in the portfolio at the start-of-day.
Concentration ratio – large	Sum of the weights of the companies in the portfolio with a weight over 5% at the start-of-day.
Herfindahl-Hirschman Index	The sum of the squares of the market share percentages of all the individual components in an index computed using beginning of period market caps.
Aggregate Dollar Trading Volume	\sum (end of day price \times daily number of traded shares for all securities in an index)

PRICE ADJUSTMENT TABLE

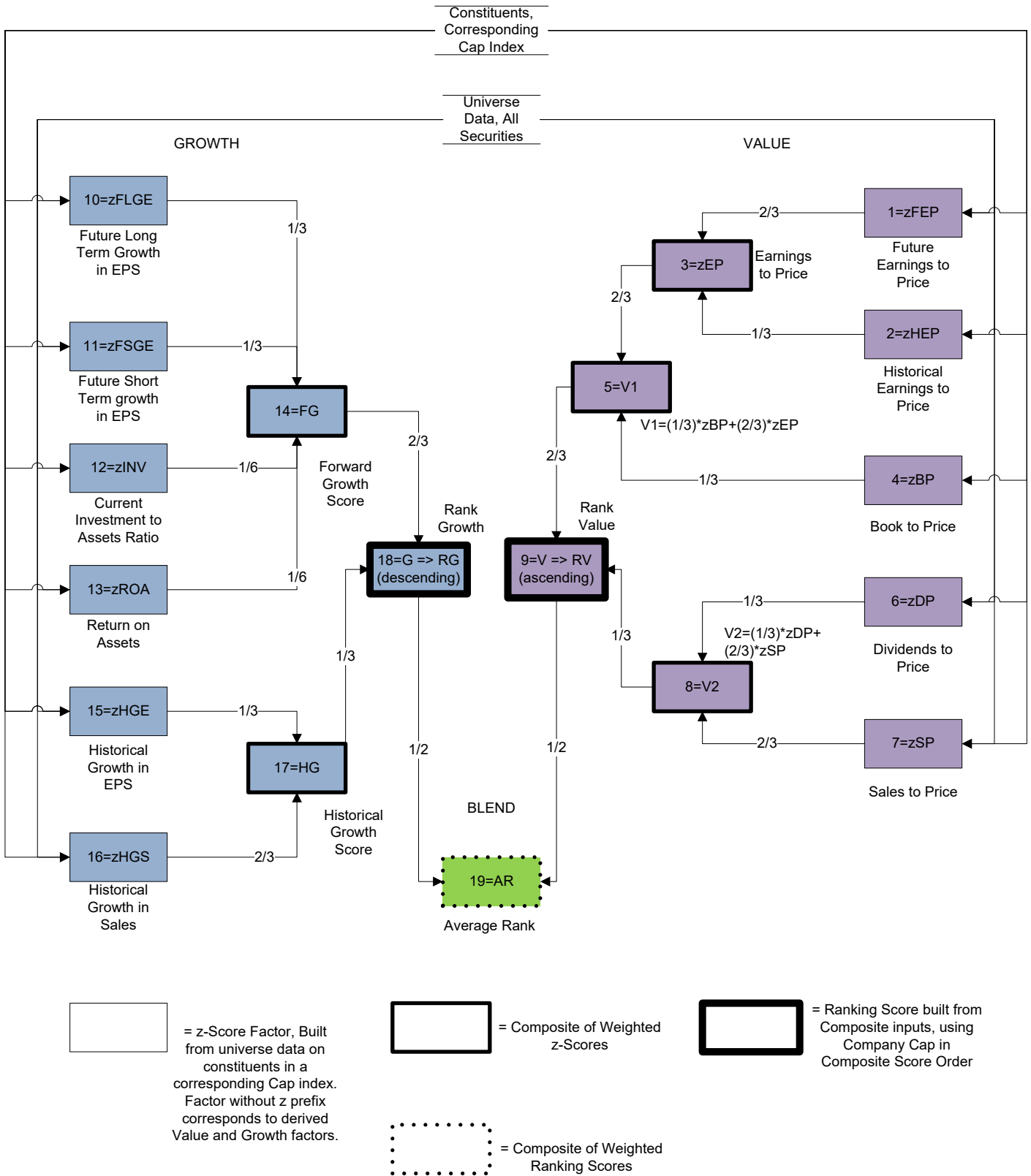
Action:	Description:	Price adjustment:
Special Dividend	A non-recurring distribution of a company's assets, usually in the form of cash to shareholders.	Adjusted price = previous day closing price - special dividend cash amount.
Stock Dividend	A dividend payment made in the form of additional shares rather than a cash payout	Adjusted price = previous day closing price / (1+stock div ratio)
Stock Split	The increase in a company's number of outstanding shares of stock with an equally offsetting reduction in price. This event has no impact on the company's market capitalization.	Adjusted price = previous day closing price / split ratio
Reverse Stock split	The decrease in a company's number of outstanding shares of stock with an equal and offsetting increase in price. This event has no impact on the company's market capitalization.	Adjusted price = previous day closing price / split ratio
Spin-off (when-issued trading available before the ex-date)	The creation of an independent company through the sale or distribution of new shares of an existing business/division of a parent company. A spinoff is a type of divestiture.	Parent company's adjusted SOD price on the ex-date = parent company's closing price on the day before the ex-date – spun-off company's closing WI price on the day before the ex-date * spin-off ratio
Rights Offering	Rights issuance to the existing shareholders of a company allowing them to buy a number of additional shares at a given price (usually a discount) within a fixed period of time.	If the rights trade when-issued on the day before the ex-date, the price of the right on that day will be used to adjust the parent's price. If the rights do not trade and the rights are in-the-money, the fair market value formula is used to adjust the parent's price.
Stock Distribution	One security (A) distributes shares of another existing security (B).	Adjusted price (A) = previous day closing price (A) - closing price of (B) * distribution ratio

APPENDIX C: VALUE AND GROWTH FACTOR DEFINITIONS AND CALCULATIONS

Value Factors	Definition	Sources	Calculation	Data Considerations
BP	Book to Price	Compustat quarterly and annual, CRSP price and shares	Book Value = ATQ – LTQ + TXDITCQ – first available of (PSTK, PSTKRV, PSTKL); replace negative result with 0. BP = Book Value / Company Cap	Company Cap is the total capitalization of index eligible securities for the company. If no non-missing preferred stock value, then use 0 in calculation. If both ATQ and LTQ are unavailable at the last quarter, then use the latest quarter within the last four quarters where both are available. If no quarterly data in this range is available, then use the last annual AT and LT values. If still no data for both, then BP is missing. Use TXDITCQ or TXDITC at the corresponding filing used for ATQ and LTQ. If missing in that filing use a 0 in the calculation. If only one of the estimates is available, it is fully weighted.
FEP	Future Earnings per Price	IBES consensus, CRSP price	$FEP = (\text{weight_1Y} * \text{EPS_EST_1Y} + \text{weight_2Y} * \text{EPS_EST_2Y}) / \text{price}$, where $\text{weight_1Y} = \# \text{ of months, rounded up between current date and next annual reporting period, (minimum of 1) / 12}$, and $\text{weight_2Y} = 1 - \text{weight_1Y}$.	Calculated for primary security according to IBES, inherited by other securities of the same company. Earnings per Share values are split adjusted between report date and current date using CRSP adjustment data.
HEP	Historical Earnings per Price	IBES actual, CRSP price	$HEP = \text{sum of last 4 EPS_ACT_QTR} / \text{price}$	Calculated for primary security according to IBES, inherited by other securities of the same company. Earnings per Share values are split adjusted between report date and current date using CRSP adjustment data.
DP	Dividends to Price	Compustat, CRSP price and shares	$DP = \text{DVC} / \text{Company Cap}$	Same Company Cap as BP.
SP	Sales to Price	Compustat Quarterly, CRSP price and shares	$SP = \text{sum of last 4 SALEQ} / \text{Company Cap}$	Same Company Cap as BP. Pro-rate as in HEP.

Growth Factors	Definition	Sources	Calculation	Data Considerations
FLGE	Future Long Term Growth in EPS	IBES consensus	$FLGE = EPS_EST_LTG$	No restrictions based on number of estimates. Calculated for primary security according to IBES, inherited by other securities of the same company.
FSGE	Future Short Term Growth in EPS	IBES consensus and Actual	$FSGE = (weight_1Y * EPS_EST_1Y + weight_2Y * EPS_EST_2Y) - \text{sum of last 4 } EPS_ACT_QTR / \text{abs}(\text{sum of last 4 } EPS_ACT_QTR)$	Inputs and rules are similar to FEP and HEP, but without price, which is the same and cancels out. Calculated for primary security according to IBES, inherited by other securities of the same company. Missing if sum of EPS_ACT_QTR last 4 quarters is ≤ 0 or calculated 1 year estimate is negative. Earnings per Share values are split adjusted between report date and current date using CRSP adjustment data.
HGE	Historical Growth in EPS	IBES Actual	$HGE = (\text{sum of last four } EPS_ACT_QTR - \text{sum of } EPS_ACT_QTR \text{ 12-15 quarters ago}) / \text{abs}(\text{sum of } EPS_ACT_QTR \text{ 12-15 quarters ago})$	Pro rate sums separately for quarters 0-3 and 12-15 if not all quarters are available. Missing if sum 12-15 quarters ago is ≤ 0 or sum 0-3 quarters ago is negative. If pro rating base period then pro rate final period using the quarters corresponding to the available base quarters. Earnings per Share values are split adjusted between report date and current date using CRSP adjustment data.
HGS	Historical Growth in Sales	Compustat	$HGS = (\text{sum of last four } SALEQ - \text{sum of } SALEQ \text{ 12-15 quarters ago}) / \text{abs}(\text{sum of } SALEQ \text{ 12-15 quarters ago})$	Pro rate sums separately for quarters 0-3 and 12-15 if not all quarters are available. Missing if sum of $SALEQ$ 12-15 quarters ago is ≤ 0 or sum of $SALEQ$ 0-3 quarters ago is negative. If pro rating base period then pro rate final period using the quarters corresponding to the available base quarters. $SALEQ$ earlier than the most recent quarter can be used even if non-primary as long as the most recent quarter is primary.
INV	Current Investment to Assets Ratio	Compustat	$INV = (PPEGTQ - PPEGTQ \text{ 4 quarters earlier} + INVTQ - INVTQ \text{ 4 quarters earlier}) / ATQ \text{ 4 quarters earlier}$	If $INVTQ$ is unavailable for the last quarter, then use the latest quarter within the last four quarters where it is found. If still no quarterly data in this range, then use the last annual $INVT$ value. If both $INVTQ$ and ATQ are unavailable five quarters ago, then use the last quarterly filing five to eight quarters ago where both are found. If both are still not found, use $INVT$ and AT from the second to last annual filing. Use the $PPEGTQ$ or $PPEGT$ value corresponding to the quarterly or annual filing used to represent latest $INVTQ$ or four quarters earlier $INVTQ$ and ATQ . If $PPEGTQ$ is not available in either, use a 0 in the calculation for both. If only one is available, then report INV as missing.
ROA	Return on Assets	Compustat	$ROA = \text{Sum of last 4 } IBQ / ATQ \text{ 4 quarters earlier}$	Pro-rate IBQ quarters as in HEP. If ATQ is missing five quarters ago then use the last annual AT .

APPENDIX D: VALUE AND GROWTH FACTORS DIAGRAM



APPENDIX E: CRSP INDEXES QUICK REFERENCE SUMMARY

Index Description	Index Name	Index Identifier	CUSIP	NASDAQ GIDS Post Date	Inception Date Open Val = 1000	Bloomberg Ticker
Total Market Index	CRSP US Total Market Index (TR)	CRSPTMT	12628H109	12/31/2012	4/1/2011	BBG003PZ7F43
	CRSP US Total Market Index (PR)	CRSPTM1	12628G101	1/18/2011	4/1/2011	BBG001DQ7123
CRSP Australian Hedged Index	CRSP US Total Market Index (AUD-hedged) (TR)	CRSPTAHT	12633D200	7/1/2015	–	BBG009J9GN20
	CRSP US Total Market Index (AUD-hedged) (PR)	CRSPTAH1	12633D101	7/1/2015	–	BBG009J9GN11
CRSP Australian Non-Hedged Index	CRSP US Total Market Total Return Index AUD (TR)	CRSPTMAT	12633D408	7/1/2015	–	BBG009J9GN48
	CRSP US Total Market Total Return Index AUD (PR)	CRSPTMA1	12633D309	7/1/2015	–	BBG009J9GN39
CRSP Canadian Hedged Index	CRSP US Total Market Index (CAD-hedged) (TR)	CRSPTCHT	12630Y108	12/31/2012	–	BBG003PZ7F52
	CRSP US Total Market Index(CAD-hedged) (PR)	CRSPTCH1	12628G200	12/31/2012	–	BBG003PZ7F34
CRSP Canadian Non-Hedged Index	CRSP US Total Market Total Return Index CAD (TR)	CRSPTMCT	12632P204	4/15/2013	–	BBG004MFW5W1
	CRSP US Total Market Index CAD (PR)	CRSPTMC1	12632M201	4/15/2013	–	BBG004MFW5V2
Mega Cap	CRSP US Mega Cap Index (TR)	CRSPMET	12627R108	12/31/2012	4/1/2011	BBG003PZ7F61
	CRSP US Mega Cap Index (PR)	CRSPME1	12627R108	8/15/2011	4/1/2011	BBG001YCYN69
Mega Cap Growth	CRSP US Mega Cap Growth Index (TR)	CRSPMEGT	12630R103	12/31/2012	9/10/2012	BBG003PZ7F70
	CRSP US Mega Cap Growth Index (PR)	CRSPMEG1	12630R103	10/1/2012	9/10/2012	BBG003PZ7DH4
Mega Cap Value	CRSP US Mega Cap Value Index (TR)	CRSPMEVT	12630T109	12/31/2012	9/10/2012	BBG003PZ7F89
	CRSP US Mega Cap Value Index (PR)	CRSPMEV1	12630T109	10/1/2012	9/10/2012	BBG003PZ7DJ2
Mega + Mid Cap	CRSP US Large Cap Index (TR)	CRSPLCT	12631M103	12/31/2012	4/1/2011	BBG003PZ7F98
	CRSP US Large Cap Index (PR)	CRSPLC1	12627P102	8/15/2011	4/1/2011	BBG001YCYN50
Mega + Mid Cap Growth	CRSP US Large Cap Growth Index (TR)	CRSPLCGT	12630W102	12/31/2012	9/10/2012	BBG003PZ7FB5
	CRSP US Large Cap Growth Index (PR)	CRSPLCG1	12630W102	10/1/2012	9/10/2012	BBG003PZ7DK0
Mega + Mid Cap Value	CRSP US Large Cap Value Index (TR)	CRSPLCVT	12630X100	12/31/2012	9/10/2012	BBG003PZ7FC4
	CRSP US Large Cap Value Index (PR)	CRSPLCV1	12630X100	10/1/2012	9/10/2012	BBG003PZ7DL9
Mid Cap	CRSP US Mid Cap Index (TR)	CRSPMIT	12631T108	12/31/2012	4/1/2011	BBG003PZ7FD3
	CRSP US Mid Cap Index (PR)	CRSPMI1	12627W107	8/15/2011	4/1/2011	BBG001YCYN87
Mid Cap Growth	CRSP US Mid Cap Growth Index (TR)	CRSPMIGT	12628N106	12/31/2012	9/10/2012	BBG003PZ7FF1
	CRSP US Mid Cap Growth Index (PR)	CRSPMIG1	12631A109	10/1/2012	9/10/2012	BBG003PZ7DM8
Mid Cap Value	CRSP US Mid Cap Value Index (TR)	CRSPMIVT	12629L109	12/31/2012	9/10/2012	BBG003PZ7FG0
	CRSP US Mid Cap Value Index (PR)	CRSPMIV1	12631C105	10/1/2012	9/10/2012	BBG003PZ7DN7
Small Cap	CRSP US Small Cap Index (TR)	CRSPSCT	12630N102	12/31/2012	4/1/2011	BBG003PZ7FH9
	CRSP US Small Cap Index (PR)	CRSPSC1	12628A104	8/15/2011	4/1/2011	BBG001YCYNB3
Small Cap Growth	CRSP US Small Cap Growth Index (TR)	CRSPSCGT	12630V104	12/31/2012	9/10/2012	BBG003PZ7FJ7
	CRSP US Small Cap Growth Index (PR)	CRSPSCG1	12631E101	10/1/2012	9/10/2012	BBG003PZ7DP5
Small Cap Value	CRSP US Small Cap Value Index (TR)	CRSPSCVT	12631N101	12/31/2012	9/10/2012	BBG003PZ7FK5
	CRSP US Small Cap Value Index (PR)	CRSPSCV1	12631F108	10/1/2012	9/10/2012	BBG003PZ7DQ4
Small + Mid Cap	CRSP US Small / Mid Cap Index (TR)	CRSPSMT	12591C103	3/10/2014	3/31/2011*	BBG0069LWSJ3
	CRSP US Small / Mid Cap Index (PR)	CRSPSM1	12632T107	3/10/2014	3/31/2011*	BBG0069LWSH5
Small + Mid Cap Growth	CRSP US Small / Mid Cap Growth Index (TR)	CRSPSMGT	12591P104	3/10/2014	9/10/2012*	BBG0069LWSF7
	CRSP US Small / Mid Cap Growth Index (PR)	CRSPSMG1	12591M101	3/10/2014	9/10/2012*	BBG0069LWSC0
Small + Mid Cap Value	CRSP US Small / Mid Cap Value Index (TR)	CRSPMVT	12591L103	3/10/2014	9/10/2012*	BBG0069LWSG6
	CRSP US Small / Mid Cap Value Index (PR)	CRSPMV1	12591E109	3/10/2014	9/10/2012*	BBG0069LWSD9
Micro Cap Index	CRSP US Micro Cap Index (TR)	CRSPMCT	12631V103	12/31/2012	4/1/2011	BBG003PZ7FL4
	CRSP US Micro Cap Index (PR)	CRSPMC1	12627T104	8/15/2011	4/1/2011	BBG001YCYN78

Index Description	Index Name	Index Identifier	CUSIP	NASDAQ GIDS Post Date	Inception Date Open Val = 1000	Bloomberg Ticker
Basic Materials	CRSP US Basic Materials Index (TR)	CRSPMTT	12632G105	12/31/2012	2/1/2012	BBG003PZ7FV3
	CRSP US Basic Materials Index (PR)	CRSPMT1	12630E102	7/16/2012	2/1/2012	BBG003PZ7DZ4
Consumer Discretionary	CRSP US Consumer Discretionary Index (TR)	CRSPCDT	12631X109	12/31/2012	2/1/2012	BBG00VC1QCP3
	CRSP US Consumer Discretionary Index (PR)	CRSPCD1	12630J101	7/16/2012	2/1/2012	BBG00VC1Q658
Consumer Staples	CRSP US Consumer Staples Index (TR)	CRSPCST	12631W101	12/31/2012	2/1/2012	BBG003PZ7FM3
	CRSP US Consumer Staples Index (PR)	CRSPCS1	12630G107	7/16/2012	2/1/2012	BBG003PZ7DR3
Energy	CRSP US Energy Index (TR)	CRSPENT	12631Y107	12/31/2012	2/1/2012	BBG003PZ7FP0
	CRSP US Energy Index (PR)	CRSPEN1	12630A100	7/16/2012	2/1/2012	BBG003PZ7DT1
Financials	CRSP US Financials Index (TR)	CSPFNT	12632A108	12/31/2012	2/1/2012	BBG003PZ7FQ9
	CRSP US Financials Index (PR)	CRSPFN1	12630M104	7/16/2012	2/1/2012	BBG003PZ7DV8
Health Care	CRSP US Health Care Index (TR)	CRSPHCT	12632C104	12/31/2012	2/1/2012	BBG003PZ7FR8
	CRSP US Health Care Index (PR)	CRSPHC1	12630H105	7/16/2012	2/1/2012	BBG003PZ7DW7
Industrials	CRSP US Industrials Index (TR)	CRSPIDT	12632E100	12/31/2012	2/1/2012	BBG003PZ7FS7
	CRSP US Industrials Index (PR)	CRSPID1	12630F109	7/16/2012	2/1/2012	BBG003PZ7DX6
Real Estate	CRSP US Real Estate Index (TR)	CRSPRET	12632K106	12/31/2012	4/1/2011	BBG003PZ7FY0
	CRSP US Real Estate Index (PR)	CRSPRE1	12627X105	8/15/2011	4/1/2011	BBG001YCYN96
Small Cap ex-Real Estate	CRSP US Small Cap ex-Real Estate Index (TR)	CRSPSXT	12631G106	12/31/2012	2/1/2012	BBG003PZ7FZ9
	CRSP US Small Cap ex-Real Estate Index (PR)	CRSPSX1	12631G106	10/1/2012	9/10/2012	BBG003PZ7F25
Technology	CRSP US Technology Index (TR)	CRSPITT	12632F107	12/31/2012	2/1/2012	BBG003PZ7FT6
	CRSP US Technology Index (PR)	CRSPIT1	12630P107	7/16/2012	2/1/2012	BBG003PZ7DY5
Telecommunications	CRSP US Telecom Index (TR)	CRSPTET	12632H103	12/31/2012	2/1/2012	BBG003PZ7FW2
	CRSP US Telecom Index (PR)	CRSPTE1	12630K108	7/16/2012	2/1/2012	BBG003PZ7F07
Utilities	CRSP US Utilities Index (TR)	CRSPUTT	12632J109	12/31/2012	2/1/2012	BBG003PZ7FX1
	CRSP US Utilities Index (PR)	CRSPUT1	12630L106	7/16/2012	2/1/2012	BBG003PZ7F16

**Small Cap + Mid Cap indexes are initialized on 2/7/2014 based on the composite history of their underlying Small and Mid indexes since their inception.*

APPENDIX F: US TERRITORIES, DOMICILES OF CONVENIENCE, AND TAX HAVENS

ISO Code	US Territories
AS	American Samoa
GU	Guam
MH	Marshall Islands
MP	Northern Mariana Islands
PW	Palau
PR	Puerto Rico
VI	US Virgin Islands

ISO Code	Domiciles of Convenience
AW	Aruba
AI	Anguilla
AN	Netherlands Antilles
AG	Antigua
BS	Bahamas
BM	Bermuda
BB	Barbados
KY	Cayman Islands
DM	Dominica
DO	Dominican Republic
GG	Guernsey
GI	Gibraltar
HT	Haiti
IM	Isle of Man
JM	Jamaica
JE	Jersey
KN	St. Kitts and Nevis
LR	Liberia
LC	St. Lucia
LU	Luxembourg
MF	St. Martin
MS	Montserrat
PA	Panama
TC	Turks and Caicos Islands
TT	Trinidad and Tobago
VC	St. Vincent and the Grenadines
VG	British Virgin Islands

ISO Code	Tax Havens
CH	Switzerland
IE	Ireland
NL	Netherlands

Note: Other locations may be considered case-by-case for business reasons.

APPENDIX G: HOURS, HOLIDAYS, AND EARLY CLOSURES

HOURS:

The CRSP Index Operations department is open from 7:00 a.m. to 6:00 p.m. CT.

HOLIDAYS:

CRSP observes the following exchange holidays:

	2020	2021
New Year's Day	January 1	January 1
Martin Luther King, Jr. Day	January 20	January 18
President's Day	February 17	February 15
Good Friday	April 10	April 2
Memorial Day	May 25	May 31
Independence Day	July 3*	July 5*
Labor Day	September 7	September 6
Thanksgiving Day**	November 26	November 25
Christmas	December 25***	December 24*

*CRSP will observe the holiday on this date due to the holiday occurring on a weekend.

**CRSP will close at Noon CT the day after this holiday.

***CRSP will close at noon on the day before this holiday.

EARLY CLOSURES:

CRSP will close early on the days stated above, in accordance with early equity market closes. On days of early close, CRSP's final release will be completed at 10:30 a.m. CT.

On half trading days (typically the day before Christmas and Independence Day, and the day after Thanksgiving), CRSP's final release will be completed by 10:30 a.m. CT.

APPENDIX H: TRANSITIONAL RECONSTITUTION CALENDAR

2020 TRANSITIONAL RECONSTITUTION CALENDAR

March Quarter 2020:	
Ranking Date:	After end of day Friday, March 6
Pro Forma Indexes Available via FTP:	Sunday evening, March 8
Pro Forma Indexes Available via Website:	Start of business Monday, March 9
Transitional Reconstitution Date:	After end of day Wednesday, March 18 – After end of day Tuesday, March 24
June Quarter 2020:	
Ranking Date:	After end of day Friday, June 5
Pro Forma Indexes Available via FTP:	Sunday evening, June 7
Pro Forma Indexes Available via Website:	Start of business Monday, June 8
Transitional Reconstitution Date:	After end of day Wednesday, June 17 – After end of day Tuesday, June 23
September Quarter 2020:	
Ranking Date:	After end of day Friday, September 4
Pro Forma Indexes Available via FTP:	Sunday evening, September 6
Pro Forma Indexes Available via Website:	Start of business Monday, September 8
Transitional Reconstitution Date:	After end of day Wednesday, September 16 – After end of day Tuesday, September 22
December Quarter 2020:	
Ranking Date:	After end of day Friday, December 4
Pro Forma Indexes Available via FTP:	Sunday evening, December 6
Pro Forma Indexes Available via Website:	Start of business Monday, December 7
Transitional Reconstitution Date:	After end of day Wednesday, December 16 – After end of day Tuesday, December 22

APPENDIX I: UPDATES TO CRSP SECTOR INDEXES

The Industry Classification Benchmark (ICB[®]) standard underwent significant restructuring. See [link to FTSE materials] for an overview of the changes implemented. CRSP will switch its sector indexes to the new standard beginning with the June, 2020 ranking. All existing sector indexes will have a successor index. The new indexes will begin with the same constituents and index levels as their predecessors, and fully transition to the new constituents by the close of June 23, 2020.

Current Official Name	Current ICB Range	New Official Name	New ICB Range	Current Total Return Symbol	Current Price Return Symbol	New Total Return Symbol	New Price Return Symbol	Current Indno	New Indno
CRSP US REIT Index	8671-8675, 8677 minus Timber REITs	CRSP US Real Estate Index	35000000-39999999	CRSPRET	CRSPRE1	Same	Same	1001329	1001634
CRSP US Oil & Gas Index	100-999	CRSP US Energy Index	60000000-64999999	CRSPENT	CRSPEN1	Same	Same	1001600	1001639
CRSP US Materials Index	1000-1999	CRSP US Basic Materials Index	55000000-59999999	CRSPMTT	CRSPMT1	Same	Same	1001601	1001638
CRSP US Industrials Index	2000-2999	Same	50000000-54999999	CRSPIDT	CRSPID1	Same	Same	1001602	1001637
CRSP US Consumer Goods Index	3000-3999	CRSP US Consumer Staples Index	45000000-49999999	CRSPCGT	CRSPCG1	CRSPCST	CRSPCS1	1001603	1001636
CRSP US Health Care Index	4000-4999	Same	20000000-29999999	CRSPHCT	CRSPHC1	Same	Same	1001604	1001632
CRSP US Consumer Services Index	5000-5999	CRSP US Consumer Discretionary Index	40000000-44999999	CRSPCST	CRSPCS1	CRSPCDT	CRSPCD1	1001605	1001635
CRSP US Telecom Index	6000-6999	CRSP US Telecommunications Index	15000000-19999999	CRSPTET	CRSPT1	Same	Same	1001606	1001631
CRSP US Utilities Index	7000-7999	Same	65000000-69999999	CRSPUTT	CRSPUT1	Same	Same	1001607	1001640
CRSP US Financials Index	8000-8999	Same	30000000-34999999	CRSPFNT	CRSPFN1	Same	Same	1001608	1001633
CRSP US Technology Index	9000-9999	Same	10000000-14999999	CRSPITT	CRSPIT1	Same	Same	1001609	1001630
CRSP US Small Cap ex-REIT Index	all but 8671-8677	CRSP US Small Cap ex-Real Estate Index	all but 35000000-39999999	CRSPSXT	CRSPSX1	Same	Same	1001612	1001642

TRANSITION PLAN

On Friday, June 5, 2020, the current indexes will run and all files will be produced with the existing indexes and constituents. After close on Friday June 5, 2020, the constituents and levels for each sector index will be copied to its successor index. Start of day files for June 9, 2020 will be re-posted with all sector indexes replaced by the new indexes. Beginning with Sunday night files on June 7, 2020, the secure website, all external files, and all real-time index calculations will only include the new indexes.

Pro forma indexes created at ranking will be based on the new Enhanced ICB assignments and will not use the predecessor constituents as an input. During the transition period beginning after close on June 17, 2020 constituents will move to the pro forma targets in 20% per day chunks. By the close of June 23, 2020 the constituents will be fully transitioned to the new standard.

EXTERNAL FILES

- Vanguard Security Reference files will include a new field EnhancedICB as the last field. The existing ICB field will continue in the short term, but will no longer be updated after the end of the year. The enhanced ICB standard uses an 8-character field, unlike the existing standard which uses a 4-character field.
- Vanguard Index and ICL files will switch to the new index identifiers and content beginning with files posted Sunday, June 7, 2020. There is no change to fields or format.
- Index change files will only show change to the new indexes beginning on files posted June 8, 2020. There is no change to fields or format.
- Third party Index Level and Index Constituent files will see new Index_Name and Index_Codes for sector indexes beginning with files delivered June 7, 2020. There is no change to fields or format.
- Factsheets will show industry breakdowns of indexes in terms of the Enhanced ICB standard beginning with June, 2020 factsheets.

BACKTEST HISTORY

A backtest history will be available, consistently with each standard, based on current rules, for both existing and successor indexes.

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The historical performance statistics of CRSP’s market cap indexes are based upon 10 years of backtest data from January 1, 2001, through March 31, 2011. Subsequent backtesting was completed with June 29, 2001, as the start date in order to align with the value and growth style indexes. As is common industry practice, CRSP backtest data does not include float shares. Descriptive statistics are based upon current index constituents. Backtest results are not indicative of future performance.

CRSP CONTACT INFORMATION

For further information, please visit our website at www.crsp.org or email indexes@crsp.org.

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