RESEARCH

Dimensional

Index Reconstitution Effect Within Small Caps

Kaitlin Hendrix, CFA
Asset Allocation Research Director and Vice President

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The effects of index reconstitution on tracking funds, including abnormal trading volume and price pressure, are prevalent across asset classes.

Introduction

Research by Dimensional has previously documented some of the costs associated with trading by funds that track some of the largest US and non-US indices.[1] The S&P 500 Index often gets highlighted due to its massive tracking assets of nearly $9 trillion and high-profile names in the reconstitution events.[2] But the index reconstitution effect is prevalent across asset classes, including small caps.

In fact, there are good reasons to pay more attention to trading in small caps. In markets around the world, small caps tend to be more thinly traded than large caps, which can lead to higher trading costs and create a drag on investment performance. This is especially true when trading volumes exceed typical levels or when immediate execution is demanded, such as during index reconstitutions.

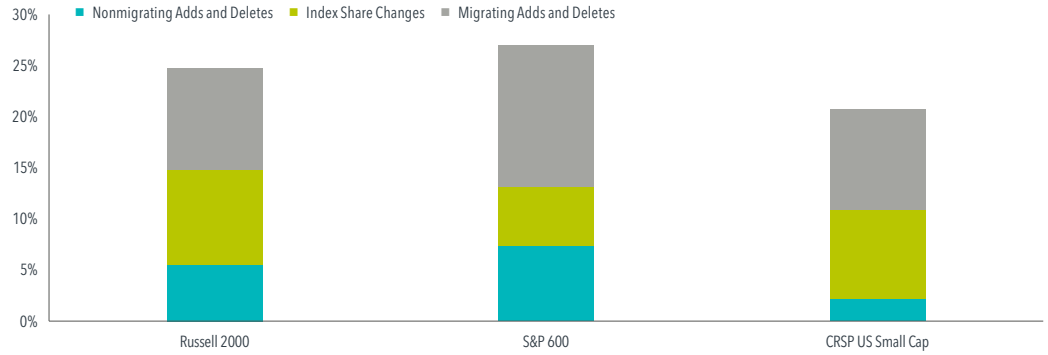
Herein, we focus on the Russell 2000 Index, S&P 600 Index, and CRSP US Small Cap Index over the 10-year period from 2014 to 2023, or the shorter five-year period from 2019 to 2023 where data are limited. There was over $450 billion in index-tracking assets across these three indices as of year-end 2025.[3] We find a total price impact from index reconstitution of 5–30 basis points (bps) per year across the three indices.

This estimate is made up of three types of index reconstitution events: nonmigrating additions and deletions, migrating additions and deletions, and index-share-change events. These events together affect about 25% of each index per year, as shown in Exhibit 1.

Nonmigrating stocks are added to (or deleted from) an index and not deleted from (or added to) another index in the same index family on the same day, whereas migrating additions and deletions move between related indices on reconstitution day. Index share changes happen when an index changes the number of shares allotted to a constituent stock for reasons such as float share adjustments or corporate actions like seasoned equity offerings, stock-based compensation, and share buybacks. All of these events contribute to abnormal trading volume and price pressure within small cap stocks.

1. For a review of the index reconstitution effect globally, see: Kaitlin Hendrix, Jerry Liu, and Trey Roberts, "Measuring the Costs of Index Reconstitution: A Global Perspective" (white paper, Dimensional Fund Advisors, March 2025). We also evaluate the costs associated with index share changes—see Jerry Liu and Trey Roberts, "Another Hidden Cost for Index Funds: Index Share Changes" (white paper, Dimensional Fund Advisors, August 2025)—and migrating securities—see Trey Roberts and Wei Dai, "Even Migrating Stocks Face Index Reconstitution Costs" (white paper, Dimensional Fund Advisors, May 2025).
2. See, for example, Kaitlin Hendrix and Mia Huang, "Tesla's Charge Reveals Weak Points of Indexing," *Insights* (blog), Dimensional Fund Advisors, January 15, 2021; $8.99 trillion in assets track the S&P 500 as of December 31, 2024: "S&P Dow Jones Indices Annual Survey of Assets as of December 31, 2024," S&P Dow Jones Indices: A Division of S&P Global, December 2024.
3. S&P 600, $173 billion: "S&P Dow Jones Indices Annual Survey of Assets as of December 31, 2024," S&P Dow Jones Indices: A Division of S&P Global, December 2024; CRSP US Small, $162 billion: CRSP Linked Asset Values (USD $M) as of December 31, 2025; Russell 2000, $134 billion: Morningstar, December 31, 2025.

EXHIBIT 1: Average Annual Index Weight (%) by Rebalance Type, *2019–2023*

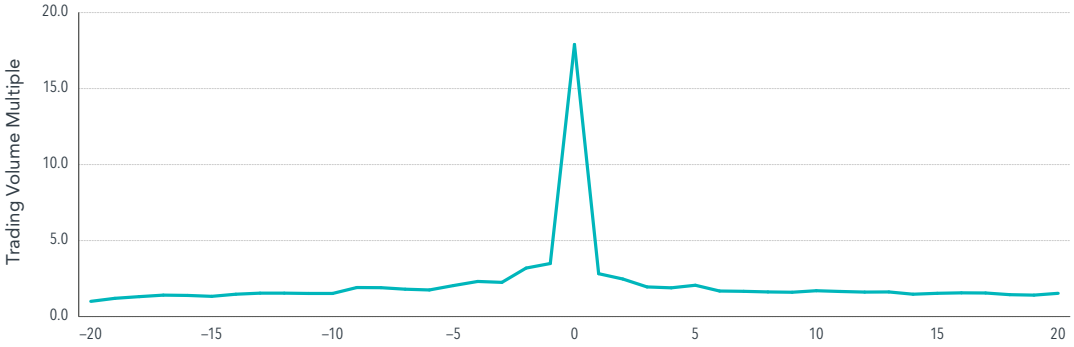


The sample includes events when shares of a stock in an index change and excludes nondiscretionary changes (e.g., mergers and acquisitions, spin-off, share split, etc.). Days when a stock is suspended from trading are also excluded. Migrating Adds and Deletes are defined as additions (deletions) that are removed from (added to) indices in the same index family and share increases and decreases between large and small indices CRSP US Large Cap/CRSP US Small Cap and CRSP US Mid Cap/CRSP US Small Cap. Nonmigrating Adds and Deletes are defined as stocks added to or deleted from an index, excluding migrations. Index Share Changes are defined as stocks with a share increase or decrease in an index, excluding migrating adds and deletes. Index weights are calculated at each rebalancing event and summed across all events in a calendar year, then averaged across the five-year sample period.

Abnormal Trading Volume

To quantify the extent to which index reconstitution events are associated with abnormal trading volume, we compare average trading volume for stocks impacted by the rebalance on reconstitution day with average trading volume for the same stocks in the month before and after. In **Exhibit 2**, we show the trading volume in nonmigrating adds and deletes as a multiple of trading volume in the same stock 20 trading days prior. For the Russell 2000 Index, S&P 600 Index, and CRSP US Small Cap Index, on average, trading volume spikes to 18 times that of the previous month.[4]

EXHIBIT 2: Average Trading Volume Multiples for Additions and Deletions on Reconstitution Day vs. 20 Days Prior, *2014–2023*

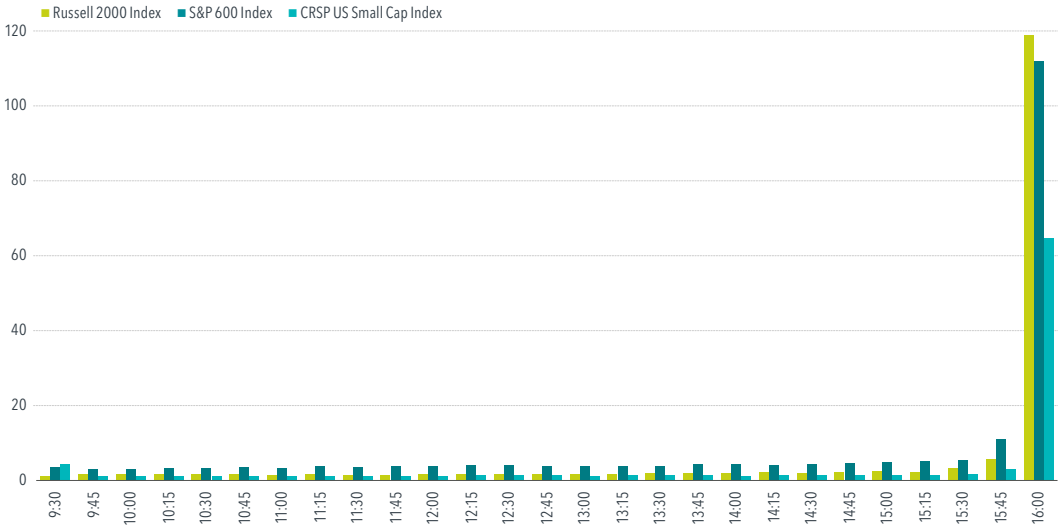


The security-level trading volume multiple is based on the ratio of observed daily volume levels over the event horizon relative to the observed daily volume of 20 trading days prior to the reconstitution date. For the CRSP US Small Cap Index, day 0 represents day 3 of the five-day rebalance period. For each index, the value-weighted average trading volume multiple is calculated by weighting the set of trading volume multiples on a day by the securities' respective free-float market capitalizations, which are month-end values from the most recent month prior to reconstitution dates. The trading volume multiples presented are the equal-weighted average across the three indices. Migrating events for the S&P, Russell, and CRSP indices are excluded.

4. Abnormal volume spikes on index reconstitution day versus 20 days prior, by index: S&P 600 is 26.1; Russell 2000 Index is 21.3; CRSP US Small Cap Index is 6.3.

We also find that the abnormal trading volume is concentrated around market close on reconstitution day, likely due to index managers seeking to execute additions and deletions at the closing price, which is used to compute the daily returns of an index. The abnormal spike in trading volume from 4 pm to 4:15 pm ET on reconstitution day in rebalanced stocks compared to trading volume in the same stocks during the same 15-minute window averaged over the prior month is 119x for the Russell 2000 Index, 112x for the S&P 600 Index, and 65x on day 3 of the five-day rebalance period for the CRSP US Small Cap Index, as shown in **Exhibit 3**.[5]

EXHIBIT 3: Average Intraday Trading Volume Multiples for Index Additions and Deletions on Reconstitution Day, *2019–2023*



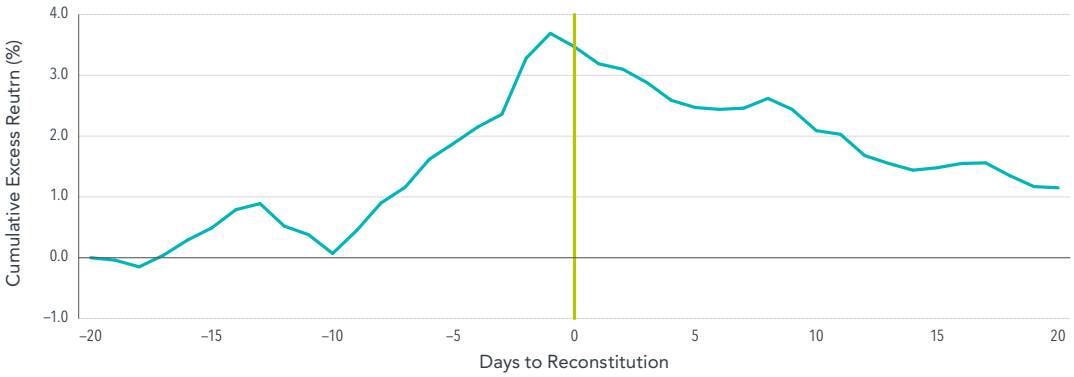
Data are from January 2019 through December 2023. The security-day-level intraday volume multiple is based on the ratio of observed intraday volume levels on the index reconstitution date relative to the observed equal-weighted average intraday volume over the 30-calendar-day period prior to the reconstitution date. The value-weighted average intraday volume multiples are then calculated across all securities and reconstitution days for each index, using securities' respective free-float market capitalizations, which are month-end values from the most recent month before the reconstitution date. Migrating events for the S&P, Russell, and CRSP indices are excluded. The CRSP indices add/delete stocks at a rate of 20% per day over a five-day period. For CRSP US Small Cap Index, the volume multiple is only shown for day 3.

5. The CRSP indices add and delete stocks at a rate of 20% per day over a five-day period. The abnormal volume is the greatest on day 3. This day occurs on the third Friday of the quarter-end month (the day when S&P indices also typically rebalance), which is a triple-witching day. Triple-witching days are when stock market index futures, stock market index options, and stock options all expire. These derivative expirations generally lead to higher trading volume in the underlying stocks, so it is plausible that the jump in volume is driven by the volume related to triple witching. But the fact that we see a consistent 20x jump in 4:00–4:15 pm volume for most CRSP adds and deletes on the other four days of the rebalancing schedule suggests that the rebalance does cause an abnormal trading volume at the end of the day for the adds and deletes. For the S&P indices, the exclusion of triple-witching days does not materially impact the results.

Price Pressure

How does the abnormal trading volume shown in the previous section impact the prices of rebalanced stocks? We find that index additions exhibit positive excess return patterns and deletions exhibit negative excess return patterns before reconstitutions, while both exhibit a reversal in the pattern after reconstitutions. In **Exhibit 4**, we show the average cumulative excess return of additions and deletions across the three small cap indices, with the returns to deletions multiplied by –1 to present additions and deletions together. The average excess return to added/deleted securities is 3.5% over the 20 trading days leading up to reconstitution, with a reversal of 2.3% in the next month.

EXHIBIT 4: Average Cumulative Excess Return of Index Additions and Deletions in 20 Days Around Reconstitution, *2014–2023*

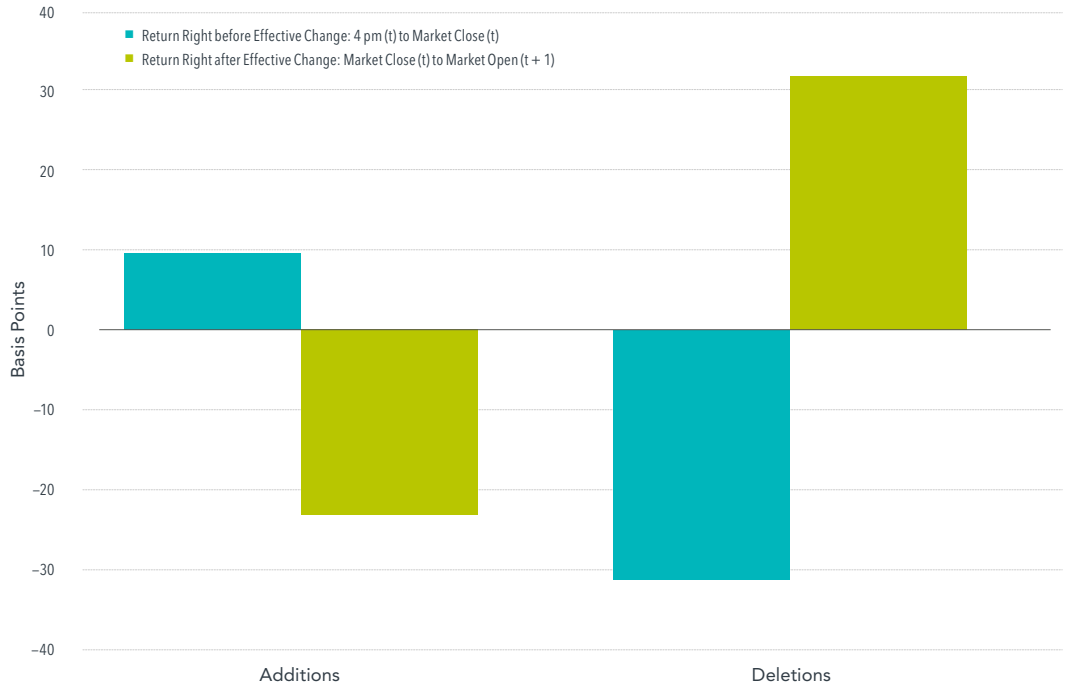


Past performance is no guarantee of future results.

Cumulative excess returns (CERs) are calculated as the cumulative sum of the daily excess returns for an individual security versus its respective index from market close 20 trading days before reconstitution. CERs for deletions are multiplied by –1 before being averaged with CERs of additions. Value-weighted average CERs are calculated by weighting the sets of CERs on a day by the securities' respective free-float market capitalizations as of the most recent month prior to reconstitution. Migrating events for S&P, Russell, and CRSP indices are excluded. Indices are not available for direct investment; therefore their performance does not reflect the expenses associated with the management of an actual fund.

Using high-frequency-trading data from 2019 to 2023, we can zoom in on the price pressure right around market close. **Exhibit 5** highlights these results by regressing the returns of all stocks on flags indicating if the stock was an index addition or deletion that day. This regression estimates how much variation in stock returns can be explained by whether or not a stock is an index addition or deletion. As shown in the blue bars, from the end of continuous trading at 4 pm ET to the closing auction, as expected, prices move up for adds and down for deletes, by 10 basis points and –31 bps, respectively. This price pressure happens in a very short span of time: The typical span between the last trade and the closing auction is 10 seconds or less. We also document a strong price reversal for those stocks by market open the following morning as shown in the lime-green bars: The price for adds reverses by 23 bps, and the price for deletes reverses by a relative 31 bps. This means that for index additions, the index "buys" higher and the price falls immediately after the stock is added to the index, and vice versa for deletions.

EXHIBIT 5: Price Pressure Around Market Close



Past performance is no guarantee of future results.

Regression specification for the price pressure into closing auction is: $Ret_{LastMid,T}^{Auc,T} = a + b * Additions + c * Deletions + e_T$, where $Ret_{LastMid,T}^{Auc,T}$ is the gross return (in bps) from last midpoint price of the continuous session on T to the closing auction price. Regression specification for the overnight reversal is: $Ret_{Auc,T}^{Open,T+1} = a + b * Additions + c * Deletions + e_T$, where $Ret_{Auc,T}^{Open,T+1}$ is the market-adjusted return (in bps) from closing auction price on T to open auction price on T + 1. $Additions$ is an indicator variable with 1 for index additions and 0 for other stocks. $Deletions$ is an indicator variable with 1 for index deletions and 0 for other stocks. Day fixed effects are included. The blue bars and lime-green bars represent the coefficient estimates for the $Additions$ and $Deletions$ indicator variables in the former and latter model, respectively. Samples includes all index addition and deletion events, as well as all other US stocks traded on the same index reconstitution days. Index migrations and events due to corporate actions are excluded. For CRSP indices, we include all five days of the transition period in the price pressure regression, but we only include the last day in the overnight reversal regression. Indices are not available for direct investment; therefore their performance does not reflect the expenses associated with the management of an actual fund.

Migrations

Thus far, we have focused on nonmigrating securities to avoid the conflicting trading pressure migrating securities may face. However, migrating additions and deletions may also face index reconstitution effects, especially if one index from an index family has a much larger following than the others.

For example, the Russell 2000 Index is the more popular index within the Russell family, as identified by assets tracking it ($134 billion for the Russell 2000 versus $62 billion for the Russell 1000, based on assets in index funds from Morningstar as of December 31, 2025). As a result, we find evidence of price pressure for Russell 2000 Index migrating stocks in the days leading up to reconstitution, with a reversal following reconstitution.

From 2014 to 2023, stocks that migrate into or out of the Russell 2000 Index exhibit returns in excess of the index in the month leading up to reconstitution (1.4% on average), with a reversal in month after (1.5% reversal on average).[6]

Results are similar for the S&P 600, for which migrating securities exhibit a positive cumulative excess return of 1.7% in the month ahead of reconstitution and a reversal of 2.0% in the month after, on average.

Price pressure for migrating stocks into and out of the CRSP US Small Cap Index is more muted, with a flat excess return, on average, in the month following reconstitution.[7] The impact for the CRSP index is likely smaller because of the rebalance approach that allows for securities to partially transition between indices, for example, 50% at a time. This approach does, however, contribute to style drift. The CRSP US Small Cap Index also has fewer assets in index funds tracking it than its mid cap counterpart ($162 billion tracking the small cap index versus $202 billion tracking the mid cap index, as of December 31, 2025, as reported by CRSP).

6. We can evaluate the price pressure (and volume spikes) even more cleanly by comparing subsets of stocks near the migrating breakpoint set by the Russell Index. See Trey Roberts and Wei Dai, "Even Migrating Stocks Face Index Reconstitution Costs" (white paper, Dimensional Fund Advisors, May 2025).

7. Average cumulative excess returns from 20 trading days before to 20 days after the effective date of reconstitution for different stock groups, where the cumulative excess return for each stock on day t is the sum of the excess returns from day t − 20 to day t relative to the respective index. We then form a value-weighted average cumulative excess return, with weights proportional to the market capitalizations of stocks in the group, as of the month-end before reconstitution.

Index Share Changes

Index-tracking funds that seek to minimize tracking error against their benchmark are also forced to trade around index-share-change events.

As a result, share-change events are also associated with abnormal volume spikes and price pressure on reconstitution day. On average across the three small cap indices, a stock with a 2% index share increase sees its price increase by 0.19 bps relative to nonrebalanced stocks from the end of the continuous trading session to the closing auction on rebalancing day, meaning index fund managers must buy those additional shares at a higher price to match the price reflected in the index. By market open on the day following the rebalance, that same stock would see a downward reversal in price of 0.43 bps relative to nonrebalanced stocks. The opposite would be true for a stock with a 2% decrease in index shares.[8]

On average, 5%–10% of the weight of these indices undergoes an index-share-change event each year. Thus, while these impact estimates are relatively small, the costs can add up for investors.

What Can Be Done?

The trading volume and price pressure indices face from rebalanced securities are ultimately reflected in the total price impact. For the Russell 2000 Index, the total price impact is around 30 bps per year, mainly driven by an estimated cost of 15 bps from nonmigrating securities and 15 bps from migrating securities. The total price impact for the S&P 600 is similarly around 30 bps, with most of the cost coming from migrating securities (around 5 bps for nonmigrating and around 25 bps for migrating). With a smaller contribution from migrating securities, the total cost is 5–10 bps for CRSP (entirely coming from nonmigrating securities).[9]

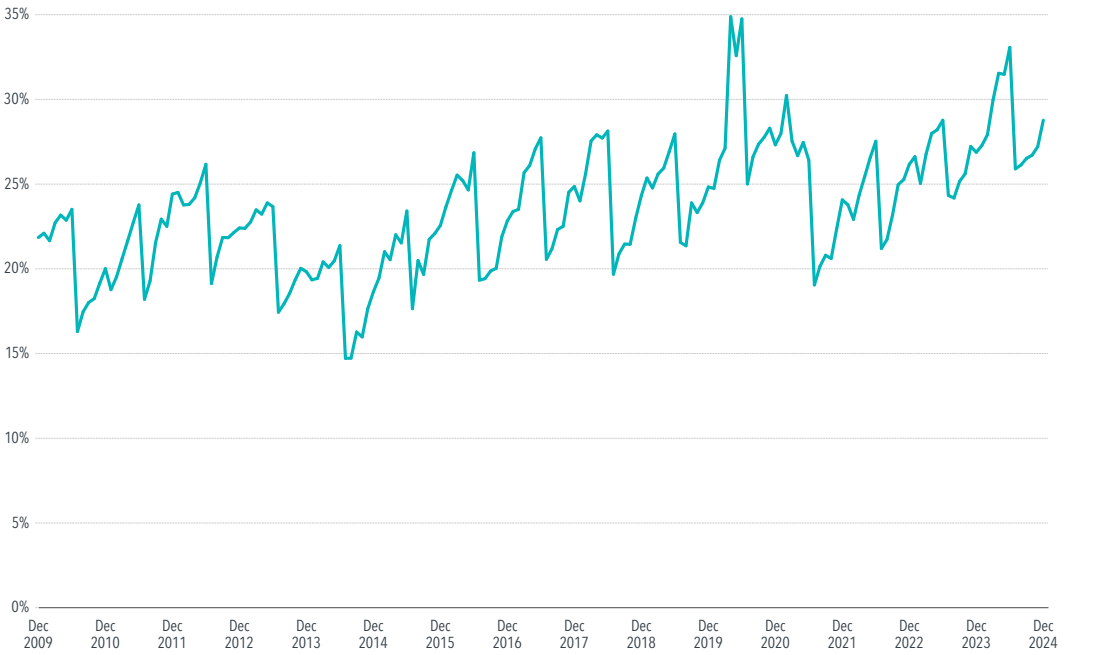
8. For broader results across 10 US equity indices, see Jerry Liu and Trey Roberts, "Another Hidden Cost for Index Funds: Index Share Changes" (white paper, Dimensional Fund Advisors, August 2025).

9. The Russell 2000 estimate is driven by about 15 bps resulting from nonmigrating additions and deletions (5% of the index weight per year times a roughly 3% price reversal in the month after reconstitution), 15 bps from migrating securities (10% of the index per year times 1.5% price reversal), and less than 0.05 bps from index share changes (all together about 10% of the index per year but very small events with a median index share change of around 2%). The S&P 600 estimate is driven by 5 bps from nonmigrating additions and deletions (about 5%-10% index weight times 0.5% reversal) and 25 bps from migrating securities (about 10%-15% of the index times about 2% reversal). The CRSP US Small Cap Index estimate is driven by nonmigrating securities; 2% index weight times over 3% reversal. Migrating securities contribute approximately 0% to the price impact for CRSP but make up about 10% of index weight per year on average. All estimates are based on data from 2014 through 2023.

This illustrates that just how much trading volume and price pressure rebalanced securities face is related to the magnitude of the index weight that is rebalanced. Yet, it's important to note that there is a tradeoff for less rebalancing: style drift. While reducing index rebalancing may help reduce the trading costs investors incur, the resulting index will likely stray from its stated exposure. For example, Russell indices are generally designed to share boundaries and have buffers so as to minimize buys and sells across indices. But as a result, from 2010 through 2024, roughly 25% on average of the Russell 2000 Index, positioned as a small cap index, was composed of stocks that were among the largest 1,000 in the Russell 3000 Index, as shown in **Exhibit 6**.

A better approach may be a daily process that consistently focuses on stocks with higher expected returns and spreads turnover across all trading days in the year, with flexibility across stocks and quantities. For investors in small caps and beyond, such an approach may allow investors to avoid the cost of demanding immediacy from the market, which in turn can improve net returns.[10]

EXHIBIT 6: Russell 2000 Index Weight in the 1,000 Largest Stocks
December 31, 2009–December 31, 2024



Source: Dimensional, using data from Russell. Data shown is the weight of the Russell 2000 Index in the 1,000 largest stocks. The 1,000 largest stocks identified based on the descending order of total issuer weight in Russell 3000 Index. Indices are not available for direct investment. Frank Russell Company is the source and owner of the trademarks, service marks, and copyrights related to the Russell Indexes.

10. For example, see Byung Hyun Ahn and Namiko Saito, "Four Decades of Implementing the Great Ideas in Finance: US Micro Cap Equity Strategy" (research paper, Dimensional Fund Advisors, August 2025).

Glossary

Basis point: One basis point equals one-hundredth of a percentage point (0.01%).

Closing auction: An event, typically at 4 pm ET in US markets, during which buy and sell orders for a security are matched and a closing price is set.

Excess return: Return to a security in excess of a benchmark.

Free-float market capitalization and **float-share adjustments:** Free float represents the portion of a company's market value that is readily available for public trading. It excludes, for example, shares that are "locked up," like some held by company insiders that are unavailable for trading. Float-share adjustments refer to changes in the level of a company's freely floating shares.

Seasoned equity offerings: The issuance of additional shares by a company that is already publicly listed.

Share buyback: When a company buys some of its outstanding shares, reducing the total number available. Sometimes called a share repurchase.

Share split: When a company increases its shares outstanding while proportionately reducing the price per share, thereby keeping the total outstanding market value unchanged.

Spin-off: A subsidiary of a parent company that is "spun off" into its own separate company.

Value-weighted vs. equal-weighted: Approaches to estimate the average of a group, where value-weighted computes an estimate such that each stock's weight is proportionate to its market capitalization, and equal-weighted computes an estimate such that each stock is weighted equally.

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