Dimensional

RESEARCH

Measuring the Costs of Index Reconstitution: A Global Perspective

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KEY TAKEAWAYS

- Index-tracking funds seek to match an index's performance, which may lead to constraints and implementation costs that hurt returns.
- We find that demanding immediacy during reconstitution events leads to costs for a broad range of funds that track indices around the world.
- A better approach would provide the flexibility to spread turnover across all trading days, avoiding the costs of demanding immediacy and allowing for a consistent focus on stocks with higher expected returns.

The appeal of low expense ratios and broad diversification has contributed to the growth of index funds. Yet those appealing qualities can come at a cost. Index funds primarily seek to match the performance of an index. This objective may lead to constraints and implementation costs that are not reflected in the funds' expense ratios.

To help unpack the implications for investors, we can broadly categorize the costs of index investing as those related to:

- Portfolio design, such as ignoring information about differences in expected returns across securities.
- Portfolio management, such as style drift due to infrequent rebalancing and not using short-term information that impacts security returns.
- Trading, such as volume and price pressure around index reconstitution.

BUYING HIGH AND SELLING LOW

In recent research, we focus on the third category: costs related to trading. We measure these costs using data from 2014 to 2023 for 10 widely tracked US indices from S&P, Russell, and CRSP and for five international indices covering Australia, Canada, Europe, Japan and the UK.[1]

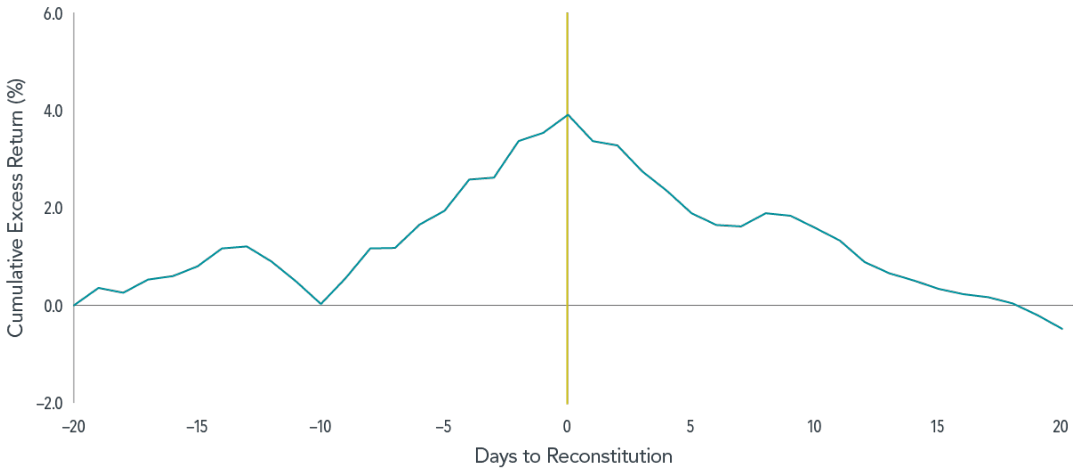
Remember that an index fund's goal is to match the performance of an index, so the fund is heavily constrained in what it trades and when it trades by the index provider. Consistent with many prior studies, our research finds that index additions tend to rise in price ahead of when a fund has to buy them at a reconstitution event and deletions fall in price prior to when an index fund has to sell, while both exhibit reversals following reconstitution.

Exhibit 1 shows the average cumulative excess return of additions and deletions versus those of their respective indices, with excess returns for deletions multiplied by –1 to present addition and deletion results together. The average excess return to additions and deletions for our 15 indices is 3.9% over the 20 days leading up to reconstitution, with a reversal of 4.4% over the 20 days after reconstitution. Results vary across individual indices, but their overall pattern is consistent.

Exhibit 1

Average Cumulative Excess Return of Index Additions and Deletions in 20 Days Around Reconstitution

US and ex-US indices, 2014–2023



Past performance is no guarantee of future results. Indices are not available for direct investment.

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. All returns for US and international indices are in USD. Cumulative excess returns for deletions are multiplied by –1 before being averaged with cumulative excess returns 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. Tesla's addition to the S&P 500 on December 18, 2020, is excluded. Indices are not available for direct investment; therefore, their performance does not reflect the expenses associated with the management of an actual fund.

VOLUME SPIKE

The creeping 20-day price rise (or fall) and the reversal are accompanied by a spike in trading volume on the day of reconstitution which becomes acute at the market close. Because their objective is to minimise tracking error, index managers not only need to match index holdings before and after reconstitution, they also need to match the price at which the index adds and deletes stocks. This price is set in or near the closing auction.

Trading volume for stocks involved in reconstitution events spikes on reconstitution day on average 23x across the 15 indices examined, and rises as high as 149x for individual indices, compared to the trading volume 20 trading days prior.

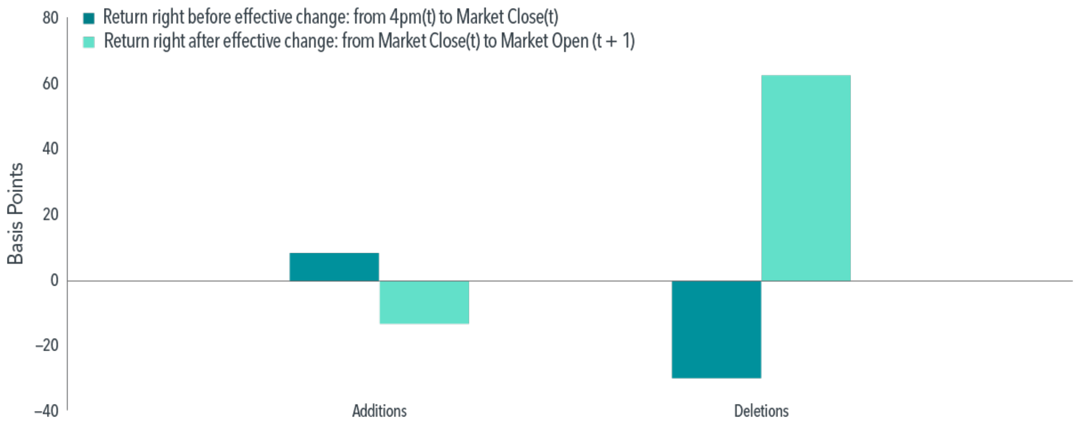
In the final few seconds of the day, between the last trade of continuous trading and the closing auction, we see average trading volume spikes across our 15 indices 75x the prior month's average. For example, stocks added to or deleted from the S&P 500 Index, which has the most tracking assets of the indices we examined, exhibit an increase in trading volume at 4 pm on reconstitution day of around 109x trading volume, compared to the prior month.

INTRADAY PRICE PRESSURE

Using high-frequency trading data from 2019 to 2023, we zoom in to examine price pressure on reconstitution day for the 10 US indices (see **Exhibit 2**). We find that prices for additions move up from the end of continuous trading at 4 pm to the closing auction—a span of roughly 10 seconds—and prices for deletions move down (dark blue bars). Like the longer-time-horizon results, there is a reversal for those stocks by market open the morning following reconstitution (light blue bars).

The price of additions on average increases by 9 basis points (bps) compared to the price of nonrebalanced stocks between 4 pm on reconstitution day and market close when being "bought" by the index, and reverses by a relative 13 bps by market open the next day. The opposite is true for deletions: On average, the price for deletions falls relative to nonrebalanced stocks by 30 bps from 4 pm to market close on reconstitution day, just prior to being "sold" from the index, with a reversal of a relative 63 bps by market open the following day. Therefore, by rebalancing just before market close on reconstitution day or by delaying rebalancing to the next trading day, significant price pressure costs could be avoided. We observe similar results for our ex-US indices.

Exhibit 2
Price Pressure into Closing Auction on Reconstitution Days and Overnight Price Reversal after Reconstitution
US indices, 2019–2023



Past performance is no guarantee of future results. Indices are not available for direct investment.

*The exhibit shows the results of regressing the returns of all US stocks on flags indicating if a stock was an addition or deletion on that day. The dark blue bars and light blue bars represent the coefficient estimates for the additions and deletions indicator variables in the models. For further details, see Kaitlin Hendrix, Jerry Liu, and Trey Roberts, "**Measuring the Costs of Index Reconstitution: A 10-Year Perspective**" (research paper, Dimensional Fund Advisors, 2024). Samples include 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. Tesla's addition to the S&P 500 on December 18, 2020, is excluded. Indices are not available for direct investment; therefore their performance does not reflect the expenses associated with the management of an actual fund.*

INVISIBLE COSTS

Overall, by prioritizing the minimisation of tracking error, index-tracking funds face costs in trading the same securities at the same time on the same day they are added or deleted by indices. The costs borne by this inflexibility are baked into the performance of the indices themselves, not visible from the returns of an index fund against its benchmark. While some have argued that the index reconstitution effect has gone away, we find that spikes in trading volume and price pressure around reconstitution events are still prevalent for 15 major US and international indices in the most recent 10 years. Further, efforts by index providers to mitigate some of the impacts do not come for free. For example, designing asset class indices to share boundaries and have buffers to minimize net buys and sells is likely to lead to a diluted emphasis on premiums and style drift, taking investors off their desired course.

Instead, evidence suggests a better approach would be a daily process that uses information from market prices every day and spreads turnover across all trading days in the year, with flexibility across stocks, quantities, and time. Such an approach can help investors target higher expected returns while also managing risks and costs.

1. US indices examined include the S&P 500 index, S&P MidCap 400 index, S&P SmallCap 600 index, Russell 1000 Growth Index, Russell 1000 Value Index, Russell 2000 Index, CRSP US Large Cap Growth Index, CRSP US Large Cap Value Index, CRSP US Mid Cap Index, and CRSP US Small Cap Index. International indices examined include the FTSE 100 Index, S&P/TSX 60 index, S&P/ASX 300 index, EURO STOXX 50 index, and Nikkei 225 index.

RISKS

Investments involve risks. The investment return and principal value of an investment may fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original value. Past performance is not a guarantee of future results. There is no guarantee strategies will be successful.

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