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The cost of equity index rebalances

Introduction

Equity indices, such as the S&P 500 Index, represent and measure the performance of specific markets, sectors, or investment strategies. All indices periodically update, or “rebalance,” based on their index methodology (the criteria that define what securities are included in the index and at what weight), ensuring that the index continues to reflect its stated methodology.¹ This is not a new phenomenon; for example, the S&P 500 Index has been rebalancing quarterly since 1957.²

While useful for benchmarking purposes, indices themselves are not investable. Instead, investors access exposures using index-tracking vehicles such as mutual funds and exchange traded funds (ETFs), which seek to track the performance of a specified index. All index-tracking funds must also rebalance periodically, reviewing and reconfiguring fund portfolio holdings to match index changes.³ Since the launch of the first index fund over 50 years ago, index-tracking funds have experienced rapid asset growth, reaching over \$22 trillion in assets under management (AUM) globally.⁴ As a result, assets traded during index rebalances have also grown significantly (see **Figure 1** for an example of this growth). This has raised questions about the impact of index rebalancing on stock prices and the potential costs to index fund investors.⁵

In this paper, we explain the roles various market participants play throughout the index rebalance cycle. We then illustrate the costs of rebalance trading activity for index fund investors by analysing the net buys and sells of individual stocks traded across indices during a rebalance, using FTSE Russell’s annual Russell U.S. indices Reconstitution event as a case study.⁶ We find that despite the amount of assets rebalanced during this event each year, the price impact on stocks traded (and therefore the costs associated with rebalancing index funds) has been minimal (see **Figure 4**).



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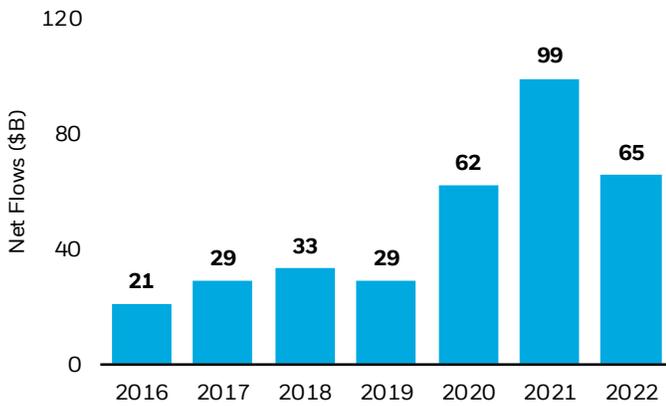
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The growing scale of index rebalances

Total flows during Russell rebalances have increased nearly fivefold over the past five years, driven by a growth in index assets and recent periods of heightened market volatility.⁷ Despite this large volume of rebalance activity, the total stock turnover is low. For example, in 2022, one-way turnover in funds tracking Russell indices was relatively small on a percentage basis—well below 10%.⁸ This is because index-tracking funds have generally low turnover relative to actively managed portfolios.⁹

Figure 1: Net flows (\$B) on Russell rebalance days (2016–2022)¹⁰



Participants in the index rebalance ecosystem

A diverse group of market participants engages in trading around index rebalances and each has different goals. This enables a dynamic and highly competitive market environment. For example, some participants explicitly seek to provide liquidity to index fund managers; others may be trading speculatively for bespoke strategies (Figure 2). The combination of these diverse activities creates a dynamic environment of buying and selling, resulting in generally deeper liquidity and tighter bid-ask spreads for all fund investors.¹¹

Figure 2: Key participants in the index rebalance ecosystem

01

INDEX PROVIDERS

Create and maintain indices (e.g., FTSE Russell, MSCI and S&P Dow Jones Indices)

02

INDEX FUND MANAGERS

Manage portfolios that seek to track the performance of an index (e.g., BlackRock, Vanguard, State Street)

03

LIQUIDITY PROVIDERS

Support index fund manager trading activities or trade around rebalance events (e.g., hedge funds, broker-dealers, active funds, corporations)

04

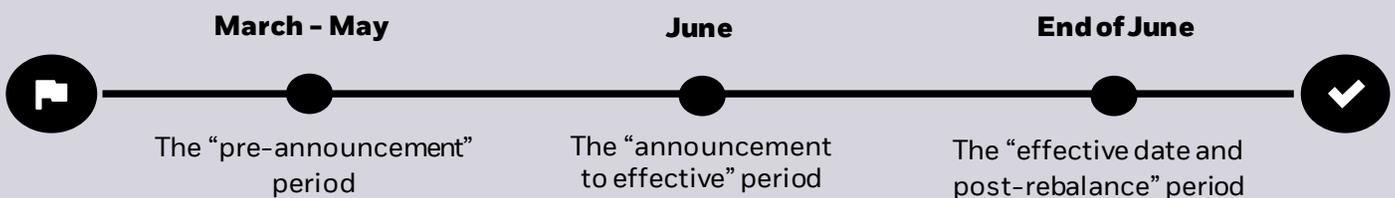
REBALANCE FACILITATORS

Serve as intermediaries for market participants during index rebalances by providing access to capital or liquidity for trading activities (e.g., securities lending, prime brokerage, custody firms)

The three stages of an index rebalance

A range of activities take place before, during, and after an index rebalance as market participants prepare for, execute, and monitor the impact of index changes.

Figure 3: Stages of the annual Russell rebalance¹²



Note: While the annual U.S. Russell Index reconstitution is used here as an example, these analogous periods exist for all index rebalances (albeit at different times of the year)

The “pre-announcement” period: Preparing for index changes

Planning for index rebalances often starts weeks to months in advance of the rebalance effective date. Because index methodologies are generally transparent and changes to each index tend to take place at the same time each year, many market participants have developed sophisticated processes, including running forecasts and predictive analytics, to prepare for the event.¹³

Sample actions taken by key participants:

INDEX PROVIDERS

- Review current index constituents and weights to confirm they meet inclusion criteria; evaluate if stocks need to be added, deleted, or have weightings adjusted¹⁴

INDEX FUND MANAGERS, LIQUIDITY PROVIDERS, AND REBALANCE FACILITATORS¹⁵

- Develop predictions based on a combination of publicly available index methodologies, current market information, and proprietary predictive research models
- Map out potential trade strategies for buying and selling securities that may be rebalancing

The “announcement to effective” period: Reviewing the new index composition

Projected index changes are announced in advance of the implementation/effective date. This triggers an important period of validating predictions and research using the new, publicly available information about upcoming index changes.

Sample actions taken by key participants:

INDEX PROVIDERS

- Announce the index changes to be made on a stated future effective date and engage with market participants on any questions/clarifications about the new index composition

INDEX FUND MANAGERS

- Compare the new index composition and current portfolio holdings to determine what adjustments need to be made to align the fund with its index on or ahead of the effective date
- Engage with liquidity providers to better understand market conditions and liquidity to inform trading strategy

LIQUIDITY PROVIDERS AND REBALANCE FACILITATORS

- Liquidity providers and rebalance facilitators directly and indirectly participate in index rebalances. For example, some, like authorised participants, may support index fund managers directly, while others may manage ancillary processes that support the trading activities of other market participants (e.g., securities lending desks, prime brokerage firms, and trading desks using index-tracking derivatives for hedging or risk management)¹⁶

The “effective date and post-rebalance” period: Index changes are officially “live”

Once the rebalance is implemented, index fund managers and other market participants carefully evaluate trade execution to ensure they met their goals of efficient completion and limited market impact. While many participants may seek to complete trading before the market closes on the rebalance effective date, it is possible that some may have residual trades to complete after the rebalance. For example, if some of the securities traded as part of the rebalance are less liquid, index fund managers may need additional time to manage execution in a manner that minimises trading costs in the fund.

Measuring the cost and scale of index rebalancing

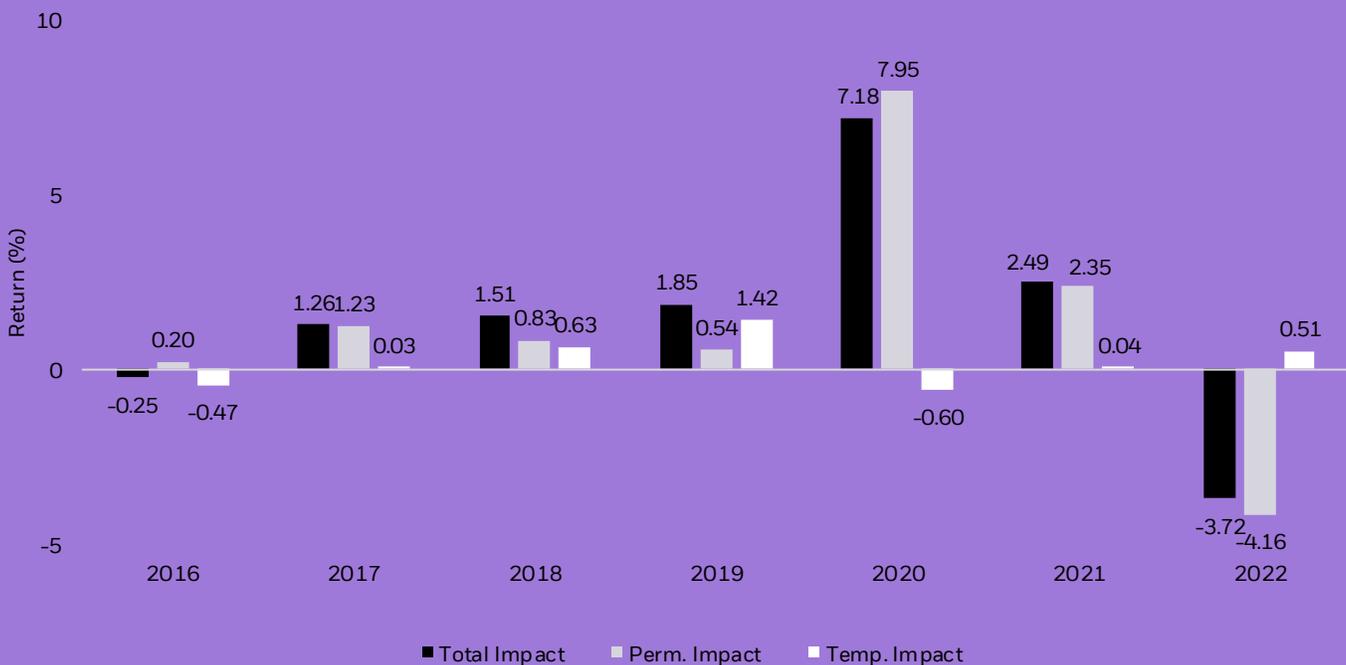
To assess if index rebalance-driven trading impacts the prices of stocks in the index (and therefore the costs associated with trading them), two key factors are considered: total net stock flows across indices and the timing of stock price movement. Looking at stock-level flows on a net basis is critical because a stock often belongs to multiple indices and can be bought or sold in different quantities depending on which index a fund tracks. For example, a stock may be traded at different weights in the Russell 3000 and Top 200 (a subset of the Russell 3000) indexes based on its current market capitalisation.¹⁷ Aggregating estimated net flows for each stock across Russell indices captures whether each stock being traded during a rebalance is a net buy or net sell.¹⁸

To assess whether a stock’s price is impacted solely by rebalance trading, it matters not only how much the stock trades, but also when the trading takes place. For example, when it is predicted that a stock will be added to a popular index, the stock’s liquidity often increases, driven by heightened interest from different types of investors, from active managers to retail investors. A stock’s price might move from anticipation around the rebalance announcement, routine market activity unrelated to index rebalance trading, or both. As a result, index inclusion also generally improves the availability of information on the stock as the number of research analysts following it typically increases.¹⁹ We consider this type of price movement *permanent* price impact, which can be measured from the date the new index composition is announced through the post-trading period after the updated index is effective. However, because this price movement stems from many economic factors, it does not exclusively address the impact of index fund rebalance trading on costs for investors.

To isolate the impact of the trading activities of rebalancing index funds, a narrower measure is required. We consider this *temporary* price impact, or the price impact from net flows that occur between the rebalance effective date and three days after its implementation.²⁰ If temporary price impact is large and positive (i.e., costs to investors have gone up), this could mean there is insufficient liquidity or inefficient, one-sided trading leading to wider bid-ask spreads. This would drive up total price impact, translating to additional trading costs to the fund. However, looking at seven years of Russell index rebalance data, temporary price impacts have a typically small, even sometimes negative, contribution to total price impact (Figure 4).

When permanent price impacts are larger this may imply that information from the announced index changes may lead to price movement in a stock, but this is likely more of a reflection of the market’s view of the stock and its status in an index. This suggests that index fund managers or other market participants cannot trade on the permanent price impact or influence its magnitude.²¹

Figure 4: Total, permanent, and temporary price impact in Russell rebalances (2016–2022)²¹



Index performance is for illustrative purposes only. Index performance does not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Past performance does not guarantee future results.

Efficiency of institutional trading strategies

End of day volumes published by exchanges are often overstated because the impacts of trading strategies carried out internally by institutions are not always captured. For example, index fund managers may use internal “cross-trades” to reduce overall trade size and impact on the underlying market, subject to regulatory constraints.²² The total trading volume published by an exchange for that day will be the gross volume, even though a portion of the stocks may have been “crossed” with no market impact.²³

The bottom line

While asset growth in index tracking funds has led to an increase in the size and scale of trading around index rebalances,²⁴ evidence based on total net stock flows during Russell rebalances suggests that trading around index rebalances has minimal impact on stock prices (see **Figure 4**). We find this is due to the robust competition amongst the diverse group of players in the rebalance ecosystem (see **Figure 2**) and the comprehensive preparation and sophisticated trading strategies employed by market participants.²⁵ In fact, we find it is macroeconomic factors, not index fund trading, that likely impact the direction of stock prices around these events.²⁶

Endnotes

1. In this paper, rebalancing includes adding, deleting, and adjusting stock weights in response to both corporate actions and index criteria eligibility. For more information on the role of index providers, see: <https://www.ishares.com/us/literature/whitepaper/ishares-investigates-indices-and-index-investing-en-us.pdf>.
2. The S&P 500 rebalances on the third Friday of every quarter. For more information on the index methodology and history, see: <https://www.spglobal.com/spdji/en/indices/equity/sp-500/#overview>, <https://www.spglobal.com/spdji/en/documents/additional-material/sp-500-brochure.pdf>
3. For a detailed explanation on BlackRock's approach to equity index rebalances, see: <https://www.ishares.com/us/literature/whitepaper/ishares-investigates-indices-and-index-investing-part-2-en-us.pdf>
4. There are roughly \$15.7 trillion in equity and \$6.6 trillion in fixed income index assets worldwide. Source: Simfund/Broadridge, McKinsey, Markit, as of 31 December 2020.
5. For example, see "Passive ETFs Hit by Billion-Dollar Rebalancing Costs," Financial Times, January 4, 2022.
6. Index provider FTSE Russell manages a broad range of indices, including the annual Russell U.S. Index Reconstitution event. In this paper, reconstitution is referred to as rebalance. Cost analysis is generally based on empirical analysis done by Madhavan, Ribando, Udevbulu (2022) using a large dataset of 22,179 stock trades that took place during annual U.S. Russell index rebalance events from 2016 to 2022. Microcap stocks that are in the Russell 3000 extended but not in the Russell 3000 are not included. Source: Madhavan, A., Ribando, J., Udevbulu, N., "Demystifying Index Rebalancing: An Analysis of the Costs of Liquidity Provision," Journal of Portfolio Management Market Microstructure July 2022.
7. Source: BlackRock as of June 27, 2022, based on FTSE Russell surveys. Russell index constituents and IDC pricing provided by Refinitiv via QA Direct. As seen in Exhibit 1, net flows on Russell Rebalance days increased from \$20.6B to \$99.B between 2016 and 2021 before decreasing to \$65.3B in 2022. The recovery from March 2020 Covid-19 U.S. market lows also led to increased rebalance activity in 2020 and 2021 caused by large market cap shifts among index constituents, as evidenced by the jump in total net flows in 2020 (\$61.9B) and 2021 (\$99.0B). Broad market downturns in H1 2022 led to the first year-over-year decrease in total net flows that we have observed in recent years.
8. Source: BlackRock as of June 27, 2022, based on FTSE Russell surveys. Russell index constituents and IDC pricing provided by Refinitiv via QA Direct. On the most recent Russell reconstitution and rebalance date (June 24, 2022), the estimated one-way turnover across all Russell indices was approximately 6.63%, or \$110.6B, on total estimated AUM of ~\$1,668.7B. The reported tracking AUMs are approximations to the total index assets tracking each index, and FTSE Russell handles missing survey responses by augmenting with publicly available fund AUM data. We further adjust these AUMs by index returns between the most recent survey date and the rebalance date to handle the time lag between survey reporting and next year's Russell reconstitution. Combining AUM estimates with the index weight changes yields the dollar amount of gross one-way turnover per index.
9. Source: ICI Factbook 2022, available at: <https://www.icifactbook.org/>
10. Source: BlackRock as of June 27, 2022, based on FTSE Russell surveys. Russell index constituents and IDC pricing provided by Refinitiv via QA Direct.
11. Bid-ask spreads measure the difference between the price at which someone is willing to buy a security and the price at which someone is willing to sell the security. Tight bid-ask spreads generally mean that there is deep market liquidity, dynamic trading volume for the stock and robust competition, and indicates efficient trading.
12. The annual Russell U.S. index rebalance is used to analyze costs of an index rebalance because it is the only major index rebalance event that occurs during the last week of June and includes a large and overlapping range of popularly tracked indices and a wide range of stocks. There is also a large body of academic research that references the widespread usage of Russell indices by fund managers. See: Chincó, A., and M. Sammon. "Excess Reconstitution-Day Volume." 2022, Madhavan, A., "The Russell Reconstitution Effect." *Financial Analysts Journal* 59 (4): 51–64. 2003, and Micheli, A., and E. Neuman. "Evidence of Crowding on Russell 3000 Reconstitution Events." 2020.
13. For Russell indices, most index weight changes are broadcasted by the official Russell ranking date in May and leading up to the announcement date on the first Friday of June.
14. This includes integrating corporate actions, updating index weights based on shares outstanding and floated shares, updating financial metrics, and establishing market price dates for the new universe of securities.
15. Examples include broker dealers, custody firms, hedge funds, active fund managers and corporations.
16. To learn about the role of authorized participants in index fund management, see: <https://www.ishares.com/us/literature/investor-education/ishares-investigates-authorized-participants-market-makers-part-1-en-us.pdf>
17. For detailed methodologies on Russell U.S. indices, see: <https://www.ftserussell.com/products/indices/russell-us>.
18. To calculate net flows, each stock is classified as a buy or sell based on an estimate of the weight change of every stock in around two dozen Russell indices and the AUM tracking each index. Total index tracking AUM is based on data from FTSE Russell surveys and includes assets from ETFs, retail and institutional mutual funds, separate accounts, and commingled funds that license Russell indices for fund benchmarks. For detailed methodology, see Madhavan, A., Ribando, J., Udevbulu, N., "Demystifying Index Rebalancing: An Analysis of the Costs of Liquidity Provision," Journal of Portfolio Management Market Microstructure July 2022.

Endnotes (continued)

19. Source: Madhavan, A., Ribando, J., Udevbulu, N., "[Demystifying Index Rebalancing: An Analysis of the Costs of Liquidity Provision](#)," Journal of Portfolio Management Market Microstructure July 2022.
20. Based on BlackRock institutional insights, this analysis conservatively estimates three days as the timeframe post-effective date where final trading activities take place, however these findings have been found to be robust to longer timeframes as well. Source: Madhavan, A., Ribando, J., Udevbulu, N., "[Demystifying Index Rebalancing: An Analysis of the Costs of Liquidity Provision](#)," Journal of Portfolio Management Market Microstructure July 2022.
21. Figure 4 follows the calculation methodology of Madhavan, Ribando, Udevbulu (2022), showing the decomposition of total returns into the permanent impact and temporary impact. Returns are calculated at the stock level, averaged across buy and sell baskets separately, then netted to represent a dollar neutral trade that is long the buy basket and short the sell basket. This defines the sign of the trade based on the direction of flow. The table is for illustrative purposes only as it may not be possible to short the sell basket. Source: BlackRock as of June 30, 2022, based on FTSE Russell surveys. Russell index constituents and IDC pricing by Refinitiv via QA Direct.
22. For example, if a stock is being removed from Fund A and added to Fund B, funds may, subject to regulatory constraints, "cross" those shares. Because no buying or selling activity is required, those trades are considered to be offset through the internal crossing mechanism, minimizing market impact.
23. Implementation cost based purely on inputs such as daily trading volume, bid-ask spreads, and market impact models using published end of day volumes are often overstated. For example, market impact models that use the ratio of the day's trading volume to the trailing 20-day average daily volume (ADV) for that stock, for example, are not properly calibrated to consider the excess liquidity that shows up on major index rebalance days.
24. See Endnote 7.
25. See page 3 for explanation of market participant processes.
26. See pages 2-3 of Madhavan, Ribando, Udevbulu (2022) for explanation of market movement driven permanent price impacts. Source: Madhavan, A., Ribando, J., Udevbulu, N., "[Demystifying Index Rebalancing: An Analysis of the Costs of Liquidity Provision](#)," Journal of Portfolio Management Market Microstructure July 2022.

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