Trading on Index Constituent Changes: Active vs. Passive Fund Management

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May 17, 2023

Abstract

We investigate mutual funds' trading related to constituent changes in major Russell indices. This setting is unique because index membership changes at fixed intervals, follows a pre-defined communication protocol, and depends only on stock market capitalization. We find an inclusion premium between 92 and 208 bps for stocks added to an index, and an exclusion effect between –9 and –80 bps for stocks leaving an index. Returns and losses amplify when investing before the announcement of index constituent changes. The return patterns help explain active mutual fund performance. About 20% of active funds buy (sell) stocks that later join (leave) an index already before the announcement of index changes, allowing us to conclude that some fund managers have the skill to forecast index inclusions and profit from it. The cost that these funds impose on constrained passive index investors amounts to 1 billion USD per year.

JEL: G11, G12, G14, G23.
Keywords: Active management, index inclusion premium, ETFs, managerial skill

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1 Introduction

The popularity of passive investing is undiminished with passively managed assets amounting to 40% of U.S. assets and 20% of European assets in 2020, doubling market share in both markets over a 10-year period.[1] Passive funds replicate an index. While this strategy requires a minimum of trading, the necessary trades to keep tracking an index are rather mechanical and thus predictable by other market participants such as active mutual funds. Active management instead allows mutual fund managers to follow a wide set of strategies aiming to realize superior performance compared to a passive benchmark by stock picking or market timing. One possible strategy is to exploit constrained passive index investors by front running index constituent changes.

In this paper, we investigate mutual funds' trading related to index constituent changes to identify whether active managers exploit constrained passive investors. We a) find an index inclusion premium of 1.8–3.9% that helps to explain active mutual fund returns, b) identify a subset of funds that follow a trading strategy on index constituent changes, and c) estimate the costs that these funds impose on passive investors to be 1 billion USD per year. Our findings allow for the conclusion that at least a subset of mutual fund managers have the skill to forecast index constituent changes and thus profit from predicting passive investors' demand.

To answer our research question whether active managers exploit constrained passive investors, taking a closer look at funds following a Russell index is useful for at least two reasons. First, Russell indices change at fixed intervals and follow a pre-defined procedure when communicating constituent changes. Second, index membership depends only on stock market capitalization. For this reason, new inclusions are rather mechanical (see, e.g., Petajisto, 2011; Chang, Hong, and Liskovich, 2015). They are also easier to predict compared

[1] See the Financial times article titled "Passive funds' share of European investment market jumps to 20%" from December 8, 2020: https://www.ft.com/content/0b5325da-585f-41ad-8267-0741e9693a7a

to, for example, inclusions to the S&P 500 since Standard & Poor's also uses other inclusion criteria such as profitability and liquidity. We test whether funds trade on announced information about index constituent changes and if they already invest in potential inclusion targets in advance of announcements. This allows us to conclude that at least a subset of active managers have the skill of forecasting changes in index membership and thus time the market.

The first step in our analysis is to construct portfolios following a strategy to buy (sell) stocks that are to join (leave) an index before the reconstitution. Across the nine major Russell indices, we identify 7,686 unique stocks that join or leave an index from 2004 to 2020. For each yearly reconstitution event we build portfolios of joiners and leavers, and record both equally-weighted returns and value-weighted returns by stock market capitalization on the ranking date. Figure 1 shows the average returns of these strategies in excess of the index return. The strategies targeting the blend version of the Russell indices deliver excess returns between 92 and 208 bps when investing in joiners on the announcement date and holding them until index reconstitution becomes effective. At the same time leaver portfolios are losing 9–80 bps on average. The results are robust across indices, weighting schemes, and are even larger when investing prior to the announcement of index membership changes. The portfolio returns of the strategies targeting the three Russell blend indices amount to 1.8–3.9 percentage points when investing already on the ranking date. We further show that following these strategies during the reconstitution period and otherwise investing passively produces a significant positive yearly alpha of 1.6–4.7% per year. Our results confirm the existence of an inclusion premium, but the magnitude of the effect is larger in previous studies (see, e.g., Chen, Noronha, and Singal, 2004; Petajisto, 2011; Chang et al., 2015). However, recent studies find a decreasing index inclusion premium over the past decade (see, e.g., Greenwood and Sammon, 2022), which is possibly the result of arbitrageurs anticipating index changes ahead of their announcements, consistent with our results.

The second step is to explain active mutual fund returns with the strategy returns. We show that the returns of our proposed strategies explain variation in mutual fund returns before reconstitution. To identify individual funds, we run a time series regression separately for each fund. Each funds daily alphas are regressed on the excess return of our strategy to calculate how much of a funds value added comes from the strategy of investing in index inclusions. This allows us to identify a subset of about 30% of funds that most likely follow a strategy on index inclusion effects either from announcement or even before that. But limiting us to funds that show significant factor loadings in the regression in both time periods, we further identify about 15% of funds that follow the proposed strategies exerting skill in forecasting index changes before announcement. These funds seem to have lower alphas, but larger strategy betas. Moreover, we explain more of fund return variation for those funds in the time series.

In the simplest version, active fund managers solely act on publicly available information that constraint passive managers cannot yet act on (i.e., the announcement of index constituent changes). However, if active fund managers have the particular skill of anticipating index constituent changes and thereby upcoming stock purchases and sales of index funds, they earn further profits by taking risky bets on their forecast. These profits must be borne by index funds who are bound to trade at given prices at reconstitution. We thus lastly estimate the cost imposed on passive fund management as the profit of the previously identified funds attributed to following a strategy on index inclusions. We measure the cost as total aggregated value added that can be linked to the returns of a strategy investing in index joiners early. We believe this gives a more accurate estimate of imposed costs compared to just taking the increased value in joiner stocks, as these are affected by fundamentals and noise. Taking the profits of active mutual funds that are borne by passive investors gives are more direct estimate of this cost instead. We quantify this cost be about 1 billion USD per year. To understand the magnitude of this cost one may look at the asset management industry. End of 2020 US domestic equity mutual funds amount to 9.5 trillion US Dollar and ETFs in domestic equity amount to 3.2 trillion US Dollar.[2] While these ETFs follow a wide range of indices, only passive funds that track one of the 9 major Russell indices bear the cost we estimate. Hence, we conclude that 3 bps is the lower bound on the cost passive investors following Russell indices face each year at index reconstitution.

This paper adds to three strands of research. First, we contribute to the literature on index investing. The inclusion of a new stock into an index results in demand from passive funds that follow the index and the exclusion of a stock consequently results in extra supply (see, e.g., Chen et al., 2004; Chinco and Sammon, 2022). The resulting inclusion premium is well documented (see, e.g., Harris and Gurel, 1986; Chen et al., 2004; Greenwood and Sammon, 2022; Chinco and Sammon, 2022). If active managers forecast these changes in the index, they might try to front run the more constraint passive managers. Thereby, active managers drive up prices of stocks that are to join an index and thus impose a cost to passive funds (see, e.g., Chen, Noronha, and Singal, 2006). Petajisto (2011) frames the hidden cost that passive investors have to bare as index turnover cost. Chen et al. (2004) and Petajisto (2011) show that stocks that are newly included in the S&P 500 index or the Russell 2000 show superior performance around the inclusion date. However, only Petajisto (2011) finds negative effects for deleted stocks. In addition, Chang et al. (2015) use a regression discontinuity design to show that the upgrade from Russell 2000 to Russell 1000 actually comes with a negative stock performance. They argue that this is caused by lower weights that these stocks receive as the smallest stocks in the upper size index compared to their weighting as the biggest stocks in the lower size index. The evidence on how much of the index premium is temporary and how much persistent is mixed (see, e.g., Harris and Gurel, 1986; Chen et al., 2004; Cai and Houge, 2008). To our knowledge no paper has documented the returns to strategies trading on index constituent changes generated by active mutual

[2] See the ICI Fact Book from 2021: https://www.ici.org/system/files/2021-05/2021_factbook.pdf

funds. Potential profits from index inclusions may create wrong incentives for managers. Onayev, Tang, and Zdorovtsov (2017) show that managers engage in manipulating closing prices to force inclusion and profit from a self-fulfilling prophecy.

Second, we contribute to the literature on benchmarking as we document how benchmark changes affect funds profit opportunities and trading behaviors. A large passive fund industry leads to high demand on reconstitution dates that is possible to predict (see, e.g., Ben-David, Franzoni, and Moussawi, 2019). Pavlova and Sikorskaya (2022) argue that also active fund managers invest a substantial amount of their assets in the benchmark portfolio for risk management reasons as they are evaluated against that benchmark. This means that excess demand for index joining stocks might be even higher if active funds retain shares to replicate the benchmark. Thus, benchmarking exacerbates index inclusion effects. In addition there is some debate and theoretical work on which benchmark to chose is right (see, e.g., Hunter, Kandel, Kandel, and Wermers, 2014; Kashyap, Kovrijnykh, Li, and Pavlova, 2020; Akey, Robertson, and Simutin, 2021; Kashyap, Kovrijnykh, Li, and Pavlova, 2021).

Third, we contribute to the literature on managerial skill. In contrast to Sharpe (1991), Berk and van Binsbergen (2015) find persistent performance of active managers defining alpha adjusted for size (labeled added value) as appropriate measure of investment skill. Pástor, Stambaugh, and Taylor (2017) find that funds that trade more also show better subsequent performance. The trading strategy we document in this paper is a candidate for what the authors phrase as time-varying profit opportunities. Moreover, we quantify how much of the profits of skilled managers in the active asset management industry come at the expense of passive investors. Cremers and Petajisto (2009) propose active share as a fund performance risk metric. It is calculated as the average deviation of benchmark weights for fund portfolio holdings. Frazzini, Friedman, and Pomorski (2016) however, argue that it does not relate to performance and is thus not a measure of skill. Our proposed trading strategy to buy joiners early would provide an easy possibility to outperform the benchmark index. We show that a fund that invests in joiners during Russell's reconstitution cycle and otherwise invests in the benchmark during the rest of the year yields yearly alphas of up to 4.74%. Those funds would have a low active share and still cater high outperformance to their investors.

One potential threat to our methodology could be that though fund managers would want to invest in joiners they are not able to do so for liquidity reasons. Especially the joiners to the Russell 3000 are small firms that are perhaps not traded as frequently as other stocks and thus implementing our strategy might not be possible to full extend. For example, Dekker, Gider, and De Jong (2021) find that active or passive funds might select to deviate from the benchmark depending on free-float, illiquidity, and return volatility of a stock. However, we show that even the returns of a Russell 3000 inclusion portfolio is reflected in fund returns and thus at least the subset of funds that we identify trade in those stocks.

The rest of the paper is organized as follows. Section 2 describes the Russell reconstitution methodology in more detail and summarizes our data sets. Section 3 introduces our methodology and reports our findings. Section 4 relates our findings to the literature and discusses the existence of managerial skill. Section 5 concludes.

2 Data

The data we use for our analysis are threefold. First, we collect data on index membership stocks and changes in the index reconstitution. Second, we match these stocks with stock level data such as daily returns. Third, we use data on active mutual funds to speak to their trading behavior. The following subsections describe the data in more detail.

2.1 Russell indices and methodology

The major FTSE Russell indices present a good setting to study the trading behavior of active and passive investors for three reasons (see, e.g., Petajisto, 2011; Chang et al., 2015). The indices are large and investable as they comprise a universe of 3000 stocks and many ETFs follow them allowing for easy and cheap access. They are further popular as benchmarks for mutual funds, which is important for our analysis as we postulate our trading strategies are an easy way for any mutual fund to outperform their benchmark. Finally, the Russell reconstitution methodology is standardized and relatively fixed across years allowing us to study not only the markets anticipation of reconstitution changes but also the market's reaction to news about reconstitution changes.

The 9 FTSE Russell indices that we investigate in this paper are the Russell 1000, Russell 2000, and Russell 3000. The Russell 3000 is comprised of the largest 3000 US stocks in terms of stock market capitalization. The Russell 3000 is further subdivided into the Russell 1000, which are the largest 1000 stocks, and the Russell 2000, which are the next 2000 stocks in size. All three are further available as growth and value versions, which are comprised of about half of the stocks in each index. Figure 2 illustrates the Russell indices compositions. While stocks need to fulfill a minimum liquidity or free float criterium to be eligible to be included in the indices, size is the only metric that determines to which index a stock belongs. Thus, FTSE Russell does not use soft factors such as the aim to reflect the American economy with it's index constituents, like Standard and Poor's for example do in the S&P 500.

As stocks size change the Russell indices are forced to reconstitute the index and to avoid unnecessary turbulence, FTSE Russell executes the reconstitution only once a year at the end of June. They follow a rigid and transparent methodology when doing so. Figure 3 illustrates the reconstitution timeline that is described in the follow exemplary for year 2016. In May on the ranking date all eligible stocks are ranked by size, then two weeks later on the announcement date FTSE Russell publishes on their website the new member lists and lists of index constituent changes. Two weeks later on the last Friday in June, or the second to last if the last is too close to the month's end, the index constituents change once markets are closed. On the next Monday, which FTSE Russell calls the effective date, markets start with the new index constituents. The core methodology has not changed since 2004, but the time frame changed a bit. In the early years of our sample the time frame differs by one or two business days as some effective date was on Friday or Memorial Day interrupted the schedule. In more recent years the time frame was extended to now 7 weeks between ranking and effective date and 5 weeks between announcement and effective date. Table 1 gives an overview of the time frame in the different years. None of these changes though change our view on how active mutual funds exploit the reconstitution and thus do not affect our methodology.

FTSE Russell is transparent about their methodology in order to shield their customers from too much turbulence around reconstitution. However, they need to cater to their customers an index that is reflecting current markets. Thus, FTSE Russell has three quarterly IPO inclusions to their indices and of course updates the indices on an ongoing basis for stocks that cease to exist. Both are for our study of minor importance. The first because we focus only on the weeks around the annual reconstitution end of June, the second because we investigate strategies on forecastable changes in index membership and not on strategies investing in acquisition targets or divest from almost bankrupt firms.

We identify membership changes from constituents' data from Mergent and Bloomberg. The Mergent data set contains end-of-month constituent data including return contribution weights for each stock and stems directly from FTSE Russell. Bloomberg data are available on a daily level but does only contain constituent identifiers. The combined data set lets us compare constituents on the last and the effective date and thus identify 118,182 unique events of a stock changing membership in one of the indices. As a stock that is i.e., excluded from the Russell 1000 also may be included in the Russell 2000 is counted as two events, we link the events to 36,123 unique stock year observations. As a stock can be included in one year and be excluded in a following year, we identify 7,686 unique stocks that are at least in one year an event stock.

Ideally, one would want to use the announced information and form a portfolio accordingly. Unfortunately, we do not observe the announced index changes from the announcement date. We identify joiners and leavers solely from the actual change that took place on the effective date. We do not make an attempt to predict the event stocks at any point in time and rather use the information on actual changes as the proxy for the most optimal prediction any fund manager could form. We consequently cannot make a statement on how announced information differs from the actual changes that happen two weeks later. However, we believe these differences are small as our proposed strategies of buying joiners early will only increase their size and thus ensure their inclusion even more. Madhavan (2003) argues that ex-post portfolios are a good proxy due to the transparency of the methodology and find industry forecasts to differ only to a minor extent to actual inclusion lists.

Figure 4 shows the number of events over the years. While in the 90s the membership drastically changed, the number of inclusions and exclusions decreases in the early 2000s and stabilized over the last 10 years. Table 2 reports the average yearly number of inclusions and exclusions for the Russell 1000, Russell 2000, and Russell 3000 in the years 2004 to 2020. Not surprisingly there are a lot more inclusions and exclusions in the Russell 3000 and Russell 2000 then in the Russell 1000. The numbers of Russell 1000 and Russell 2000 inclusions do not sum up to the average amount of Russell 3000 inclusions for the simple fact that a stock can stay in the Russell 3000 while switching back and forth between the other two over the years. The table further reports the origins of the inclusions and the destination of the exclusions. About 80% of inclusions and exclusions in the Russell 2000 are stocks coming from or leaving to the outside of the Russell universe, while most of the inclusions and exclusions in the Russell 1000 are upgraded from and downgraded to the Russell 2000.

2.2 Stock level data

In order to analyze the performance of event stocks around the reconstitution we match them with time series information of stock prices and returns. This time series stock level data are available in the CRSP data on WRDS. It provides daily stock prices, returns, and trading volume identified by CUSIP.

The constituent lists retrieved from Bloomberg are identified by historical Bloomberg tickers and the constituent lists from Mergent are identified by CUSIP and Bloomberg ticker. We use the Mergent data as default mapping between CUSIP and Bloomberg ticker. For all Bloomberg tickers that are not present in this data set we use historical Ticker information from Bloomberg to match a CUSIP. We are thus able to map 7,071 out of 7,686 individual stocks to price information from CRSP. For the remainder 615 stocks we are not able to map a CUSIP or find any daily price observations in the CRSP data set. We are confident that this number is a sufficient amount to make a claim about the general performance of joiners and leavers around the reconstitution event.

We analyze the performance of these stocks in Section 3.1. However, one observation that is interesting to report is the average daily trading volume of joiners and leavers around reconstitution, which is depicted in Figure 5. The average daily trading volume is rather stable with about 2 to 3 million US Dollar for the joiners and leavers in the Russell 1000 and 500,000 USD for the Russell 2000 and 3000. However, on the last trading day before reconstitution the average trading volume spikes to 4 to 10 times the average, amounting to almost 12 million US Dollar for the Russell 1000 joiners. This finding is interesting as it tells us that there is enormous demand to trade event stocks on the date before their inclusion or exclusion. We infer that these trades are done by passive investors replicating the respective index as trading on the last date will minimize their tracking error. We support this as in example Li (2021) finds that about 60% of ETFs do not conceal their trades and rebalance over one trading day. The fact that the trading volume is so high on the last and not on the effective date tells us further that passive investors have a rebalanced portfolio with the new weights at market closing rather than having to rebalance on the first day when those new weights apply.

The enormous spike of trading volume on the last date shows that there is a high demand for the event stocks on that date and that the pattern is so clear shows that this excess demand is quite predictable. While some of the demand could be satisfied by other passive investors in the case of stocks switching between indices, most of the demand, and especially so for joiners and leavers to and from the Russell universe, must be met by other traders. We propose that these other traders are active managers that try to harvest the inclusion premium by buying stocks to more favorable prices earlier and then provide liquidity to the passive managers on the last date. By doing so, active investors would impose a cost on passive investors.

The surge in trading volume on the last date before the reconstitution is showing the importance of the reconstitution event and that market participants do react to it. Thus, our aim with this paper is to shed more light on index reconstitutions and investigate the trading behavior of active mutual fund managers around reconstitution events.

2.3 Mutual funds level data

The third part of our data is on active mutual funds. From Morningstar we download all funds that use one of our 9 FTSE Russell indices as benchmark. This benchmark is either the one that the fund self-reports or the category benchmark that Morningstar assigns to the fund according to its asset composition. Besides the benchmarks we observe daily fund net returns and AUMs since 2012. As Russell's reconstitution methodology is executed within several weeks, data on daily frequency for both event stock returns, and fund returns are most preferred for our study. We thus limit our research in the last part of our paper to the years 2012 to 2020 and within these years to business days of 4 to 7 weeks before the reconstitution. Our final data set contains 5,079 active mutual funds with daily observations around reconstitution.

3 Methodology

In this section we explain our methodology to answer our two main questions: Do active funds extract profits from passive funds by trading on index constituent changes? Do active fund managers display skill when doing so?

We first explain how we construct portfolio strategies exploiting the reconstitution of the major indices. Then establish that these strategies have superior outperformance relative to the respective index. Next, we test whether active mutual fund returns are sensitive to the returns of our strategy portfolios. Lastly, after identifying funds that follow a strategy of betting on index reconstitutions, we infer the profits of those active mutual funds and by that the cost that these funds impose on passive management.

3.1 Portfolio construction

The index inclusion premium discussed in the literature postulates that stocks that are included in the index rise in price and stocks that leave the index decrease in price. Petajisto (2011) discusses this as a cost to passive management as the prices of joiners rise and leavers lose in value before the inclusion takes place and thus index investors need to buy and sell at unfavorable prices. Passive investors internalize this cost as they are more concerned about tracking error than about superior performance. Active managers harvest this premium by buying joiners and selling leavers earlier than the passive investor and then sell to or buy from the index investor on reconstitution date. The more active traders are following this strategy and the larger the passive fund industry and thus their demand is the larger the costs grow as active managers bet up prices for joiners or lower them for leavers.

As the passive investors' demand is quite mechanical and size is the only characteristic that matters for the Russell indices, it is relatively easy to forecast changes to index membership and profit from price changes. This is especially true as Russell announces changes well in advance too. The first question to tackle is thus if a active trader makes a profit investing in joiners and divest from leavers once Russell announces the changes and reverts it positions once reconstitution happens.

If a trader makes a profit on the strategy described above, then one could hardly explain returns with skill. Simply reacting to announced information should not be considered a skill and thus should not be compensated. But perhaps active traders invest even earlier in the strategy and thus we want also to investigate the performance of such a strategy in the time between ranking date and announcement date.

We construct the portfolios as follows. For each of the 9 indices and each year between 2004 and 2020 we collect all the joiners and weigh their daily returns around reconstitution. We apply a simply equal weighting and a value weighting in which we build returns and the value weighted average using the weight of each stock on the ranking date and holding weights fixed over the reconstitution period. We do the same for leavers. Note here that we report a long portfolio of leavers in all tables and graphs although we expect this portfolio to yield negative returns. Third, we construct the theoretical long-short portfolio investing in joiners and divesting from leavers.

Figure 6 shows the daily averaged cumulative return on the joiner and leaver portfolios for the Russell 1000. Panel (a) depicts the returns of the equal-weighted portfolio and panel (b) the value weighted portfolio returns. The cumulative returns are normalized to the ranking date and thus one can read the average portfolio return from the intersection with the black line on the ranking date. While the joiner portfolios do not seem to show a much different path than the index itself, the leaver portfolios lose about 5% over the reconstitution horizon. However, this loss seems to be temporary as the cumulative returns revert to the index value over the course of several weeks.

Figures 7 and 8 show the cumulative returns for the Russell 2000 and Russell 3000 respectively. Leavers of the Russell 2000 seem to lose in value only in the equal-weighted portfolio as the value weighted portfolio stays close to the index over the whole time span. In Figure 8 we see a clear out performance for the joiners and an underperformance for leavers in the Russell 3000. But also, here out and under performance seem to revert to the index value a few weeks after the reconstitution.

As we needed to drop years with a different reconstitution horizon for the normalization in the figure, the reported returns stem only from the years 2005, and 2008 to 2016. This restriction we did not need to follow when reporting the average returns over the horizon in Table 3. One can see that the average excess returns over the index are as expected. The joiner portfolios yield positive returns while the leaver portfolios underperform the index. The highest excess return could be earned by investing in joiners in the Russell 3000 from the ranking date to the effective date with 3.85%. This portfolio is also the one with the highest Sharpe ratio. The theoretical long-short portfolios produce higher returns on average but come in the cases on the Russell 1000 and Russell 3000 with decreases in Sharpe ratio suggesting they load relatively more risk than the simple long portfolio in joiners. Table 4 reports the results of the portfolios built with value-weighting joiners or leavers. Interestingly, the returns for the Russell 1000 and Russell 3000 portfolios are even higher and come with a higher Sharpe ratio, while the Russell 2000 portfolio produces lower returns when it is built with value weighting joiners. In Figure 1 the average excess returns across the 9 indices are visualized. One can see that returns are higher once you invest earlier as the blue bars are always higher than the red bars. Further the strategies on blend versions of the indices seem to yield higher performance. Lastly it is interesting to note that value-weighting does not yield superior performance for value versions of the indices. We have no explanation for it. For the fact that value weighting does not work for portfolios on the Russell 2000, we offer a possible explanation. Inclusions to the Russell 2000 happen from above and from below, so from the Russell 1000 and from outside the Russell universe. Supposedly deleted stocks from the Russell 1000 are bigger than the newly included stocks to the universe, at least on average. We know that the newly included stock carries a profit as the strategy of buying joiners in the Russell 3000 yields a profit, however when value weighting, we undervalue these stocks relative to the inclusions of leavers of the Russell 1000. As further there are more inclusions to the universe than from the Russell 1000 the profit that can be made by equal-weighted joiners to the Russell 2000 is diminished when overweighting the leavers of the Russell 1000.

Looking at the different time horizons we report that it yields higher returns to investing earlier across all indices, but those returns do not necessarily come with a higher Sharpe ratio. We conclude that there are several strategies across different indices that exploit the reconstitution event and yield a positive excess return on average. However, these returns are volatile across years and thus the portfolios come with risk.

The consequent next step is thus to investigate risk-adjusted performance of the portfolios of joiners. We run the following pricing regressions evaluating the performance relative to the benchmark index:

$$R_t - R_{f,t} = \alpha + \beta(R_{b,t} - R_{f,t}) + \epsilon_t, \tag{1}$$

where R_t is the strategy return on day t; $R_{b,t}$ is a index return; and $R_{f,t}$ is the risk-free rate.

The excess return of each strategy is regressed on a constant and the excess benchmark return over the risk-free rate. To yield annual returns we assume the investor in our strategies invests in the benchmark index in the rest of the year and only deviates from it from the ranking date to the effective date or between the announcement and effective date. The yearly observations come from $t = 2004$ to 2020.

Table 5 reports the alphas of those regressions and one can see that most portfolios deliver a significant positive yearly alpha, amounting up to 4.74%. These alphas are huge given that the portfolio deviates from the index just in 4 to 7 weeks a year and otherwise is passive. The highest alphas are found for the blend versions of the indices and in general for the Russell 3000. Value portfolios do not seem to outperform again when portfolios are value weighted and the Russell 2000 again does no show superior returns for the value weighted portfolios.

We conclude that there are several strategies across different indices that exploit the reconstitution event and yield a positive risk-adjusted excess return on average. A consequence of this is that the inclusion premium exists in the most recent data and amounts to 0.92–3.85% depending on the index and the time horizon its measured in. This premium has to be incurred by passive investors as a cost.

3.2 Mutual fund return analysis

Now that we have established profitable strategies investing in index joiners before reconstitution, we analyze active mutual fund returns to show that there are funds that follow those strategies.

We first exploit the panel structure of the mutual fund data set and restrict observations to the reconstitution horizon between the ranking and the effective date. We then regress daily fund returns in excess of the risk-free rate on both the benchmark return and the strategy return in excess of the risk-free rate:

$$R_{i,t} - R_{f,t} = \alpha + \beta_b(R_{b,i,t} - R_{f,t}) + \beta_s(R_{s,i,t} - R_{f,t}) + \epsilon_{i,t}, \tag{2}$$

where $R_{i,t}$ is the gross return of fund i on day t; $R_{b,i,t}$ is a fund-specific benchmark return; $R_{s,i,t}$ is the benchmark-specific strategy return; and $R_{f,t}$ is the risk-free rate.

We consider three different strategy returns. First, a portfolio that is long index joiners.

Then, we also include the long portfolios in leavers, and finally we consider the long-short portfolio of joiners minus leavers. All strategies are using equal weighting for the event stocks as those portfolios had more profitable results than value-weighted portfolios as Table 5 showed. We adjust standard errors for potential serial correlation over 10 business days.

Table 6 reports the results. The first to note is that fund returns are explained to a large extent buy the benchmark return as benchmark betas are close to one and the R squared are high. However, all the benchmark betas are significantly different from one on a significance level of less than 1%. Thus, there is sufficient variation left for the average fund, which is not surprising as the data consists predominately of active mutual funds that should not follow the index too closely.

The second observation is that our strategy betas are significant as well in all specifications. The joiner portfolio has a beta of 0.03 between the ranking and announcement date and it stays the same between announcement and effective date. That the beta is constant is unexpected as the closer the reconstitution comes, and the more information is announced the more easily funds could follow the strategy. Furthermore, the leaver portfolios have positive and significant betas between the ranking and announcement date. This means that fund returns on average are explained by leaver returns which we have shown to be negative on average and this suggests that funds hold on to leaver stocks in this period. However, as the beta switches sign, funds might react to the announced information and divest from leavers.

The average fund has further a positive and significant alpha of 4 to 19 basis points over the whole horizon across specifications. As mutual funds follow a variety of strategies, we are not surprised that there is a part of returns that remains unexplained.

One might argue that we should account for more known risk factors such as for example proposed by Fama and French (1993) or Carhart (1997). However, we follow Berk and van Binsbergen (2017) and Pástor, Stambaugh, and Taylor (2015) in their argumentation that these factors are not investable and thus though of academic value, are unsuited to measure performance of funds.

The panel regression results show that the return on a portfolio on joiners can on average help explain the returns of mutual funds. However, the underlying assumption when running the panel regression are that each fund has the same alpha and the same beta(s). These assumptions are rather strong and thus we zoom in further in the following analysis.

Fund performance can be measured as the value added by active management and is calculated as the product of AUM and alpha. It is thus a measure in Dollar of how much a fund yields from deviation of its benchmark. We answer in the following how much of value added is coming from our proposed strategy of buying joiners early.

We start by calculating a fund's exposure to its benchmark in a rolling window. This approach is good for at least two reasons. First, a fund might change its benchmark over time. As we observe the Morningstar category benchmark as a monthly series we do see this happen in the data. Second, a fund might change its strategies and thus might not have constant betas over time. We estimate betas for each fund and year on the ranking date separately using the recent 6 months' daily returns. We then assume that these betas are constant also for the reconstitution cycle that year and calculate daily alphas as follows:

$$\alpha_t = (R_t - R_{f,t}) - \beta_{b,y}(R_{b,t} - R_{f,t}) \tag{3}$$

So alphas are calculated as the fund return R on date t that cannot be explained by the risk-free rate $R_{f,t}$ nor the return the fund makes due to its current exposure $\beta_{b,y}$ to its benchmark b which returns are $R_{b,t}$. The exposure is calculated in a rolling window as described above and thus constant for all days in the reconstitution cycle in year y.

To understand how much of this daily alpha can be attributed to strategies investing in joiners we run the following time-series regression for each fund:

$$\alpha_t = c + \beta_s(R_{s,t} - R_{f,t}) + \epsilon_t \tag{4}$$

where α_t is the daily alpha at day t from equation 3; $R_{s,t}$ is the benchmark-specific strategy return; and $R_{f,t}$ is the risk-free rate.

From the results we can calculate value added in general as the daily alpha times the fund's AUM and the value added from our inclusion strategy as the product of β_s, the return on joiners and the fund's AUM. We aggregate the alphas and value added in the periods between the ranking and announcement date and between announcement and effective date. We summarize the results by first averaging across years for each fund and then across funds.

Table 7 reports the summary statistics separately for active and passive funds. We can see that as expected passive funds have a benchmark beta that is closer to one and as we estimated the beta for each year it is the same in both periods. Active funds have on average a positive significant alpha in both time periods. However, it is surprising that passive funds including ETFs have an equally high or even higher alpha. We are not the first to documant that passive fund appear more active then expected, see i.e. Akey et al. (2021).

With the return on the portfolio of index joiners we can explain a significant part of fund alphas. However, there does not seem to be a difference between active and passive funds. Looking at R squared we can explain more variation in alphas for passive funds than active funds. In line with higher alphas, passive funds also have higher value added. However, more of value added can be attributed to the investment in index inclusions for active funds. In addition, funds in all specifications have higher value added in the period before the announcement of index changes. This suggests that fund managers pay attention to index changes and engage in predicting them.

We want to shed further light on what kind of funds have returns sensitive to our joiner strategy and thus report summary statistics of the full sample and those funds in Table 8. Funds in Group 1 have a significant strategy beta between the ranking and announcement date. Funds in Group 2 have such a beta between the announcement and effective date and funds in Group 3 do have it in both periods.

Relative to the full sample it seems like alphas might be lower for the groups, strategy betas are higher and the average R-squared is higher. The groups have higher value added by joiners in both time periods compared to the full sample, however, they do not have higher value added in general. Again, funds generate more value added by investing in joiners before the announcement of index joiners. The strategy of investing in index joiners can explain between 32 and 232 percent of value added in mutual funds. Groups 1 and 2 account for a bit less than one third of funds in the sample and group 3 is comprised of about 15 percent of active mutual funds. These shares are higher than if betas were completely random.

4 Discussion

We find that the inclusion premium across indices lies between 1.81–3.85% above the index return in the time between ranking and effective date. And between announcement date and effective date we get estimates between 0.92–2.08%. Our estimates are thus lower than what the literature found previously. Chen et al. (2004) find an inclusion premium of 8.9% from announcement to effective date. However, they study the S&P 500 in a time period between 1962 to 2000. As the S&P 500 methodology is quite different leading in terms of inclusion criteria and length of the announcement cycle, is it not surprising that inclusions come as a bigger surprise to market participants and lead to higher price impacts. Russell argues that its longer time horizon in its methodology and its transparency led to smoother inclusions for example. Further is our data sample completely distinct from that of Chen et al. (2004).

Petajisto (2011) studies both the S&P 500 and the Russell 2000 in a period between 1990 and 2005. He finds equally high inclusion premia for the S&P 500 but lower premia for the Russell 2000 with 4.7%. He further showed that the inclusion premium spiked in 2000 and decreased afterwards. As our estimate for the excess return in the Russell 2000 joiners between announcement and effective date is only 0.92, we argue that the trend Petajisto (2011) found for the beginning of the 2000's continued. On the other hand, does Petajisto (2011) only include inclusions from below and we include all inclusions in the Russell 2000. Thus, perhaps the inclusions to the Russell 3000 give a better estimate for comparison and that one is 2.08%. In either case we find a lower return in the same time frame before reconstitution. However, our estimate of 3.85% between the ranking and the reconstitution date is much closer than the estimate of Petajisto (2011). So, it is possible that the inclusion premium is not getting smaller but is arising earlier. We contribute by showing the development of the inclusion premium over time and confirming its existence even before the announcement of index changes.

Chang et al. (2015) find an inclusion premium of 5% for inclusions from above to the Russell 2000 and identify it with a regression discontinuity design. While their approach employs a identification strategy the excess return estimate is relative to a few stocks that just did not get included in the Russell 2000 and thus remain in the Russell 1000. As our returns are relative to the benchmark index it is difficult to compare magnitudes directly. They further use monthly returns thus missing out on a few dates in May and including a few too many in June. We have the highest overlap in years with their paper as they analyze the reconstitution between 1996 and 2012.

The comparison of our two papers conceptually is interesting. Chang et al. (2015) argue in their paper for a inclusion premium for stocks leaving the Russell 1000 and joining the Russell 2000. Further the inclusion of new stock to the Russell universe from below should also carry a premium. Taking these two together the investment strategy to buy any joiner to the Russell 2000 should be profitable. However, we find that the returns of equal-weighted joiners in the Russell 2000 is diminished when instead value-weighting joiners. This means that larger joiners do perform worse than smaller joiners. As the joiners from the Russell 1000 should be larger we suspect that the inclusion premium from above might not exist or is considerably lower when measured relative to the index performance. Looking at the leavers from Russell 1000 we see underperformance though most of them are joining the Russell 2000 (see i.e., Figure 1). Further opposing Chang et al. (2015) we find positive returns relative to the index for an inclusion portfolio in the Russell 1000 while they find negative returns relative to staying stocks in the Russell 2000. Their argument relies on the fact that a fund switching from the bottom ranks of the Russell 1000 with a low weight in its index is getting a high weight in the Russell 2000 as it will be among the top-ranking stocks. However, if the relative amounts of capital following the indices changed over time it might no longer hold that the weight change is rewarded that highly.

We show that a substantial part of value added of active funds can be explained by a strategy of buying index joiners early. Each active fund yields on average 0.21 million USD per year. With 4,329 active mutual funds in our data set this amounts to about 900 million USD of profits each year. If we only calculate the total value added for funds that we identify to engage in our strategy, we get a total return of 1 billion USD. We argue that these profits come from passive investors that need to buy joiners on the reconstitution date from these active investors.

We relate our estimate of the costs that active management imposes on passive management to Petajisto (2011). He finds an average annual cost of 170 to 340 million USD for the Russell 2000 alone. While our estimate is higher at about one billion USD, we think it is in the same ballpark as the findings in his paper. First, our costs are a total across all 9 Russell major indices. Second, he uses for his estimate a value of 44 billion USD that is following the Russell 2000 while our full sample of funds following the Russell 2000 comprises about

250 billion USD in assets. Third, he uses only the time between announcement and effective date and in that time frame, we estimate the cost of 216 million. Thus, we deem our results confirming what he found though our estimation differs as we identify the funds driving up joiner prices.

We show that the inclusion premium exists in our sample time frame, that profitable investment strategies exist to exploit the inclusion premium and identified funds that most likely follow our proposed trading strategies and thus extract profits from passive index investors. It remains to be answered whether active fund managers exert skill when trading on index inclusions and exclusions.

If fund managers would simply react to information about index changes, we would expect to be able to only explain fund returns in the period between announcement and effective date with our strategy returns. However, we find that fund returns are explained for at least a subset of funds also in the period between ranking date and announcement date. While some funds might have a significant beta for our strategy of buying joiners because of statistical randomness, we are quite confident that the subset of funds that show significant betas in both periods are following some inclusion strategy. Further funds seem to generate more value added in the period before the announcement of index changes, suggesting that engaging in predicting inclusions is profitable. We are confident that these funds are able to forecast index inclusions and thus passive excess demand. As these funds can buy joiners at a more favorable price and sell to passive investors on the effective date, they directly impose their profits as cost on passive investors.

As we built our strategy for the information of actual and not perceived index changes, one can see our strategy as the most optimal in terms of foresight. Thus, the fact that we find its returns explaining fund returns speaks to the ability of the managers to pick the right securities and time the market. So perhaps some managers have this particular skill of forecasting index changes. Another argument for skill is the finding that not a lot of funds are following our strategies, and not even so after announcement of changes. Though one could argue here that the fact that some managers do not pay attention to information or easy-to-predict changes, does not necessarily mean that those who do have skill. Not even our strategy with perfect foresight is a riskless strategy, thus fund managers take risks when investing in inclusions and at least merit compensation above a passive fee if they are able to produce excess returns on average. But the decision whether these managers have skill or just pay attention is left to the reader.

5 Conclusion

This paper investigates the setting of trading related to index constituent changes. First, we revisit the index inclusion premium. We shed light on its timing and magnitude in 9 major Russell indices, Second, identify active managers that follow a strategy of beating their benchmark index by exploiting constraints of passive investors in the same benchmark. These active managers buy and sell stocks already after index changes are announced and then trade with passive investors on the day index changes become effective, thereby front-running passive investors and imposing a hidden cost to them. We quantify these costs related to index inclusions and deletions borne by passive investors. Moreover, we identify how much of the outperformance that is generated by active managers is explained by this particular skill of stock picking and market timing. We analyze to which extend active managers anticipate changes to an index and generate returns through risky bets arguably showing managerial skill as compared to acting on publicly available information exploiting tracking error constraints of passive investors.

We find that the inclusion premium is lower in the most resent years and arises earlier compared to what previous research has shown. However, we show that it can be exploited across several indices with investment strategies producing positive risk adjusted returns.

With the returns of those strategies, we explain mutual fund returns in general and in particular are able to identify funds that follow a strategy on index reconstitution effects. These funds impose yearly a substantial cost of 900 to 1,000 million USD on passive index investors and these costs are in line with earlier findings. As these funds further can profit from our proposed strategies before the announcement of index changes, we find evidence that these fund managers exert some particular skill in stock picking and market timing when forecasting passive index funds excess demand.

It is left for further research to show how well inclusions and exclusions can be predicted and to potentially further refine the strategies to exploit the index inclusion premium. It remains also to be shown if the inclusion premium in quarterly IPO inclusions is similar and whether fund managers use their skill to profit from these or other index changes too.

References

Akey, Pat, Adriana Robertson, and Mikhail Simutin, 2021, Closet Active Management of Passive Funds, *Rotman School of Management Working Paper 3874582* .

Ben-David, Itzhak, Francesco Franzoni, and Rabih Moussawi, 2019, An Improved Method to Predict Assignment of Stocks into Russell Indexes, *NBER Working Paper w26370* .

Berk, Jonathan B., and Jules H. van Binsbergen, 2015, Measuring Skill in the Mutual Fund Industry, *Journal of Financial Economics* 118, 1–20.

Berk, Jonathan B, and Jules H van Binsbergen, 2017, Mutual Funds in Equilibrium, *Annual Review of Financial Economics* 9, 147–167.

Cai, Jie, and Todd Houge, 2008, Long-term Impact of Russell 2000 Index Rebalancing, *Financial Analysts Journal* 64, 76–91.

Carhart, Mark M., 1997, On Persistence in Mutual Fund Performance, *Journal of Finance* 52, 57–82.

Chang, Yen-Cheng, Harrison Hong, and Inessa Liskovich, 2015, Regression Discontinuity and the Price Effects of Stock Market Indexing, *Review of Financial Studies* 28, 212–246.

Chen, Honghui, Gregory Noronha, and Vijay Singal, 2004, The Price Response to S&P 500 Index Additions and Deletions: Evidence of Asymmetry and a New Explanation, *Journal of Finance* 59, 1901–1930.

Chen, Honghui, Gregory Noronha, and Vijay Singal, 2006, Index Changes and Losses to Index Fund Investors, *Financial Analysts Journal* 62, 31–47.

Chinco, Alex, and Marco Sammon, 2022, The Passive-Ownership Share is Double What You Think it is, *Working Paper* .

Cremers, Martijn K.J., and Antti Petajisto, 2009, How Active Is Your Fund Manager? A New Measure that Predicts Performance, *Review of Financial Studies* 22, 3329–3365.

Dekker, Lennart, Jasmin Gider, and Frank De Jong, 2021, How do Funds Deviate from Benchmarks? Evidence from MSCI's Inclusion of Chinese A-shares, *Working Paper* .

Fama, Eugene, and Kenneth French, 1993, Common Risk Factors in the Returns on Stocks and Bonds, *Journal of Financial Economics* 33, 3–56.

Frazzini, Andrea, Jacques Friedman, and Lukasz Pomorski, 2016, Deactivating Active Share, *Financial Analysts Journal* 72, 14–21.

Greenwood, Robin M., and Marco Sammon, 2022, The Disappearing Index Effect, *NBER Working Paper w30748* .

Harris, Lawrence, and Eitan Gurel, 1986, Price and Volume Effects Associated with Changes in the S&P 500 List: New evidence for the Existence of Price Pressures, *Journal of Finance* 41, 815–829.

Hunter, David, Eugene Kandel, Shmuel Kandel, and Russ Wermers, 2014, Mutual Fund Performance Evaluation with Active Peer Benchmarks, *Journal of Financial Economics* 112, 1–29.

Kashyap, Anil K., Natalia Kovrijnykh, Jian Li, and Anna Pavlova, 2020, Is There Too Much Benchmarking in Asset Management?, *NBER Working Paper w28020* .

Kashyap, Anil K., Natalia Kovrijnykh, Jian Li, and Anna Pavlova, 2021, The Benchmark Inclusion Subsidy, *Journal of Financial Economics* 142, 756–774.

Li, Sida, 2021, Should Passive Investors Actively Manage their Trades?, *Working Paper* .

Madhavan, Ananth, 2003, The Russell Reconstitution Effect, *Financial Analysts Journal* 59, 51–64.

Newey, Whitney K., and Kenneth D. West, 1987, A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix, *Econometrica* 55, 703–708.

Onayev, Zhan M., Olivia Tang, and Volodymyr M. Zdorovtsov, 2017, Predatory Trading around Russell Reconstitution, *Working Paper* .

Pástor, Ľuboš, Robert F. Stambaugh, and Lucian A. Taylor, 2015, Scale and Skill in Active Management, *Journal of Financial Economics* 116, 23–45.

Pástor, Ľuboš, Robert F. Stambaugh, and Lucian A. Taylor, 2017, Do Funds Make More When They Trade More?, *Journal of Finance* 72, 1483–1528.

Pavlova, Anna, and Taisiya Sikorskaya, 2022, Benchmarking Intensity, *Review of Financial Studies* Forthcoming.

Petajisto, Antti, 2011, The Index Premium and its Hidden Cost for Index Funds, *Journal of Empirical Finance* 18, 271–288.

Sharpe, William F., 1991, The Arithmetic of Active Management, *Financial Analysts Journal* 47, 7–9.

Table 1
Reconstitution time frame

The table reports Russell's reconstitution schedule for the years 2004 to 2020. On the ranking date, Russell ranks all stocks according to stock market capitalization to determine which index a stock belongs to in the coming year. On the announcement date, Russell publishes a list of membership changes and thereby communicates which stocks are index joiners and which are index leavers. On the effective date, the new member list is effective with the start of the trading day. We further report the number of business days between ranking and effective dates, and between announcement and effective dates.

Year	Ranking date	Announcement date	Effective date	Days between ranking and effective dates	Days between announcement and effective dates
2004	2004-05-28	2004-06-11	2004-06-25	20	10
2005	2005-05-27	2005-06-10	2005-06-27	21	11
2006	2006-05-31	2006-06-16	2006-07-03	23	11
2007	2007-05-29	2007-06-11	2007-06-25	19	10
2008	2008-05-30	2008-06-13	2008-06-30	21	11
2009	2009-05-29	2009-06-12	2009-06-29	21	11
2010	2010-05-28	2010-06-11	2010-06-28	21	11
2011	2011-05-27	2011-06-10	2011-06-27	21	11
2012	2012-05-25	2012-06-08	2012-06-25	21	11
2013	2013-05-31	2013-06-14	2013-07-01	21	11
2014	2014-05-30	2014-06-13	2014-06-30	21	11
2015	2015-05-29	2015-06-12	2015-06-29	21	11
2016	2016-05-27	2016-06-10	2016-06-27	21	11
2017	2017-05-12	2017-06-09	2017-06-26	31	11
2018	2018-05-11	2018-06-08	2018-06-25	31	11
2019	2019-05-10	2019-05-24	2019-07-01	36	26
2020	2020-05-08	2020-05-22	2020-06-29	36	26

Table 2
Average number of index inclusions and exclusions per year

The table shows the average number of stocks per year included in and excluded from three major Russell indices from 2004 to 2020. Further we report percentages on whether these inclusions and exclusions are a change in the Russell universe or if the stocks switch between the Russell 1000 and Russell 2000. As universe we understand all stocks that were a member of any Russell index in the subsequent year. We think of an upgrade as the change from the Russell 2000 to the Russell 1000 and a downgrade vice versa.

	Inclusions	% new to universe	% upgraded	% downgraded
Russell 3000	214.6	100.0		
Russell 1000	55.8	26.2	73.8	
Russell 2000	241.8	84.1		15.9
	Exclusions	**% out of universe**	**% upgraded**	**% downgraded**
Russell 3000	151.6	100.0		
Russell 1000	41.6	7.5		92.5
Russell 2000	192.2	78.6	21.4	

Table 3
Average returns of equal-weighted portfolios on Russell Blend indices

The table shows average yearly abnormal returns on strategies trading on index reconstitution events. The strategies are buying stocks joining the respective index (J), buying the leaving stocks of the respective index (L) and holding the long-short portfolio of buying joiners and selling leavers (J–L). On the ranking date Russell ranks all stocks according to market capitalization, the announcement date is when Russell announces the first time the new members of their indices, and the effective date is the date the indices start with the new constituent list. The strategies are implemented between the ranking date and the effective date or between the announcement date and the effective date and the stocks are weighted equally in the portfolio. The panels correspond to strategies on the changes in the Russell 1000, Russell 2000, and Russell 3000 indices. Means are calculated as the average yearly abnormal return above the index and are given in percentages. Standard deviations are calculated across years and the Sharpe ratio is calculated as the ratio between the return and its standard deviation. The data stems from the years 2004 to 2020.

	Rank to effective date			Announcement to effective date		
	J	L	J–L	J	L	J–L
R1000						
Mean	1.81	−0.87	2.68	1.53	−0.09	1.62
SD	3.56	7.29	9.11	2.95	4.29	6.24
SR	0.51	−0.12	0.29	0.52	−0.02	0.26
R2000						
Mean	2.02	−1.51	3.53	0.92	−0.80	1.71
SD	5.09	5.67	7.54	4.25	5.10	6.67
SR	0.40	−0.27	0.47	0.22	−0.16	0.26
R3000						
Mean	3.85	−0.81	4.65	2.08	−0.41	2.49
SD	5.50	7.69	8.86	4.19	6.30	7.76
SR	0.70	−0.11	0.53	0.50	−0.06	0.32

Table 4
Average returns of value-weighted portfolios on Russell Blend indices

The table shows average yearly abnormal returns on strategies trading on index reconstitution events. The strategies are buying stocks joining the respective index (J), buying the leaving stocks of the respective index (L) and holding the long-short portfolio of buying joiners and selling leavers (J–L). On the ranking date Russell ranks all stocks according to market capitalization, the announcement date is when Russell announces the first time the new members of their indices, and the effective date is the date the indices start with the new constituent list. The strategies are implemented between the ranking date and the effective date or between the announcement date and the effective date and the stocks are value-weighted according to their stock market capitalization on the ranking date. The panels correspond to strategies on the changes in the Russell 1000 Blend, Russell 2000 Blend, and Russell 3000 Blend indices. Means are calculated as the average yearly abnormal return above the index and are given in percentages. Standard deviations are calculated across years and the Sharpe ratio is calculated as the ratio between the return and its standard deviation. The data stems from the years 2004 to 2020.

	Rank to effective date			Announcement to effective date		
	J	L	J–L	J	L	J–L
R1000						
Mean	2.34	−0.95	3.29	2.30	−0.40	2.70
SD	4.19	5.77	8.23	3.36	3.45	5.83
SR	0.66	−0.13	0.36	0.78	−0.09	0.43
R2000						
Mean	0.51	−0.79	1.30	0.35	−0.23	0.59
SD	4.44	4.07	7.32	3.37	3.03	5.67
SR	0.10	−0.14	0.17	0.08	−0.05	0.09
R3000						
Mean	4.71	−1.32	6.03	3.53	−0.91	4.44
SD	5.52	4.60	6.15	4.49	4.77	6.45
SR	0.86	−0.17	0.68	0.84	−0.14	0.57

Table 5
Yearly alphas investing in joiners before reconstitution

The table shows the alphas from a regression of yearly excess strategy returns on yearly index returns in excess of the risk-free rate $R_{f,t}$ in the period $t = 2004$ to 2020. The strategy is to invest in joiners before the reconstitution on the effective date either from the ranking or the announcement date. For the rest of the year the strategy invests in the relative benchmark index indexed with b. Panel A depicts the alphas of strategies build with equal weighing of joiners while Panel B uses value-weighing according to the relative size of joiners on the ranking date.

$$R_t - R_{f,t} = \alpha + \beta(R_{b,t} - R_{f,t}) + \epsilon_t$$

Standard errors are presented in parentheses. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient.

Panel A: Equal-weighted

	Rank to effective date			Announcement to effective date		
	Blend	Growth	Value	Blend	Growth	Value
R1000	2.67***	1.94***	0.74**	2.37***	2.00***	0.59**
	(0.70)	(0.42)	(0.53)	(0.63)	(0.45)	(0.48)
R2000	1.63**	1.59**	1.25**	0.72	0.36	1.08**
	(1.27)	(0.90)	(0.97)	(1.17)	(0.92)	(0.68)
R3000	3.59**	2.85***	2.03**	1.91**	1.65**	1.37**
	(1.57)	(0.90)	(0.88)	(1.21)	(0.62)	(0.48)

Panel B: Value-weighted

	Rank to effective date			Announcement to effective date		
	Blend	Growth	Value	Blend	Growth	Value
R1000	3.19***	1.80**	0.21	3.15***	1.72***	0.09
	(0.92)	(0.65)	(0.63)	(0.83)	(0.45)	(0.54)
R2000	0.33	0.87**	0.32	0.37	0.14	0.63**
	(1.12)	(0.80)	(0.77)	(0.96)	(0.72)	(0.56)
R3000	4.74***	1.78**	0.25	3.58**	1.49***	0.14
	(1.53)	(0.63)	(0.62)	(1.36)	(0.47)	(0.52)

Table 6
Panel regression

The table shows regression results in the daily panel data set of fund returns. Fund i's return on date t is calculated in excess of the risk free rate $R_{f,t}$ and regressed on benchmark b's returns and our index reconstitution strategy s' returns.

$$R_{i,t} - R_{f,t} = \alpha + \beta_b(R_{b,i,t} - R_{f,t}) + \beta_s(R_{s,i,t} - R_{f,t}) + \epsilon_{i,t}$$

The data set includes all mutual funds from Morningstar that report as a benchmark on of the 9 major Russell indices or that are assigned one of those indices by Morningstar as category benchmark. Both the benchmark return and the strategy return depend on the fund's assigned benchmark b and are thus also indexed with i. The used strategy returns are calculated with an equal-weighting of the respective event stocks. The time horizon is between 2007 and 2020 as for those years daily fund returns are available. We separate the time series in the business days between ranking date and announcement date and between announcement date and reconstitution date. Their average length per fund each year in the data set is 11.3 and 16.6 business days. Alphas are reported in percent and as the total alpha a fund has on average in the relative time period each year. Newey and West (1987) standard errors allowing for serial correlation up to 10 lags are presented in parentheses. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient which exception for β_b which is tested against one.

	Rank to announcement date				Announcement to effective date			
	Base	J	L	J–L	Base	J	L	J–L
α	0.18***	0.16***	0.19***	0.18***	0.05***	0.04***	0.05***	0.05***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
β_b	0.90***	0.86***	0.88***	0.89***	0.89***	0.86***	0.89***	0.89***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
β_s		0.03***	0.01***	−0.00**		0.03***	−0.00**	0.01***
		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)
$\bar{R}^2$	77.17	77.20	77.18	77.17	76.61	76.65	76.61	76.62

Table 7
Value added

The table summarizes regression results from individual daily fund return regressions. Each fund's alpha on date t is calculated as the part of the fund's return that is not explained by the benchmark and regressed on our index reconstitution strategy s' return of buying joiners.

$$\alpha_t = c + \beta_s(R_{s,t} - R_{f,t}) + \epsilon_t$$

The data set includes all mutual funds from Morningstar that report as a benchmark on of the 9 major Russell indices or that are assigned one of those indices by Morningstar as category benchmark. The used strategy returns are calculated with an equal weighting of the respective joining stocks. The time horizon is between 2007 and 2020 as for those years daily fund returns are available. We separate the time series in the business days between ranking date and announcement date and between announcement date and reconstitution date. We report results separately for active and passive mutual funds. We report the average alphas, betas and their standard errors. Alphas are reported in percent and as the total alpha a fund has on average in the relative time period each year. Value added is given in million USD, and we report both the total value added from active management as the part that we can associate to trading on index joiners. Standard errors from the cross-section of regression results are presented in parentheses. Lastly, we report the number of funds N.

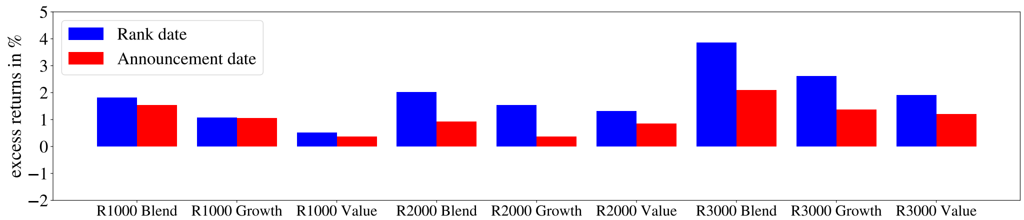
	Rank to announcement date		Announcement to effective date	
	Active	Passive	Active	Passive
β_b	0.85	0.93	0.85	0.93
	(0.00)	(0.01)	(0.00)	(0.01)
α	0.06	0.15	0.02	0.02
	(0.01)	(0.02)	(0.01)	(0.02)
β_s	0.02	0.02	0.02	0.02
	(0.00)	(0.00)	(0.00)	(0.00)
$\bar{R}^2$	3.95	6.44	3.41	5.01
	(0.16)	(0.37)	(0.13)	(0.31)
Value added	0.64	1.08	0.03	0.21
	(0.20)	(0.41)	(0.27)	(0.42)
Value added from joiners	0.16	−0.01	0.05	−0.06
	(0.04)	(0.05)	(0.06)	(0.08)
N	4,329	1,087	4,329	1,087

Table 8
Value added of funds that follow a strategy on index reconstitutions

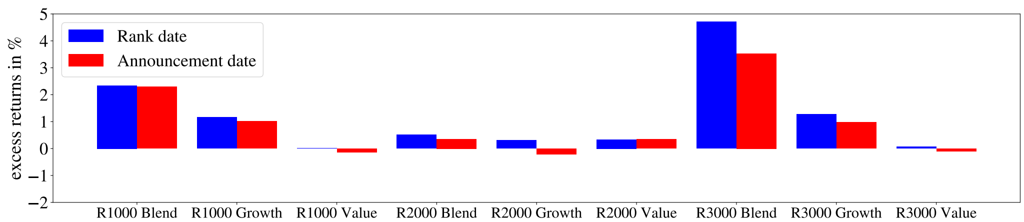
The table shows summary statistics of mutual fund groups. Column 1 shows the results for the full sample of active mutual funds. Group 1 in column 2 are funds that have a significant beta towards our trading strategy between ranking and announcement date. Group 2 in column 3 are those funds with a significant beta between announcement and effective date and funds in group 3 in column 4 have significant betas in both time periods. We consider a significance level of 10% for the cutoff. Panels A and B report the averaged regression results for the two time periods around the announcement of index changes. The full data set includes all active mutual funds from Morningstar that report as a benchmark on of the 9 major Russell indices or that are assigned one of those indices by Morningstar as category benchmark. The used strategy returns are calculated with an equal weighting of joiners. Alphas are reported in percent and as the total alpha a fund has on average in the relative time period each year. Value added is given in million USD, and we report both the total value added from active management as the part that we can associate to trading on index joiners. Standard errors are presented in parentheses. Lastly, we report N the number of funds in each group.

	Full sample	Group 1	Group 2	Group 3
Panel A: Rank to announcement date				
α	0.06	0.02	0.02	−0.01
	(0.01)	(0.02)	(0.02)	(0.03)
β_s	0.02	0.11	0.06	0.12
	(0.00)	(0.00)	(0.00)	(0.00)
$\bar{R}^2$	3.95	10.86	6.49	12.96
	(0.16)	(0.36)	(0.33)	(0.54)
Value added	0.64	0.25	0.57	0.33
	(0.20)	(0.25)	(0.35)	(0.46)
Value added by joiners	0.16	0.58	0.40	0.80
	(0.04)	(0.10)	(0.11)	(0.19)
Panel B: Announcement to effective date				
α	0.02	0.02	0.06	0.06
	(0.01)	(0.03)	(0.03)	(0.04)
β_s	0.02	0.05	0.09	0.10
	(0.00)	(0.00)	(0.00)	(0.00)
$\bar{R}^2$	3.41	5.71	8.47	10.16
	(0.13)	(0.29)	(0.28)	(0.44)
Value added	0.03	0.20	0.85	0.30
	(0.27)	(0.32)	(0.65)	(0.57)
Value added by joiners	0.05	0.15	0.28	0.29
	(0.06)	(0.18)	(0.19)	(0.33)
N	3,930	1,163	1,229	613

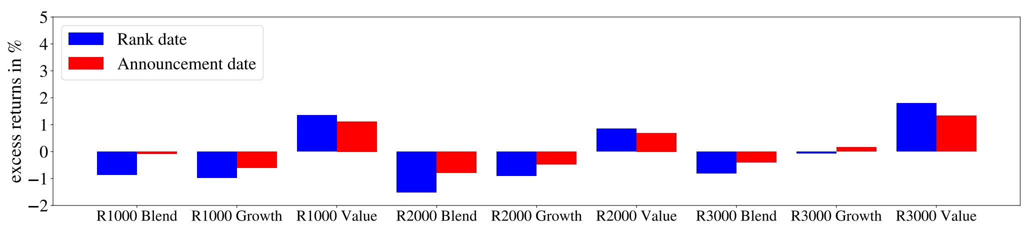
Figure 1: Average excess returns on Russell reconstitution portfolios



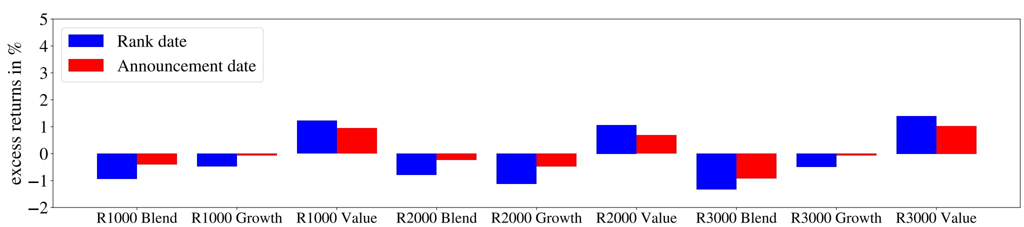
(a) Joiners equal-weighted



(b) Joiners value-weighted



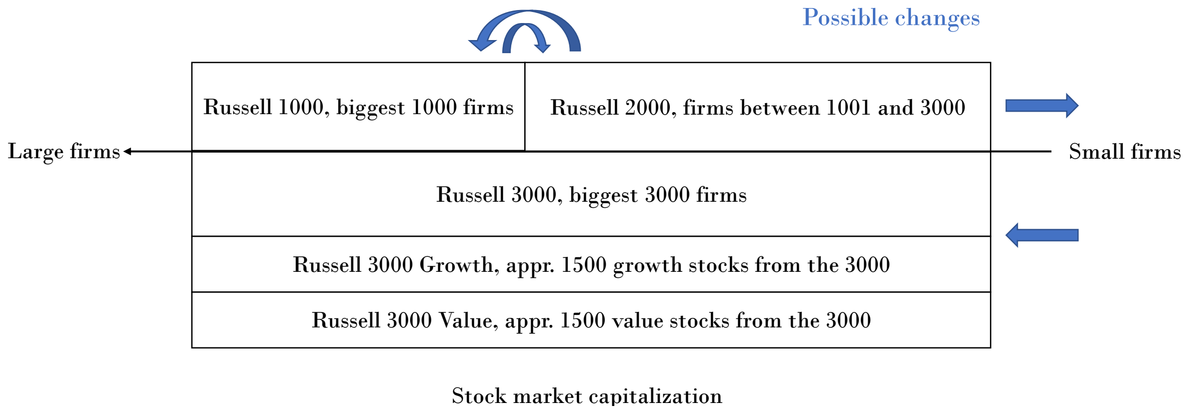
(c) Leavers equal-weighted



(d) Leavers value-weighted

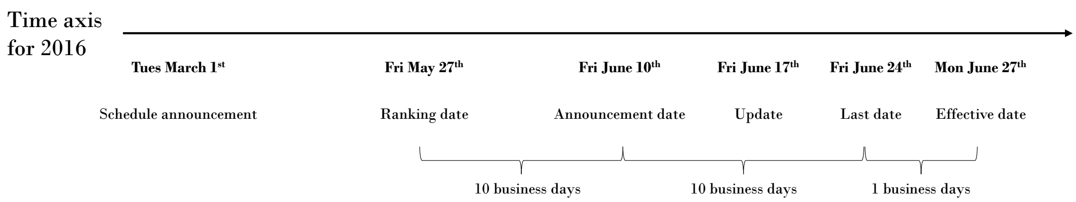
This figure depicts the average excess return an investor makes over and above the relative index when investing in index constituent changes each year. Blue bars symbolize the return an investor could make from investing from the ranking date, while red bars symbolize the average return from the announcement date. Panels (a) and (b) report returns for portfolios of index joiners, panels (c) and (d) report returns of index leavers. In panel (a) and (c) the strategy is using equal weights for the stocks and in panel (b) and (d) the stocks are weighted according to the stocks size on the ranking date.

Figure 2: Russell indices



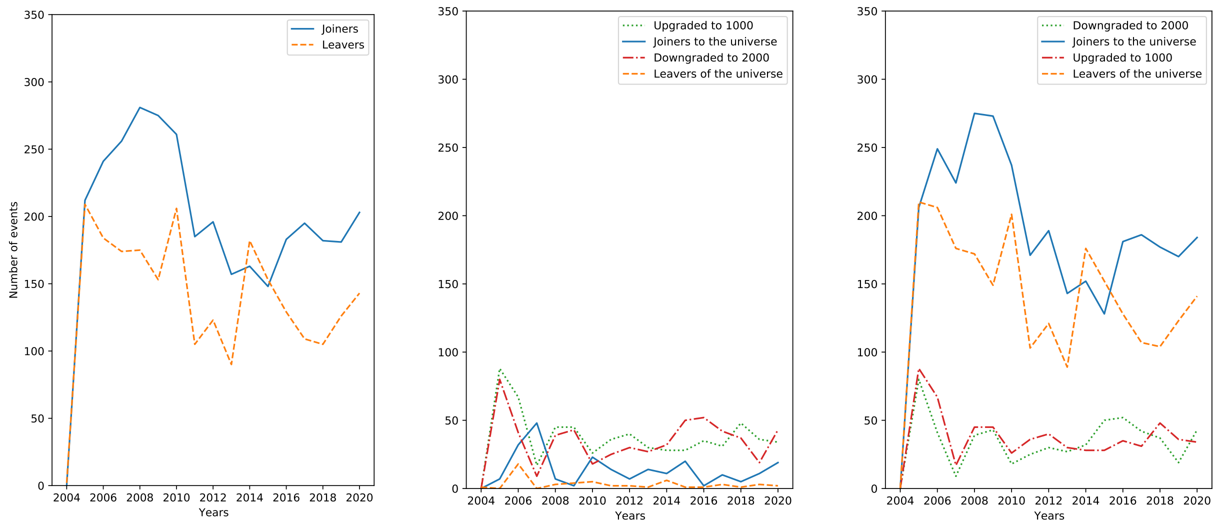
This figure depicts the Russell index relations of the main Russell indices and possible changes to constituents. The Russell 3000 is comprised of the largest 3000 stocks and then further divided into the Russell 1000 containing the largest 1000 stocks and the Russell 2000 which contains the next 2000 stocks. All three indices exist also as a value and growth index, though they do not contain exactly half of the respective stocks.

Figure 3: Russell reconstitution timeline



This figure depicts the Russell reconstitution schedule exemplary for the year 2016. The timeline each year starts with the announcement of the reconstitution schedule in March. All following dates are then public knowledge. On the ranking date Russell ranks all stocks to determine index changes. Only on the announcement date the new index constituent lists and index changes are made public. A week later Russell may publish updated index changes. After market closing on the last date the new index constituents and their weights are active and the index starts with the new weights on the effective date.

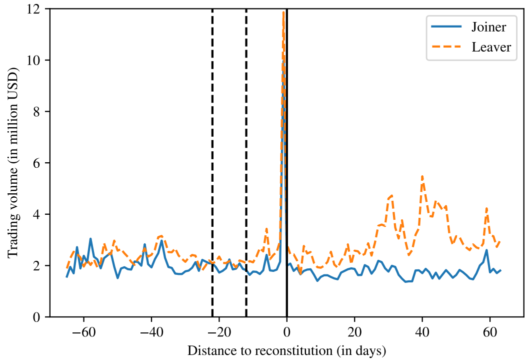
Figure 4: Russell index reconstitutions



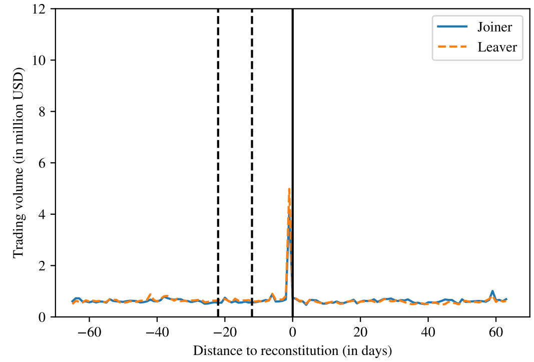
(a) Russell 3000 Blend **(b)** Russell 1000 Blend **(c)** Russell 2000 Blend

This figure depicts the yearly Russell index reconstitutions across time. The solid blue line shows the number of stocks that are included to the index and are new to the Russell universe of stocks. The dashed yellow line shows the stocks that are leaving the index and the universe of Russell securities in our study. The dotted green line shows the stocks that are upgraded from the Russell 2000 to the Russell 1000. They are thus leavers in the Russell 2000 and joiners in the Russell 1000. The dash-dotted red line shows vice versa the number of stocks that are downgraded from the Russell 1000 to the Russell 2000.

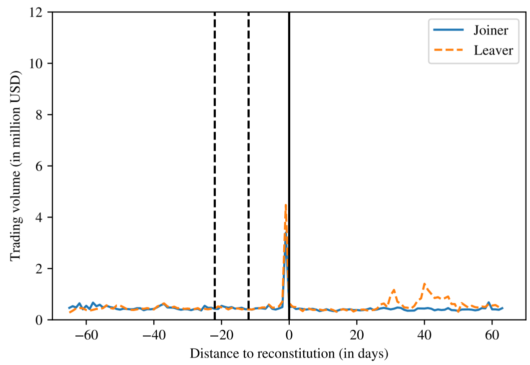
Figure 5: Average daily trading volume of event stocks around reconstitution



(a) Russell 1000 Blend



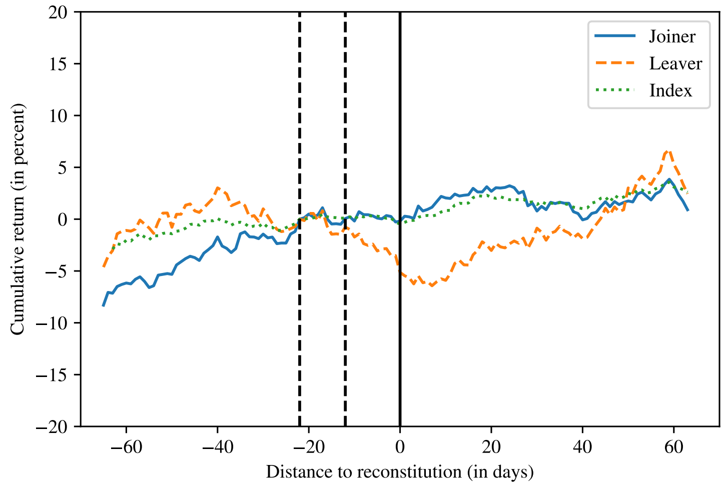
(b) Russell 2000 Blend



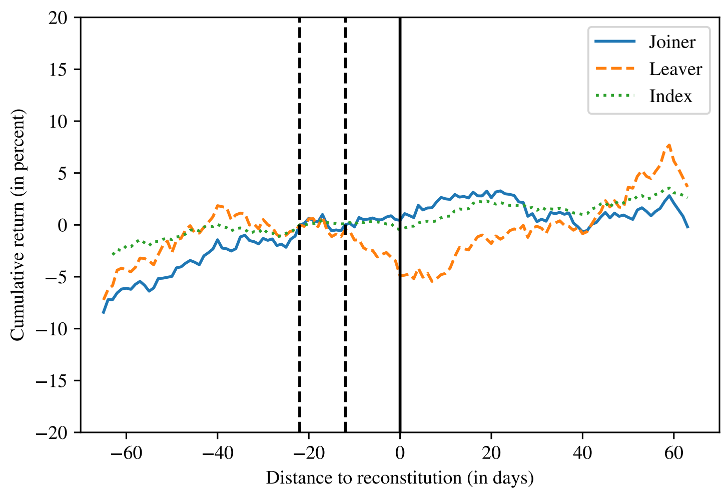
(c) Russell 3000 Blend

This figure depicts the average daily trading volume of joining and leaving stocks of the respective index in million USD around the reconstitution. The solid blue line symbolizes joining stocks and the dashed yellow line leaving stocks. Panels (a) reports the results for the Russell 1000 Blend, panel (b) the ones for the Russell 2000 Blend and (c) the results for the Russell 3000 Blend. The vertical solid black line marks the reconstitution date, the two vertical dashed lines mark the ranking and the announcement date. They lie 21 and 11 business days before the reconstitution. The data stems from the years 2005 and 2008 to 2016, as in these years the reconstitution schedule was equally long.

Figure 6: Cumulative returns of reconstitution portfolios for Russell 1000



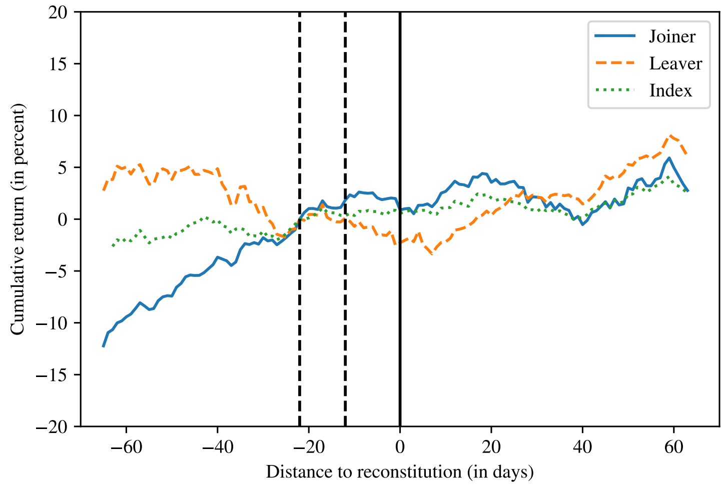
(a) Average equal-weighted portfolio returns



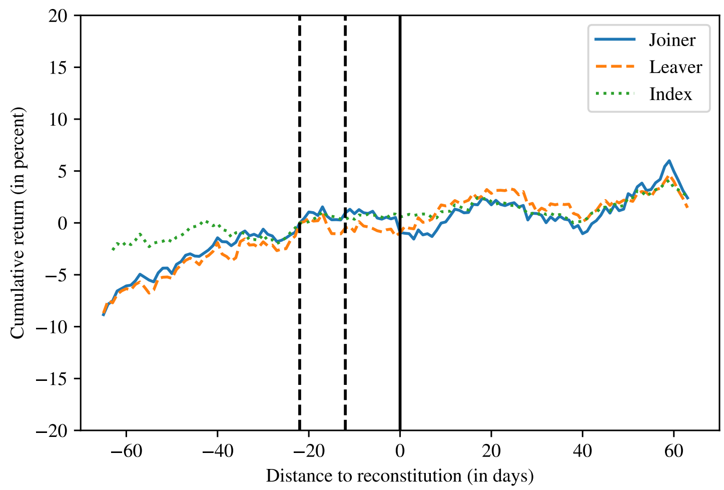
(b) Average value-weighted portfolio returns

This figure depicts the average daily cumulative return on portfolios investing in joining or leaving stocks for the Russell 1000 Blend. Returns are normalized to zero on the ranking date. The solid blue line symbolizes portfolios of joining stocks and the dashed yellow line the one of leaving stocks. Panel (a) reports the results for an equal weighting of event stocks each year and panel (b) the results for a value-weighted portfolio. The weights are relative to the stock's stock market capitalization on the ranking date and are fixed over the horizon each year. The vertical solid black line marks the reconstitution date, the two dashed lines mark the ranking and the announcement date. They lie 21 and 11 business days before the reconstitution. The data stems from the years 2005 and 2008 to 2016, as in these years the reconstitution schedule was equally long.

Figure 7: Cumulative returns of reconstitution portfolios for Russell 2000



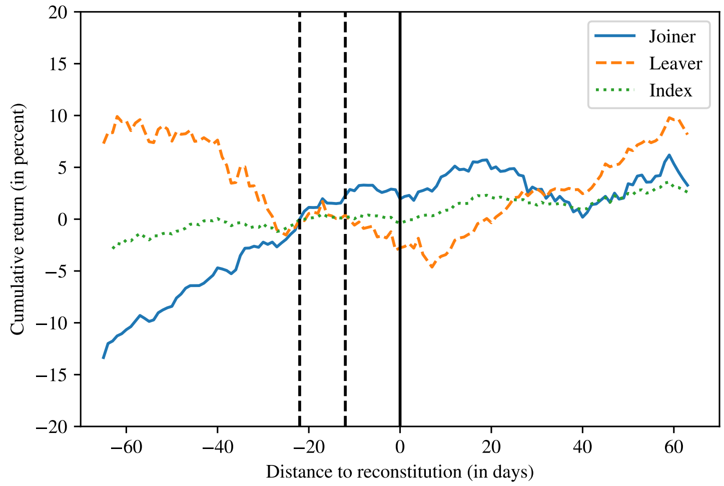
(a) Average equal-weighted portfolio returns



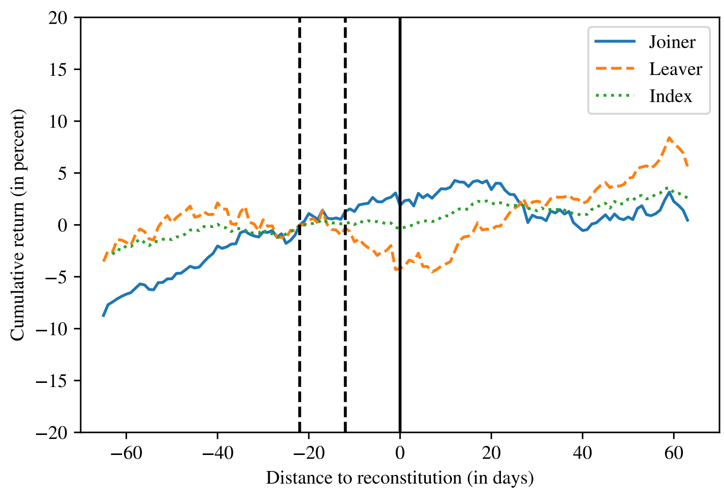
(b) Average value-weighted portfolio returns

This figure depicts the average daily cumulative return on portfolios investing in joining or leaving stocks for the Russell 2000 Blend. Returns are normalized to zero on the ranking date. The solid blue line symbolizes portfolios of joining stocks and the dashed yellow line the one of leaving stocks. Panel (a) reports the results for an equal weighting of event stocks each year and panel (b) the results for a value-weighted portfolio. The weights are relative to the stock's stock market capitalization on the ranking date and are fixed over the horizon each year. The vertical solid black line marks the reconstitution date, the two dashed lines mark the ranking and the announcement date. They lie 21 and 11 business days before the reconstitution. The data stems from the years 2005 and 2008 to 2016, as in these years the reconstitution schedule was equally long.

Figure 8: Cumulative returns of reconstitution portfolios for Russell 3000



(a) Average equal-weighted portfolio returns



(b) Average value-weighted portfolio returns

This figure depicts the average daily cumulative return on portfolios investing in joining or leaving stocks for the Russell 3000 Blend. Returns are normalized to zero on the ranking date. The solid blue line symbolizes portfolios of joining stocks and the dashed yellow line the one of leaving stocks. Panel (a) reports the results for an equal weighting of event stocks each year and panel (b) the results for a value-weighted portfolio. The weights are relative to the stock's stock market capitalization on the ranking date and are fixed over the horizon each year. The vertical solid black line marks the reconstitution date, the two dashed lines mark the ranking and the announcement date. They lie 21 and 11 business days before the reconstitution. The data stems from the years 2005 and 2008 to 2016, as in these years the reconstitution schedule was equally long.