Box Jumping: Portfolio Recompositions to Achieve Higher Morningstar Ratings*

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Abstract

We show a novel mechanism by which mutual fund managers strategically alter their portfolios to take advantage of investors' reliance on Morningstar star ratings. Specifically, funds achieve higher ratings by changing their holdings to induce Morningstar to reclassify them into size/value style boxes with lower average performance, thereby enabling more favorable peer comparison. This practice, which we term 'box jumping,' attracts fund flows and higher fees, despite sacrificing return performance and the ratings upgrades reversing within three years on average. These patterns emerge after 2002 when Morningstar ratings began to be based on relative performance within style boxes, and are predictably absent beforehand. We also show that pervasive box jumping creates negative spillover effects on other funds. Together, our findings highlight portfolio recomposition as a novel and strategic lever that funds use to manipulate Morningstar ratings, and the trend of box jumping by funds despite compromising future returns due to investors' fixation on ratings when allocating capital.

Keywords: Strategic behavior, mutual fund benchmarks, performance management, investor protection, Morningstar

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1 Introduction

Delegated portfolio management is the predominant—and still growing—form of stock market participation in the United States (Federal Reserve, 2022; ICI, 2024). Therefore, the way capital is allocated to fund managers is of first-order importance in asset pricing. A stylized fact is that investor flows respond convexly to past performance (Berk and Green, 2004), creating incentives for funds to boost perceived returns. To mitigate excessive risk-taking for higher raw return and protect investors from misleading information, the SEC mandates that mutual funds disclose performance benchmarks (SEC, 1993). However, prior studies find that funds often choose these self-declared benchmarks strategically so as to inflate their perceived past performance (Sensoy, 2009; Mullally and Rossi, 2024). A natural alternative is to rely on benchmarks assigned by independent information intermediaries. For example, Morningstar—a leading intermediary—classifies U.S. equity funds into one of nine style categories based on fund holdings and then uses these peer-based benchmarks to rate the funds. This process is transparent and standardized, and it is commonly used in the literature to assess the validity of self-declared benchmarks (Sensoy, 2009; Chen et al., 2025). However, we provide novel evidence that the Morningstar-assigned benchmark can create another strategic behavior. We show that mutual funds strategically adjust their portfolios so that Morningstar reassigns them to more favorable benchmarks, ultimately resulting in higher ratings.

Morningstar assigns a star rating to a given fund based on how its historical return performance compares relative to other funds with which it is grouped. Morningstar groups funds based on the size- and value-profiles of the securities they hold, which results in each fund being assigned to one of nine style boxes (see section 2 for details). A fund's assignment to a specific style box is not permanent. Morningstar commonly reassigns funds in response to changes in their holdings. Moreover, when a fund is reassigned to a new category—a process we refer to as 'box jumping'—Morningstar immediately begins to compare the fund's historical performance against other funds in its newly assigned style box.

Our central hypothesis is that actively-managed funds—with full knowledge that Morningstar compares them against their endogenously chosen box-peers—take advantage of this by jumping boxes to achieve higher Morningstar ratings. Our hypothesis is based on the idea that, all else equal, box jumping is attractive if it results in a fund being compared to funds with worse historical returns. Thus, funds are incentivized to change their holdings to induce Morningstar to reclassify them into style boxes with worse average performance. However, a fund's incentive to box jump is curtailed by the threat of potentially lower investment returns, driven by buying assets that facilitate box jumping but are unrelated or even detrimental to future performance. Additionally, if a fund's investors prefer to remain within a specific style box, the fund risks capital outflows if Morningstar reassigns it.

To illustrate our approach, consider the case of Goldman Sachs U.S. Equity ESG A (ticker: GAGVX). This fund was categorized as a large growth fund from December 2012 until May 2021, when it box jumped to the large blend category (refer to Appendix B for visual illustrations). Despite a slight decline in its three-year trailing returns—from 14.5% in April 2021 to 14.2% in May 2021—the fund's three-year Morningstar rating increased from three stars to five stars due to its new comparison group, which had worse historical returns. Following the rating upgrade, the fund experienced significant benefits. Notably, it shifted from experiencing outflows to inflows, receiving approximately 1% of inflow per month in the six months after the box jump, compared to monthly outflows of –0.4% in the preceding six months. However, to facilitate box jumping, the fund increased its exposure to value stocks, which underperformed in the following quarter compared to the growth stocks in its portfolio. The upgraded ratings also proved transitory, with the fund's three-year rating reverting back to three stars in less than a year. Lastly, the reclassification of Goldman Sachs U.S. Equity ESG into the large blend category led to a downgrade of the Hartford Core Equity A Fund, pushing its three-year rating from five stars to four. In this paper, we show that this case study is emblematic of a broader pattern across a substantial fraction of

U.S. mutual funds.

Our main sample focuses on active U.S. equity mutual funds covered by Morningstar from 1997 to 2007. We focus on this specific period because Morningstar ratings began to be based on relative performance within style boxes in the third quarter of 2002. Prior to this reform, Morningstar did not use style boxes to determine ratings. Instead, ratings were based on relative performance within each broad asset category (e.g., equity vs. bonds), which did not create incentives for funds to box jump.[1] Thus, we conduct difference-in-difference regressions in the five years before and after the 2002 ratings reform, which provide a cleaner, more focused setting to rule out alternative explanations for our findings. In later tests, we also show that our evidence of funds box jumping for higher ratings remains economically and statistically robust in more recent years.

We first show that box jumping is common, occurring in approximately 9% of the funds in our sample each year, with 24% of funds and 37% of fund managers having experienced at least one box jump between 1997 and 2007. Importantly, funds are more than twice as likely ($t = 7.04$) to receive a rating upgrade than a downgrade as a result of moving to a new style box. This evidence casts significant doubt on the notion that box jumping occurs randomly. Additionally, this strong asymmetry toward receiving an upgrade only emerges after Morningstar changed its rating system in 2002 and is predictably absent beforehand. Specifically, while only 6% of funds received rating upgrades when they changed boxes before 2002, this figure rises to 48% after 2002. To sharpen these inferences, we also use difference-in-differences regressions surrounding the 2002 reform with fund and quarter-fixed effects. These effects are economically large: funds on average receive an upgrade of 0.37 higher star ratings and a 9.39 higher percentile ranking when box jumping.

We next document that funds change their holdings in a predictable fashion based on *ex ante* incentives to box jump. We do so by identifying fund-quarters where funds face higher incentives to box jump (IBJ), denoted as high IBJ funds, which reflect cases where a fund is

[1] Morningstar suspends ratings for mutual funds that change asset categories (Morningstar, 2021).

near the border of a neighboring style box in which the fund would receive a ratings upgrade. Being near the border of a worse-performing style box is important because we expect that a fund would want to box jump for higher ratings, but would be dissuaded if box jumping required too radical a change to its current investment style. Conversely, if a fund is near the border of a box where it would receive worse ratings, it would face lower incentives to box jump (labeled as low IBJ funds).

We show that high IBJ funds engage in style drift by changing the profile of their holdings. They do so by accumulating atypical positions that resemble a neighboring style box with lower returns. In these tests, we take advantage of Morningstar's transparent process for assigning funds to style boxes, assigning size and value scores to all stocks, which are then aggregated into a single style score for each fund.[2] By using these numerical scores, we show that high IBJ funds accumulate positions that are atypical in terms of both size and value relative to their current style box, but that pull funds specifically in the direction of underperforming neighboring style boxes. Moreover, this effect is predictably symmetric: funds also change their holdings to retreat away from neighboring style boxes in cases where being moved to that style box would result in a ratings downgrade. Consistent with funds box jumping based on rating incentives, we show that high IBJ funds are about four times more likely to box jump within the subsequent three years compared to low IBJ funds, after controlling for fund characteristics.

In cross-sectional tests, we show that our main findings vary intuitively with proxies for managers' willingness and ability to box jump. For example, fund managers are more likely to engage in box jumping when they have done so previously and when they have more fund managing experience. Conversely, funds are less likely to box jump if neighboring style boxes are populated by incumbent funds from the same fund family, if their names imply specific style boxes (e.g., Fidelity Small Cap Growth Fund), or if the current style box has higher box-aggregated fund flows than neighboring boxes. Lastly, funds that underperformed

[2]This style score is available to all subscribers of Morningstar Direct.

relative to their box peers or family peers are more likely to box jump. These findings point to the role of incentives and opportunities in driving our main results, which provides more supportive evidence for the mechanism of our findings.

Box jumping is attractive because Morningstar rating upgrades achieved through box jumping spur significant fund inflows, totaling about 6.7% of assets under management in the 12 months following the box jump. The flow response to a ratings upgrade driven by box jumping is economically and statistically indistinguishable from the flow response to a ratings upgrade a fund receives while staying within its historical style box (i.e., when not box jumping). This evidence suggests that investors fixate on ratings when allocating capital (Ben-David et al., 2022b) and do not sufficiently distinguish between upgrades earned through better performance versus those earned through box jumping.

Box jumping funds also take advantage by charging investors higher management fees. On average, box jumping funds that receive a rating upgrade raise management fees by approximately 5% of the average fee in our sample. These findings suggest that funds not only benefit from added assets under management when successfully jumping boxes, but they also charge more for every dollar of money that they manage. Using a simple back-of-the-envelope calculation, we estimate that funds receive an additional $1.05 million in fee revenues per year on average for rating upgrades received when box jumping, representing about a 12% increase in their annual fee.

The inflows and higher fees we document are particularly surprising because funds appear to sacrifice return performance when box jumping. This is potentially driven by specialized fund managers moving away from their investment expertise when they begin to invest in new styles of stocks (Kacperczyk et al., 2005; Brown et al., 2009). We conduct these tests by flagging high IBJ funds that build atypical positions in the direction of more favorable style boxes. The atypical stocks that these flagged funds purchase underperform in the following quarter by approximately 88bps on average compared to other stocks that the fund holds. In contrast, stocks bought by these same flagged funds that do not appear connected to box jumping generate higher returns compared to other stocks the fund holds. Moreover, the same trend happens in reverse when these funds sell stocks. In aggregate, these flagged funds sacrifice approximately 21bps of quarterly return performance in the subsequent quarter in raw returns or CAPM excess returns, after fund and quarter fixed effects. In annual terms, this represents about an 84bps decrease in CAPM excess returns, which is substantial given that the average standard deviation within each box-quarter is 3.53%. Moreover, comparatively, five-star funds that receive their upgrades through box jumping underperform five-star upgraded funds which do not by roughly 8 percentage points (t = -2.23) over the following five years.

We also show that ratings upgrades driven by box jumping are transitory. While funds receive an immediate ratings upgrade upon box jumping, the upgrade is completely reversed within three years. This evidence aligns closely with our finding of high IBJ funds sacrificing investment returns and mitigates concerns that fund managers move style boxes to capitalize on a comparative advantage in stock selection within the new style box. Moreover, this evidence underscores that investors who reallocate capital toward funds that box jump are not compensated with higher long-term payoffs in terms of better-managed funds. Fund flows only gradually reflect these patterns, which provide greater revenues to box jumping funds in the interim period.

Finally, we show that pervasive box jumping creates spillover effects on other funds. Intuitively, this occurs because Morningstar assigns ratings based on relative performance, and box jumping funds alter the distribution of fund performance represented within a given style box. The movement of high IBJ funds into a new style box leads to ratings downgrades for existing funds in that style box. We show that the proportion of flagged funds jumping to a new box predicts rating downgrades of these existing funds for up to three quarters.

A central contribution of our study is to document a novel mechanism through which actively managed mutual funds strategically boost their perceived past performance at the expense of lower future returns. Whereas early work on excessive risk-taking by mutual funds (e.g., Brown et al., 1996; Chevalier and Ellison, 1997) focuses on managers' efforts to influence future returns, our paper shows that funds also inflate their historical performance by shifting into more favorable peer groups. Prior studies examine how funds strategically select or disclose self-declared benchmarks (Sensoy, 2009; Chen et al., 2021; Mullally and Rossi, 2024; Chen et al., 2025), and we extend this literature by introducing a new channel: real changes to portfolio holdings that induce reassignment to a better-performing benchmark group. Such portfolio adjustments can be more costly than simply altering a disclosed benchmark, because they often involve sacrificing future performance when funds move away from their areas of expertise. This is especially important given recent evidence that Morningstar ratings are the strongest driver of flows among mutual funds (Ben-David et al., 2022b).

More broadly, our findings illustrate that even independent and transparent information intermediaries can induce strategic behavior by market participants. Information intermediaries, such as Morningstar, were introduced to help investors navigate the complexities and strategic behaviors of mutual funds by providing standardized ratings and benchmarks. However, our findings show that while intermediaries offer transparency, they do not fully eliminate strategic behaviors. Instead, the locus of manipulation has merely shifted to different forms. As markets and financial products become increasingly complex, investors will likely rely more on intermediaries—but these intermediaries can incentivize new forms of manipulation.

2 Institutional Details and Data

2.1 Morningstar Rating and Category

Morningstar provides various types of ratings to mutual funds, such as star performance ratings, analyst ratings, and sustainability ratings. Among these, the star rating (hereafter "rating") is designed to evaluate a fund's past investment performance and has the longest history. Morningstar publicly discloses the details of how star ratings are measured. It starts with calculating monthly risk-adjusted returns using its own methodology, which transforms monthly total returns to penalize volatility but does not incorporate any standard risk factors (Morningstar, 2021). Morningstar accumulates monthly risk-adjusted returns over the past three, five, and 10 years. Morningstar then ranks the funds' returns relative to other funds in the same category.[3]

In 2002, Morningstar began rating funds based on their trailing returns relative to peer funds within the same size/value style box (Morningstar, 2020a). Prior to 2002, ratings were assigned based on relative performance within each asset category (e.g., equity vs. bonds). For each three-, five-, and 10-year ranking, Morningstar assigns three-, five-, and 10-year star ratings based on the following distribution:

- Funds in the top 10% in each category receive 5-star ratings.
- Funds in the next 22.5% receive 4-star ratings.
- Funds in the next 35% receive 3-star ratings.
- Funds in the next 22.5% receive 2-star ratings.
- Funds in the bottom 10% receive 1-star ratings.

Morningstar creates an overall star rating for a fund using a weighted average of the three star ratings that the fund receives for the three-, five-, and 10-year horizons. If all three ratings are available, the overall rating is the result of rounding $0.5 \times$ 10-year rating $+$ $0.3 \times$ five-year rating $+$ $0.2 \times$ three-year rating. If the fund is less than 10 years old and only three- and five-year ratings are available, the overall rating is the result of rounding $0.6 \times$ five-year rating $+$ $0.4 \times$ three-year rating. If only the three-year rating is available, the overall rating is the three-year rating.[4]

[3]Morningstar rates funds based on individual share class performance, as each share class may have unique fees and available return periods. When determining the distribution of performance ratings, Morningstar assigns fractional rankings for funds offering multiple share classes. This method helps avoid the overrepresentation of these multishare funds in the overall performance distribution. Refer to Morningstar (2016) for details.

[4]From 2002 to 2016, Morningstar adjusted the weighting in overall rating calculations for funds that box jumped. However, this adjustment rarely altered a fund's overall rating, and Morningstar discontinued this in 2016. In our main sample period, this adjustment affected overall ratings in only about 2% of fund-months following a box jump.

The most relevant feature of star ratings to this study is that the peer group Morningstar uses to determine ratings is solely based on the fund's currently assigned style box. For example, if a fund changes style boxes from mid-growth to large-growth in May 2024, the June 2024 star rating will be calculated by comparing the fund's past performance—while it was in the mid-growth box—against the past performance of other large-growth funds. This feature can incentivize funds to strategically jump across style boxes to be compared against peers with poorer past performance, thus receiving better star ratings.

We focus on U.S. equity categories within Morningstar U.S. mutual fund categories, where most U.S. equity funds are classified into one of nine categories based on the Morningstar Style Box Methodology (Morningstar, 2020b).[5] It first assigns two scores to each stock: a size score and a value-growth score. The size score is the vertical axis of the style box, which is based on market capitalization. The value-growth score is the horizontal axis of the style box, which is based on various valuation ratios and growth measures. Both scores are scaled to be roughly 150 on average. Each score is then value-weighted for each fund, with the weight being the fraction of the fund's stock assets held in each stock.

Funds are classified into one of the three-by-three style boxes based on the three-year trailing average of their size and value scores. Specifically, a fund with a size score below 100 is classified as a small-cap fund, between 100 and 200 as a mid-cap fund, and over 200 as a large-cap fund. Similarly, a fund with a value-growth score below 125 is classified as a value fund, between 125 and 175 as a blend fund, and over 175 as a growth fund. The combination of the two scores determines the style box of the fund (e.g., large growth, small blend). Morningstar reviews category assignments semi-annually and reassigns categories based on these scores. Morningstar may overrule score-based reassignments using contextual information, though such overruling is uncommon.

Some prior studies examine Morningstar star ratings and categories. Del Guercio and Tkac (2008) find that changes in Morningstar star ratings are positively associated with

[5]Other categories may invest in U.S. equities but are categorized as *Sector Equity* or *Allocation*.

fund flow, even after controlling for performance. Reuter and Zitzewitz (2021) further show a significant discontinuity in flow between bottom five-star-rated funds and top four-star-rated funds. Importantly, Ben-David et al. (2022b) find that Morningstar rating is the strongest determinant that explains the cross section of fund flows. While Huang et al. (2020) suggest a model in which investors rationally track ratings and deploy capital, empirical evidence in Ben-David et al. (2022a) and Evans and Sun (2021) indicates that investors heuristically rely on simple signals. There are limited prior studies of funds changing their Morningstar categories. An exception is Fang et al. (2021), who show that changes in category attract flow but do not improve ratings on average. The crucial difference between Fang et al. (2021) and this paper is that this paper focuses on changes within nine categories of U.S. equity funds, while Fang et al. (2021) analyze sector equity and allocation funds, which incur significant costs to change categories, in addition to U.S. equity funds.[6]

We expect that fund managers weigh the costs and benefits of strategic box jumping. The benefit is receiving a favorable rating in the new category, thereby attracting increased fund flows and fee revenues. However, changing a portfolio style exposure may involve buying or selling stocks that are unrelated or detrimental to future returns, leading to lower fund performance and reduced compensation for fund managers (Ma et al., 2019). In addition, lower performance can indirectly affect compensation through lower flows in the longer term. Thus, ex ante, it is unclear whether and when fund managers will choose to strategically change categories. Our main tests explore the balance of these competing factors by studying fund managers' actions and their implications for ratings, returns, and fund compensation.

2.2 Data Source and Sample Selection

Our initial sample of mutual funds comes from Morningstar Direct. We begin with mutual funds (open-ended funds) in the "Equity" Global Broad Category Group and in the "US Equity" US Category Group. We include dead funds to avoid survivorship bias. The

[6]Sector equity funds refer to funds investing in specific sectors such as the technology sector, and allocation funds refer to funds that mix equity and other asset classes.

main sample spans from 1997, a year after the introduction of the Morningstar Category classifications (Morningstar, 2020a), to 2007, providing a symmetric window surrounding the Morningstar rating reform of 2002.[7] We merge this with mutual fund characteristics from the CRSP mutual fund data using the matching table provided by Pástor et al. (2020), complemented by CUSIP. Then we follow Barber et al. (2016) and aggregate share class-level variables at the fund level by TNA-weighting (Total Net Assets) different share classes. Finally, we merge aggregated fund-level data with Thomson Reuters' S12 fund holdings data.

From our sample of mutual funds, we filter out passive funds to focus on actively managed funds. To flag index funds, we follow prior studies by identifying index funds based on specific strings in fund names or when the CRSP Mutual Fund Database classifies the fund as an index fund (Iliev and Lowry, 2015; Appel et al., 2016; Dannhauser and Pontiff, 2019).[8] We then exclude observations lacking style box allocations.

3 Main Findings

3.1 Box Jumping and Rating Changes

We begin by providing descriptive statistics on box jumping. Figure 1 shows that about 24% of funds experienced one box jump during the sample period, and about 4% of funds experienced two, suggesting that box jumping is common in our sample. Similarly, over a third of the fund managers (roughly 37%) during the sample period experienced box jumping during their tenure. This is supplemented by the evidence in Column (4) of Panel A of Table 1, which shows that 9.01% of funds box jump each year on average during our sample period.

Column (5) of Table 1 reports the mean rating changes associated with box jumping. Rating changes are measured from $m-1$ to m, where m represents the first month in

[7] We run robustness tests for a longer period, until 2022.

[8] Index funds are flagged if the fund name contains the strings SP, DOW, Dow, or DJ, or if the lower-case version of the CRSP fund name contains index, idx, indx, ind˙ (˙indicates space), composite, russell, s&p, s & p, s and p, sandp, msci, bloomberg, kbw, nasdaq, nyse, stoxx, ftse, wilshire, morningstar, 100, 400, 500, 600, 900, 1000, 1500, 2000, 3000, or 5000.

the new style box. If box jumps are not driven by incentives for favorable ratings, rating changes associated with box jumps would be randomly distributed around zero. Conversely, if funds strategically change style boxes to secure rating upgrades, we would expect to see predominantly positive rating changes following the box jump. The results in Table 1 show that before 2002, the mean rating change associated with box jumping is economically small and insignificant, and it oscillates between negative and positive. In sharp contrast, it becomes consistently positive, large, and statistically significant right after the box jump to the new boxes post-2002. The average of rating changes in pre- and post-June 2002 confirms this finding. Column (6) reports the probability of funds getting a rating upgrade when they jump boxes.[9] The probability of being upgraded by box jumping is around 6% before the 2002 reform but increased to nearly 50% following the reform. Conversely, the probability of being downgraded after box jumping is about 21% in the post period (Column (7)), suggesting that funds are more than twice as likely to get rating upgrades as they are to get downgrades, and this is only so in the post period.[10] Panel B of Table 1 shows that this trend in the post period continues into the recent sample period as well, especially more so in recent years.

Next, we examine this trend in regressions with fund and year-quarter fixed effects at the fund-quarter level.[11] Table 2 reports regression results of the following model:

$$\begin{aligned}\Delta Rating_{i,q} = &\beta_1 BoxJump_{i,q} + \beta_2 BoxJump_{i,q} \times Post_q \\ &+ \Gamma Controls_{i,q} + FundFE + QuarterFE + \epsilon_{i,q},\end{aligned} \tag{1}$$

[9] We round rating changes to the nearest integer to minimize noise from minor fractional changes in security classes. Therefore, Column (6) reports the probability of rating changes to be larger than or equal to 0.5.

[10] To provide more precise benchmarks, we recalculate the values in columns (5) and (6) for the pre-period, assuming that funds are rated under the reformed system—that is, relative to peers within the same boxes. These benchmark values are reported in parentheses in columns (5) and (6). On average, the probability of a pre-period box-jumping fund receiving an upgrade under the reformed system is 26.86%, while the probability of a downgrade is 35.57%. Even relative to these adjusted benchmarks, we find that the probability of upgrades for box-jumping funds increases following the ratings reform, whereas the probability of downgrades decreases.

[11] We report quarterly regressions for the consistency of this result with other results. However, the monthly regression results yield similar results.

in which $\Delta Rating_{i,q}$ is the quarterly change in fund star rating. *BoxJump* equals 1 if the fund's style box changed relative to the prior quarter. Our control variables include net asset value, expense ratio, turnover ratio, number of stock holdings, and fund age, following Mullally and Rossi (2024). We also run this regression with three alternative outcome variables: the quarterly change in a fund's ranking;[12] an indicator variable which is 1 if the fund received a rating upgrade compared to the previous quarter; and an indicator variable which is 1 if the fund received a rating downgrade compared to the previous quarter. Standard errors are clustered by fund and quarter.

The first two columns of Table 2 show a significantly positive coefficient on $BoxJump \times Post$, which indicates that funds tend to receive rating upgrades when they change style boxes and more so after the 2002 reform. In Column (1), the coefficient on $BoxJump \times Post$ is 0.369 ($t = 4.34$), corresponding to an upgrade of 0.369 ratings on average when they change style boxes.

The results are very similar for quarterly changes in funds rankings (Column (2)). In Column (3), we examine the change in the likelihood of box jumping funds receiving rating upgrades. The coefficient on $BoxJump \times Post$ is 0.398 ($t = 11.03$), corresponding to a 39.8 percentage point increase in the likelihood of getting rating upgrades when funds box jump after the Morningstar rating reform. No significant coefficient on *BoxJump*—which measures the probability of a box jump corresponding to a ratings upgrade in the pre-reform period—confirms that this effect is likely driven by box jumping incentives, present only post-reform. Column (4) suggests that funds are more likely to get rating downgrades as well when they box jump in the post period. This is mechanical, given that box jumping changes ratings only after the 2002 rating reform. Nevertheless, the increase in the probability of getting an upgrade is 3.7 times higher than that of getting a downgrade, with the coefficients being highly statistically distinct. This result echoes the results in Columns (1) and (2).

Figure 2 illustrates the distribution of rating changes associated with box jumping be-

[12] Higher numeric values in *Ranking* correspond to higher ratings, which is the reverse of the *Rank* metric used in Morningstar Direct, where lower values signify higher ratings.

tween the third quarter of 2002 and the fourth quarter of 2007, presented as a percentage of the total box jumping occurrences. The most frequent rating change associated with box jumping is from three to four stars, which is consistent with the evidence in Ben-David et al. (2022a) that fund flows are net positive for funds with at least four stars and negative otherwise. Regardless of their initial ratings, funds are more likely to experience an upgrade rather than a downgrade following a box jump.

3.2 Box Jumping Incentives and Style Drift

In this section, we provide evidence that box jumping is driven by funds strategically changing their portfolios toward style boxes that will result in higher ratings. Our main variables of interest relate to funds' ex ante incentives and their ex post behavior.

Ex Ante Incentives To measure the incentives of the funds, we define $HighIBJ$, which is an indicator variable for funds with high incentives to box jump, and $LowIBJ$, which is an indicator variable for funds with low incentives to box jump. To construct these variables, we rely on the size-and-value style exposure of mutual fund holdings. Specifically, we use summary measures of size and value exposure of holdings (i.e., the holdings-weighted average of each stock's size and value score) in Morningstar Direct: *SizeScore* and *ValueScore*, respectively (refer to section 2 for details).[13] Before 2000, when *SizeScore* and *ValueScore* are sparsely recorded, we closely follow the Morningstar methodology and prior literature (Morningstar, 2020b; Schadler and Eakins, 2001) to manually construct these variables and fill in the gaps in our early sample period. We then calculate *SizeGrid* and *ValueGrid*, which Morningstar uses to determine the fund's box (i.e., category) allocations. Specifically, they

[13] In Morningstar Direct, these variable names are *raw size score* and *raw value-growth score*, respectively.

are the three-year trailing average of *SizeScore* and *ValueScore*:

$$SizeGrid_{i,q} = \sum_{\tau=0}^{11} SizeScore_{i,q-\tau}, \tag{2}$$
$$ValueGrid_{i,q} = \sum_{\tau=0}^{11} ValueScore_{i,q-\tau},$$

for given fund i in quarter q.

Using *SizeGrid* and *ValueGrid*, we create indicator variables that flag funds on the border of an adjacent style box. *Border_size* equals 1 if *SizeGrid* is within the threshold of style box borders, and *Border_value* is defined analogously for *ValueGrid*. We set the threshold of being on the border to be 20% of the bandwidth of the middle box for each dimension, considering the trade-offs between box jumping incentives and the number of treatment observations.[14] This process codes *Border_size* and *Border_value* as 1 for about 16% and 18% of the funds each quarter on average, respectively.

Figure 3 provides a visual illustration of *Border*, in which the shaded area indicates funds with *Border* equal to 1. For the size dimension, the values of *SizeGrid* within the mid-cap box range from 100 to 200, thus *Border_size* equals 1 if the absolute difference between *SizeGrid* and the nearest box border is less than 20 (i.e., a small-cap fund with *SizeGrid* greater than 80, a mid-cap fund with *SizeGrid* less than 120 or greater than 180, or a large-cap fund with *SizeGrid* less than 220). For the value dimension, the values of *ValueGrid* range from 125 to 175 within the blend box; thus *Border_value* equals 1 if the absolute difference between *ValueGrid* and the nearest box borders is less than 10 (i.e., a value fund with *ValueGrid* greater than 115, a blend fund with *ValueGrid* less than 135 or greater than 165, or a growth fund with *ValueGrid* less than 185).

To measure whether a fund would receive a favorable or unfavorable rating in the new

[14]If the *Border* is too wide, it would include funds less sensitive to box jumping incentives. If the *Border* is too narrow, it would not properly capture the set of funds with the incentive and ability to jump. Nevertheless, we conduct a sensitivity check in Figure 5 and show that our main findings are robust to different bandwidths.

style box, we simulate the ratings each fund would receive in the neighboring style boxes in each dimension, all other things being equal except for box allocations. To do so, we closely follow Morningstar ratings methodology (Morningstar, 2021) and rank each fund in the new style box. We first calculate MRAR (Morningstar Risk-Adjusted Return) for trailing three, five, and 10 years for each fund. Then we rank the three, five, and 10 years of MRAR of the focal fund compared to other funds in the new style box.[15] This process yields simulated ranks, which are summarized into one overall rating and one overall ranking (refer to section 2 or Morningstar (2021) for details).[16]

$HighIBJ\_size$ is an indicator variable for funds on the border of a neighboring size style box offering a higher ranking. Specifically, $HighIBJ\_size$ equals 1 if a fund's *Border_size* equals 1 and the fund's simulated ranking in the new style box in the size dimension is higher than its current ranking, and 0 otherwise. Similarly, $LowIBJ\_size$ is analogously defined for funds on the border of an adjacent size style box offering a lower ranking. We repeat this process for the value dimension. Finally, for the main regression, we combine two dimensions for parsimony and create *HighIBJ*, which equals 1 if either $HighIBJ\_size$ or $HighIBJ\_value$ equals 1, and 0 otherwise. Similarly, *LowIBJ* equals 1 if either $LowIBJ\_size$ or $LowIBJ\_value$ equals 1, and 0 otherwise.

To examine how funds change the size-value style exposure of their portfolio, we create a summary measure of the change in style exposure. Specifically, we start by measuring the difference between the fund's current position in the size-value grid and size-value score in the following quarter. If the *StyleScore* in the following quarter is greater, the *StyleGrid* for that quarter will increase as it incorporates the new *StyleScore* into its trailing average. We then adjust the difference between *StyleScore* and *StyleGrid* to ensure that positive

[15] Funds with multiple share classes are adjusted with fractions following Morningstar (2016). Also, for periods before June 2002, Morningstar used a simpler version of MRAR to rank funds. We follow Blume (1998) for performance before June 2002.

[16] Although Morningstar does not provide an overall ranking, it can be computed using the same weights of three, five, and 10 years of ranking, as for rating. We focus on ranking because it is continuous compared to rating, which is discrete. The correlation between overall rating and overall ranking is 0.9.

values accurately indicate a drift away from the original style box:

$$StyleDrift\_Size_{i,q} = (SizeScore_{i,q+1} - SizeGrid_{i,q}) \times SizeDir_{i,q}, \tag{3}$$
$$StyleDrift\_Value_{i,q} = (ValueScore_{i,q+1} - ValueGrid_{i,q}) \times ValueDir_{i,q},$$

in which $SizeDir_{i,q}$ in Eq. (3) is 1 for small-cap and mid-cap with $SizeGrid_{i,q} > 150$ and -1 for large-cap and mid-cap with $SizeGrid_{i,q} < 150$ for given fund i in quarter q. Similarly, $ValueDir_{i,q}$ in Eq. (3) is 1 for value and blend with $ValueGrid_{i,q} > 150$ and -1 for growth and blend with $ValueGrid_{i,q} < 150$ for a given fund i in quarter q. The holdings data are updated quarterly, as are $StyleDrift\_size_{i,q}$ and $StyleDrift\_value_{i,q}$. Finally, similar to our measure of box jumping incentives, we add the two dimensions together for parsimony, which results in $StyleDrift_{i,q} = StyleDrift\_Size_{i,q} + StyleDrift\_Value_{i,q}$.

In Table 3, we first examine whether funds near box borders change their portfolios depending on their rating incentives. To do so, we employ difference-in-differences regressions around the 2002 Morningstar rating reform with two treatment groups: *HighIBJ* and *LowIBJ*. We include style box by year-quarter fixed effects in our regressions so that the control group for each fund is all other funds in the same style box in that quarter. The independent variable is *StyleDrift*. Thus, we run the following regression for the sample from 1997 to 2007, which covers five years around the 2002 reform:

$$\begin{aligned} StyleDrift_{i,q} = \beta_1 HighIBJ_{i,q} + \beta_2 LowIBJ_{i,q} + \beta_3 HighIBJ_{i,q} \times Post_q \\ + \beta_4 LowIBJ_{i,q} \times Post_q + \Gamma Controls_{i,q} + Box\text{-}QuarterFE + \epsilon_{i,q}, \end{aligned} \tag{4}$$

in which control variables include the log of net asset value, expense ratio, turnover ratio, log of the number of stock holdings, and log of fund age, following prior studies (Mullally and Rossi, 2024). We expect β_3 to be positive and β_4 to be statistically indistinguishable from zero or even negative.[17]

[17] The $LowIBJ$ funds may either maintain the status quo or actively engage in style drift to stay in the current box. This is partly because style scores can change due to changes in stock style scores, which are beyond what funds can control.

This empirical design provides several benefits. First, style box by year-quarter fixed effects absorb time-series trends in the returns of specific styles of stocks. For example, in a specific quarter, large growth stocks may outperform. This can increase the exposure of large growth stocks, but such a confounding effect is filtered out by style box by year-quarter fixed effects. Second, two treatment groups enhance confidence that the documented effects are driven by favorable versus unfavorable box jumping incentives, instead of by the current style exposure of the portfolio. Even though two funds have exactly identical portfolios at a given month, one fund can receive a favorable rating by moving to a new style box, and another fund can receive an unfavorable rating because ratings are based on their respective historical distributions of returns. By separating the two, this empirical design better identifies portfolio style drifts driven by rating incentives. Third, the placebo period before the 2002 ratings reform alleviates concerns about unobserved confounding effects. The 2002 ratings reform exogenously shocks the incentives to get favorable ratings through changing style boxes. For an unobserved confounding effect to explain our results, it must not exist before 2002, yet should exist precisely after June 2002, and solely on funds (even with *identical* portfolios) that happen to have favorable historical returns compared to the now newly formed size and value ratings categories. To better take advantage of this, we examine periods of five years around the 2002 reform for our main analyses.[18]

Table 3 illustrates that funds change their holdings in a predictable fashion based on ex ante incentives to box jump. In Column (1), we report regression results for both dimensions combined. The coefficient on $HighIBJ \times Post$ is significantly positive, indicating that funds near the box borders and that would receive favorable ratings in the new box, drift their portfolios toward the new box relative to other funds in the same box. The coefficient

[18] Some readers might consider the regression discontinuity design around box borders as an alternative research design. However, several factors suggest that a fund's incentives for style drift may not change abruptly at box borders. First, surpassing a numerical threshold does not instantly lead to box jumping due to Morningstar's additional qualitative evaluation process (section 2). Second, even after a fund has changed its classification, it might continue to drift in the same direction to ensure staying in the new box. This is because part of the style scores depend on changes in the style scores of individual stocks that the fund cannot control. Consequently, funds might opt to further drift their style scores to the center of the new box to mitigate the risk of being reclassified back due to these uncontrollable changes.

on $HighIBJ \times Post$ is 3.228 ($t = 3.81$). In terms of economic magnitude, the additional $StyleDrift$ driven by $HighIBJ \times Post$ is equivalent to 14% of the standard deviation of $StyleDrift$ (22.27). In contrast, the coefficient on $LowIBJ \times Post$ is significantly negative, indicating that funds near the border, which would receive unfavorable ratings in the new box, drift their portfolios toward the original box compared to other funds in the same box. The difference between coefficients on $HighIBJ \times Post$ and $LowIBJ \times Post$ confirms that these effects are likely driven by rating incentives. Insignificant coefficients for $HighIBJ$ and $LowIBJ$ serve as a placebo test in the pre period sample, indicating that the effects are triggered by the post-reform shock in box jumping incentives.

Figure 4 plots the coefficients on $HighIBJ \times Year$ from Eq. (4) in event time relative to 2002, the year when Morningstar changed its rating system. These tests illustrate that the effects documented in Table 3 only become significantly different from zero right after 2002, which mitigates concerns about the lack of parallel trends. Similarly, Figure 5 examines different border widths used to define $HighIBJ$ and $LowIBJ$ to confirm that this effect holds across border widths and is stronger for narrower border widths.

We then examine the effect in two dimensions, size and value-growth, separately. Columns (2) and (3) report the results. As expected, the coefficients on $HighIBJ \times Post$ are significantly positive, confirming the similar effects on each dimension. Conversely, the coefficients on $LowIBJ \times Post$ are significantly negative or insignificant, indicating that low IBJ funds either actively retreat to the original box or maintain the status quo.

Ex Post Behavior Timing We next explore how box jumping incentives impact the behavior of fund managers in their actual decision to jump boxes in the time series. Specifically, we run the following regression of future box jumps on $HighIBJ$ and $LowIBJ$:

$$\begin{aligned} BoxJump_{i,q+\tau} = {} & \beta_1 HighIBJ_{i,q} + \beta_2 LowIBJ_{i,q} + \beta_3 HighIBJ_{i,q} \times Post_q \\ & + \beta_4 LowIBJ_{i,q} \times Post_q + \Gamma Controls_{i,q} + Box\text{-}Quarter FE + \epsilon_{i,q}, \end{aligned} \tag{5}$$

in which $BoxJump_{i,q+\tau}$ is an indicator variable equal to 1 if the fund box jumps between

$q+\tau-1$ and $q+\tau$. In addition to the control variables in Equation 4, we include additional control variables which are $HighIBJ_{i,q+\tau-1}$, $LowIBJ_{i,q+\tau-1}$, $HighIBJ_{i,q+\tau-1} \times Post_q$, and $LowIBJ_{i,q+\tau-1} \times Post_q$ (denoted as $PreviousIBJ$) to account for changes in a fund's $HighIBJ$ status over time.

Table 4 reports the results for the four quarters after the quarter box jumping incentives are measured (i.e., $\tau = 1$ to 4). The coefficients for $HighIBJ \times Post$ are positive and statistically significant across all four columns.[19] Thus, a fund being near the box borders and receiving a better rating in the new box predicts box jumps in the subsequent four quarters. Conversely, a fund receiving a worse rating, despite being near the border, does not predict future box jumps.[20] In separate untabulated analyses, we use cumulative indicator variables for box jumps to show that $HighIBJ$ funds are 23.7 percentage points more likely to jump boxes in the following three years compared to other funds in the same box during the same quarter, while the likelihood for $LowIBJ$ funds is only 6.3 percentage points. Thus, the incremental likelihood of box jumping for funds near the box borders is about four times greater when the funds receive favorable ratings in the new box compared to when they receive unfavorable ratings.

3.3 Mechanism: Variation in Box Jumping

We next explore cross-sectional variation in our main findings. In Table 5, we show that our main findings intuitively vary with proxies for managers' willingness and ability to box jump. These tests shed light on why some high IBJ fund managers abstain from box jumping as well as why some high IBJ fund managers are more likely to box jump.

In Table 5, Panel A, we analyze the manager and fund traits that explain box jumping in the post period. Columns (1) and (2) test for determinants of box jumping in the following quarter, and Columns (3) and (4) examine box jumps that receive a ratings upgrade.

[19] We run a robustness test using Poisson regressions, yielding similar results (Cohn et al., 2022).

[20] For Column (1), the F-test statistic testing for the equality of coefficients of $HighIBJ \times Post$ and $LowIBJ \times Post$ (post period) is 5.81 (p-value: 0.02), whereas that of $HighIBJ$ and $LowIBJ$ in the pre period is an insignificant 0.56 (p-value: 0.46).

Beginning with manager-level characteristics, we find that funds led by managers with a history of favorable box jumping in other funds are more likely to box jump, as indicated by positive coefficients on $PastJumper$. Additionally, fund managers early in their tenure with the fund ($Tenure$), but with more overall fund management experience ($Career$), are more likely to engage in box jumping. These findings underscore the importance of manager characteristics in fund-level decisions (Chevalier and Ellison, 1999; Chen et al., 2021).

Next, we examine fund-level characteristics. The results in Panel A of Table 5 show that fund families avoid having an overly concentrated coverage of style boxes within the family. Specifically, we find that a fund is less likely to box jump when there are more incumbent funds in the same fund family in adjacent style boxes compared to family peer funds in the original box ($FamNeighbor$). Furthermore, we hypothesize that it is more costly for funds with style-box-indicating names (e.g., "Fidelity Small Cap Growth Fund") to box jump than for funds with box-neutral names (e.g., "Dynamic Equity Fund"). Consistent with this hypothesis, we find that funds with style-box-indicating names ($BoxName$) tend to box jump less.

Third, we show that a fund's past performance is associated with its box jumping (Chan et al., 2002). Funds with lower past performance compared to box peers ($PastRet_{box}$) or fund-family peers ($PastRet_{fam}$) are more inclined to box jump. Similarly, the aggregate expected flows of style boxes also impact box jumping. If a fund belongs to a style box with less aggregated fund inflows compared to adjacent boxes, the fund is more likely to box jump to that more attractive larger-flow box, as indicated by positive coefficients on $BoxFlow$.

Panel B reports how these characteristics are associated with portfolio style drift decisions. To do so, we run a regression similar to Equation 4 with independent variables interacted with various characteristics, focusing on the post period. This approach provides further insight into which funds, even among high IBJ funds, are more actively drifting their portfolios. Column (1) shows that $HighIBJ$ funds managed by those with favorable box jumping experience more actively drift their portfolios towards the new box compared to

$HighIBJ$ funds managed by others. Similarly, Column (2) shows that funds managed by more experienced managers tend to drift portfolios more in response to box jumping incentives. Conversely, Columns (3) and (4) show that funds with more family-peer funds in adjacent boxes and funds with style-box-indicating names exhibit less portfolio drift when they have high incentives to box jump compared to other funds with similar incentives. Lastly, Column (5) shows that funds are more actively drifting their portfolios when the new box has higher aggregated flows.[21]

Given the results in Table 5, we next explore to what extent box jumping is driven by active or passive decisions taken by managers. For instance, if a specific category of stocks (e.g., growth stocks) is experiencing unusually high returns, or if the style exposure of the stocks themselves undergoes significant changes, this could lead a fund to shift toward a particular box without deliberate rebalancing by the manager. To explore this, in Online Appendix Figure OA-1, we decompose the changes in style scores over the four quarters preceding a box jump into two components: trade-driven changes (i.e., active changes) and non-trade-driven changes (i.e., passive changes). For non-trade-driven changes, we calculate the style scores a fund would have if it maintained the same portfolio from four quarters earlier. Trade-driven changes are the residual changes after accounting for non-trade-driven changes. If the $HighIBJ$ funds are indeed acting in a more concerted and incentive-aligned manner, we would expect a larger proportion of their box jumps to be driven by active decision-making. Consistent with this expectation, Figure OA-1 indicates that for favorable box jumping funds, over 88% of the style drift is trade-driven, compared to only 24% for unfavorable box jumping funds (difference: $t = 1.87$). Similarly, Table OA-1 demonstrates that active stock trading aligns closely with box jumping incentives for these funds.

Taken together, the results in Table 5 point to the role of incentives and opportunities at both the manager and fund-family levels—and even *within* high IBJ funds—in driving our main results, casting further doubt on alternative explanations for our findings.

[21] We do not run similar tests with past performance, given its correlation with $HighIBJ$ and $LowIBJ$.

4 Consequences of Strategic Box Jumping

4.1 Fund Flows and Fees following Box Jumping

We first examine whether rating upgrades driven by box jumping attract fund flows and enable funds to charge higher management fees. First, we define fund flows following prior literature (Ben-David et al., 2022b):

$$Flow_{i,q} = \frac{TNA_{i,q}}{TNA_{i,q-1}} - (1 + Ret_{i,q}), \tag{6}$$

in which $TNA_{i,q}$ is fund i's total net assets at the end of quarter q, and $Ret_{i,q}$ is the fund's return in quarter q. We analyze how various variables affect fund flows over the next four quarters (i.e., $Flow_{(q+1,q+4)}{=}\sum_{\tau=1}^{4} Flow_{q+\tau}$). The key independent variables measure the rating upgrades with and without box jumping. $\Delta Rating$ is the change in ratings, which is decomposed into $\Delta Rating\_BoxJump$, which is the change in ratings associated with box jumping, and $\Delta Rating\_NoBoxJump$, which is the change in ratings not associated with box jumping. $Upgrade\_BoxJump$ equals 1 for a rating upgrade associated with box jumping, and 0 otherwise. $Upgrade\_NoBoxJump$ equals 1 for a rating upgrade not associated with box jumping, and 0 otherwise. The control variables include 12 quarterly lags of fund flows, decile indicators of the previous 12-quarter cumulative fund returns, and the previous 12-quarter cumulative style box benchmark-adjusted returns, following prior studies (e.g., Ben-David et al., 2022a).

Table 6 reports the results of this regression. In Column (1), we regress the fund flow on $\Delta Rating$. The coefficient on $\Delta Rating$ is significantly positive, indicating that rating upgrades are associated with future fund inflows. We then decompose rating changes into changes that are and are not associated with box jumping to examine the difference between the two. Column (2) shows that both the coefficient on $\Delta Rating\_BoxJump$ and that on $\Delta Rating\_NoBoxJump$ are positive and significant, with the two being statistically indistinguishable. Column (3) repeats this analysis using indicator variables of rating upgrades and finds that funds that receive rating upgrades by box jumping get fund inflows of 6.7%

on average. Figure 6 plots coefficients of this specification in the expanding window of fund flows and confirms that the fund flows from rating changes associated with box jumping are comparable to those from rating changes within the same box. This empirical pattern that mutual fund investors are fixated on the face value of Morningstar ratings without understanding how the ratings are calculated is consistent with prior studies (Ben-David et al., 2022b). As a consequence, funds benefit from strategically selecting boxes through achieving higher assets under management.

We then examine the consequences of box jumping on fund management fees. To do so, we regress funds' management fees on the same sets of key dependent variables. $Fee_{q+1,q+4}$ is the fund management fee scaled by total assets under management in percentage, over the four quarters following a rating change. Specifically, we merge annual management fees from CRSP each quarter and take the average of annual management fees merged each quarter. Table 7 reports the results. In Column (1), the coefficient on $\Delta Rating$ is significantly positive, indicating that ratings upgrades are associated with higher management fees in the following year. We then decompose rating changes into changes that are and are not associated with box jumping to examine the differences. Column (2) shows that the coefficient on $\Delta Rating\_BoxJump$ and that on $\Delta Rating\_NoBoxJump$ are positive and significant, with the two being statistically indistinguishable. Column (3) repeats this analysis using indicator variables for rating upgrades. The results show that box jumping funds with a rating upgrade increase their fees by 3.3 bps in the 12 months following the box jump, which corresponds to roughly 5% of the mean annual fee in our sample (66.1 bps).

Collectively, we show that fund managers benefit from box jumping through fund inflows and higher management fees. Using a simple back-of-the-envelope calculation, we estimate that funds receive an additional $1.05 million in fee revenues per year on average for rating upgrades received when box jumping, which represents an over 12% increase in their annual fee revenues.[22]

[22]The average assets under management in our sample is $1.31 billion. The annual fee for the average fund is $8.65 million(= 1.31 billion*66.1bps). After the box jump, the annual fee for the average fund that

4.2 Performance of Style Drifted Portfolios

Next, we examine the costs of strategic box jumping for mutual funds. We first investigate whether funds forego future return performance for box jumping benefits (increased ratings, flows, and fees). To do so, we start by flagging funds whose behavior is consistent with changing their portfolio to strategically jump boxes. Specifically, we define $flag = 1$ for the fund-quarters when $HighIBJ = 1$ and $StyleDrift > 0$. Then, for the flagged funds, we examine their portfolio holdings to track the returns of stocks bought or sold to style drift the portfolio. For example, assume a mid-cap fund is flagged in 2005Q2, because moving to large-cap would be favorable and it drifted its portfolio toward large-cap between 2005Q2 and 2005Q3. We mark large-cap buys and small-cap sells during 2005Q3 as transactions aligned with style drift. In contrast, other buys and sells are marked as unaligned buys and sells. Then, we measure the cumulative returns of these stocks in 2005Q4. Therefore, we run the following regression at the fund-quarter-stock level for the sample of flagged funds in the post period (from 2002Q3 to 2007Q4):

$$
\begin{aligned}
StockRet\_qtr_{i,j,q+1} &= \beta_1 Buy\_BoxJump_{i,j,q} + \Gamma Controls_{i,j,q} \\
&\quad + Fund\text{-}QuarterFE + StockFE + \epsilon_{i,j,q}, \\
StockRet\_qtr_{i,j,q+1} &= \beta_1 Buy\_NoBoxJump_{i,j,q} + \Gamma Controls_{i,j,q} \\
&\quad + Fund\text{-}QuarterFE + StockFE + \epsilon_{i,j,q}, \\
StockRet\_qtr_{i,j,q+1} &= \beta_1 Sell\_BoxJump_{i,j,q} + \Gamma Controls_{i,j,q} \\
&\quad + Fund\text{-}QuarterFE + StockFE + \epsilon_{i,j,q}, \\
StockRet\_qtr_{i,j,q+1} &= \beta_1 Sell\_NoBoxJump_{i,j,q} + \Gamma Controls_{i,j,q} \\
&\quad + Fund\text{-}QuarterFE + StockFE + \epsilon_{i,j,q},
\end{aligned}
\tag{7}
$$

in which $Ret\_qtr_{i,j,q+1}$ is the quarterly stock return in percentage in the following quarter of stock j, fund i. $Buy\_BoxJump$ is 1 if stock j position for fund i in quarter q

box jumped with rating upgrades is \$9.70 million(= 1.31 billion*1.067*69.4bps).

has increased and this increase is aligned with box jumping. Specifically, stock buys are aligned with box jumping if either $(StockSizeScore_{j,q} - SizeGrid_{i,q}) \times SizeDir_{i,q} > 0$ or $(StockValueScore_{j,q} - ValueGrid_{i,q}) \times ValueDir_{i,q} > 0$. *Buy_NoBoxJump* is 1 if stock j position for fund i in quarter q has increased and this increase is unaligned with box jumping. *Sell_BoxJump* is 1 if stock j position for fund i in quarter q has decreased and this decrease is aligned with box jumping. Specifically, stock sells are aligned with box jumping if either $(StockSizeScore_{j,q} - SizeGrid_{i,q}) \times SizeDir_{i,q} < 0$ or $(StockValueScore_{j,q} - ValueGrid_{i,q}) \times ValueDir_{i,q} < 0$. *Sell_NoBoxJump* is 1 if stock j position for fund i in quarter q has decreased and this decrease is unaligned with box jumping. Control variables include *size*, *btm*, $ret_{1,0}$, and $ret_{12,2}$. We add fund-quarter fixed effects to compare stock returns among other stocks held by the same fund in the same quarter, and stock fixed effects to focus on the timing of the trading instead of unobserved stock fixed characteristics.

Table 8 shows the results of this regression. In Panel A, Column (1), the coefficient on *Buy_BoxJump* is significantly negative (coefficient: -0.880; t = -4.22), indicating that stocks bought ostensibly to achieve strategic portfolio drift in order to box jump yield 88bps lower returns in the following quarter compared to other stocks held by the fund. In Column (2), this effect is similar after controlling for size, book-to-market, and momentum (coefficient: -0.616; t = -3.47). Conversely, the results in Columns (3) and (4) serve as placebo tests. Consistent with prior studies (Nofsinger and Sias, 1999; Gompers and Metrick, 2001), the coefficients on *Buy_NoBoxJump* are significantly positive, indicating that the "normal" buys are associated with higher returns. Panel B shows mirrored results with sells. In Column (1), the coefficient on *Sell_BoxJump* is significantly positive (coefficient: 0.572; t = 3.65), showing that stocks sold to shift the portfolio toward achieving box jumping result in 57bps *higher* quarterly returns in the following quarter compared to other stocks held by the fund. Column (2) shows that this effect is similar after controlling for size, book-to-market, and momentum. Columns (3) and (4) of Panel B confirm that other sells are associated with lower returns.

Using portfolio holdings data, we show evidence consistent with funds foregoing stock returns to adjust their portfolios' style exposures due to box jumping incentives.

To examine this notion from a different angle, we compare fund returns of flagged fund-quarters to others. To do so, we run the following regression at the fund-quarter level for funds in the post period (from 2002Q3 to 2007Q4):

$$RawRet\_qtr_{i,q+1} = \beta_1 Flag_{i,q-1} + FundFE + QuarterFE + \epsilon, \tag{8}$$
$$CAPMRet\_qtr_{i,q+1} = \beta_1 Flag_{i,q-1} + FundFE + QuarterFE + \epsilon,$$

in which $RawRet(CAPMRet)$ is the quarterly raw return (CAPM excess return) in percentage starting from quarter $q+1$ of fund i.[23] CAPM excess return is measured based on 36-month window regressions. We include fund fixed effects and quarter fixed effects to compare within each fund and within each quarter. Table 9 shows the results. In Column (1), the coefficient on $Flag$ is -0.213 (t = -2.67). Thus, funds that drift their portfolios due to box jumping incentives show 85bps less in annualized return than in other quarters of the same fund and compared to other funds in the same quarter. Column (2) shows that this effect is robust to CAPM excess returns.

Lastly, we track the long-term performance of funds that box jump. We expect to see initial upgrades reverse in the longer period for at least two reasons. First, if initial rating upgrades for these funds are indeed a result of strategic box jumping instead of better stock-picking skills, the fund would not perform well in the new box. The boosted ratings will then reverse as performance in the old box is replaced by the new box. Second, lower performance from stocks bought or sold for box jumping incentives may linger in the new box, deteriorating performance. Since these position changes were necessary for the box jump, funds are likely to maintain those positions or hold stocks with similar style exposures to remain in the new box. Panel A of Figure 7 plots the coefficient $BoxJump \times Post$

[23]The flagged fund is based on $q-1$ while the return calculation is based on $q+1$. This is because $StyleDrift_{i,q-1}$ is based on portfolio choices in q.

as in Table 2, Column (1) but in expanding windows of $\Delta Rating$. It reveals that the initial rating upgrades from box jumping are fully reversed in three years on average and insignificantly different from zero after three years. Panel B compares the performance of funds that achieved five stars through box jumping to those that did not. Specifically, we estimate the following regression in the post period: $RawRet\_qtr_{i,(q,q+\tau)} = \beta_1 BoxJump_{i,q} + \Gamma Controls_{i,q} + Box\text{-}QuarterFE + \epsilon_{i,q}$, for fund i upgraded to five stars in quarter q in which $RawRet\_qtr_{i,(q,q+\tau)}$ is the cumulative quarterly raw return. Our results show that funds achieving five stars via box jumping underperform by approximately 8% over five years compared to funds achieving five stars within the same style box (t = -2.23).[24]

Collectively, the set of evidence in this section reinforces the notion that funds are sacrificing future return performance to strategically jump boxes for rating incentives.

4.3 Spillover to Other Funds

Finally, we examine the negative externality of a fund's box jumping on other funds. Morningstar ratings are assigned based on percentile ranking within a box. If a new fund joins the box, some funds near the ratings threshold can experience changes in ratings. Given that funds moving into the new box are likely to have higher performance than the incumbent funds, the incumbent funds can receive rating downgrades on average. However, the impact of this change is uncertain due to the increased total number of funds in the box. To test this empirical question, we examine whether future rating changes of incumbent funds in the new box can be predicted by the number of funds flagged to shift towards the new box scaled by the total number of funds in the new box. Specifically, we run the following regression at the fund-quarter level:

$$\begin{aligned} \Delta Rating_{i,q} = {} & \beta_1 Flag\_ratio_{q-\tau} + \beta_2 Flag\_ratio_{q-\tau} \times Post_{i,q} \\ & + \Gamma Controls_{i,q} + FundFE + QuarterFE + \epsilon_{i,q}, \end{aligned} \tag{9}$$

[24]For funds upgraded to any star rating (two to five stars), the average return difference between those with and without box jumping is about 2%.

in which $\Delta Rating_{i,q}$ is the quarterly change in fund star rating of the incumbent funds in the new box. $Flag\_ratio_{q-\tau}$ is the number of funds drifting their portfolio towards the new box due to box jumping incentives ($HighIBJ = 1$ and $StyleDrift > 0$) scaled by the total number of funds in the new box. The control variables include those in Equation 4.

Table 10 tabulates the results. Column (1) shows that the coefficient on $Flag\_ratio_{t-1} \times Post$ is significantly negative (coeff: -0.286; t = -2.26), indicating that the presence of flagged funds in the previous quarter can predict rating downgrades for incumbent funds in the new box. Columns (2) and (3) show that this predictive effect exists for up to three quarters. Column (4) shows that the effect then becomes insignificant in predicting rating changes by roughly four quarters ahead. Overall, funds' box jumping has negative spillover effects on other funds' ratings. The downgrade of funds, unrelated to performance, negatively impacts not only the downgraded funds but also the broader information environment of mutual funds, introducing noise into the benchmarking and assessment process.

5 Conclusion

In this study, we show a novel mechanism by which mutual fund managers strategically alter their portfolios to take advantage of investors' reliance on Morningstar star ratings, generating higher fund flows and allowing them to charge higher fees. Namely, using the 2002 Morningstar ratings reform as a shock to funds' incentives, we illustrate how funds strategically modify their portfolios to prompt a reclassification into different size/value style boxes that are less competitive, and in which their performance record will rank them higher—resulting in a ratings upgrade. This strategic reallocation and resulting upgrade lead to significant capital inflows due to the comparative nature of Morningstar's rating system within specific style boxes, along with the opportunity to charge significantly higher fees. However, the trades made in order to prompt the re-classification result in future underperformance, and the funds more broadly underperform in the future in their new non-native style box. Together, our findings reveal how funds use portfolio recomposition as a novel strategy to manipulate Morningstar ratings, and that funds box jump despite trading off higher ratings for lower future returns, given investors focus on ratings when allocating capital.

Our paper highlights the costs associated with an overreliance on information intermediaries in financial markets, particularly when their ratings are susceptible to manipulation. To address the distortions we identify, one potential solution is for Morningstar to incorporate multiple peer benchmarks when assigning ratings to box jumping funds. For example, when assigning a three-year rating to a fund that box jumped a year ago, the performance benchmark could be the new category peer group for the most recent year and the old category peer group for the prior two years. While this could mute the immediate benefits and incentives for box jumping, future research should more broadly explore varied and additional technologically-enabled monitoring mechanisms.

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Appendix A. Variable Descriptions

Variable Name	Definition	Source
Main Variables		
$\Delta Rating$	Quarterly (monthly) change in fund star rating.	Morningstar Direct
$\Delta Ranking$	Quarterly (monthly) change in fund percentile ranking, adjusted such that higher values correspond to higher ratings.	Morningstar Direct
$BoxJump$	An indicator variable that equals 1 if the fund's style box (i.e., category) is different from its style box in the prior quarter (month), and 0 otherwise.	Morningstar Direct
$Post$	An indicator variable that equals 1 for the period starting from the third quarter of 2002, and 0 otherwise.	Morningstar Direct
$StyleDrift$	$StyleDrift\_Size_{i,q} + StyleDrift\_Value_{i,q}$, in which $StyleDrift\_Size_{i,q} = (SizeScore_{i,q+1} - SizeGrid_{i,q}) \times SizeDir_{i,q}$. $SizeScore$ is the holdings-weighted average of each stock's size score. $SizeGrid_{i,q}$ is $\sum_{\tau=0}^{11} SizeScore_{i,q-\tau}$. $SizeDir_{i,q}$ is 1 for small-cap and mid-cap with $SizeGrid_{i,q} > 150$ and -1 for large-cap and mid-cap with $SizeGrid_{i,q} < 150$ for given fund i in quarter q. Similarly, $StyleDrift\_Value_{i,q} = (ValueScore_{i,q+1} - ValueGrid_{i,q}) \times ValueDir_{i,q}$. $ValueGrid_{i,q}$ is $\sum_{\tau=0}^{11} ValueScore_{i,q-\tau}$. $ValueDir_{i,q}$ is 1 for value and blend with $ValueGrid_{i,q} > 150$ and -1 for growth and blend with $ValueGrid_{i,q} < 150$ for a given fund i in quarter q. Refer to subsection 3.2 for details and to Figure 3 for visual illustrations.	Morningstar Direct
$HighIBJ$	An indicator variable that equals 1 for funds on the border of style boxes and would receive a favorable ranking in the new box in either size or value-growth dimension. Borders are defined as being less than 20 points from the size dimension thresholds and less than 10 points from the value-growth dimension thresholds. Refer to subsection 3.2 for details and to Figure 3 for visual illustrations.	Morningstar Direct
$LowIBJ$	An indicator variable that equals 1 for funds on the border of style boxes and would receive an unfavorable ranking in the new box in either size or value-growth dimension. Borders are defined as being less than 20 points from the size dimension thresholds and less than 10 points from the value-growth dimension thresholds. Refer to subsection 3.2 for details and to Figure 3 for visual illustrations.	Morningstar Direct

PastJumper	An indicator variable that equals 1 if the fund is managed by a manager who previously engaged in box jumps with rating upgrades in other funds.	Morningstar Direct
Tenure	The quintile of the average years of tenure of fund managers in the given fund within each quarter.	Morningstar Direct
Career	The quintile of the average years of fund managing career of fund managers, including previous tenure in other funds, within each quarter.	Morningstar Direct
FamNeighbor	The quintile of the average number of funds within the same fund family that are in the adjacent style boxes, scaled by the number of funds within the same fund family in the focal fund's style box, within each quarter. The adjacent style boxes are determined as the closest style boxes based on size and value dimensions, respectively.	Morningstar Direct
BoxName	An indicator variable that equals 1 if the fund's name includes words indicative of style boxes (i.e., large, mid, small, growth, blend, value).	Morningstar Direct
BoxFlow	An indicator variable that equals 1 if the box-aggregated flow of the adjacent style boxes is larger than the fund's style box.	Morningstar Direct
$PastRet_{box}$	The quintile of a fund's past three-year return within each style box and quarter.	Morningstar Direct
$PastRet_{fam}$	The quintile of a fund's past three-year return within each style fund family and quarter.	Morningstar Direct
Flow	Quarterly net flow into the fund divided by lagged total net asset.	Morningstar Direct
Fee	Fund management fee scaled by the total asset under management in percentage.	CRSP
Buy_BoxJump	An indicator variable that equals 1 if there is an increase in the stock position for stocks aligned with box jumping by the fund.	Morningstar Direct &Thomson Reuters
Buy_NoBoxJump	An indicator variable that equals 1 if there is an increase in the stock position for stocks not aligned with box jumping by the fund.	Morningstar Direct &Thomson Reuters
Sell_BoxJump	An indicator variable that equals 1 if there is a decrease in the stock position, where the selling of the stock is aligned with box jumping by the fund.	Morningstar Direct &Thomson Reuters
Sell_NoBoxJump	An indicator variable that equals 1 if there is a decrease in the stock position, where the selling of the stock is not aligned with box jumping by the fund.	Morningstar Direct &Thomson Reuters
StockRet_qtr	The quarterly stock return in percentage.	CRSP&Thomson Reuters
RawRet_qtr	The quarterly raw return of the fund in percentage.	Morningstar Direct
CAPMRet_qtr	The quarterly excess return based on the CAPM model of the fund in percentage, in which CAPM returns are calculated using 36-month moving windows.	Morningstar Direct

Flag_ratio	The number of flagged funds scaled by the total number of funds in the new box. The flagged funds are defined as funds with $HighIBJ = 1$ and $StyleDrift > 0$.	Morningstar Direct
Control Variables		
Netasset	The total net asset of a fund.	CRSP
Exp_ratio	The expense ratio of a fund.	CRSP
Turn_ratio	The fund turnover ratio of a fund.	CRSP
Num_holdings	The number of distinct stock holdings of a fund.	CRSP&Thomson Reuters
Age	The number of months since inception.	CRSP
Size	A market capitalization of a stock.	CRSP
Btm	Book value of equity divided by market capitalization of a stock.	CRSP&COMPUSTAT
$r_{1,0}$	Past performance of a stock measured at horizons of one month.	CRSP
$r_{12,2}$	Past performance of a stock measured at horizons of twelve to two months.	CRSP

Appendix B. Illustrative Example of Goldman Sachs U.S. Equity ESG A

Figure B1. Relative Performance in Neighboring Boxes

This figure illustrates the fund's position within the distribution of past returns for both the large growth and large blend categories. The blue bars represent the distribution of three-year trailing returns for large growth funds, while the red bars correspond to those of large blend funds. The dotted line marks the three-year trailing return of Goldman Sachs U.S. Equity ESG A Fund as of April 2021.

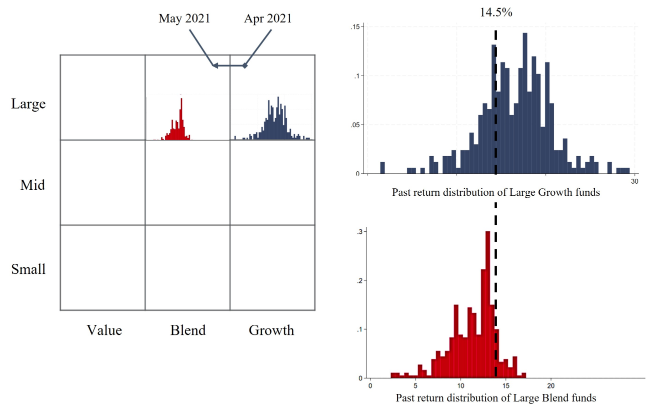


Figure B2. Benefits after Box Jumping

This figure illustrates the potential benefits for the Goldman Sachs U.S. Equity ESG A Fund following its box jump from the large growth to the large blend category. The first row shows the fund's overall star rating by month, while the second row displays its three-year star rating by month. The third row indicates the fund's style box classification each month. The final row represents the timeline in months. The gray bars represent the fund flows, and the black line represents the management fee on a monthly basis. The dotted line marks the month of box jumping.

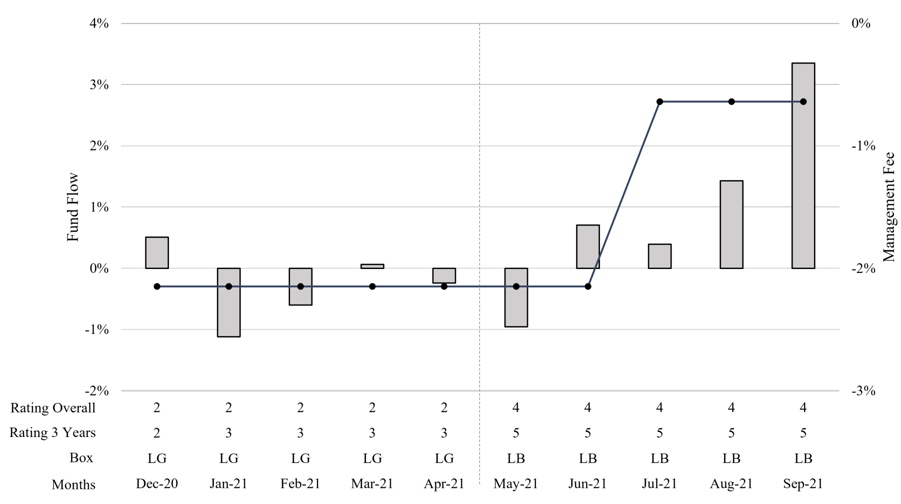


Figure B3. Reversal of Upgraded Ratings

This figure illustrates the three-year star ratings for the Goldman Sachs U.S. Equity ESG A Fund over time. The horizontal axis represents the timeline in months, while the vertical axis shows the fund's three-year star rating for each month. The dotted line marks the month of box jumping.

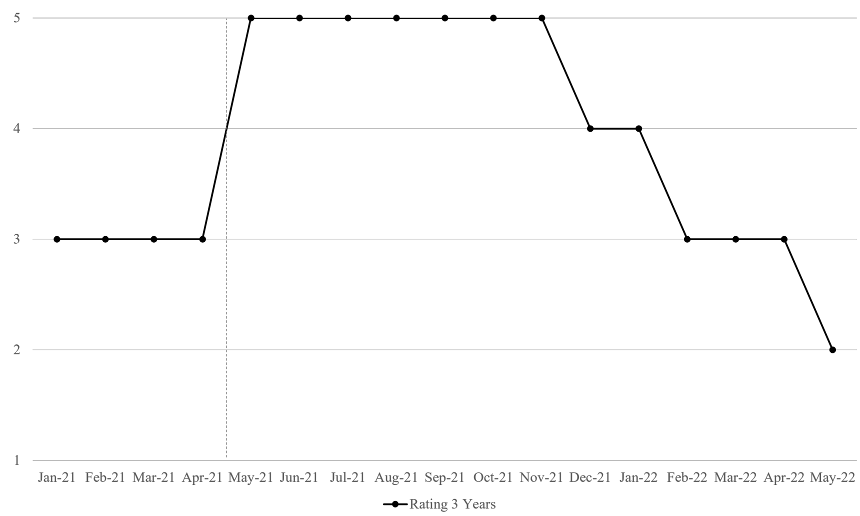


Figure 1. **Fund-Level Box Jumping Frequencies**

This figure illustrates the proportion of funds that underwent 1, 2, 3, or 4 box jumps from 1997 to 2007, relative to the total number of funds in the sample.

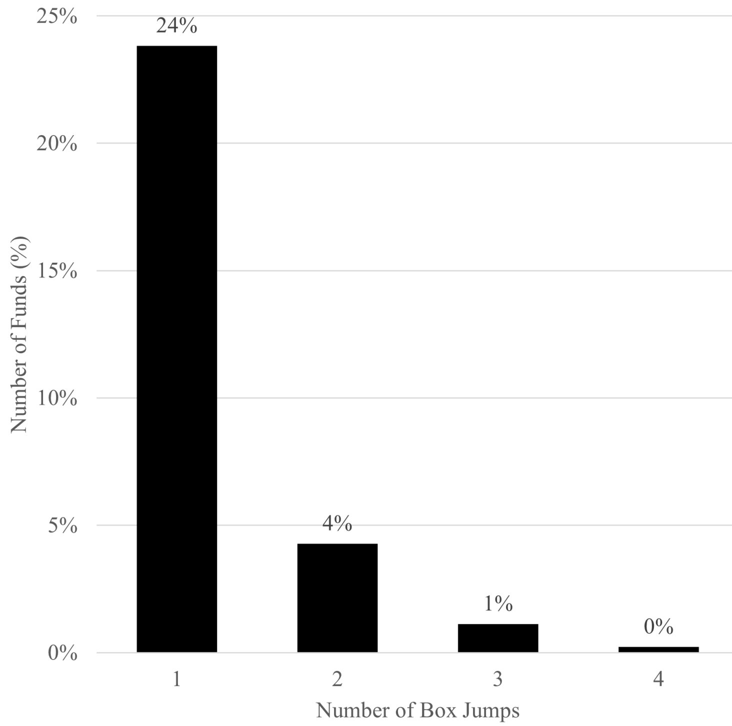


Figure 2. Box Jumping and Rating Changes

This figure illustrates the distribution of rating changes associated with box jumping from the third quarter of 2002 to 2007, expressed as a percentage of the total instances of box jumping. The vertical axis categorizes the initial ratings prior to box jumping, which are further subdivided by the subsequent star ratings achieved after the box jump.

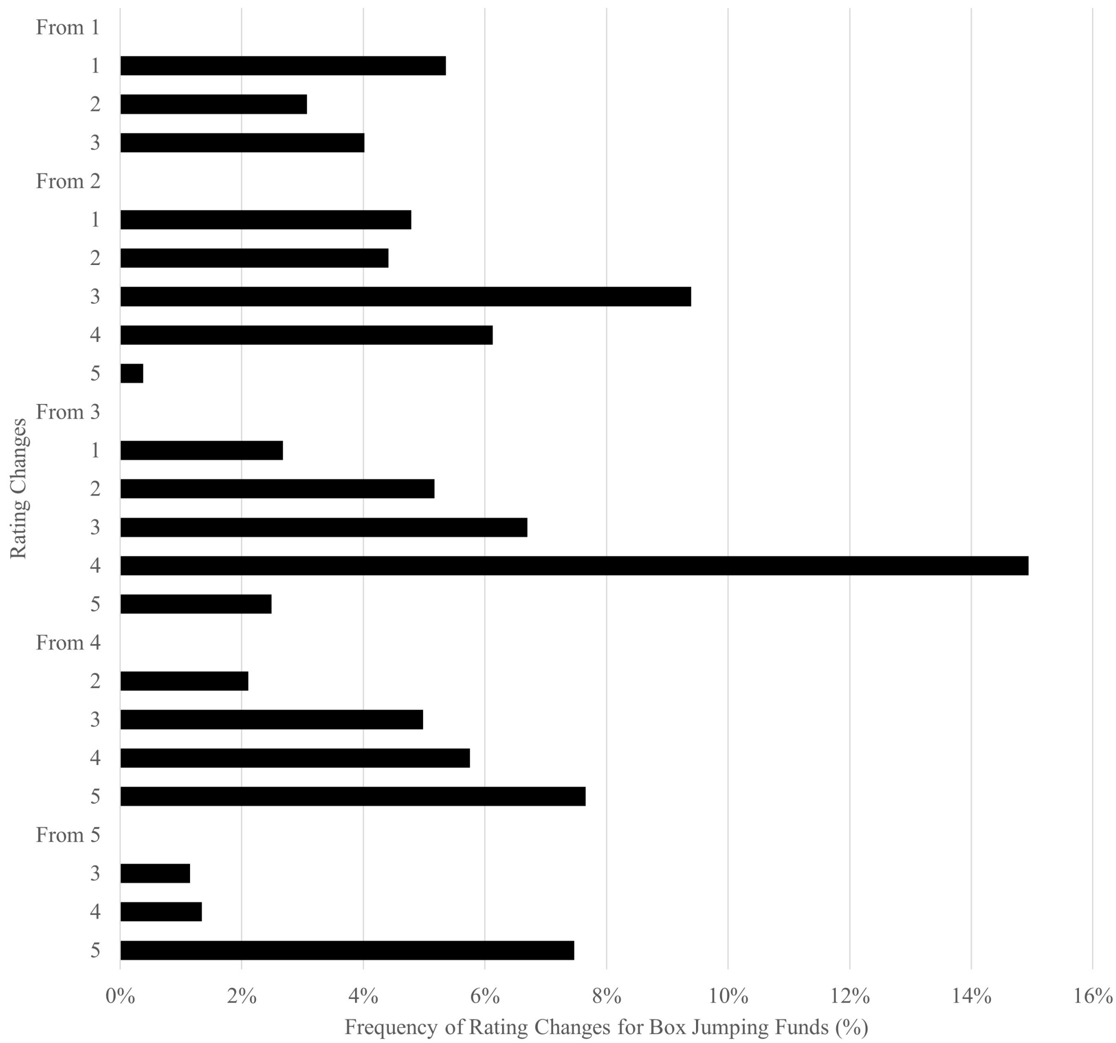


Figure 3. Morningstar Style Boxes and Variable Illustration

This figure illustrates the Morningstar category style boxes and how key variables relate to these boxes. The vertical axis represents the size score of a given fund. Funds with scores less than 100 are classified as small-cap; those with scores from 100 to 200, as mid-cap; and those with scores over 200, as large-cap. The horizontal axis represents the value-growth score of a fund. Funds with scores below 125 are classified as value funds; those from 125 to 175, as blend funds; and those exceeding 175, as growth funds. Shaded regions indicate funds on the border of boxes, defined as 20% of the bandwidth of the middle box in each dimension. For funds in these shaded regions, $HighIBJ$ is 1 if the fund would receive a favorable ranking in a new box, and $LowIBJ$ is 1 if it would receive an unfavorable ranking. $StyleDrift$ quantifies the deviation of a portfolio in the succeeding quarter from its current box, calculated as $StyleDrift = StyleDrift\_Size_{i,q} + StyleDrift\_Value_{i,q}$. Here, $StyleDrift\_Size_{i,q} = (SizeScore_{i,q+1} - SizeGrid_{i,q}) \times SizeDir_{i,q}$ in which $SizeScore$ is the holdings-weighted average of each stock's size score. $SizeGrid_{i,q}$ is $\sum_{\tau=0}^{11} SizeScore_{i,q-\tau}$. $SizeDir_{i,q}$ is 1 for small-cap and mid-cap with $SizeGrid_{i,q} > 150$ and -1 for large-cap and mid-cap with $SizeGrid_{i,q} < 150$ for given fund i in quarter q. Similarly, $StyleDrift\_Value_{i,q} = (ValueScore_{i,q+1} - ValueGrid_{i,q}) \times ValueDir_{i,q}$. $ValueGrid_{i,q}$ is $\sum_{\tau=0}^{11} ValueScore_{i,q-\tau}$. $ValueDir_{i,q}$ is 1 for value and blend with $ValueGrid_{i,q} > 150$ and -1 for growth and blend with $ValueGrid_{i,q} < 150$ for a given fund i in quarter q. Squares on the arrows indicate the fund's current position in the grid ($SizeGrid$ & $ValueGrid$), while triangles indicate the position in the following quarter ($SizeScore_{i,q+1}$ & $ValueScore_{i,q+1}$). $StyleDrift$ is positive (negative) when the fund's style score is drifting towards a new (or back towards the current) box, adjusted by $SizeDir_{i,q}$ and $ValueDir_{i,q}$.

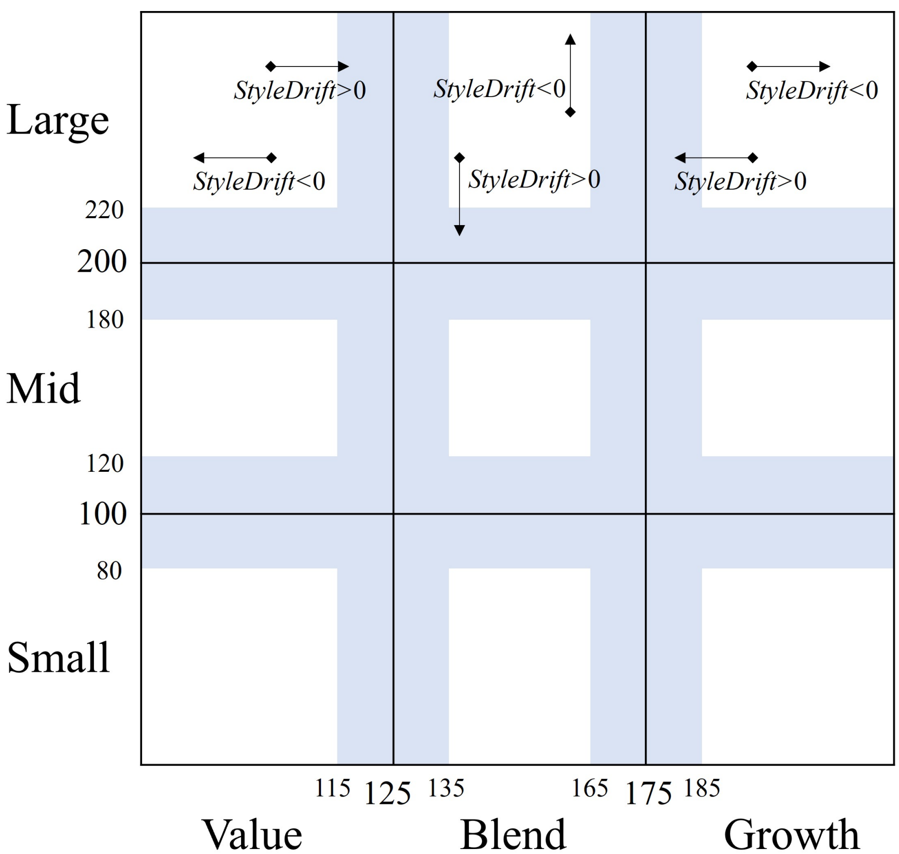


Figure 4. Event Time Plots

This figure plots the coefficients and 90% confidence intervals for $HighIBJ \times Year$ from an event time version of Equation 4. The holdout year is 1997. The dotted line represents the change in Morningstar rating methodology in June 2002.

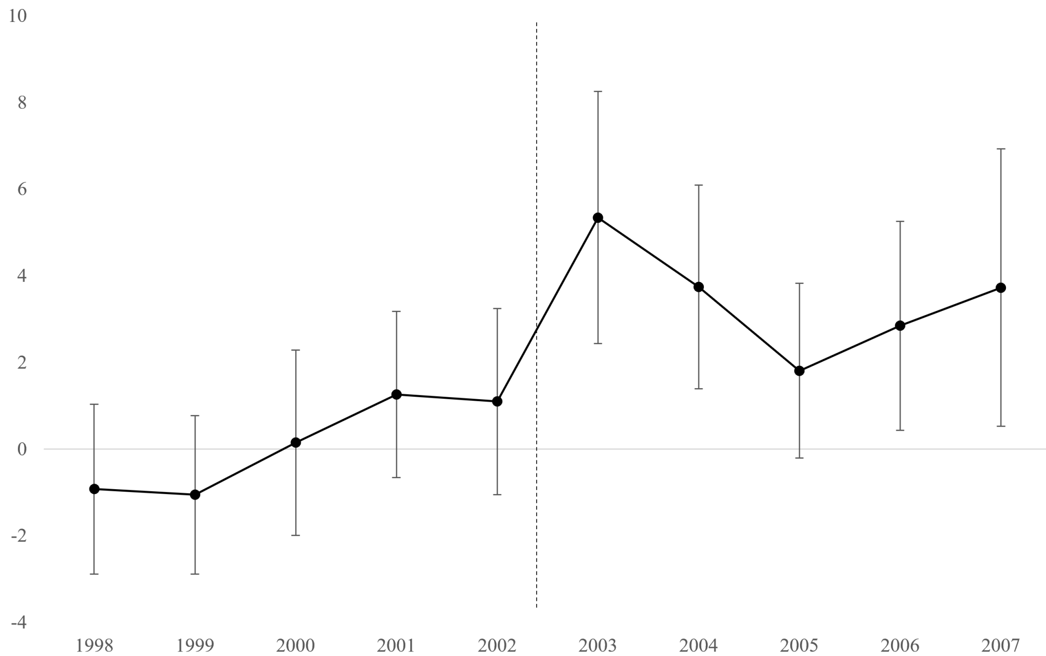
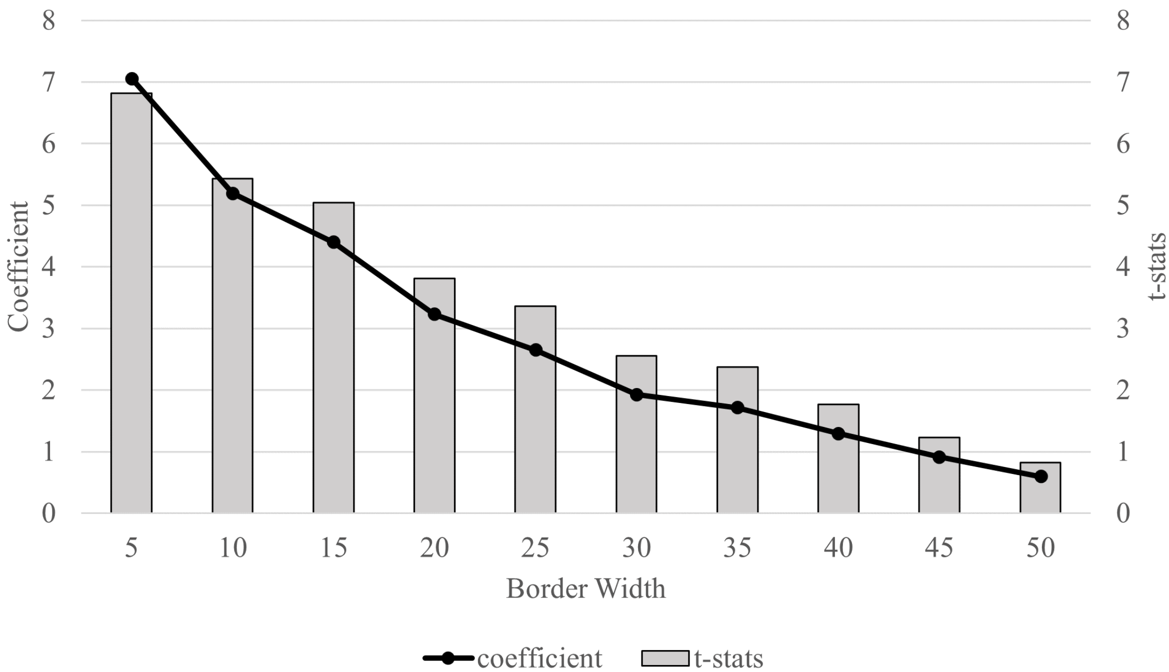


Figure 5. Sensitivity of Border Thresholds on Main Results

These figures illustrate the sensitivity of the coefficient $HighIBJ \times Post$ from Equation 4 across different border widths. Each border width represents the percentage of the grid length of the middle box in each dimension (i.e., mid-cap for the size dimension and blend for the value dimension). Panel A reports coefficient estimates with the corresponding t-statistics for different border widths. Panel B reports the proportion of funds with $HighIBJ = 1$ across different border widths.

Panel A. Coefficient Estimates by Border Width



Panel B. Proportion of *HighIBJ* Funds by Border Width

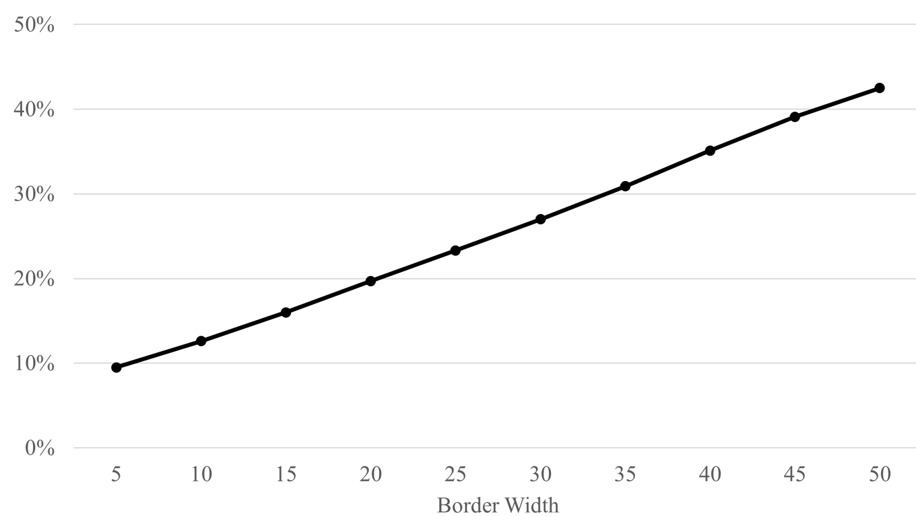


Figure 6. **Fund Flow Driven by Box Jumping**

This figure illustrates cumulative response of fund flows to changes in fund ratings from the following regression for rating upgrades: $Flow_{i,(q+1,q+\tau)} = \beta_1 \Delta Rating\_BoxJump_{i,q}(Rating\_NoBoxJump_{i,q}) + \Gamma Controls_{i,q} + FundFE + QuarterFE + \epsilon_{i,q}$. $Flow_{(q+1,q+\tau)}$ is $\sum_{\delta=1}^{\tau} flow_{q+\delta}$, which is the cumulative flow during τ quarters after rating changes. $\Delta Rating\_BoxJump$ is the change in ratings associated with box jumps. $\Delta Rating\_NoBoxJump$ is the change in ratings not associated with box jumps. The control variables include four quarterly lags of fund flows, decile indicators of cumulative fund returns over the previous 12 quarters, and benchmark-adjusted returns.

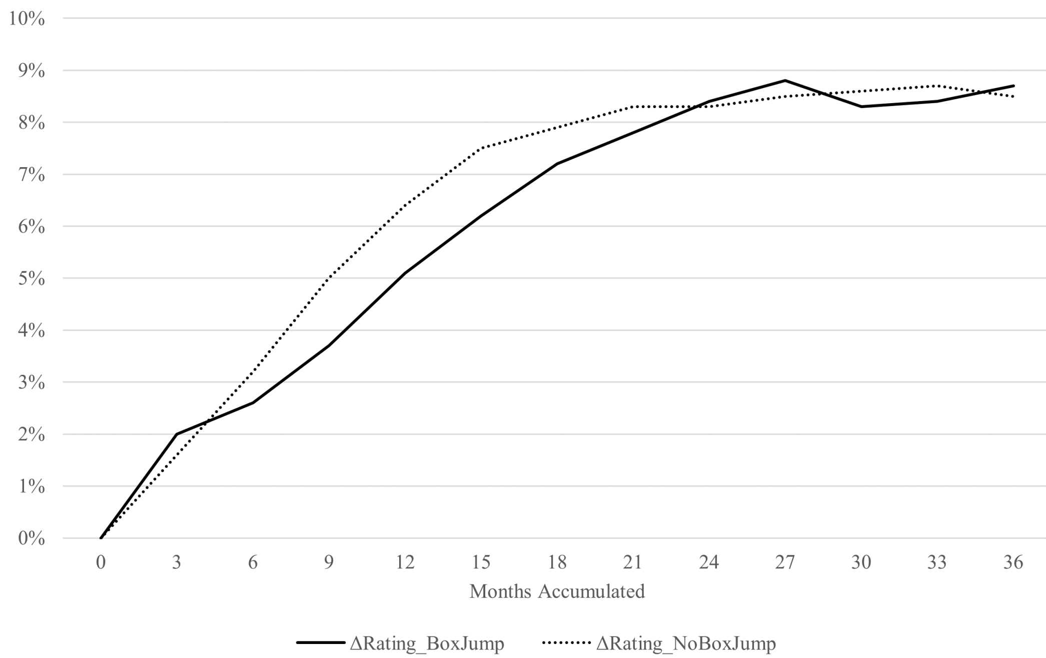
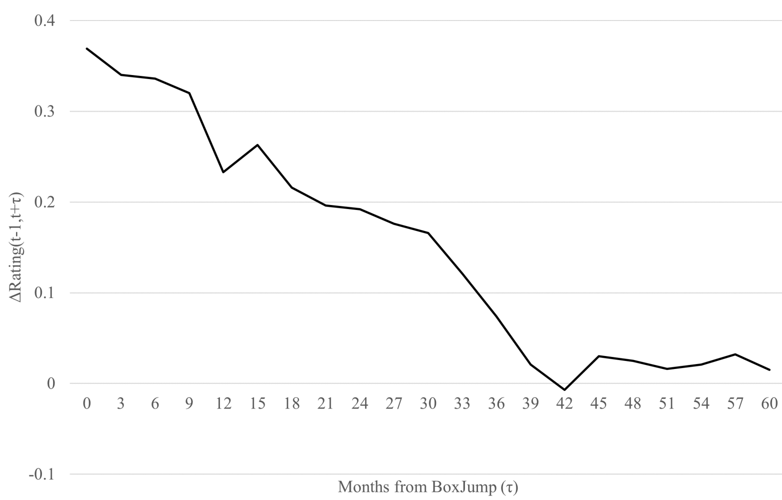


Figure 7. Fund Performance After Box Jumping

This figure plots fund performance after box jumping. Panel A shows reversals in rating upgrades after box jumping. Specifically, it plots the estimates of $BoxJump \times Post$ from the following regression at the fund-quarter level: $\Delta Rating_{i,(q-1,q+\tau)} = \beta_1 BoxJump_{i,q} + \beta_2 BoxJump_{i,q} \times Post_{i,q} + \Gamma Controls_{i,q} + FundFE + QuarterFE + \epsilon_{i,q}$. $\Delta Rating_{(q-1,q+\tau)}$ is the change in fund star rating from the previous quarter of the box jumping to τ quarters after the box jumping. $BoxJump$ equals 1 if the fund's box is different from its box in the prior quarter. $Post$ equals 1 for the period starting from the third quarter of 2002. Control variables include $log(netasset)$, exp_ratio, $turn\_ratio$, $log(num\_holdings)$, and $log(age)$. Refer to Appendix A for definitions of control variables. Panel B illustrates the differences in cumulative returns between funds upgraded to five stars with box jumping and those without. Specifically, it plots the estimates of $BoxJump_{i,q}$ from the following regression at the fund-quarter level in the post period: $RawRet\_qtr_{i,(q,q+\tau)} = \beta_1 BoxJump_{i,q} + \Gamma Controls_{i,q} + Box\text{-}QuarterFE + \epsilon_{i,q}$, for fund i upgraded to five stars in quarter q. $RawRet\_qtr_{i,(q,q+\tau)}$ is the cumulative quarterly raw return.

Panel A. Reversion in Rating Upgrades After Box Jumping



Panel B. Return Differences Between Five-Star Funds With and Without Box-Jumping

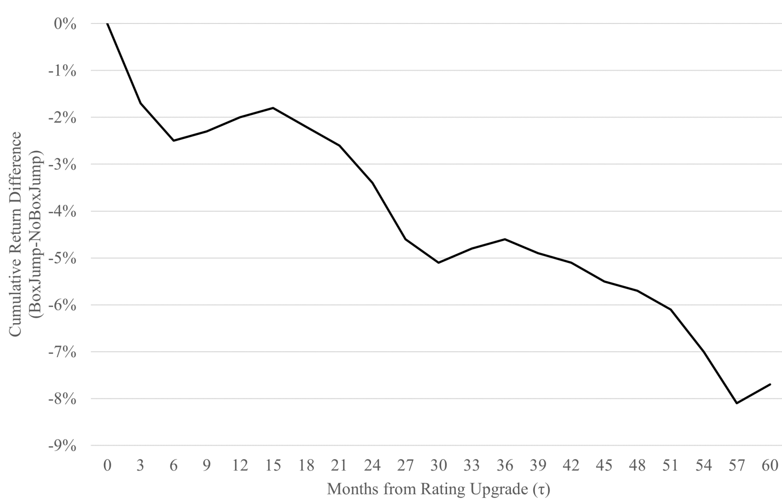


Table 1. Descriptive Statistics for Box Jumping Funds

This table reports descriptive statistics for funds that undergo box jumping (i.e., category changes). Panel A reports statistics for the sample period from 1997 to 2007. Panel B provides statistics for the extended period from 2008 to 2022. Column (1) indicates the year of analysis. Column (2) shows the annual count of box jumps for active funds classified within the nine equity style boxes. Column (3) lists the total number of active funds classified within these nine style boxes each year. Column (4) presents the ratio of the number of box jumps (column (2)) to the total number of active funds (column (3)), expressed as a percentage. Column (5) shows the average of rating changes associated with the funds' box jumping. Column (6) displays the probability of rating upgrades associated with box jumping. Column (7) shows the probability of rating downgrades associated with box jumping. The means of columns (5) to (7) for subsamples of periods, along with their t-statistics, are reported in parentheses. A dotted line demarcates the implementation of the Morningstar rating reform in June 2002.

Panel A. Box Jumping Funds in the Sample Period

(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Rating Changes Associated with Box Jumping		
Year	#Box Jumping Funds	#Funds	% Box Jumping Funds	ΔRating	I(Upgrade)	I(Downgrade)
1997	183	1,444	12.67%	0.009	7.41%	6.48%
1998	211	1,644	12.83%	-0.009	2.80%	3.74%
1999	215	1,853	11.60%	-0.009	7.14%	8.04%
2000	214	2,022	10.58%	0.018	7.69%	5.92%
2001	166	2,116	7.84%	0.051	10.26%	5.13%
2002	278	2,201	12.63%	0.044	28.96%	21.86%
2003	161	2,214	7.27%	0.333	44.05%	19.05%
2004	143	2,232	6.41%	0.225	46.08%	29.97%
2005	134	2,201	6.09%	0.320	52.43%	25.24%
2006	131	2,302	5.69%	0.563	56.25%	15.00%
2007	125	2,270	5.51%	0.443	49.37%	13.92%
			Pre period mean	0.008	6.66%	5.79%
			(1997-–May 2002)	(0.57)	(6.62)	(6.18)
			Post period mean	0.353	48.90%	21.55%
			(July 2002-–2007)	(7.21)	(21.87)	(11.72)

Panel B. Box Jumping Funds in the Longer Period

(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Rating Changes Associated with Box Jumping		
Year	#Box Jumping Funds	#Funds	% Box Jumping Funds	ΔRating	I(Upgrade)	I(Downgrade)
2008	103	2,299	4.48%	0.230	34.43%	11.48%
2009	167	2,180	7.66%	-0.088	13.60%	21.60%
2010	95	1,976	4.81%	0.016	11.11%	7.94%
2011	71	1,942	3.66%	-0.102	16.33%	26.53%
2012	179	1,912	9.36%	0.013	16.78%	16.11%
2013	51	1,852	2.75%	-0.104	8.33%	18.75%
2014	95	1,874	5.07%	0.013	16.88%	15.58%
2015	87	1,900	4.58%	0.135	29.73%	16.22%
2016	83	1,882	4.41%	-0.095	11.11%	22.22%
2017	84	1,830	4.59%	0.106	25.76%	15.15%
2018	97	1,798	5.39%	0.270	38.10%	12.70%
2019	84	1,751	4.80%	0.104	40.26%	31.17%
2020	47	1,698	2.77%	0.651	60.47%	23.26%
2021	120	1,622	7.40%	0.802	63.54%	18.75%
2022	57	1,610	3.54%	0.477	47.73%	18.18%
		Period mean		0.153	27.75%	17.94%
		(2008-–2022)		(5.68)	(20.37)	(15.37)
		Recent five years mean		0.487	51.27%	20.70%
		(2018–2022)		(6.73)	(18.15)	(9.04)

Table 2. Box Jumping and Rating Changes

This table reports estimates from the following regression at the fund-quarter level: $\Delta Rating_{i,q}(\Delta Rank_{i,q}, I(Upgrade)_{i,q}, I(Downgrade)_{i,q}) = \beta_1 BoxJump_{i,q} + \beta_2 BoxJump_{i,q} \times Post_{i,q} + \Gamma Controls_{i,q} + FundFE + QuarterFE + \epsilon_{i,q}$. $\Delta Rating$ is the quarterly change in fund star rating. $\Delta Rank$ is the quarterly change in fund ranking. $I(Upgrade)$ is an indicator variable that equals 1 if the fund's rating has increased compared to the previous quarter. $I(Downgrade)$ is an indicator variable that equals 1 if the fund's rating has decreased compared to the previous quarter. *BoxJump* equals 1 if the fund's box is different from its box in the prior quarter. *Post* equals 1 for the period starting from the third quarter of 2002. Refer to Appendix A for definitions of control variables. F-test statistics and the corresponding p-values are provided. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1) $\Delta Rating$	(2) $\Delta Ranking$	(3) $I(Upgrade)$	(4) $I(Downgrade)$
$BoxJump$	0.019	0.065	0.010	-0.027
	(0.68)	(0.02)	(0.70)	(-1.56)
$BoxJump \times Post$	0.369***	9.389**	0.398***	0.108***
	(4.34)	(2.51)	(11.03)	(2.89)
$log(netasset)$	-0.052***	-1.216***	-0.027***	0.021***
	(-4.52)	(-4.72)	(-5.21)	(3.57)
exp_ratio	-2.662	-6.752*	-1.170	1.355
	(-1.46)	(-1.96)	(-1.20)	(1.42)
$turn\_ratio$	-0.015**	-0.557***	-0.005	0.012**
	(-2.41)	(-3.06)	(-1.28)	(2.27)
$log(num\_holdings)$	0.011	0.202	-0.006	-0.018**
	(1.04)	(0.87)	(-1.09)	(-2.30)
$log(age)$	0.032*	1.285	0.003	-0.030**
	(1.69)	(0.95)	(0.25)	(-2.20)
FE	Fund, YQ	Fund, YQ	Fund, YQ	Fund, YQ
N	45,312	45,312	45,312	45,312
R-sq	0.032	0.041	0.019	0.009
			(3) $BoxJump \times Post =$ (4) $BoxJump \times Post$	
F-test stats			33.45***	
p-value			(0.000)	

Table 3. Incentive to Box Jump and Style Drift

This table reports estimates from the following regression at the fund-quarter level: $StyleDrift_{i,q} = \beta_1 HighIBJ_{i,q} + \beta_2 LowIBJ_{i,q} + \beta_3 HighIBJ_{i,q} \times Post_{i,q} + \beta_4 LowIBJ_{i,q} \times Post_{i,q} + \Gamma Controls_{i,q} + Box\text{-}QuarterFE + \epsilon$. $StyleDrift$ is the degree of portfolio style drift towards the new box measured as in Eq. (3). $HighIBJ$ is an indicator variable that equals 1 for funds in the border of boxes (refer to Figure 3 for visual illustrations) and would receive a favorable rating in the new box in either size or value-growth dimension. $LowIBJ$ is an indicator variable that equals 1 for funds in the border of boxes (refer to Figure 3 for visual illustrations) and would receive an unfavorable rating in the new box in either size or value-growth dimension. $Post$ equals 1 for the period starting from the third quarter of 2002. Column (1) reports the results regarding all dimensions as illustrated in subsection 3.2. Column (2) reports the result for the size dimension, using $StyleDrift\_Size$, $HighIBJ\_Size$, and $LowIBJ\_Size$. Column (3) reports the result for the value dimension, using $StyleDrift\_Value$, $HighIBJ\_Value$, and $LowIBJ\_Value$. Refer to Appendix A for definitions of control variables. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Dimension	(1) All $StyleDrift$	(2) Size $StyleDrift\_Size$	(3) Value $StyleDrift\_Value$
$HighIBJ$	0.197	-0.504	-0.327
	(0.46)	(-1.40)	(-0.87)
$LowIBJ$	0.326	-0.333	0.088
	(0.85)	(-0.89)	(0.21)
$HighIBJ \times Post$	3.228***	4.434***	3.474***
	(3.81)	(4.75)	(3.95)
$LowIBJ \times Post$	-2.926***	-5.668***	1.278
	(-2.94)	(-5.54)	(1.15)
$log(netasset)$	-0.513***	-0.265**	-0.254***
	(-3.40)	(-2.63)	(-2.75)
exp_ratio	-85.841	-29.378	-57.216
	(-1.47)	(-1.00)	(-1.22)
$turn\_ratio$	0.121	0.262	-0.069
	(0.30)	(0.97)	(-0.24)
$log(num\_holdings)$	0.720**	0.220	0.490**
	(2.08)	(0.91)	(2.14)
$log(age)$	0.671**	0.730***	0.004
	(2.30)	(3.88)	(0.02)
FE	Box×YQ	Box×YQ	Box×YQ
N	45,312	45,312	45,312
R-sq	0.229	0.211	0.281

Table 4. Incentive to Box Jump and Actual Box Jump

This table reports estimates from the following regression at the fund-quarter level: $BoxJump_{i,q+\tau} = \beta_1 HighIBJ_{i,q} + \beta_2 LowIBJ_{i,q} + \beta_3 HighIBJ_{i,q} \times Post_{i,q} + \beta_4 LowIBJ_{i,q} \times Post_{i,q} + \Gamma Controls_{i,q} + Box\text{-}QuarterFE + \epsilon_{i,q}$. $BoxJump_{q+\tau}$ is an indicator variable equal to 1 if the fund box jumps between $q+\tau-1$ and $q+\tau$. $HighIBJ$ is an indicator variable that equals 1 for funds in the border of boxes (refer to Figure 3 for visual illustrations) and would receive a favorable rating in the new box in either size or value-growth dimension. $LowIBJ$ is an indicator variable that equals 1 for funds in the border of boxes (refer to Figure 3 for visual illustrations) and would receive an unfavorable rating in the new box in either size or value-growth dimension. $Post$ equals 1 for the period starting from the third quarter of 2002. Columns (2)–(4) include additional control variables which are $HighIBJ_{i,q+\tau-1}$, $LowIBJ_{i,q+\tau-1}$, $HighIBJ_{i,q+\tau-1} \times Post_{i,q}$, and $LowIBJ_{i,q+\tau-1} \times Post_{i,q}$ (denoted as $PreviousIBJ$) in order to control for the difference in incentives to jump box between quarters q and $q+\tau$. Refer to Appendix A for definitions of control variables. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1) $BoxJump_{q+1}$	(2) $BoxJump_{q+2}$	(3) $BoxJump_{q+3}$	(4) $BoxJump_{q+4}$
$HighIBJ$	0.003	0.001	0.002	-0.000
	(1.61)	(0.27)	(0.63)	(-0.05)
$LowIBJ$	0.006*	0.005	0.002	0.003
	(1.74)	(1.54)	(0.46)	(0.80)
$HighIBJ \times Post$	0.028***	0.015**	0.014***	0.016***
	(3.42)	(2.12)	(2.74)	(3.06)
$LowIBJ \times Post$	0.009	0.005	0.007	0.005
	(1.29)	(0.89)	(1.43)	(1.09)
$log(netasset)$	-0.001***	-0.001**	-0.001***	-0.001**
	(-3.72)	(-2.21)	(-2.84)	(-2.59)
exp_ratio	0.253	0.371*	0.179	0.196
	(1.51)	(1.90)	(1.07)	(0.96)
$turn\_ratio$	0.001	0.002	0.000	0.001
	(1.29)	(1.68)	(0.13)	(0.49)
$log(num\_holdings)$	-0.003***	-0.002*	-0.002*	-0.002*
	(-2.98)	(-1.80)	(-1.70)	(-1.72)
$log(age)$	-0.003**	0.000	0.000	0.001
	(-2.44)	(0.54)	(0.73)	(0.97)
$PreviousIBJ$	No	Yes	Yes	Yes
$PreviousIBJ \times post$	No	Yes	Yes	Yes
FE	Box×YQ	Box×YQ	Box×YQ	Box×YQ
N	45,312	45,312	45,312	45,312
R-sq	0.037	0.049	0.048	0.047

Table 5. Cross-Sectional Variations in Box Jumping

This table reports estimates from regressions regarding the impact of fund or fund manager characteristics on box jumping for observations in the post period. Panel A reports regressions of box jumping on fund or fund manager characteristics. $BoxJump_{q+1}$ is an indicator variable that equals 1 if the fund box jumps between quarters q and $q+1$. $BoxJump^{Up}_{q+1}$ is an indicator variable that equals 1 if the fund box jumps with rating upgrades between quarters q and $q+1$. Panel B reports regressions of portfolio style drift on fund or fund manager characteristics. $PastJumper$ is an indicator variable that equals 1 if the fund is managed by a manager who previously engaged in box jumps with rating upgrades in other funds, and 0 otherwise. $Tenure$ is the quintile of the average years of tenure of fund managers in the given fund within each quarter. $Career$ is the quintile of the average years of fund managing career of fund managers, including previous tenure in other funds, within each quarter. $FamNeighbor$ is the quintile of the number of funds within the same fund family that in the adjacent style boxes, scaled by the number of funds within the same fund family in the focal fund's style box, within each quarter. $BoxName$ is an indicator variable that equals 1 if the fund's name includes words indicative of style boxes, and 0 otherwise. $BoxFlow$ is an indicator variable that equals 1 if the box-aggregated fund flow of the fund's adjacent style box is larger than the fund's style box, and 0 otherwise. $PastRet_{box}$ is the quintile of a fund's past three-year return within each style box and quarter. $PastRet_{fam}$ is the quintile of a fund's past three-year return within each fund family and quarter. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Panel A. Box Jumping and Fund or Manager Characteristics

	(1)	(2)	(3)	(4)
	$BoxJump_{q+1}$	$BoxJump_{q+1}$	$BoxJump^{Up}_{q+1}$	$BoxJump^{Up}_{q+1}$
$PastJumper$	0.004**	0.004**	0.005**	0.005**
	(2.24)	(2.30)	(2.57)	(2.63)
$Tenure$	-0.001**	-0.001**	-0.001*	-0.001**
	(-2.15)	(-2.19)	(-2.05)	(-2.33)
$Career$	0.001*	0.001*	0.001***	0.001***
	(1.87)	(1.82)	(3.03)	(2.99)
$FamNeighbor$	-0.002***	-0.001**	-0.001**	-0.001*
	(-2.90)	(-2.26)	(-2.42)	(-1.78)
$BoxName$	-0.004**	-0.004**	-0.003*	-0.003*
	(-2.13)	(-2.13)	(-1.82)	(-1.83)
$BoxFlow$	0.022***	0.022***	0.018***	0.018***
	(3.88)	(3.88)	(3.25)	(3.23)
$PastRet_{box}$	-0.001*		-0.001**	
	(-2.05)		(-2.69)	
$PastRet_{fam}$		-0.002***		-0.002***
		(-3.05)		(-3.59)
Controls	Yes	Yes	Yes	Yes
FE	Box×YQ	Box×YQ	Box×YQ	Box×YQ
N	29,733	29,733	29,733	29,733
R-sq	0.019	0.020	0.020	0.020

Panel B. Portfolio Style Drifts and Fund or Manager Characteristics

	(1) $StyleDrift$	(2) $StyleDrift$	(3) $StyleDrift$	(4) $StyleDrift$	(5) $StyleDrift$
$HighIBJ$	3.010***	-3.106*	5.694***	4.945***	2.621***
	(3.85)	(-1.89)	(4.12)	(4.32)	(3.04)
$LowIBJ$	-2.582**	0.577	-4.010**	-2.995**	-1.971*
	(-2.47)	(0.28)	(-2.42)	(-2.09)	(-2.04)
$HighIBJ \times PastJumper$	3.827**				
	(2.30)				
$LowIBJ \times PastJumper$	0.254				
	(0.12)				
$HighIBJ \times Tenure$		0.734			
		(1.28)			
$LowIBJ \times Tenure$		0.978			
		(1.33)			
$HighIBJ \times Career$		1.407**			
		(2.63)			
$LowIBJ \times Career$		-2.042***			
		(-2.88)			
$HighIBJ \times FamNeighbor$			-0.817*		
			(-1.81)		
$LowIBJ \times FamNeighbor$			0.552		
			(1.08)		
$HighIBJ \times Boxname$				-2.861**	
				(-2.12)	
$LowIBJ \times Boxname$				0.620	
				(0.38)	
$HighIBJ \times BoxFlow$					2.700**
					(2.11)
$HighIBJ \times BoxFlow$					1.585
					(1.44)
Main variable	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
FE	Box×YQ	Box×YQ	Box×YQ	Box×YQ	Box×YQ
N	29,733	29,733	29,733	29,733	29,733
R-sq	0.149	0.152	0.149	0.152	0.149

Table 6. Box Jumping and Fund Flows

This table reports estimates from the regression of fund flows on box jumping and rating changes at the fund-quarter level. $Flow_{(q+1,q+4)}$ is $\sum_{\tau=1}^{4} flow_{q+\tau}$, which is the cumulative fund flow over four quarters following a rating change. $\Delta Rating$ is the change in ratings from the prior quarter. $\Delta Rating\_BoxJump$ is the rating change associated with box jumping. $\Delta Rating\_NoBoxJump$ is the change in ratings not associated with box jumping. $Upgrade\_BoxJump$ is an indicator variable that equals 1 for rating upgrades associated with box jumping. $Upgrade\_NoBoxJump$ is an indicator variable that equals 1 for rating upgrades not associated with box jumping. The control variables include 12 quarterly lags of fund flows, decile indicators of the previous 12-quarter cumulative fund returns, and the previous 12-quarter cumulative benchmark-adjusted returns. F-test statistics and the corresponding p-values are provided. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1) $Flow_{q+1,q+4}$	(2) $Flow_{q+1,q+4}$	(3) $Flow_{q+1,q+4}$
$\Delta Rating$	0.063***		
	(7.85)		
$\Delta Rating\_BoxJump$		0.050**	
		(2.12)	
$\Delta Rating\_NoBoxJump$		0.064***	
		(7.96)	
$Upgrade\_BoxJump$			0.067**
			(2.01)
$Upgrade\_NoBoxJump$			0.072***
			(7.59)
Control	Yes	Yes	Yes
FE	Fund, YQ	Fund, YQ	Fund,YQ
N	45,132	45,132	45,132
R-sq	0.405	0.405	0.403
$Rating\_BoxJump$=$Rating\_NoBoxJump$			
F-test stats.		0.01	0.02
p-value		(0.929)	(0.878)

Table 7. Box Jumping and Fund Fees

This table reports the estimates from the regression of management fee on fund box jumping and fund rating changes from the regressions of fund fee on box jumping and rating upgrades at the fund-quarter level. $Fee_{q+1,q+4}$ is fund management fee scaled by the total asset under management in percentage over four quarters following a rating change. $\Delta Rating$ is the change in ratings from the prior quarter. $\Delta Rating\_BoxJump$ is the rating change associated with box jumping. $\Delta Rating\_NoBoxJump$ is the change in ratings not associated with box jumping. $Upgrade\_BoxJump$ is an indicator variable that equals 1 for rating upgrades associated with box jumping. $Upgrade\_NoBoxJump$ is an indicator variable that equals 1 for rating upgrades not associated with box jumping. The control variables include $log(netasset)$, $turn\_ratio$, $num\_holdings$, and age. Refer to Appendix A for definitions of control variables. F-test statistics and the corresponding p-values are provided. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1) $Fee_{q+1,q+4}$	(2) $Fee_{q+1,q+4}$	(3) $Fee_{q+1,q+4}$
$\Delta Rating$	0.006***		
	(3.21)		
$\Delta Rating\_BoxJump$		0.013**	
		(2.36)	
$\Delta Rating\_NoBoxJump$		0.005***	
		(2.79)	
$Upgrade\_BoxJump$			0.033***
			(2.68)
$Upgrade\_NoBoxJump$			0.012***
			(3.72)
Control	Yes	Yes	Yes
FE	Fund, YQ	Fund, YQ	Fund, YQ
N	45,132	45,132	45,132
R-sq	0.830	0.830	0.830
$Rating\_BoxJump$=$Rating\_NoBoxJump$			
F-test stats.		2.10	2.67
p-value		(0.155)	(0.110)

Table 8. Portfolio Style Drifts and Stock Performance

This table reports estimates from the following regression for the flagged funds at the fund-quarter-stock level: $StockRet\_qtr_{i,j,q+1} = \beta_1 Buy(Sell)\_(No)BoxJump_{i,j,q} + \Gamma Controls i, j, q + Fund\text{-}Quarter FE + Stock FE + \epsilon_{i,j,q}$. $Ret\_qtr_{i,j,q+1}$ is the quarterly stock return in percentage in the following quarter of stock j, fund i. Panel A reports results for the bought stocks. $Buy_{BoxJump}$ is an indicator variable that equals 1 if there is an increase in the stock position for stocks aligned with box jumping by the fund. $Buy_{NoBoxJump}$ is an indicator variable that equals 1 if there is an increase in the stock position for stocks not aligned with box jumping by the fund. Panel B reports results for sold stocks. $Sell_{BoxJump}$ is an indicator variable that equals 1 if there is a decrease in the stock position, where the selling of the stock is aligned with box jumping by the fund. $Sell_{NoBoxJump}$ is an indicator variable that equals 1 if there is a decrease in the stock position, where the selling of the stock is not aligned with box jumping by the fund. The flagged funds are defined as funds with $HighIBJ = 1$ and $StyleDrift > 0$. The control variables include *size*, *btm*, $ret_{1,0}$, and $ret_{12,2}$. Refer to Appendix A for definitions of control variables. The sample period is from 2002Q3 to 2007Q4. The flagged funds are defined as funds with $HighIBJ = 1$ and $StyleDrift > 0$. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Panel A. Stock Returns of Aligned and Unaligned Buys

	(1) $StockRet\_qtr_{i,j,q+1}$	(2) $StockRet\_qtr_{i,j,q+1}$	(3) $StockRet\_qtr_{i,j,q+1}$	(4) $StockRet\_qtr_{i,j,q+1}$
Buy_BoxJump	-0.880***	-0.616***		
	(-4.22)	(-3.47)		
Buy_NoBoxJump			0.813***	0.554***
			(4.14)	(3.06)
Controls	No	Yes	No	Yes
FE	Fund×YQ, Stock	Fund×YQ, Stock	Fund×YQ, Stock	Fund×YQ, Stock
N	395,397	395,397	395,397	395,397
R-sq	0.253	0.274	0.253	0.274

Panel B. Stock Returns of Aligned and Unaligned Sells

	(1) $StockRet\_qtr_{i,j,q+1}$	(2) $StockRet\_qtr_{i,j,q+1}$	(3) $StockRet\_qtr_{i,j,q+1}$	(4) $StockRet\_qtr_{i,j,q+1}$
Sell_BoxJump	0.572***	0.417**		
	(3.65)	(2.76)		
Sell_NoBoxJump			-1.239***	-0.715***
			(-5.70)	(-3.95)
Controls	No	Yes	No	Yes
FE	Fund×YQ, Stock	Fund×YQ, Stock	Fund×YQ, Stock	Fund×YQ, Stock
N	395,397	395,397	395,397	395,397
R-sq	0.253	0.274	0.253	0.274

Table 9. **Box Jumping and Fund Performance**

This table reports estimates from the following regression for the flagged funds at the fund-quarter level: $RawRet(CAPMRet)\_qtr_{i,q+1} = \beta_1 Flag_{i,q-1} + FundFE + QuarterFE + \epsilon_{i,q}$. $RawRet(CAPMRet)\_qtr_{i,q+1}$ is the quarterly raw return (CAPM excess return) in percentage in the following quarter of fund i. CAPM excess return is measured based on 36-month window regression. The flagged funds are defined as funds with $HighIBJ = 1$ and $StyleDrift > 0$. The sample period is from 2002Q3 to 2007Q4. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1)	(2)
	$RawRet\_qtr_{i,q+1}$	$CAPMRet\_qtr_{i,q+1}$
$Flag_{i,t-1}$	-0.213***	-0.209***
	(-2.67)	(-2.64)
FE	Fund, YQ	Fund, YQ
N	29,733	29,733
R-sq	0.774	0.125

Table 10. Box Jumping and Spillover to other Funds

This table reports estimates from the following regression at the fund-quarter level: $\Delta Rating_{i,q} = \beta_1 Flag\_ratio_{q-\tau} + \beta_2 Flag\_ratio_{q-\tau} \times Post_{i,q} + \Gamma Controls_{i,q} + FundFE + QuarterFE + \epsilon_{i,q}$. $\Delta Rating_{i,q}$ is the quarterly change in fund star rating of incumbent funds in the new box. $Flag\_ratio_{q-\tau}$ is the number of funds style drifting towards the new box per box jumping incentives ($HighIBJ = 1$ and $StyleDrift > 0$) scaled by the total number of funds in the new box. $Post$ equals 1 for the period starting from the third quarter of 2002. Control variables include $log(netasset), exp\_ratio, turn\_ratio, log(num\_holdings)$, and $log(age)$. Refer to Appendix A for definitions of control variables. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1)	(2)	(3)	(4)
τ (lag of Flag_ratio)	q-1	q-2	q-3	q-4
	$\Delta Rating$	$\Delta Rating$	$\Delta Rating$	$\Delta Rating$
$Flag\_ratio_{q-\tau}$	0.005	-0.012	-0.036	-0.025
	(0.07)	(-0.18)	(-0.56)	(-0.45)
$Flag\_ratio_{q-\tau} \times Post$	-0.286**	-0.198*	-0.179*	-0.111
	(-2.26)	(-1.90)	(-1.91)	(-1.23)
Controls	Yes	Yes	Yes	Yes
FE	Fund, YQ	Fund, YQ	Fund, YQ	Fund, YQ
N	45,132	45,132	45,132	45,132
R-sq	0.039	0.039	0.038	0.039

Online Appendix

Box Jumping: Portfolio Recompositions to Achieve Higher Morningstar Ratings

Lauren Cohen
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Figure OA-1. Proportion of Trade-Driven Style Drifts

This figure illustrates the proportion of trade-driven style drifts relative to total style drifts for box jumping funds. We decompose changes in style scores over the past four quarters prior to box jumping into two components: trade-driven changes and non-trade-driven changes. Non-trade-driven changes are calculated under the assumption that the fund's portfolio composition remains constant over the past four quarters. Trade-driven changes are derived as the residual. Specifically, for each stock j held by each fund in quarter q, the total changes in style scores are $\Delta StyleScore_{q-4,q} = \frac{\sum_j (StockStyle_{jq} \times StockPrice_{jq} \times StockShare_{jq})}{\sum_j (StockPrice_{jq} \times StockShare_{jq})} - \frac{\sum_j (StockStyle_{jq-4} \times StockPrice_{jq-4} \times StockShare_{jq-4})}{\sum_j (StockPrice_{jq-4} \times StockShare_{jq-4})}$. Non-trade-driven changes are $\Delta StyleScore^{NonTrade}_{q-4,q} = \frac{\sum_j (StockStyle_{jq} \times StockPrice_{jq} \times StockShare_{jq-4})}{\sum_j (StockPrice_{jq} \times StockShare_{jq-4})} - \frac{\sum_j (StockStyle_{jq-4} \times StockPrice_{jq-4} \times StockShare_{jq-4})}{\sum_j (StockPrice_{jq-4} \times StockShare_{jq-4})}$. Trade-driven changes are $\Delta StyleScore^{Trade}_{q-4,q} = \Delta StyleScore_{q-4,q} - \Delta StyleScore^{NonTrade}_{q-4,q}$. We plot mean $\Delta StyleScore^{Trade}_{q-4,q}$ and $\Delta StyleScore^{NonTrade}_{q-4,q}$ scaled by $\Delta StyleScore_{q-4,q}$ separately for favorable and unfavorable box-jumping funds.

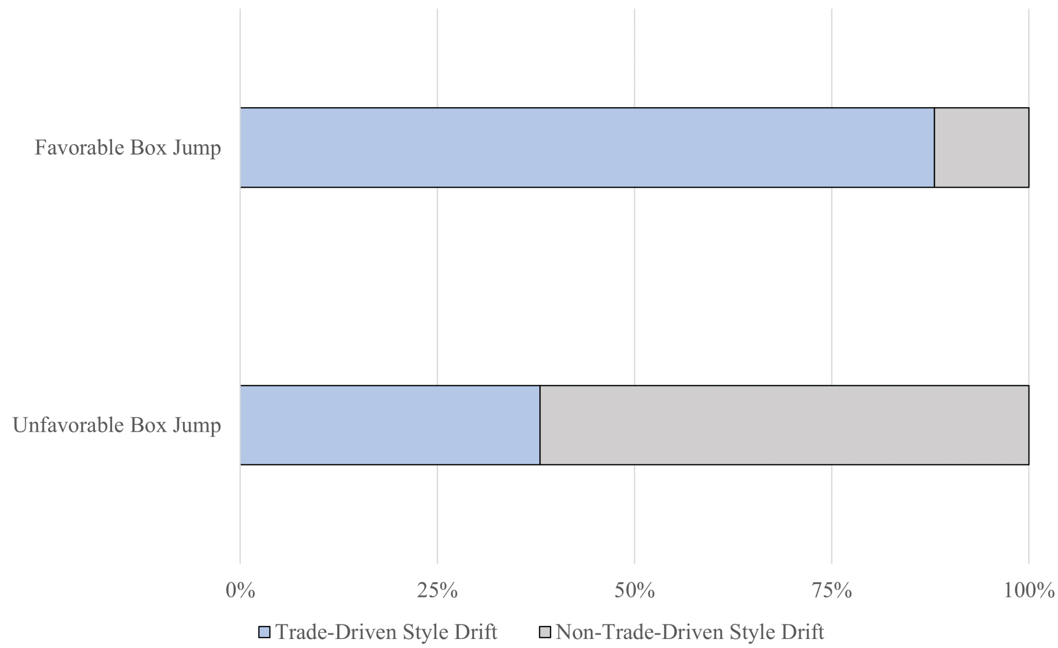

Table OA-1. Incentive to Box Jump and Changes in Portfolio

This table reports estimates from the following regression at the fund-quarter level: $Trade_{i,q} = \beta_1 HighIBJ_{i,q} + \beta_2 LowIBJ_{i,q} + \beta_3 HighIBJ_{i,q} \times Post_{i,q} + \beta_4 LowIBJ_{i,q} \times Post_{i,q} + \Gamma Controls_{i,q} + Box\text{-}QuarterFE + \epsilon$. $Trade\_BoxJump_{i,q}$ is the market value of stocks bought or sold between quarters q and $q+1$, in which the trade is aligned with box jumping, scaled by the fund's total net assets. $Trade\_NoBoxJump_{i,q}$ is the market value of stocks bought or sold between quarters q and $q+1$, in which the trade is not aligned with box jumping, scaled by the fund's total net assets. $HighIBJ$ is an indicator variable that equals 1 for funds in the border of boxes (refer to Figure 3 for visual illustrations) and would receive a favorable rating in the new box in either size or value-growth dimension. $LowIBJ$ is an indicator variable that equals 1 for funds in the border of boxes (refer to Figure 3 for visual illustrations) and would receive an unfavorable rating in the new box in either size or value-growth dimension. $Post$ equals 1 for the period starting from the third quarter of 2002. Refer to Appendix A for definitions of control variables. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1) $Trade\_BoxJump$	(2) $Trade\_NoBoxJump$
$HighIBJ$	0.001	-0.000
	(1.63)	(-0.82)
$LowIBJ$	0.000	0.000
	(0.38)	(1.40)
$HighIBJ \times Post$	0.010***	0.000
	(4.27)	(0.20)
$LowIBJ \times Post$	-0.000	0.002***
	(-0.17)	(3.99)
Controls	Yes	Yes
FE	Box×YQ	Box×YQ
N	45,312	45,312
R-sq	0.229	0.211

Table OA-2. Box Jumping and Rating Changes in the Longer Sample

This table reports estimates from the following regression at the fund-quarter level for the period from 1997 to 2022: $\Delta Rating(\Delta Rank, I(Upgrade), I(Downgrade) = \beta_1 BoxJump + \beta_2 BoxJump \times Post + \Gamma Controls + FundFE + QuarterFE + \epsilon$. $\Delta Rating$ is the quarterly change in fund star rating. $\Delta Rank$ is the quarterly change in fund ranking. $I(Upgrade)$ is an indicator variable that equals 1 if the fund's rating has increased compared to the previous quarter. $I(Downgrade)$ is an indicator variable that equals 1 if the fund's rating has decreased compared to the previous quarter. *BoxJump* is an indicator variable that equals 1 if the fund's category is different from its category in the prior quarter. *Post* equals 1 for the period starting from the third quarter of 2002. Refer to Appendix A for definitions of control variables. F-test statistics and the corresponding p-value are provided. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1) $\Delta Rating$	(2) $\Delta Ranking$	(3) $I(Upgrade)$	(4) $I(Downgrade)$
$BoxJump$	0.019	0.019	0.007	-0.029
	(0.71)	(0.01)	(0.51)	(-1.56)
$BoxJump \times Post$	0.225***	6.901**	0.238***	0.098***
	(3.65)	(1.99)	(6.53)	(3.99)
Control	Yes	Yes	Yes	Yes
FE	Fund, YQ	Fund, YQ	Fund, YQ	Fund, YQ
N	127,775	127,775	127,775	127,775
R-sq	0.075	0.067	0.018	0.015
			(3) $BoxJump \times Post =$ (4) $BoxJump \times Post$	
F-test stats			15.17***	
p-value			(0.000)	

Table OA-3. Incentive to Box Jump and Style Drift in the Longer Sample

This table reports estimates from the following regression at the fund-quarter level for the period between 1997 and 2022: $StyleDrift = \beta_1 HighIBJ + \beta_2 LowIBJ + \beta_3 HighIBJ \times Post + \beta_4 LowIBJ \times Post + \Gamma Controls + Category\text{-}QuarterFE + \epsilon$. $StyleDrift$ is the degree of portfolio style drift towards the new category measured as in Equation 3. $HighIBJ$ equals 1 for funds in the border of categories (refer to Figure 3 for visual illustrations) and would receive a favorable rating in the new category in either size or value-growth dimension. $LowIBJ$ equals 1 for funds in the border of categories (refer to Figure 3 for visual illustrations) and would receive an unfavorable rating in the new category in either size or value-growth dimension. $Post$ equals 1 for the period starting from the third quarter of 2002. Column (1) reports the result regarding all dimensions as illustrated in subsection 3.2. Column (2) reports the result for the size dimension, using $StyleDrift\_Size$, $HighIBJ\_Size$, and $LowIBJ\_Size$. Column (3) reports the result for the value dimension, using $StyleDrift\_Value$, $HighIBJ\_Value$, and $LowIBJ\_Value$. Refer to Appendix A for definitions of control variables. All continuous variables are winsorized at the 1st and 99th percentiles. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1)	(2)	(3)
Dimension	All	Size	Value
	$StyleDrift$	$StyleDrift\_Size$	$StyleDrift\_Value$
$HighIBJ$	0.409	-0.122	-0.287
	(0.99)	(-0.37)	(-0.86)
$LowIBJ$	0.668	-0.044	0.240
	(1.43)	(-0.13)	(0.62)
$HighIBJ \times Post$	1.47***	2.712***	1.559***
	(2.41)	(4.09)	(2.79)
$LowIBJ \times Post$	-2.16***	-1.941***	-1.084*
	(-3.61)	(-3.29)	(-1.80)
Controls	Yes	Yes	Yes
FE	Box×YQ	Box×YQ	Box×YQ
N	127,775	127,775	127,775
R-sq	0.206	0.233	0.281

Table OA-4. Falsification Tests on Passive Funds

This table reports regressions using models in key columns of Table 2 and Table 3 using the sample of passive funds in the original sample period, from 1997 to 2007. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively. *, **, *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

	(1) $\Delta Rating$	(2) $StyleDrift$
$BoxJump$	0.074	
	(0.32)	
$BoxJump \times Post$	0.056	
	(0.17)	
$HighIBJ$		-0.652
		(-0.82)
$LowIBJ$		0.167
		(0.20)
$HighIBJ \times Post$		0.771
		(0.38)
$LowIBJ \times Post$		-1.029
		(-0.44)
Controls	Yes	Yes
FE	Fund, YQ	Box×YQ
N	6,778	6,778
R-sq	0.006	0.284