Is there an Incentive for Active Retail Mutual Funds to Closet Index in Down Markets? Fund Performance and Subsequent Annual Fund Flows between 1997 and 2011

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1. Introduction

Closet indexing is the practice of staying close to the benchmark index while still maintaining to be an active mutual fund manager and probably also charging fees similar to those of truly active managers.[1] Petajisto (2013) finds that during the down markets of 2000-2002 and 2008, active mutual fund managers were much more likely to closet index than during periods when markets were up or flat. He shows that in the down markets of 2000-2002 and 2008 closet indexing peaked, becoming so popular that it accounted for about a third of all mutual fund assets during these time periods.[2]

What is the incentive for active funds to closet index during down markets? According to Petajisto it is that underperforming the benchmark is particularly painful in a down markets when everyone is suffering losses, as opposed to an up market where the investors are still making money.[3] Consequently a fund that underperforms in a down market will have lower net flows than a closet indexer. These losses in flows can cause the managers' compensation to fall as it is often tied to size of the net assets of the fund, or worse, cause the manager to be fired. To avoid these consequences it is in the manager's interest to closet index during down markets.

Of course such behavior among fund managers is not in the interest of fund shareholders. The costs to investors of this behavior are many. First, there is deception as some so-called actively managed funds are not active. Second, investors are paying higher fees for an "index" fund. Indeed, the difference in fees between closet index funds and true index funds is usually around one to two percent a year and in some cases more. Third, one of the benefits of truly actively managed mutual funds is that they tend to beat their benchmark indexes during down markets. Indeed, over the period 1980-2009, Sun, Wang and Zheng (2009) find that the most active funds outperform the least active ones by 4.5 to 6.1 percent per year in down markets after adjusting for risk and expenses. Hence, in down markets--the very time that fund managers closet index--investors are losing one of the great benefits of active management.[4]

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[1] Petajisto (2013), p. 10.

[2] Petajisto (2013), figure 5, p. 46

[3] Petajisto (2013), p. 14

[4] Kosowski (2011) also finds similar results.

Finally, outperformance in down markets should be, in a way, more attractive to investors than outperformance in up markets. When a fund outperforms in a down market it means that its investors are doing relatively better than they would by similarly outperforming the benchmark in an up market. To understand this better consider two situations. First, take a year where the Standard and Poor's 500 index is up 10 percent and your fund is up 15 percent. Second, take a year where the Standard and Poor's 500 index is down 10 percent but your fund is only down five percent. In both scenarios you are beating the index by 500 basis points, but in the down market scenario you have relatively more wealth now than others do as compared to the up market case.[5] As a result, investors should value outperformance more in down markets but again due to more closet indexing in down markets, there is less opportunity for active funds to outperform.

In this paper we set out to answer the question of whether there actually is an incentive for mutual fund managers to closet index during down markets. To do this we examine the relationship between annual *retail* mutual fund performance and subsequent annual fund flows in both up and down markets. We choose retail mutual funds as these funds are primarily used by individual investors who have been shown to be more subject to behavioral biases[6] than institutional investors and because individual investors pay the highest cost for closet indexing as they pay significantly higher fees for active management than institutional investors. We then examine the relationship between fund performance (as measured as the difference between the fund's total returns and the benchmark returns) and the subsequent year's annual flows while controlling for various other factors. We do this for each year from 1997 to 2011.

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[5] For example, if everyone had 1 million dollars and the market went up 10 percent everyone else would have 1,100,000. Since your fund outperformed the index by 5 percent you would have 1,150,000. Hence you would have 1,150,000/1,100,000 -1 = .045 or 4.5 percent more wealth than the average equity investor. Conversely, in a down market, the average investor that started out with 1 million dollars and then experienced a market decline of 10 percent would only have 900,000 dollars. But since your outperforming fund had only a five percent loss you would have 950,000. Hence, in relation to everyone else you would have 950,000/900,000 - 1 = .055 or 5.5 percent more wealth than the average investor. Hence, you should be at least as well off with outperformance in a down market as you are in an up market in terms of relative wealth.

[6] For example, it has been shown by Barber and Odean (2005, 2008, 2011) that institutional investors are not as subject to behavioral biases as are individual investors.

Using this approach we find that the relationship between fund performance and subsequent net fund flows is significantly different in up markets years as compared to down market years.[7] Specifically, we find that fund performance does not drive subsequent flows nearly as much in down markets as it does in up markets. Indeed, in up markets, we find a strong positive relationship between fund performance and subsequent flows; the more a fund outperforms its benchmark the higher the future flows while the more a fund underperforms the benchmark the lower the future fund flows. Conversely, in down years, the magnitude of outperformance or underperformance does not significantly influence the next year's fund flows.

Hence, we find results that are somewhat different from what Petajisto theorizes. Instead of underperformance in down years being particularly painful in terms of future flows, we find that underperformance in down years does not significantly influence future flows. That being said, our results still show that fund managers have an incentive to closet index in down markets. Since neither outperformance nor underperformance is related to subsequent future flows, it is sensible for a manager to closet index during down markets. Indeed, why work hard trying to beat the market when it does not matter for flows?

The rest of the paper is organized as follows. In Section 2 we provide a brief review of the empirical research on fund flows. In Section 3 we discuss our data. In Section 4 we present our methodology and our results and Section 5 concludes the paper.

2. Brief Literature Review of Empirical Research on Mutual Fund Flows

Our paper examines the relationship between outperformance and subsequent fund flows in up and down markets. As a result our paper spans several areas of the literature on mutual funds. Here we very briefly review this literature.

In terms of the relationship between past performance and mutual fund flows, Ippolito (1992), Gruber (1996), Chevalier and Ellison (1997), Sirri and Tufano (1998), Huang, Wei and Yang (2007) all document a convex relationship between past performance and subsequent net flows, where investors reward high performing funds with large increases in flows and yet do not similarly punish funds with poor performance. As a result of this convex flow to performance

[7] Down years are defined by significantly negative annual Standard and Poor's 500 total return index returns (which included dividends). The down market years are 2000, 2001, 2002 and 2008.

relationship, fund managers have an incentive to outperform the market as they will receive higher flows and hence higher compensation. Chevalier and Ellison (1997) and Brown, Harlow and Starks (1996) both document that funds will shift their risk in the last part of the year in order to be at the top of the rankings and hence gain large increases in flows.

More recent research on the relationship between past performance and flows has used purchase and redemption data to re-examine the performance-to-flow relationship. Using different methods and different data, O'Neal (2004), Ivkovic and Weisbenner (2008) and Cashman et al. (2012) all have found that while past winning funds still receive high inflows, *poor performers are punished with redemptions*. Hence, there is some evidence that poor performing funds do pay for the lack of performance in terms of future flows.

While the link between past performance and flows has been well studied, relatively little research has specifically examined how the performance to flows relationship may be significantly different in down markets. One paper that does examine this question, to some extent, is Ederington and Golubeva (2011). They find that mutual fund flows are negatively related with market volatility. Hence, in low volatility periods flows are high and in high volatility periods (which usually occur in down markets) they find that flows are much smaller. Another paper that examines this issue is Kim (2011a) who finds similar results to those reported here. Specifically, Kim finds that fund performance is generally not related to future funds flows during periods of high volatility (which are usually associated with down markets). Conversely, in low-volatility environments, Kim finds that performance is significantly and positively related to fund flows.

Our paper differs from last two aforementioned papers in a number of key ways. First, our focus is on whether there is an incentive for active fund managers to closet index on individual investors. Again, as stated before, we focus on individual investors as they have been shown to be more subject to behavioral biases[8] and because individual investors pay the highest cost for closet indexing as they pay significantly higher fees for active management than institutional investors. We choose individual investors as they pay the highest costs for active management in terms of fees and are the most damaged by closet indexing and they tend to be

[8] For example, it has been shown by Barber and Odean (2005, 2008, 2011) that institutional investors are not as subject to behavioral biases as are individual investors.

subject to behavioral biases which may drive fund managers incentives to closet index. These other papers examine both institutional and retail funds. Second, we focus on the issue of performance and subsequent mutual fund flows within the context of up and down markets, whereas the others focus solely on volatility. Third, our paper uses a performance metric that most individual investors have been shown to use--simple returns relative to a benchmark. Conversely, the others use risk-adjusted measures.

3. Data

To select mutual funds we use the year-end Morningstar Principia mutual fund data disks from 1997-2011. We use annual data rather than monthly data for several reasons. First, there is long tradition in the literature of using annual flow to measure the relationship between performance and future flows. This includes Ippolito (1992), Gruber (1996), Chevalier and Ellison (1997), Sirri and Tufano (1998), Huang, Wei and Yang (2007) and Huang (2012). Second, since we are examining such a long period (15 years) using monthly or quarterly data would be quite cumbersome. Third, if one is looking at higher frequency data one must start worrying about tax effects of buying and selling funds. That is, if the fund flows are in the same year as the performance measurement the fund flows may be affected by tax incentives. Since we examine annual performance and then subsequent annual flows we are not exposed to this issue. Fourth, research from the tournament literature, e.g. Brown, Harlow and Starks (1996) and Chevalier and Ellison (1997), shows that individual investors largely make fund flow decisions based on year-end performance. Other time periods such as monthly or quarters have much less impact on individual investors' decisions. Fifth, this 15-year period allows us to examine some significant down years in the U.S. stock market. Indeed, over the period 2000-2002 the average annual total return (which includes dividends) was -14.36 while it was -37 percent in 2008. A quarterly or monthly approach may not allow for as many down market periods as the annual approach.

We choose all open, actively-managed (non-index) domestic equity funds from each of the fifteen Morningstar Principia data disks at the end of each year 1997 to 2011. Domestic equity consists of funds that had the following Morningstar Categories: Large Growth, Large Blend, Large Value, Mid-Cap Growth, Mid-Cap Blend, Mid-Cap Value, Small Growth, Small Blend and Small Value. Note that Morningstar itself identifies the Standard and Poor's 500 index as the benchmark for all these funds. We choose these funds as individual investors will often

compare the performance of these funds to that of the Standard and Poor's 500 index, which is arguably the most well-known index in U.S. and the one that individual investors mostly use to compare their own fund's performance.[9]

As mentioned before, according to Petajisto (2013) it is the fear of massive redemptions that results from underperforming the benchmark in down markets that drives many managers to closet index. With this in mind, our goal was to select mutual funds in which the fund flows were likely to react differently in up markets than in down markets as it is this behavior that possibly drives mutual fund managers to closet index more during down markets. That is, we wanted to look at funds where the incentives for managers to closest index were the greatest. In light of this we chose to examine individual investors who have been found to be the most influenced by behavioral factors such as the disposition effect and overconfidence.[10] Indeed, one could argue that investors who penalize a fund for underperformance in a down market while not similarly penalizing underperformance in an up market is irrational. Moreover, it is individual investors who usually pay the highest cost for closet indexing as they usually pay significantly higher fees for active management than do institutional investors. Hence, it makes sense to focus on the group of investors who likely display behavior that is provides incentives for managers to closet index yet at the same time pay the highest cost for this behavior.

As a result of the above, we further reduce the sample by choosing only retail funds as these are primarily used by individual investors. We exclude institutional funds as institutional investors have been shown to not be as sensitive to behavioral influences. We also exclude retirement funds because they are specifically issued for defined-contribution plans (such as 401(k) and 403(b) plans) whose participants are often constrained in their investment choice set of funds or families and in the frequency they can reallocate their funds within the choice set.

To eliminate institutional funds and retirement funds we use the method described by Chen, Goldstein and Jiang (2010). For institutional funds we eliminate any funds that have the terms *I, Is, Ins, In, Instl, X, Y, Z* or *Tr* at the end of the fund name, along with funds with a

[9] Del Guercio and Tkac (2002) show that simple excess returns over the Standard and Poor's 500 index is one of the important determinants of mutual fund flows for individual investors.

[10] For example, it has been shown by Barber and Odean (2005, 2008, 2011) that institutional investors are not as subject to behavioral biases as are individual investors.

minimum required purchase with more than 50,000 dollars. To eliminate retirement funds we eliminate funds with the terms *Retirement, R, Ret, K* or *J* at the end of the fund name.

We also require that all funds in our sample be no-load funds (hence no front load, no deferred load and no 12b-1 fee). We do this as the presence of high front load may inhibit people from buying the fund, while the payment of front load or deferred load may influence the investor not to sell the fund. Again we want the investors in the fund to be free, in sense, to move their money in and out of the funds depending up on whether the market is up or down.

We also restrict our funds to those with three years of historical data so that we can calculate a 3-year standard deviation in order to measure the volatility of the fund. This relatively long period to measure standard deviation is consistent with what other authors have done including Barber, Odean and Zheng (2005).

Next, as is typical in the fund flow literature, we eliminate small size funds by requiring that each fund to have at least 10 million dollars in total net assets. After this process, if there are any replicate funds (the same fund listed twice due to multiple share classes) we only take the fund with the longest history. Finally, we winsorize the top and bottom 1 percent of funds in the sample based on the net flow data. We do this to reduce the potential impact of outliers due to fund mergers and splits.

Thus, we have 15 samples of funds, one for each year 1997 to 2011, where the funds in the sample are open, domestic-equity, actively managed retail funds that have no loads, but do have at least three years of historical data and at least 10 million dollars in net assets.

With this sample of funds we collect the following data for each fund: Total net assets, total annual returns (which include dividends), expense and turnover ratios, the age of the fund (as measured as the number of months since the inception date), and the 3-year standard deviation.

To measure fund performance we examine the difference between the fund's total annual return (which includes dividends) and the total annual return on the benchmark index, the Standard and Poor's 500 index (which also includes dividends). We use this method as empirical evidence suggests that individual investors do not seem to care as much about risk-adjusted performance as they do raw returns. Using an extensive database compiled from SEC N-SAR filings over the period 1996-2009, Clifford, Fulkerson, Jordan and Waldman (2011) find that retail investor inflows and outflows strongly chase past raw performance without regard to risk.

Furthermore, Del Guercio and Tkac (2002) also show that simple excess returns over market indexes, such as the Standard and Poor's 500 index, are one of the most important determinants of mutual fund flows. Similarly, in a study of individual investor accounts, Ivkovic and Weisbenner (2009) and Shrider (2009) find that fund outflows are sensitive to absolute fund performance and not risk-adjusted performance.

To calculate net flows we use an approach similar to that used in much of the previous literature. We take the annual net flows for the year after the fund performance is calculated. To do this we use equation (1) which is based on Huang, Wei and Yan (2012) [11]:

$$Net\ Annual\ Flow_{i,t} = \frac{Total\ Net\ Assets_{i,t} - (Total\ Net\ Assets_{i,t-1} * (1 + Ret_{i,t}))}{Total\ Net\ Assets_{i,t-1} * (1 + Ret_{i,t})} \quad (1)$$

where *i* is fund *i*, *t* is time *t*, *t-1* is one year lagged, *Ret* is annual total return (includes dividends).

We should note that while we examine annual flows we also examined the net quarterly flows for the first quarter after each year in the sample. For example, for the 1997 sample, we examined the net quarterly flows for the period January to March of 1998. The results of using these analyses were broadly similar to those using the annual flows. In the interest of space constraints we not provide the result using these data.

Table 1 presents descriptive statistics on our 15 annual samples of funds. In each year there are between 270 and 593 funds, with 2008 having the largest number of funds. The total return (including dividends) for the Standard and Poor's 500 index for each year is also listed. As can be seen, the annual total returns are positive for every year except for 2000, 2001, 2002 and 2008.

In Table 1 we also list the number of funds in each year that outperform the Standard and Poor's 500 index in terms of total return. This is followed by the number of funds that underperformed each year. The results show that in the up market years of 1997 to 1999 less than half of all funds outperformed the index. Conversely, in the down market years of 2000 to 2002, a majority of the funds outperformed the index. This is consistent with Sun, Weng and Zheng (2009) who find that active management generally outperforms passive management in down markets. However, this does not always hold true. During the down year of 2008 we see that

[11] Note that we attain very similar results using the flow measure of Sirri and Tufano (1998).

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most funds underperformed the benchmark while during the up year of 2009 most funds outperformed the index.

For the outperforming (underperforming) funds we also provide the mean outperformance (underperformance) expressed in terms of the absolute value of difference between the fund's raw annual return and raw return of the Standard and Poor's 500 index. The underperformance is particularly apparent in 1998 when the average underperforming fund underperformed by 19.45 percent. On the other hand, during the massive tech bubble of 1999, the average outperforming fund beat the index by 24.49 percent.

Table 1 also provides the mean net annual flow for the subsequent year for each sample year. As an example, the flows listed for 1997 are for the subsequent year, 1998. The flows are defined as in equation (1). We find, unsurprisingly, that the mean and median net flows for outperforming funds are greater than those for the underperforming funds in each of the fifteen years.

Finally, Table 1 also provides the mean size of the fund (expressed in terms of net assets), 3-year standard deviation, expense and turnover ratios, and mean age of the fund (expressed in terms of months since the inception date). One noteworthy finding is that during down market years, underperforming funds have considerably larger average size, risk, and turnover than the outperforming funds.

4. Methodology and Results

4.a. Is the relationship between performance and subsequent flows significantly different in down market years?

Petajisto (2013) conjectures that the reason why closet indexing increases in down markets is because underperformance in down markets is heavily penalized by lower fund flows. We begin to investigate this issue by examining whether the relationship between fund performance and the subsequent year's net annual flow is significantly different in down market years.

To do this we first pool all fifteen years of annual together and then estimate equation (2) with a fixed effects regression to control for unobserved heterogeneity in the model.

$$\begin{aligned} \textit{annual net flow}_{i,t} = \alpha + \beta_1(\textit{relative performance}_{i,t-1}) + \beta_2(\textit{down year dummy}_{i,t-1}) + \\ \beta_3(\textit{relative performance}_{i,t-1} \times \textit{down year dummy}_{i,t-1}) + \\ \beta_4(\textit{size of fund}_{i,t-1}) + \beta_5(\textit{3-year standard deviation}_{i,t-1}) + \end{aligned} \quad (2)$$

$$\beta_6(expense\ ratio_{i,t-1}) + \beta_7(turnover_{t-1}) + \beta_8(age_{i,t-1}) + \varepsilon_{i,t}$$

where,

annual net flow$_{i,t}$ is the annual net flow for fund *i* for year *t*.

relative performance$_{i,t-1}$ is the difference between fund *i*'s total annual return (including dividends) and the Standard and Poor's 500 total annual return (including dividends) for for year *t-1*.

down market dummy$_{i,t-1}$ is a 0,1 dummy variable that receives a 1 if it is a down market (according to the annual total returns of the Standard and Poor's 500 index) during year *t-1*. Hence, the years 2000, 2001 and 2002 and 2008 are the down market years.

relative performance$_{i,t-1}$ × *down year dummy*$_{i,t-1}$ is an interaction term that provides information on how the relationship between relative fund performance and subsequent flows is different during down market years as compared to up market years.

standard deviation$_{i,t-1}$ is the 3-year standard deviation of fund *i*, calculated in the year *t-1*.

size$_{i,t-1}$ is the total net assets, expressed in millions of dollars, of fund *i* for the year *t-1*. We divide this number by 1000 to get manageable coefficients on the regression.

expense ratio$_{i,t-1}$ is the annual expense ratio for fund *i* for the year *t-1*.

turnover$_{i,t-1}$ is the annual turnover for fund *i* for the year *t-1*. We divide this number by 100 to get manageable coefficients on the regression.

age of fund$_{i,t-1}$ is the number of the months since the fund *i*'s inception date calculated at the end of year *t-1*. We use the log of this number to get manageable coefficients in the regression.

The key variable in the equation (2) is the interaction variable, *relative performance*$_{i,t-1}$ × *down year dummy*$_{i,t-1.}$ A significant coefficient on this variable implies that the relationship between performance and subsequent flows is significantly different in down markets as compared to up markets.

The other control variables are used for the following reasons. We use size of the fund as Chevalier and Ellison (1997) find that size can influence future fund flows. We use the 3-year standard deviation of the fund returns as Sirri and Tufano (1998) and Cao, Chang and Wang (2008) have found that past fund volatility is related to net flows. Expenses and turnover are used to control for the fact that some funds may have higher fees and thus investors may stay away from these funds. We use the age of the fund as Chevalier and Ellison (1997) find, and Berk and Green (2004) conjecture, that the age of the fund influences the performance to flow relationship. All of these control variables have been widely used in the literature on mutual fund flows.

The results of estimating equation (2) are in Table 2. As can been seen, the interaction term *relative performance*$_{i,t-1}$ × *down year dummy*$_{i,t-1}$, is significant (at the .01 level) and negative once controls are used. These results indicate that after controlling for size and other factors, that the relationship between fund performance and subsequent fund flows is significantly different in down markets as compared to up markets. Moreover, the negative coefficients on the interaction variable indicate that the slope between performance and subsequent fund flows is lower in down markets. In other words, flows are significantly less sensitive to past performance in down markets as compared to up markets.

*4.b. Is the relationship between **outperformance** and subsequent flows significantly different in down market years?*

To delve more deeply into the results of Table 2, we next examine only funds that have outperformed the benchmark. Hence, for each of the 15 years of our sample we take all the funds that have outperformed the index, and then pool these funds together to create an outperformance sample. With this sample, we then estimate equation (3) using fixed effects.

$$\begin{aligned} \textit{annual net flow}_{i,t} = \alpha + \beta_1(\textit{absolute outperformance}_{i,t-1}) + \beta_2(\textit{size of fund}_{i,t-1}) + \\ \beta_3(\textit{standard deviation}_{i,t-1}) + \beta_4(\textit{expense ratio}_{i,t-1}) + \\ \beta_5(\textit{turnover}_{t-1}) + \beta_6(\textit{age}_{i,t-1}) + \varepsilon_{i,t} \end{aligned} \qquad (3)$$

where

absolute outperformance$_{i,t-1}$ is the absolute value of the outperformance of fund in the year preceding the annual net flows.

The results are shown in Table 3. We provide three panels for Table 3: Panel A, Panel B, and Panel C. Panel A examines funds that outperform in *up years*. Panel B examines funds that outperform in *down years* (2000, 2001, 2002 and 2008). Panel C examines the outperforming funds in *up and down years* together and uses an interaction term similar to what was used in equation (2).

In Panel A we find absolute outperformance is significantly (at the .01 level throughout) and positively related to subsequent flows. Hence, in up markets, better performance significantly predicts more flows. In Panel B, which uses the sample of outperforming funds in down market years, the story is quite different. Absolute outperformance is either not significantly related to subsequent flows (which happens in the cases of no controls or all controls) or significantly *negatively* related to future flows. Hence, in down years, outperformance does not result in higher flows and may even result in lower flows. Finally in Panel C, we test to see if the relationship between absolute outperformance and subsequent fund flows is significantly different in up markets from down markets. We find the interaction variable, *absolute outperformance*$_{i,t-1}$ *x down year dummy*$_{i,t-1}$, has a negative and significant coefficient in all cases where controls are used. Hence, in down markets, the relationship between outperformance and subsequent fund flow is significantly different from that in up markets. Flows are significantly lower when a fund outperforms in a down market as compared to when they similarly outperform in an up market.

4.c. Is the relationship between ***underperformance*** *and subsequent flows significantly different in down market years?*

We next repeat the same analysis as was conducted in section 4.b. except we use underperforming funds. To create the sample, we take all the funds that have underperformed the index, and then pool these funds together to create an underperformance sample. Rather than absolute outperformance we now measure performance as absolute underperformance.

The results of this test are located in Table 4, Panels A, B and C. Panel A examines funds that underperform in *up years*. Panel B examines funds that underperform in *down years* (2000, 2001, 2002 and 2008). Panel C examines the underperforming funds in *up and down years* together and uses an interaction term similar to what was used in equation (2).

The results in Table 4, Panel A, show that in almost all cases the coefficient on absolute underperformance is negative and significant. This indicates that in up markets, the more a fund underperforms the lower are the subsequent flows. Hence, funds are punished with lower flows if they underperform in up markets. This result is consistent with what other studies on fund flows have found, i.e., O'Neal (2004), Ivkovic and Weisbenner (2008) and Cashman et al. (2012). Conversely, in Panel B, we find that the absolute underperformance variable is not a significant predictor of future fund flows (when controls are used). Hence, unlike what has been postulated by Petajisto, when funds underperform in down markets they do not suffer large losses in flows.

In Panel C, we test to see if the relationship between absolute underperformance and subsequent fund flows is significantly different in up markets from down markets. We find the interaction variable, *absolute outperformance*$_{i,t\text{-}1}$ *x down year dummy*$_{i,t\text{-}1}$, has a positive and significant coefficient when all controls are used (at the .05 level). This result indicates that in down markets, the relationship between underperformance and subsequent fund flow is significantly different from that in up markets. Our results indicate that after controlling for various factors, subsequent flows are significantly higher when funds underperform in a down market relative to when they similarly underperform in an up market. In other words, if you underperform in an up market you are penalized with lower flows but if you similarly underperform in a down market you do not suffer nearly as much in terms of lower flows.

4.d. Summing Up Results

We find substantial evidence that the relationship between fund performance and subsequent net fund flows is significantly different in up years as compared to down years.[12] Indeed, we find that in up years, the more the fund outperforms the benchmark, the higher the future flows, and the more a fund underperforms the benchmark, the lower the future fund flows. Conversely, in down years, the amount of outperformance or underperformance does not significantly influence the next year's fund flows. Hence, in up markets, fund managers can increase their net flows by outperforming, but if they underperform they will be punished with lower subsequent flows. Yet, in down markets, performance does not influence fund flows. These results are broadly similar to

[12] Down years are defined by significantly negative annual Standard and Poor's 500 total return index returns (which included dividends). The down market years are 2000, 2001, 2002 and 2008.

Kim (2011) who has finds that during high volatility periods the relationship between performance and flows changes so much that performance is not related to fund flows much.

Thus while we find results somewhat different from what Petajisto theorizes, it still makes sense for a manager to closet index during down markets as outperformance is not rewarded. Indeed, why work hard to beat the market in down markets when it does not matter much for subsequently flows.

5. Conclusions

In this paper we ask if there is an incentive, as measured by the size of subsequent annual fund flows, for mutual funds to closet index during down markets. To do this we use a data set comprised of 15 years of open, retail, actively managed, no-load mutual funds over the period 1997-2011. We use retail funds because they capture individual investors who have been shown to be more subject to behavioral biases and because they pay the highest cost for closet indexing. Furthermore, we measure fund performance using a method that individual investors seem to respond to most, i.e., fund annual total returns relative to the Standard and Poor's 500 index. Using this approach we find that there are incentives for managers to closet index during down markets. Specifically, we find that fund performance does not drive subsequent flows nearly as much in down markets as it does in up markets. Indeed, in up markets, we find a very positive relationship between fund performance and subsequent flows. Funds with strong performance are rewarded with significantly higher flows than other funds and funds with performance below benchmark receive significantly lower flows than other funds. Conversely, in down years, the amount of outperformance or underperformance does not significantly influence the next year's fund flows.

Hence, in the end, we find results that are somewhat different from what Petajisto theorizes. Instead of underperformance in down years being particularly painful in terms of subsequent flows, we find that underperformance in down years does not significantly influence subsequent flows. That being said, our results still show that there is an incentive for active fund managers to closet index in down markets. Since neither outperformance nor underperformance is related to subsequent future flows, it is sensible for a manager to closet index during down markets as their efforts will not rewarded with higher subsequent flows. Of course, such manager behavior is not in the interest of fund shareholders as it means investors are paying higher fees

for an index fund and are missing out on active management during a time when active management has the best chances of succeeding.

We have two possible explanations for our results. First, our results could reflect the disposition effect as described in behavioral finance. The disposition effect says that since losses are much more painful that gains are helpful, investors will not sell losers. Instead they have predisposition to get back to even and will hold onto the losers. This theory works for our results as investors do not respond in down markets to out or underperformance with subsequent future flows. Since the market is down, investors do not sell (or buy) an outperforming fund or an underperforming fund because in both cases the fund performance, in terms of raw returns, is likely negative thus inducing the disposition effect.

A second, more rational explanation, comes from Berk and Green (2004) and Kim (2011b). They theorize that investors do not value outperforming funds or penalize underperforming funds in down markets because the success of the active manager is more due to luck than to skill. That is, because the dispersion of returns across fund managers is so great during down markets, the ability of an active manager to out or underperform in a down market is much more likely to be based on luck than skill. As result, investors do not reward managers with higher inflows if they outperform during down markets. Nor do they penalize managers who underperform in down markets as it is bad luck and not lack of skill that causes the manager to underperform.

Both explanations fit our results. One assumes that investors are subject to behavioral factors which of course formed how we constructed our data set and methodology. The other assumes that it is rational to not value/penalize out- or underperformance in down markets as performance is likely more due to luck than skill. Future research will try to show which explanation holds.

Of course, our study is not without its caveats. First, we only use funds that are most subject to behavioral influences, i.e., retail funds. Second, we only measure performance with basic annual returns relative to the Standard and Poor's 500 index. Third, we only measure annual net fund flows. In each of these cases, there are many alternatives to our approach which may lead to different answers. But again, individual investors have been shown to use the above. They invest in retail funds. They tend to focus on absolute returns relative to broad well-known

indexes like the Standard and Poor's 500 index, and they tend to make their fund decisions at the end of the year.

In sum, while our approach has some limitations, our results show clear evidence that there is significant difference in the relationship between fund performance and subsequent returns in down markets than in up markets. Specifically we find that performance does not seem to influence subsequent fund flows much in down markets. As such our results show that there is an incentive for actively managed funds to closet index during down markets as there is little benefit in terms of subsequent funds flows to outperforming the benchmark.

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Table 1: Descriptive Statistics

In this table we examine all domestic equity retail funds, each year, from 1997-2011 that have three-years of historical returns, no-loads, at least 10 million in net assets, and are open to new investment. Morningstar defines all these funds as using the Standard and Poor's 500 index as their benchmark index. The number of underperforming (outperforming) funds is the number of funds that underperformed (outperformed) the S&P 500 index during the year in terms of total returns (which include dividends). The mean outperformance (underperformance) is the average amount that these funds outperformed (underperformed) the Standard and Poor's 500 index in terms of total returns. The mean annual net flow is for the year after the year indicated. For example, for 1997, the annual net flow is calculated for the next year, 1998. Annual net flows are calculated using equation (1). Negative values are in parenthesis. The shaded columns indicate down market years.

Variable	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
# of Funds	308	270	281	330	380	350	486	577	565	562	570	593	578	577	547
SP500 Annual Total Return (%)	33.36	28.58	21.04	-9.1	-11.89	-22.1	28.68	10.88	4.91	15.79	5.49	-37.00	26.46	15.06	2.11
# of Funds Outperforming SP500	33	60	127	239	233	192	308	374	387	183	309	246	400	361	93
Mean Outperformance (%)	4.41	10.00	24.49	15.45	15.33	8.40	12.88	5.17	4.60	3.30	8.49	5.21	12.22	8.26	3.04
# of Funds Underper.SP500	275	210	154	91	147	158	178	203	178	379	261	347	178	216	454
Mean Underperformance (%)	9.74	19.45	13.27	8.76	8.84	6.33	3.75	3.15	2.56	5.12	5.80	6.04	5.55	2.95	5.74
Mean Annual Flow(for next yr)															
All Funds	(0.00)	0.01	0.26	(0.04)	(0.13)	0.23	0.13	0.16	0.12	0.13	(0.20)	0.29	0.06	(0.10)	0.10
Outperforming Funds	0.51	0.35	0.59	0.07	0.01	0.27	0.16	0.25	0.19	0.18	(0.20)	0.36	0.10	(0.10)	0.31
Underperforming Funds	(0.06)	(0.09)	(0.01)	(0.33)	(0.34)	0.18	0.07	(0.02)	(0.04)	0.11	(0.21)	0.24	(0.02)	(0.10)	0.06
Mean Size ($Millions)															
All Funds	1,466	1,886	1,899	1,553	1,482	1,162	1,511	1,764	1,866	2,028	1,484	891	1,148	1,272	1,259
Outperforming Funds	986	3,100	2,408	1,263	1,363	1,096	1,281	1,526	1,889	2,070	1,448	628	1,312	1,287	1,220
Underperforming Funds	1,524	1,539	1,479	2,314	1,670	1,242	1,909	2,201	1,816	2,008	1,526	1,077	777	1,247	1,267
Mean 3-year Std. Dev.(%)															
All Funds	15.70	21.44	23.70	25.55	23.38	21.57	20.85	17.74	11.73	10.27	10.30	18.20	22.55	24.80	21.32
Outperforming Funds	15.78	24.47	28.83	22.57	20.61	20.43	23.12	18.03	11.85	9.35	10.54	16.11	23.61	26.24	19.01
Underperforming Funds	15.69	20.57	19.47	33.37	27.77	22.96	16.93	17.21	11.47	10.72	10.03	19.68	20.17	22.40	21.80
Mean Expense Ratio (%)															
All Funds	1.04	1.03	1.01	1.03	1.03	1.06	1.07	1.03	1.01	1.01	0.98	0.99	1.02	1.03	1.02
Outperforming Funds	1.18	1.02	1.03	1.02	1.04	1.07	1.11	1.04	1.00	1.02	0.97	1.01	1.04	1.07	1.01
Underperforming Funds	1.03	1.03	0.99	1.07	1.01	1.05	0.99	1.00	1.02	1.00	0.99	0.97	0.99	0.95	1.02
Mean Turnover (%)															
All Funds	77.97	70.50	81.65	106.42	125.61	117.77	116.04	97.11	78.92	77.26	83.16	89.89	104.61	88.31	75.22
Outperforming Funds	76.61	96.85	109.22	87.36	104.97	97.63	133.01	101.98	84.35	63.42	96.99	78.21	98.93	95.77	61.08
Underperforming Funds	78.13	62.98	58.91	156.48	158.32	142.26	86.69	88.14	67.11	83.94	66.80	98.18	117.37	75.85	78.11
Mean Age (Months)															
All Funds	162.25	159.59	156.77	153.98	156.52	153.59	141.75	143.99	155.71	159.14	158.68	168.48	175.16	180.76	191.02
Outperforming Funds	145.36	166.07	159.06	146.74	161.41	143.58	129.32	135.07	154.73	152.77	167.61	172.59	177.06	174.12	197.75
Underperforming Funds	164.27	157.74	154.88	172.97	148.77	165.75	163.25	160.42	157.83	162.22	148.10	165.56	170.89	191.87	189.64

Table 2: The relationship between performance and flows in up and down markets (all funds)

In this table we examine all domestic equity retail funds, each year, from 1997-2011 that have three-years of historical returns, no-loads, at least 10 million in net assets, and are open to new investment. Morningstar defines all these funds as using the Standard and Poor's 500 index as their benchmark index. This table presents the results of estimating the following equation using a pooled fixed effects regression, where we pool all funds from all years together in one sample.

$$\textit{annual net flow}_{i,t} = \alpha + \beta_1(\textit{relative performance}_{i,t-1}) + \beta_2(\textit{down year dummy}_{i,t-1}) + \beta_3(\textit{relative performance}_{i,t-1} \times \textit{down year dummy}_{i,t-1}) + \beta_4(\textit{size of fund}_{i,t-1}) + \beta_5(\textit{3-year standard deviation}_{i,t-1}) + \beta_6(\textit{expense ratio}_{i,t-1}) + \beta_7(\textit{turnover}_{t-1}) + \beta_8(\textit{age}_{i,t-1}) + \varepsilon_{i,t}$$

Where $\textit{annual net flow}_{i,t}$ is the annual net flow of fund *i* in year *t* (calculated using equation (1)); $\textit{relative performance}_{i,t-1}$ is the difference between fund *i*'s annual total return (including dividends) and the total returns (including dividends) of the Standard and Poor's 500 index in year *t-1*; $\textit{down year dummy}_{i,t-1}$ is a dummy variable fund *i* receives a 1 if year *t-1* was a down year (2000, 2001, 2002 and 2008) and 0 in otherwise; $\textit{size of fund}_{i,t-1}$ is the ln(net assets) of fund *i* in year *t-1;* $\textit{3-year standard deviation}_{i,t-}$ is the 3-year standard deviation of the total returns of fund *i* in year *t-1*; $\textit{expense ratio}_{i,t-1}$ is the annual expense ratio of fund *i* in year *t-1* (defined as a fund's operating expenses are divided by the average dollar value of its assets under management); $\textit{turnover}_{t-1}$ is the annual turnover of fund *i* in year *t-1* divided by 100 (defined as the percentage of funds holdings that are sold each year); and $\textit{age}_{i,t-1}$ is the ln(age) of fund *i* at time *t-1* (using months since fund inception). . ***, **, *, indicate significance at the one, five and ten percent levels respectively.

	1	2	3	4	5	6
Dependent Variable:	Annual Flow_t	Annual Flow_t	Annual Flow_t	Annual Flow_t	Annual Flow_t	Annual Flow_t
Intercept	0.0151	1.1386***	1.1855***	1.2045***	1.2055***	2.03***
Relative Performance_{t-1}	0.0072***	0.0083***	0.0087***	0.0087***	0.0087***	0.0091***
Down Year Dummy_{t-1}	0.0805***	-0.0033	0.0083	0.0074	0.0071	-0.0023
Relative Performance_{t-1} × Down Year Dummy_{t-1}	-0.0006	-0.0052***	-0.0058***	-0.0058***	-0.0057***	-0.0072***
Size_{t-1}		-0.3345***	-0.3353***	-0.3363***	-0.3364***	-0.3262***
3-Year Standard Deviation_{t-1}			-0.0037***	-0.0037***	-0.0037***	-0.0038***
Expense Ratio_{t-1}				-0.0258	-0.0274	-0.0538
Turnover Ratio_{t-1}					0.0044	-0.0031
Age_{t-1}						-0.1895***
Adjusted R-Square	0.1327	0.2655	0.2671	0.267	0.2669	0.2794
Number	6974	6974	6974	6974	6974	6974

Table 3: The relationship between performance and flows in up and down markets (*OUTPERFORMING FUNDS ONLY*)

In this table we examine all *outperforming* domestic equity retail funds, each year, from 1997-2011 that have three-years of historical returns, no-loads, at least 10 million in net assets, and are open to new investment. An outperforming fund is one in which the fund's total annual return (including dividends) are greater than the Standard and Poor's 500 index total returns (including dividends) for the year.

We provide three panels for Table 3: Panel A, Panel B, and Panel C. Panel A examines funds that outperform in *up years*. Panel B examines funds that outperform in *down years* (2000, 2001, 2002 and 2008). Panel C examines the outperforming funds in *up and down years* together.

For Panels A and B we examine the following equation using pooled fixed effects regression :

$$annual\ net\ flow_{i,t} = \alpha + \beta_1(absolute\ outperformance_{i,t-1}) + \beta_2(size\ of\ fund_{i,t-1}) + \beta_3(3\text{-}year\ standard\ deviation_{i,t-1}) + \beta_4(expense\ ratio_{i,t-1}) + \beta_5(turnover_{t-1}) + \beta_6(age_{i,t-1}) + \varepsilon_{i,t}$$

Where $absolute\ outperformance_{i,t-1}$ is the absolute value of the difference between fund *i*'s annual total return (including dividends) and the total returns (including dividends) of the Standard and Poor's 500 index in year *t-1*.

For Panel C we examine the following equation using pooled fixed effects regression:

$$annual\ net\ flow_{i,t} = \alpha + \beta_1(absolute\ outperformance_{i,t-1}) + \beta_2(down\ year\ dummy_{i,t-1}) + \beta_3(absolute\ outperformance_{i,t-1}\ x\ down\ year\ dummy_{i,t-1}) + \beta_4(size\ of\ fund_{i,t-1}) + \beta_5(3\text{-}year\ standard\ deviation_{i,t-1}) + \beta_6(expense\ ratio_{i,t-1}) + \beta_7(turnover_{t-1}) + \beta_8(age_{i,t-1}) + \varepsilon_{i,t}$$

Table 3, Panel A: Outperforming Funds in UP Years only

	1	2	3	4	5	6
Dependent Variable:	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$
Intercept	0.0162	3.7356***	3.826***	3.923***	3.92***	6.5196***
Absolute $Outperformance_{t-1}$	0.0109***	0.0106***	0.0117***	0.0117***	0.0113***	0.0082***
$Size_{t-1}$		-0.559***	-0.564***	-0.5706***	-0.5703***	-0.519***
3-Year Standard $Deviation_{t-1}$			-0.0043	-0.0043	-0.0043	-0.0009
Expense $Ratio_{t-1}$				-0.1415	-0.156	-0.2181*
Turnover $Ratio_{t-1}$					0.0296	0.0064
Age_{t-1}						-0.6102***
Adjusted R-Square	0.012	0.1866	0.1872	0.1874	0.1882	0.2439
Number	2635	2635	2635	2635	2635	2635

Table 3, Panel B: Outperforming Funds in DOWN Years only

	1	2	3	4	5	6
Dependent Variable:	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$
Intercept	-0.1109	3.5321***	3.6278***	3.3751***	3.366***	2.0975**
Absolute $Outperformance_{t-1}$	-0.0028	-0.0082**	-0.0066*	-0.0073**	-0.0078**	-0.0052
$Size_{t-1}$		-0.5509***	-0.5408***	-0.5243***	-0.5294***	-0.5648***
3-Year Standard $Deviation_{t-1}$			-0.0097	-0.0108	-0.0107	-0.0074
Expense $Ratio_{t-1}$				0.5156*	0.4956*	0.4897*
Turnover $Ratio_{t-1}$					0.1052	0.1105
Age_{t-1}						0.3131**
Adjusted R-Square	0.2352	0.3457	0.346	0.3495	0.35	0.3561
Number	910	910	910	910	910	910

Table 3, Panel C: Outperforming Funds in ALL Years

	1	2	3	4	5	6
Dependent Variable:	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$	Annual $Flow_t$
Intercept	-0.16	3.4309***	3.5219***	3.5395***	3.5345***	5.2569***
Absolute $Outperformance_{t-1}$	0.0094***	0.0095***	0.0107***	0.0107***	0.0105***	0.009***
Down Year $Dummy_{t-1}$	0.0429	-0.0745*	-0.0596	-0.0609	-0.0629	-0.1011**
Absolute $Outperformance_{t-1}$ x Down Year $Dummy_{t-1}$	0.0017	-0.0072**	-0.0078***	-0.0077***	-0.0075**	-0.0101***
$Size_{t-1}$		-0.5289***	-0.5312***	-0.5323***	-0.5319***	-0.5016***
3-Year Standard $Deviation_{t-1}$			-0.0054**	-0.0054**	-0.0055**	-0.0045*
Expense $Ratio_{t-1}$				-0.0291	-0.0364	-0.0759
Turnover $Ratio_{t-1}$					0.0219	0.0076
Age_{t-1}						-0.4017***
Adjusted R-Square	0.0568	0.2152	0.2164	0.2161	0.2163	0.2379
Number	3545	3545	3545	3545	3545	3545

Table 4: The relationship between performance and flows in up and down markets *(UNDERPERFORMING FUNDS ONLY)*

In this table we examine all *underperforming* domestic equity retail funds, each year, from 1997-2011 that have three-years of historical returns, no-loads, at least 10 million in net assets, and are open to new investment. An underperforming fund is one in which the fund's total annual return (including dividends) are less than the Standard and Poor's 500 index total returns (including dividends) for the year.

We provide three panels for Table 3: Panel A, Panel B, and Panel C. Panel A examines funds that underperform in *up years*. Panel B examines funds that underperform in *down years* (2000, 2001, 2002 and 2008). Panel C examines the underperforming funds in *up and down years* together.

For Panels A and B we examine the following equation using pooled fixed effects regression :

$$annual\ net\ flow_{i,t} = \alpha + \beta_1(absolute\ underperformance_{i,t-1}) + \beta_2(size\ of\ fund_{i,t-1}) + \beta_3(3\text{-}year\ standard\ deviation_{i,t-1}) + \beta_4(expense\ ratio_{i,t-1}) + \beta_5(turnover_{t-1}) + \beta_6(age_{i,t-1}) + \varepsilon_{i,t}$$

Where $absolute\ underperformance_{i,t-1}$ is the absolute value of the difference between fund *i*'s annual total return (including dividends) and the total returns (including dividends) of the Standard and Poor's 500 index in year *t-1*.

For Panel C we examine the following equation using pooled fixed effects regression:

$$annual\ net\ flow_{i,t} = \alpha + \beta_1(absolute\ underperformance_{i,t-1}) + \beta_2(down\ year\ dummy_{i,t-1}) + \beta_3(absolute\ underperformance_{i,t-1} \times down\ year\ dummy_{i,t-1}) + \beta_4(size\ of\ fund_{i,t-1}) + \beta_5(3\text{-}year\ standard\ deviation_{i,t-1}) + \beta_6(expense\ ratio_{i,t-1}) + \beta_7(turnover_{t-1}) + \beta_8(age_{i,t-1}) + \varepsilon_{i,t}$$

Table 4, Panel A: Underperforming Funds in UP Years only

	1	2	3	4	5	6
Dependent Variable:	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$
Intercept	-0.038	0.4731***	0.5037***	0.5518***	0.5409***	0.9796***
Absolute Underperformance$_{t-1}$	-0.0048***	-0.0062***	-0.006***	-0.0061***	-0.006***	-0.0076***
Size$_{t-1}$		-0.151***	-0.1532***	-0.1561***	-0.1549***	-0.1494***
3-Year Standard Deviation$_{t-1}$			-0.002	-0.002	-0.0018	-0.0003
Expense Ratio$_{t-1}$				-0.0634	-0.0471	-0.0768
Turnover Ratio$_{t-1}$					-0.0341**	-0.0381***
Age$_{t-1}$						-0.1007***
Adjusted R-Square	0.128	0.1875	0.1879	0.1878	0.1905	0.1983
Number	2686	2686	2686	2686	2686	2686

Table 4, Panel B: Underperforming Funds in DOWN Years only

	1	2	3	4	5	6
Dependent Variable:	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$
Intercept	0.1857	1.5886***	1.5143***	1.3924***	1.3838***	1.4172**
Absolute Underperformance$_{t-1}$	-0.0167***	-0.0057	-0.0008	-0.0005	-0.0004	-0.0003
Size$_{t-1}$		-0.4575***	-0.3794***	-0.3802***	-0.3827***	-0.3834***
3-Year Standard Deviation$_{t-1}$			-0.0104***	-0.01***	-0.0095***	-0.0096***
Expense Ratio$_{t-1}$				0.2033	0.2268	0.2263
Turnover Ratio$_{t-1}$					-0.0225	-0.0227
Age$_{t-1}$						-0.007
Adjusted R-Square	-0.007	0.3146	0.3412	0.3401	0.343	0.3401
Number	743	743	743	743	743	743

Table 4, Panel C: Underperforming Funds in ALL Years

	1	2	3	4	5	6
Dependent Variable:	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$	Annual Flow$_t$
Intercept	0.0059	0.7018***	0.7789***	0.7949***	0.792***	0.9556***
Absolute Underperformance$_{t-1}$	-0.0058***	-0.0073***	-0.0066***	-0.0066***	-0.0066***	-0.0072***
Down Year Dummy$_{t-1}$	0.1037***	0.031	0.041	0.0403	0.0416*	0.0385
Absolute Underperformance$_{t-1}$×Down Year Dummy$_{t-1}$	-0.0017	0.0033	0.0063**	0.0063**	0.0066**	0.0068**
Size$_{t-1}$		-0.2047***	-0.2038***	-0.2047***	-0.2044***	-0.2045***
3-Year Standard Deviation$_{t-1}$			-0.0065***	-0.0065***	-0.0063***	-0.0061***
Expense Ratio$_{t-1}$				-0.0214	-0.0158	-0.0248
Turnover Ratio$_{t-1}$					-0.0221***	-0.0234***
Age$_{t-1}$						-0.0359
Adjusted R-Square	0.1268	0.2174	0.2263	0.226	0.2281	0.2286
Number	3429	3429	3429	3429	3429	3429