DOI: 10.1111/fire.12201

ORIGINAL ARTICLE

The Financial Review WILEY

Sentimental mutual fund flows

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Abstract

We show that many stylized empirical patterns for mutual fund flows are driven by investor sentiment. Specifically, when sentiment is high, investors exhibit a stronger tendency of chasing past fund performance; fund flows are less sensitive to fund expenses; and investors are attracted more to funds with sheer visibility. Moreover, the well-documented positive relation between fund flows and future fund performance is significant only during high sentiment periods and is mainly driven by expected component of fund flows. Finally, we show that mutual fund investors exhibit a significantly negative timing ability at the individual fund level when sentiment is high.

KEYWORDS
flow-performance relation, fund expenses, fund performance, fund visibility, investor sentiment, investor timing mutual fund flows

JEL CLASSIFICATIONS
G11, G02, G23

1 | INTRODUCTION

The literature documents that money flows to mutual funds are related to a number of fund characteristics. Much of the finding reinforces the notion that individual investors are unsophisticated in their investment decisions. For instance, mutual fund investors tend to chase funds with strong past performance, despite the fact that the literature finds evidence of performance persistence only for poorly performing funds (Carhart, 1997).[1] The literature shows that benchmark-adjusted fund performance fails to justify fund expenses (Carhart, 1997; Gruber, 1996), yet some investors actually pick funds with high fees.[2] Moreover, investors are attracted to funds with high visibility due to advertising or brand recognition, although very often these characteristics are poor signals of fund manager skills or fund performance.[3] Despite the corroborating evidence on behavioral biases of mutual fund investors, the literature also argues that some stylized findings on mutual fund flows may be driven by rational decisions. For instance, Berk and Green

[1] For literature on the relation between flows and past fund performance, see Chevalier and Ellison (1997), Goetzmann and Peles (1997), Sirri and Tufano (1998), and Huang, Wei, and Yan (2007).

[2] Sirri and Tufano (1998) find evidence that mutual fund investors pay attention to the cost of investment. Elton, Gruber, and Busse (2004) and Barber, Odean, and Zheng (2005) show that mutual fund investors fail to minimize expenses of investment. Bailey, Kumar, and Ng (2011) show that investors with strong behavioral biases actually select funds with high expenses.

[3] For literature on the relation of fund flows with marketing and brand recognition, see Jain and Wu (2000), Sirri and Tufano (1998), and Huang et al. (2007).

(2004) argue that it is rational for mutual fund investors to chase funds with strong past performance. In their model, rational investors form beliefs about fund manager skill based on past performance and allocate their capital toward recent winners. Furthermore, several studies document a "smart-money" effect in mutual fund flows.[4] That is, investors have the ability to identify fund managers with superior skills and invest accordingly by moving money toward good performers and away from poor performers.

In this study, we investigate the extent to which the stylized findings on mutual fund flows are driven by investor sentiment, that is, investors' subjective view of market conditions. Previous studies show that sentiment directly affects the participation of individual investors and their asset allocation decisions which, in turn, have a significant effect on market returns and individual stock returns (Baker & Wurgler, 2006; Brown & Cliff, 2005; Kumar & Lee, 2006; Lemmon & Portniaguina, 2006; Stambaugh, Yu, & Yuan, 2012; Yu & Yuan, 2011). The literature also shows that mutual fund investors are particularly subject to behavioral biases and sentiment swings (Bailey et al., 2011; Capon, Fitzsimons, & Prince, 1996; Wilcox, 2003). Given that mutual fund investments represent a substantial portion of U.S. household portfolios and investor asset allocation decisions have a direct effect on asset prices, it is important to understand mutual fund selection decisions by investors.[5]

Different from the literature on aggregated fund flows, the focus of our study is the impact of sentiment on investors' fund selection, namely how the relations between fund characteristics and fund flows vary during different sentiment periods. Specifically, we are interested in the following questions. First, do investors exhibit the same tendency of chasing past performance across different sentiment periods? As noted earlier, while chasing past performance is generally viewed as evidence of behavioral bias, it may also be consistent with rational models (Berk & Green, 2004). To distinguish trend chasing versus the ability of identifying skilled fund managers, we use both naïve measure (raw fund return) and more sophisticated measure (risk-adjusted fund return) of fund performance in our analysis. If performance chasing is rational and driven by fund manager skill, we expect that fund flows are significantly related to risk-adjusted fund returns during both high and low sentiment periods (Barber, Huang, & Odean, 2016; Berk & Van Binsbergen, 2016; Del Guercio & Reuter, 2014). On the other hand, if performance chasing is driven by unsophisticated investors, we should observe a stronger relation between fund flows and the naïve performance measure when sentiment is high. Second, are investors equally sensitive to the cost of investing in mutual funds across different sentiment periods? If investors fully understand the effect of expenses on fund returns, we should see no variation in the sensitivity of fund flows to fund expenses across different sentiment periods. However, if sentiment-driven investors do not fully understand the cost of investing in mutual funds, we expect a weaker sensitivity of fund flows to fund expenses during high sentiment periods. Third, are investors equally attracted to funds with high visibility across different sentiment periods? Fund visibility reduces search costs and information barrier for investors, especially unsophisticated investors (Huang et al., 2007; Sirri & Tufano, 1998). Nevertheless, while marketing effort increases fund visibility, it is shown to have a negative impact on fund performance (Bergstresser, Chalmers, & Tufano, 2009; Gil-Bazo & Ruiz-Verdu, 2009). On the other hand, certain proxies of fund visibility measures, for example, star manager and fund family size, may be related to fund manager skill or fund performance. In our empirical analysis, we carefully distinguish visibility measures that are potentially related to fund manager skills and other sheer visibility measures that have no effect or even a negative effect on fund performance. We examine how the relations between fund flows and these visibility measures vary across different sentiment periods and draw inference on the behavior of mutual fund investors.

Moreover, we are interested in whether the well-documented flow-performance relation varies across different sentiment periods. Gruber (1996) and Zheng (1999) interpret the positive relation between fund flows and future fund performance as evidence of smart-money effect. Several studies offer a competing explanation based on flow-induced performance. For example, Wermers (2003) finds that flow-related buying pushes up stock prices beyond

[4] For literature on the "smart-money" effect of mutual fund flows, please refer to Gruber (1996), Sapp and Tiwari (2004), Zheng (1999), and Keswani and Stolin (2008).

[5] Despite the growth of exchange-traded funds over the past decades, mutual fund remains an important investment vehicle for U.S. households. According to Investment Company Institute Fact Book, an estimated 94 million individual investors (44% of all U.S. households) owned mutual funds in 2016. The median mutual fund assets held by fund-owning households was $125,000.

the effect of stock return momentum and fund performance is more related to flow-related trades than to manager skill. Likewise, Lou (2012) attributes a positive flow-performance relation to a simple mechanism of price pressure caused by fund flows. If the positive flow-performance relation is driven by investors' fund selection ability, we expect the relation to be stronger during low sentiment periods when investor flow is more likely to be rational due to lower participation of sentiment-driven investors in such periods. On the other hand, if the positive flow-performance relation is driven by flow-induced trades, we expect the relation to be stronger during high sentiment periods when more sentiment-driven investors participate in the market. In addition, we investigate whether the timing ability of mutual fund investors varies across different sentiment periods. Friesen and Sapp (2007) propose a timing measure at individual fund level based on the difference between the dollar-weighted fund return and the buy-and-hold fund return and document poor timing ability of mutual fund investors. We conjecture that since unsophisticated investors participate more in the market when sentiment is high, the poor timing ability is stronger during high sentiment periods.

The main data used in our study is the CRSP Survivor-Bias-Free U.S. Mutual Fund Database. We use three measures of investor sentiment in our study: the University of Michigan Index of Consumer Sentiment (ICS), the Index of Consumer Confidence by the Conference Board (CBIND), and the investor sentiment measure proposed by Baker and Wurgler (2006) (BWIND). The ICS is used in our main empirical analysis as it reflects average U.S. households' prospect of business and market conditions and has been used in a number of existing studies (Bergman & Roychowdhury, 2008; Lemmon & Portniaguina, 2006; Sibley, Wang, Xing, & Zhang, 2016; Stambaugh et al., 2012; Zouaoui, Nouyrigat, & Beer, 2011). We confirm that our results are robust when we use other sentiment measures, including the ICS orthogonalized against macroeconomic variables. Moreover, we show that our results are robust if we exclude financial crisis period from 2007 to 2009 or periods with extreme investor sentiment. Previous literature also shows that institutional investors are more sophisticated and have better understanding of fund characteristics (Evans & Fahlenbrach, 2012; Keswani & Stolin, 2008). The data allows us to classify mutual funds as retail or institutional funds and compare their fund selection decisions. Our sample period is from January 1993 to December 2014.

Our results show that sentiment has a significant impact on investor fund selection decisions. First, we find that there is a greater participation of investors in the market when sentiment is high. Flow to mutual funds, especially to funds of small and growth styles, is significantly higher during high sentiment periods. Second, we find that mutual fund investors exhibit a stronger tendency of chasing past performance during high sentiment periods. Fund flows have a stronger relation with past raw fund returns during high sentiment periods but are equally sensitive to risk-adjusted fund returns during high and low sentiment periods. We interpret these results as evidence that there is a rational component in mutual fund flow driven by fund manager skill, there is nevertheless a significant portion of fund flow driven by sentiment. Third, while fund flows have an overall negative relation with expense ratios, the negative relation is significantly weaker during high sentiment periods. In addition, while there is a significantly negative relation between fund flows and marketing expenses during low sentiment periods, the relation is insignificant during high sentiment periods. These results suggest that sentiment-driven investors do not fully understand the implication of expenses on fund performance. Fourth, to distinguish visibility measures that are potentially related to fund manager skills and sheer visibility measure that has no effect on fund performance, we examine the respective effects of star manager and star-family affiliation on fund flows. Nanda, Wang, and Zheng (2004) show that a naïve strategy of pursuing star-family affiliated funds does not generate positive abnormal performance for fund investors. Our results show that while fund visibility associated with star manager equally attracts fund flows during high and low sentiment periods, sheer fund visibility, that is, star-family affiliation, attracts greater investor flows during high sentiment periods. Once again, these findings provide further evidence that there is a rational component in mutual fund flow driven by fund manager skill but a significant portion of fund flow driven by investor sentiment. Our results also show that compared to retail investors, institutional investors are less subject to sentiment swings. Specifically, for institutional funds, we find no difference in flow sensitivity to past performance, fund expenses, marketing expenses, or star-family affiliation across different sentiment periods.

We also find a clear variation in the flow-performance relation across different sentiment periods. In contrast to predictions of the smart-money hypothesis, we find that the positive flow-performance relation is significant during only high sentiment periods. This suggests that the positive flow-performance relation is unlikely driven by investors' ability

of picking funds with superior manager skills. Moreover, following previous studies, that is, Coval and Stafford (2007) and Lou (2012), we decompose fund flows into expected and unexpected components and examine which component has predictive power of future fund performance. If the positive flow-performance relation is due to investors' ability to identify superior funds, we should observe that unexpected fund flows predict subsequent fund performance. Again, in contrast to predictions of the smart-money hypothesis, we find no significant relation between unexpected component of fund flows and subsequent fund performance. Instead, the predictive power of fund performance is mainly driven by expected component of fund flows, evidence supporting the explanation based on flow-induced performance. Finally, we show that the poor timing ability of mutual fund investors documented in Friesen and Sapp (2007) is mainly driven by high investor sentiment. The dollar-weighted fund return that accounts for the timing of investor flow into and out of a fund is significantly lower than the buy-and-hold fund return during high sentiment periods.

Our study contributes to several strands of literature. First, the literature offers competing arguments on whether investor flow to mutual funds is driven by rational decisions or behavioral biases. We show that sentiment plays an important role in investor fund selection decisions. In particular, fund selection decisions by investors are not only determined by expected fund performance but also by other fund characteristics, such as past performance, expenses, and fund visibility. Second, existing studies show that aggregate mutual fund flows is strongly related to investor sentiment, and have a direct impact on overall stock market returns (Baker & Wurgler, 2007; Ben-Rephael, Kandel, & Wohl, 2011, 2012; Frazzini & Lamont, 2008; Indro, 2004; Lou, 2012; Warther, 1995). Our study adds to the literature with evidence on cross-sectional differences in investors' fund selection decisions during different sentiment periods. Third, our analysis sheds new light on a contentiously debated issue in the mutual fund literature, that is, whether the positive flow-performance relation is driven by the smart money or flow-induced performance. The finding that fund flows drive future fund performance due to the impact on stock prices has important implications on asset pricing. That is, mutual fund investors are not simply price takers, but play an important role in setting security prices, corroborating evidence in Frazzini and Lamont (2008) and Akbas, Armstrong, Sorescu, and Subrahmanyam (2015).

The rest of the paper is organized as follows. Section 2 describes the mutual fund data and investor sentiment index used in our analysis. Sections 3 and 4 present main empirical results. Section 5 performs robustness checks. Section 6 concludes.

2 | DATA

2.1 | Mutual fund sample and fund flows

The mutual fund data used in this study are obtained from the CRSP Survivor-Bias-Free U.S. Mutual Fund Database. The data contain detailed information on fund characteristics, such as monthly total net assets (TNA), fund net returns, turnover, and expense ratios. Our sample includes all actively managed U.S. equity mutual funds. We exclude index funds, international funds, sector funds, specialized funds, and balanced funds. To examine the differences in fund flows between retail and institutional investors, we further divide mutual funds in our sample into institutional funds and retail funds.[6] Our sample period is from January 1993 to December 2014. While the CRSP database provides monthly TNA for mutual funds since 1991, relatively few institutional funds are in the database prior to 1993.

Our analysis is based on monthly normalized fund flow ($FLOW_{i,t}$) computed as follows:

$$FLOW_{i,t} = (TNA_{i,t} - TNA_{i,t-1} \times (1 + Ret_{i,t}) - MGTNA_{i,t})/TNA_{i,t-1}, \quad (1)$$

[6] We use investor classification provided by the CRSP Mutual Fund Database to classify funds into *institutional funds* versus *retail funds*. Since the classification is only available after December 1999, we employ the following procedure of classification prior to December 1999. First, we manually backfill the CRSP investor classifications for those funds that are available in the database after December 1999. Second, for the remaining funds, we rely on a word search algorithm to classify a fund as either institutional fund or retail funds based on fund names. Specifically, we search for words such as *"institutional shares," "institutional class," "inst shares," "instl," and "inst class"* in fund or fund class names and classify those funds with these keywords in their names as *institutional funds*.

TABLE 1 Summary statistics of mutual funds

	Retail funds		Institutional funds	
	Mean	Median	Mean	Median
N	2,199		646	
Fund Size ($ million)	804.45	132.53	383.08	118.66
Family Size ($ million)	44,776	13,004	30,725	10,516
Expense Ratio	1.44	1.37	0.96	0.94
Marketing Expenses	0.74	0.93	0.23	0.19
Operating Expenses	0.80	0.80	0.73	0.74
Turnover	81.10	62.55	82.27	68.79
Fund Age (years)	13.11	8.85	8.86	7.76
Return (% per month)	0.78	0.75	0.83	0.82
α^{4F} (% per month)	−0.08	−0.09	−0.04	−0.06

Note. This table reports time series averages of monthly cross-sectional means and medians of fund characteristics for all mutual funds, retail funds, and institutional funds. Fund characteristics include Fund Size, Family Size, Expense Ratio, Marketing Expenses (12b-1 fees plus one-seventh front-end loads), Operating Expenses (the difference between expense ratio and 12b-1 fees), Turnover, and Fund Age. Return is fund's monthly net return. Fund four-factor alpha (α^{4F}) is the intercept of the four-factor model estimated for each fund based on preceding 36 monthly fund returns. *N* denotes the average number of funds per month. The sample period is from 1993 to 2014.

where $TNA_{i,t}$ and $TNA_{i,t-1}$ refer to the TNA of fund *i* at the end of month *t* and *t* − 1, respectively. $Ret_{i,t}$ refers to fund return and $MGTNA_{i,t}$ is the increase in TNA due to mergers during the month *t*.[7] An implicit assumption in Equation (1) is that new money flow to a fund is invested at the end of the month.

Table 1 reports the time series averages of the cross-sectional mean and median of fund characteristics. On average, there are 2,199 retail funds and 646 institutional funds per month. Retail funds are, on average, larger, older, and belong to larger fund families than institutional funds. Consistent with previous findings (e.g., Evans & Fahlenbrach, 2012), institutional funds have a lower expense ratio at 0.96% compared to 1.44% for retail funds. Table 1 also reports the fund's marketing and operating expenses. Following Sirri and Tufano (1998) and Huang et al. (2007), we define marketing expenses as 12b-1 fees plus one-seventh front-end loads and operating expenses as the difference between expense ratio and 12b-1 fees. While retail funds, relative to institutional funds, have higher marketing expenses, operating expenses of retail and institutional funds are comparable. The average portfolio turnover ratio is similar between retail and institutional funds, 81.10% and 82.27%, respectively. Finally, while the average fund return (net of fees and expenses) is 0.78%, risk-adjusted return (four-factor alpha) is −0.08% per month for the whole sample of mutual funds. Both fund return and risk-adjusted return are lower for retail funds, with the difference caused mainly by higher expense ratios for retail funds.

2.2 | Investor sentiment

Investor sentiment reflects the market participants' prospect of overall market conditions, asset valuation, and investment risk. In this study, we use three most common measures of investor sentiment in the literature: the monthly University of Michigan ICS, and the Index of CBIND and the investor sentiment measure proposed by Baker and Wurgler (2006) (BWIND). We use ICS in our main analysis and confirm that the results are robust when we use CBIND or BWIND. ICS is based on investor surveys sent to 500 households and is widely tracked by financial media and analysts. The survey respondents of ICS are asked to assess changes in their financial situation, state of economy, as well as the

[7] The typical approach in the literature is to use the last net asset value report date of the target fund to identify the approximate merger date. However, this procedure produces noticeable mismatches. We employ the following procedure suggested by Lou (2012) to identify merger date. Specifically, we match a target to its acquirer from *t* − 1 to *t* + 5, where *t* is the last report date of the target fund, then we pick the month in which the acquirer has smallest absolute percentage flow as the event month.

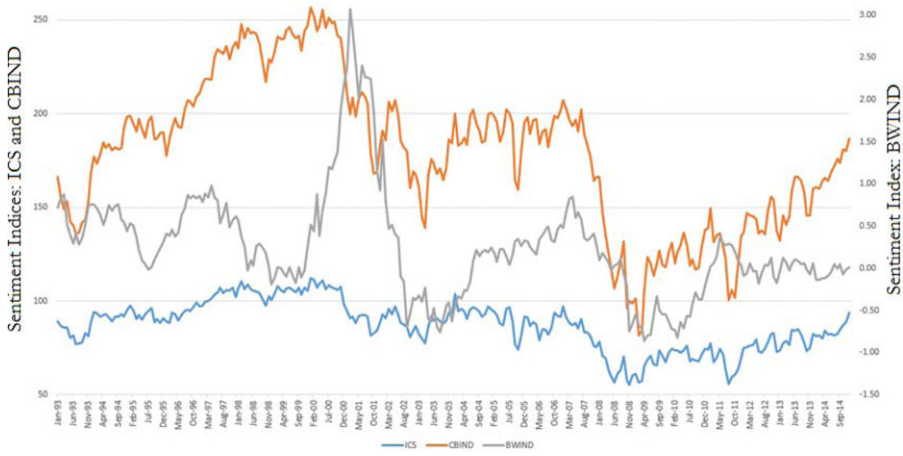

FIGURE 1 Monthly Index of Consumer Sentiment (ICS) [Color figure can be viewed at wileyonlinelibrary.com]
Note. This figure plots the monthly University of Michigan ICS, the Conference Board Consumer Confidence Index (CBIND), and the investor sentiment measure proposed by Baker and Wurgler (2006) (BWIND) from 1993 to 2014.

questions on expected business conditions (both over the next year and over the next five years) and expected changes in the respondent's financial situation over the next year.[8] Qui and Welch (2006) show that ICS is strongly related to investors' prospect of market conditions and future stock performance. Moreover, previous studies document a significant relation between ICS, a proxy of investor sentiment, and small-stock premium (Lemmon & Portniaguina, 2006), analysts' estimates of future earnings (Bergman & Roychowdhury, 2008), and a broad set of stock return anomalies (Stambaugh et al., 2012). Based on the median value of monthly ICS, we classify each month in our sample period (a total of 264 months) as either a high sentiment month or a low sentiment month. Figure 1 plots the monthly ICS, CBIND, and BWIND from January 1993 to December 2014. As expected, ICS and CBIND are highly correlated (correlation coefficient of 0.92). On the other hand, BWIND exhibits a lesser correlation with either ICS or CBIND. The correlation coefficient between BWIND and ICS is 0.38. In addition, as shown in Figure 1, relative to ICS and CBIND, BWIND exhibits higher variation over time.

2.3 | Fund flows during different sentiment periods

We begin our analysis by examining whether investor participation in mutual funds is affected by market-wide sentiment. Table 2 reports the time series mean of average normalized fund flow during the whole sample period, as well as high and low sentiment subperiods. The results are reported separately for retail funds and institutional funds. Since there was a dramatic negative shock to the market and mutual fund flows during recent financial crisis period from 2007 to 2009, we also report the results after excluding the financial crisis period.[9] For the whole sample period, the average flow is 0.163% for retail funds and 0.378% for institutional funds, respectively. The higher institutional fund flow during our sample period highlights the growth of institutional funds since the early 1990s.

Table 2 illustrates a significant difference in investors' participation in mutual funds across different sentiment periods. For example, for retail investors in Panel A, the average flow is 0.575% (−0.255%) during high (low) sentiment period. The difference in retail fund flow between high and low sentiment periods is 0.830% (t-statistic = 9.38). This finding suggests that retail fund investors are subject to sentiment swings. Moreover, this difference is not solely driven

[8] For further discussions of the University of Michigan ICS and other investor sentiment measures, please see Lemmon and Portniaguina (2006), Ludvigson (2004), Qui and Welch (2006), and Baker and Wurgler (2007).

[9] According to the Investment Company Institute, there was a net outflow of nearly $200 billion during the period from October 2007 to March 2009 (http://www.nytimes.com/2009/11/08/business/economy/08stra.html).

TABLE 2 Fund flows during high versus low sentiment periods

	Whole sample period				Excluding financial crisis			
	All periods	High sentiment	Low sentiment	Difference H-L	All periods	High sentiment	Low sentiment	Difference H-L
Panel A: All retail funds								
All Fund Flow (%)	0.163	0.575	−0.255	0.830***	0.331	0.593	0.058	0.535***
				(9.38)				(5.19)
Large Fund Flow (%)	0.031	0.397	−0.339	0.736***	0.192	0.447	−0.074	0.521***
				(8.96)				(5.58)
Small Fund Flow (%)	0.298	0.755	−0.165	0.921***	0.473	0.739	0.197	0.542***
				(7.74)				(3.81)
Value Fund Flow (%)	0.264	0.638	−0.115	0.753***	0.450	0.613	0.281	0.332**
				(6.16)				(2.32)
Growth Fund Flow (%)	0.054	0.499	−0.397	0.897***	0.202	0.559	−0.168	0.729***
				(8.23)				(5.64)

(Continues)

TABLE 2 (Continued)

	Whole sample period				Excluding financial crisis			
	All periods	High sentiment	Low sentiment	Difference H-L	All periods	High sentiment	Low sentiment	Difference H-L
Panel B: Institutional funds								
All Fund Flow (%)	0.378	0.470	0.318	0.152*	0.384	0.369	0.395	−0.003
				(1.79)				(−0.25)
Large Fund Flow (%)	0.257	0.258	0.257	0.001	0.250	0.172	0.308	−0.136
				(0.01)				(−1.38)
Small Fund Flow (%)	0.497	0.682	0.376	0.306***	0.518	0.565	0.482	0.083
				(2.72)				(0.58)
Value Fund Flow (%)	0.445	0.491	0.415	0.077	0.481	0.323	0.52	−0.197
				(0.57)				(−1.54)
Growth Fund Flow (%)	0.292	0.424	0.207	0.217**	0.260	0.390	0.162	0.228*
				(2.27)				(1.95)

Note. This table reports time series averages of monthly cross-sectional mean of normalized fund flows for retail funds in Panel A and institutional funds in Panel B during all periods, high and low sentiment periods, as well as differences with *t*-statistics between high and low sentiment periods. Fund Flow (%) is defined as monthly cash flow divided by the TNA at the beginning of the month. Results are also reported for subsamples of funds based on size- and value-style categories. Mutual funds are classified into size- (value-) style categories based on fund's four-factor loadings. Each month in our sample period is classified as either high or low sentiment period based on the median of the University of Michigan Index of Consumer Sentiment. ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively. The sample period is from 1993 to 2014. Table also presents results excluding the financial crisis period from 2007 to 2009.

by financial crisis period, and remains significant even after excluding financial crisis. On the other hand, the participation of institutional investors is less sensitive to market sentiment and the difference in institutional flow between high and low sentiment periods is mainly driven by institutional outflow during financial crisis period.

Next, we investigate investor money flows to funds with different style categories. We follow Nanda et al. (2004) and classify mutual funds into Small/Large and Value/Growth categories based on fund loadings. For each fund, we estimate the Carhart (1997) four-factor model:

$$r_{i,t} = \alpha_i^{4F} + \beta_{1,i}\text{MKT}_t + \beta_{2,i}\text{SMB}_t + \beta_{3,i}\text{HML}_t + \beta_{4,i}\text{UMD}_t + \varepsilon_t^{4F}, \quad (2)$$

where $r_{i,t}$ is the monthly return of fund i in excess of the 1-month T-bill rate; MKT is the excess return on a value-weighted market portfolio; SMB, HML, and UMD are returns to zero-investment factor mimicking portfolios for size, book-to-market, and momentum in stock returns, respectively. At the end of each month, we use the preceding 36 monthly fund returns with a minimum of 30 monthly return observations. Then, we classify mutual funds in the top half of the SMB (HML) loading as Small- (Value-) Style and those in the bottom half as Large- (Growth-) Style.

Once again, the results show significant variation in flows into funds of specific styles across different sentiment periods. Specifically, the differences in fund flows between high and low sentiment periods are higher for small and growth funds than for large and value funds. These findings are consistent with Baker and Wurgler (2007) who show that fund investors move their money into more speculative fund investment categories (i.e., aggressive growth) than less speculative fund investment categories (i.e., income mixed) when sentiment is high. For retail funds, excluding the financial crisis period of 2007–2009 does not affect the difference in flow across different sentiment periods. In contrast, the differences in institutional flow to these style categories largely disappear after excluding financial crisis period. Overall, the results show that investor participation in mutual fund market varies across high and low sentiment periods, and there is a significantly higher participation of retail investors during high sentiment periods.

3 | MUTUAL FUND FLOWS: HIGH VERSUS LOW SENTIMENT

3.1 | Effect of past performance and fund expenses on fund flows

In this section, we investigate the extent to which investors' fund selection decision is driven by investor sentiment. Here we focus on the relation of fund flow with past fund performance and fund expenses. The literature documents that fund investors pay attention to past performance when selecting funds (Gruber, 1996; Huang et al., 2007; Sirri & Tufano, 1998). However, past fund performance is at best a poor predictor of future performance (Carhart, 1997). There is a debate on the rationality of performance chasing of mutual fund investors. Berk and Green (2004) argue that chasing past performance can be consistent with rational models. If performance chasing is indeed rational and driven by fund manager skill, we expect a significant relation between fund flows and risk-adjusted fund returns during both high and low sentiment periods. As shown in Table 1, retail funds in our sample, on average, charge 144 basis points annually in expenses. However, the literature provides no evidence that funds with higher expense ratios pick stocks well enough to offset the higher fees (Carhart, 1997; Gruber, 1996). Sirri and Tufano (1998) and Gallaher, Kaniel, and Starks (2006) find a negative relation between fund flows and total fund expenses. These findings suggest that fund investors seem to pay attention to the cost of investment. Other studies document that fund investors fail to minimize fund fees (Barber et al., 2005; Capon et al., 1996; Choi, Laibson, & Madrian, 2009). In fact, Bailey et al. (2011) find that investors with strong behavioral biases actually select high expense funds. Once again, if investors fully understand the effect of expenses on net fund returns, we should see no variation in the sensitivity of fund flows to fund expenses across different sentiment periods.

To test the above hypotheses, we perform the following regression for the entire sample period, and separately for high versus low sentiment periods:

$$\begin{aligned}\text{Flow}_{i,t} = {} & \beta_1 \alpha^{4F}_{i,t-1} + \beta_2 \text{Return}_{i,t-1,t-12} + \beta_3 \text{Expense Ratio}_{i,t-1} \\ & + \beta_4 \text{Log(Fund Size)}_{i,t-1} + \beta_5 \text{Log(Fund Age)}_{i,t-1} + \beta_6 \text{Ret. Vol.}_{i,t-1} + \beta_7 \text{Turnover}_{i,t-1} \\ & + \beta_8 \text{Log(Family Size)}_{i,t-1} + \beta_9 \text{Style}_{i,t-1} + \beta_{10} \text{Past Flows}_{i,t-1} + \text{Intercept} + \epsilon_{i,t}, \end{aligned} \tag{3}$$

where the dependent variable, $\text{Flow}_{i,t}$, is normalized fund flow. To sharpen our inference on simple trend chasing versus the ability of identifying fund manager skill, we use both naïve performance measure, namely raw fund return ($\text{Return}_{t-1,t-12}$), and more sophisticated measure, namely risk-adjusted fund return ($\alpha^{4F}_{i,t-1}$), in our analysis. While sophisticated investors understand risk-adjusted fund performance, retail investors are more likely to rely on raw fund returns in their fund selection decisions. Recent studies by Berk and Van Binsbergen (2016) and Barber et al. (2016) show that mutual fund investors employ a single factor model (capital asset-pricing model) when evaluating mutual fund performance. Further, Barber et al. (2016) find that sophisticated investors use more sophisticated benchmarks (i.e., a multifactor model) to make their capital allocation decisions. Following Del Guercio and Reuter (2014), we measure risk-adjusted fund performance ($\alpha^{4F}_{i,t-1}$) based on the four-factor alpha over the past 36 months, and raw fund return ($\text{Return}_{t-1,t-12}$) based on fund returns over the past 12 months. Moreover, to control for activeness of fund portfolio and risk preferences of mutual fund investors, we include fund return portfolio turnover ($\text{Turnover}_{i,t-1}$), fund return volatility ($\text{Ret. Vol.}_{i,t-1}$) as the standard deviation of monthly returns over past 12 months, and factor loading on market portfolio ($\beta^{\text{MKTRF}}_{i,t-1}$). In addition, since there are significant differences in fund flow into funds with specific style between high and low sentiment periods as shown in the previous section, we control investors' preferences for mutual fund style using factor loadings, $\beta^{\text{SMB}}_{i,t-1}$, $\beta^{\text{HML}}_{i,t-1}$, and $\beta^{\text{UMD}}_{i,t-1}$. In untabulated results, we confirm that the findings are robust to including style fixed effects in Equation (3). Finally, since fund flow is highly persistent (Coval & Stafford, 2007; Lou, 2012), we include lagged normalized flows over month $t-1$, $t-2$, $t-3$, $t-4$ to $t-6$, and $t-7$ to $t-12$ as control variables. All variables are defined in Section 2.1.

The regressions in Equation (3) are estimated following the Fama-MacBeth (1973) procedure, separately for retail and institutional funds.[10] Table 3 reports time series averages of coefficient estimates from monthly cross-sectional regressions, the differences in coefficient estimates between high and low sentiment periods, as well as their *t*-statistic based on Newey and West (1987) standard errors that are adjusted for heteroskedasticity and autocorrelations. For brevity, the coefficient estimates of style and past flows are not reported. The results based on the whole sample period are similar to those reported in prior literature (Evans & Fahlenbrach, 2012; Huang et al., 2007; Sirri & Tufano, 1998). For example, fund flow is positively related to family size and past performance, and negatively related to fund size and age. We also find that fund flow is negatively related to expense ratios for both retail and institutional funds. There are also noticeable differences in preference of fund characteristics between retail and institutional investors. For example, retail investors seem to put money into funds with higher turnover, but flow is negatively related to turnover for institutional investors. In addition, the relation between flow and fund return volatility is significantly negative only for retail funds.

Table 3 shows clear variations in the relation between fund flow and past fund performance across different sentiment periods. Fund flows are significantly related to and equally sensitive to risk-adjusted fund performance ($\alpha^{4F}_{i,t-1}$) during both high and low sentiment periods. This suggests that there is a rational component in fund flows that is driven by sophisticated investors searching for fund manager skill, supporting argument in Berk and Green (2004). Nevertheless, the results also show a significant relation between fund flows and past raw fund return ($\text{Return}_{t-1,t-12}$) and the relation is significantly stronger during high sentiment periods. The difference in the coefficient estimates of

[10] As a robustness test, we also follow the literature and perform the regressions by standardizing all variables each month at the cross-section with a mean of 0 and a standard deviation of 1. This approach mitigates the potential time effect in fund characteristics (Amihud & Mendelson, 1986). The results, unreported for brevity, confirm that the main findings are consistent throughout the paper.

TABLE 3 Determinants of fund flows: High versus low sentiment periods

	Panel A: Retail funds				*Panel B: Institutional funds*			
	All periods	High sentiment	Low sentiment	Difference H-L	All periods	High sentiment	Low sentiment	Difference H-L
α^{4F}	0.433***	0.468***	0.411***	0.057	0.929***	0.797***	1.004***	−0.207
	(3.91)	(3.70)	(3.01)	(0.54)	(9.51)	(4.18)	(9.97)	(−1.23)
$\text{Return}_{t-1,t-12}$	0.070***	0.075***	0.064***	0.011**	0.073***	0.068***	0.076***	−0.007
	(13.22)	(8.96)	(10.56)	(2.05)	(9.33)	(4.49)	(8.61)	(−0.75)
Expense Ratio	−0.212***	−0.121**	−0.304***	0.184***	−0.266***	−0.297***	−0.237***	−0.060
	(−3.77)	(−2.50)	(−4.89)	(3.96)	(−5.29)	(−2.78)	(−4.95)	(−0.54)
Log(Fund Size)	−0.003***	−0.003***	−0.002***	−0.001***	−0.004***	−0.005***	−0.002***	−0.003***
	(−6.12)	(−7.21)	(−4.04)	(−3.09)	(−5.59)	(−4.31)	(−5.24)	(−3.64)
Log(Fund Age)	−0.001***	−0.001***	−0.001***	−0.000	−0.003***	−0.004**	−0.003***	−0.001
	(−3.67)	(−2.70)	(−5.19)	(−0.31)	(−4.09)	(−2.45)	(−4.61)	(−0.87)
Ret. Vol.	−0.049**	−0.050*	−0.054	0.004	−0.074	−0.183	−0.011	−0.171
	(−2.06)	(−1.84)	(−1.56)	(0.07)	(−1.26)	(−1.51)	(−0.24)	(−1.47)
Turnover	0.001**	0.001	0.000***	0.000	−0.001**	−0.001*	−0.001	−0.000
	(2.11)	(1.56)	(3.35)	(0.56)	(−2.10)	(−1.94)	(−1.33)	(−0.46)
Log(Family Size)	0.002***	0.003***	0.001	0.002***	0.002***	0.003***	0.002***	0.001
	(2.62)	(3.79)	(1.34)	(4.10)	(4.60)	(3.34)	(3.60)	(1.50)
Intercept	−0.003	−0.008**	0.003	−0.011***	0.002	−0.003	0.006	−0.008
	(−0.94)	(−2.40)	(0.99)	(−4.77)	(0.58)	(−0.41)	(1.35)	(−1.49)
Styles	Y	Y	Y		Y	Y	Y	
Past Flows	Y	Y	Y		Y	Y	Y	
N	2,126	1,652	2,605		608	423	729	
Adj. R^2	0.394	0.415	0.374		0.279	0.308	0.260	

Note. Each month, we perform cross-sectional regressions of monthly fund flows on fund performance—the Carhart four-factor alpha (α^{4F}_{t-1}) and the fund's return over prior 12 months ($\text{Return}_{t-1,t-12}$), expense ratio (Expense Ratio), fund size (Fund Size), fund age (Fund Age), return volatility (Ret. Vol.) measured as the standard deviation of monthly fund returns over prior 12 months, portfolio turnover (Turnover), Family Size, fund styles proxied by four factor loadings, and past fund flows for retail funds in Panel A and institutional funds in Panel B. The regressions are performed for the whole sample period and, separately for high and low sentiment periods as defined in Table 2. The table reports time series averages of the coefficient estimates of the monthly cross-sectional regressions as well as their Newey and West (1987) *t*-statistics (in parentheses). The last column reports the difference of the coefficients between high and low sentiment periods. ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively. The sample period is from 1993 to 2014.

$\text{Return}_{t-1,t-12}$ between the high and low sentiment periods is 0.011 (*t*-statistic = 2.05) for retail funds. We interpret the finding as evidence that fund flows are also driven by sentiment-driven investors chasing funds based on naïve performance measures.

The results in Table 3 also show a significant difference in the relation between flow and fund expenses across different sentiment periods. The relation between retail fund flow and expense ratio is significantly weaker during high sentiment periods and the difference in the coefficient estimates of Expense Ratio between high and low sentiment periods is significantly positive (0.184 with *t*-statistic of 3.96). This finding suggests that sentiment-driven retail investors do not seem to fully understand the cost of investing in mutual funds.

In summary, the results in Table 3 highlight that investor sentiment plays an important role on fund selection decision of investors. We show that retail investors are more likely to exhibit trend chasing behavior and fail to recognize the cost of their mutual fund investments during high sentiment periods. However, we find no evidence that fund flows

by institutional investors are subject to sentiment swings. Institutional flow is equally sensitive to past fund performance, based on both raw fund returns and risk-adjusted fund returns, during high and low sentiment periods. There is no significant difference in the sensitivity of fund flows to fund expenses between high and low sentiment periods for institutional investors.

3.2 | Effect of marketing expenses on fund flows

The results in previous section show that fund investors, particularly retail investors, are less sensitive to total fund expenses during high sentiment periods. Mutual fund expenses fall into two broad categories: operating expenses and marketing expenses. Operating expenses cover costs incurred in portfolio management, fund administration, daily fund accounting and pricing, and so on, whereas marketing expenses are mainly spent to promote the funds or to pay brokers. Unlike operating expenses that may be related to costs of portfolio management and quality of service provided to investors, the sole goal of marketing expenses is to enhance fund visibility. In this section, we are particularly interested in the relation between fund flows and marketing expenses. The results offer sharper inference on whether investors fully understand the negative impact of expenses on fund performance and also whether investors are attracted to funds with more visibility.

Different from other investment products such as stocks and bonds, mutual funds are serviced investment products. Some funds actively market their products through, for example, advertising, to attract potential investors. Previous studies show that marketing efforts by a fund, that is, advertising, promotional brochures, Web site development, reduce investor search costs, especially for unsophisticated investors, and attract more fund flows (Barber et al., 2005; Elton et al., 2004; Gallaher et al., 2006; Jain & Wu, 2000; Sirri & Tufano, 1998). However, sophisticated investors should realize that marketing expenses are a significant drain on fund performance. In fact, funds with high marketing expenses mainly target unsophisticated investors (Gil-Bazo & Ruiz-Verdu, 2009). The literature finds no evidence that funds' marketing expenses or funds sold through brokers signal superior fund manager ability or better subsequent performance (Christoffersen, Evans, & Musto, 2013; Jain & Wu, 2000). Thus, if marketing expenses have a significant effect on fund selection decisions of unsophisticated investors, we expect the relation between fund flows and marketing expenses to be different during high versus low sentiment periods.

To test this hypothesis, we perform the following regression of fund flows on marketing expenses and operating expenses:

$$\begin{aligned}\text{Flow}_{i,t} = {} & \beta_1 \text{Marketing Expenses}_{i,t-1} + \beta_2 \text{Operating Expenses}_{i,t-1} + \beta_3 \alpha^{4F}_{i,t-1} \\ & + \beta_4 \text{Return}_{i,t-1,t-12} + \beta_5 \text{Log(Fund Size}_{i,t-1}) + \beta_6 \text{Log(Fund Age}_{i,t-1}) \\ & + \beta_7 \text{Ret. Vol.}_{i,t-1} + \beta_8 \text{Turnover}_{i,t-1} + \beta_9 \text{Log(Family Size}_{i,t-1}) \\ & + \beta_{10} \text{ Style}_{i,t-1} + \beta_{11} \text{Past Flows}_{i,t-1} + \text{Intercept} + \epsilon_{i,t}, \end{aligned} \tag{4}$$

where marketing expenses are calculated as 12b-1 fees plus one-seventh of the front-end loads and operating expenses are calculated as expense ratio minus 12b-1 fees (Bergstresser et al., 2009; Elton et al., 2004; Sirri & Tufano, 1998).

The results in Table 4 show that for the whole sample period, both retail and institutional fund flows are negatively associated with fund marketing and operating expenses.[11] However, fund investors, particularly retail fund investors, are less sensitive to marketing expenses during high sentiment period. Specifically, the relation between retail fund flow and marketing expenses is −0.027 (t-statistic = −0.49) when sentiment is high, and significantly

[11] To reconcile our findings with Barber et al. (2005) who document a positive relation between fund flow and marketing expenses (12b-1 fees) between 1993 and 1999, we perform the regressions over the same sample period and confirm the significantly positive relation between fund flow and marketing expenses. That is, marketing expenses have a positive effect on fund flows prior to 2000 when investor sentiment is high as shown in Figure 1, but a negative effect over the entire sample period.

TABLE 4 The effect of marketing and operating expenses on fund flows: High versus low sentiment periods

	Panel A: Retail funds				*Panel B: Institutional funds*			
	All periods	High sentiment	Low sentiment	Difference H-L	All periods	High sentiment	Low sentiment	Difference H-L
Marketing Expenses	−0.116**	−0.027	−0.210***	0.183***	−0.262***	−0.219*	−0.276***	0.057
	(−2.48)	(−0.49)	(−4.39)	(2.88)	(−4.03)	(−1.91)	(−3.57)	(0.34)
Operating Expenses	−0.182***	−0.196***	−0.162***	−0.034	−0.239**	−0.286*	−0.199**	−0.087
	(−6.90)	(−5.19)	(−6.31)	(−0.54)	(−2.48)	(−1.72)	(−2.01)	(−0.51)
α^{4F}	0.451***	0.496***	0.417***	0.079	0.936***	0.813***	1.007***	−0.193
	(4.08)	(3.78)	(3.14)	(0.76)	(9.40)	(4.15)	(9.84)	(−1.12)
$Return_{t-1,t-12}$	0.070***	0.074***	0.064***	0.010**	0.073***	0.067***	0.076***	−0.008
	(13.36)	(9.02)	(10.96)	(1.92)	(9.27)	(4.47)	(8.59)	(−0.82)
Log(Fund Size)	−0.002***	−0.003***	−0.002**	−0.001***	−0.003***	−0.005***	−0.002***	−0.003***
	(−4.17)	(−5.59)	(−2.54)	(−3.90)	(−5.56)	(−4.21)	(−4.84)	(−3.21)
Log(Fund Age)	−0.001***	−0.001**	−0.001**	−0.000	−0.003***	−0.004***	−0.002***	−0.002
	(−2.85)	(−2.17)	(−2.54)	(−0.20)	(−4.13)	(−2.66)	(−4.26)	(−1.16)
Ret. Vol.	−0.058***	−0.051*	−0.072**	0.021	−0.072	−0.177	−0.010	−0.167
	(−2.67)	(−1.88)	(−2.35)	(0.43)	(−1.23)	(−1.49)	(−0.22)	(−1.54)
Turnover	0.001**	0.001*	0.000**	0.000	−0.001**	−0.001**	−0.000	−0.000
	(2.10)	(1.76)	(2.38)	(0.81)	(−2.05)	(−2.00)	(−1.22)	(−0.67)
Log(Family Size)	0.001**	0.002***	0.001	0.002***	0.002***	0.002***	0.002***	0.000
	(2.50)	(3.59)	(1.27)	(3.94)	(4.25)	(2.82)	(3.52)	(1.30)
Intercept	−0.004	−0.009***	0.001	−0.010***	0.002	−0.001	0.005	−0.006
	(−1.39)	(−2.94)	(0.57)	(−4.51)	(0.70)	(−0.18)	(1.26)	(−1.16)
Styles	Y	Y	Y		Y	Y	Y	
Past Flows	Y	Y	Y		Y	Y	Y	
N	2,126	1,652	2,605		608	423	729	
Adj. R^2	0.394	0.416	0.372		0.279	0.308	0.260	

Note. Each month, we perform cross-sectional regressions of monthly fund flows on marketing and operating expenses, and other fund characteristics included in Table 3 for retail funds in Panel A and institutional funds in Panel B. The regressions are performed for the whole sample period, and separately for high and low sentiment periods. Fund's marketing expenses (Marketing Expenses) and operating expenses (Operating Expenses) are defined as in Table 1. The table reports time series averages of the coefficient estimates of the monthly cross-sectional regressions as well as their Newey and West (1987) *t*-statistics (in parentheses). The last column reports the difference of the coefficients between high and low sentiment periods. ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively. The sample period is from 1993 to 2014.

negative when sentiment is low (−0.210 with *t*-statistic of −4.39). For retail funds, the difference in the coefficient estimates of Marketing Expenses between during high and low sentiment periods is 0.183 with *t*-statistic of 2.88. Our results suggest that when sentiment is high, retail investors fail to fully understand the negative effect of marketing expenses on fund performance and are more attracted to funds with higher visibility due to marketing efforts, such as advertising. Finally, for institutional investors, we find no significant difference in fund flow sensitivity to marketing expenses between different sentiment periods. This finding provides further support that institutional investors are relatively more sophisticated in their fund selection.

3.3 | Effect of star manager and star-family affiliation on fund flows

The results in previous subsections show that when sentiment is higher, retail investors seem to be attracted more to funds with high visibility as a result of marketing effort. In this section, we use additional fund visibility measures, namely fund family size, a proxy of brand recognition, star manager and star-family affiliation, and examine their effects on investor fund selection decisions. The literature finds that funds belong to well-known large fund families, such as Fidelity and Vanguard, receive greater inflows (Huang et al., 2007; Nanda et al., 2004; Sirri & Tufano, 1998). However, we caution that the positive relation between fund flows and fund family size may not be entirely driven by fund visibility but by fund performance. The literature documents a robust positive relation between fund performance and fund family size (Chen, Hong, Huang, & Kubik, 2004; Pollet & Wilson, 2008). Several studies attribute the positive relation to economies of scale on both resources and costs at the fund family level (Chen et al., 2004; Nanda et al., 2004). To better distinguish between the effect of fund visibility that is potentially related to fund manager skill and sheer visibility that is not indicative of superior manager skill, we include two additional fund visibility measures in our analysis, namely star manager and star-family affiliation. The literature documents that funds with stellar performance, as proxied by star funds or managers, not only attract disproportionate inflow to themselves, but also have a positive spillover effect on other funds that belong to the same fund family (Del Guercio & Tkac, 2008; Khorana & Servaes, 2012; Nanda et al., 2004). Nevertheless, while star funds earn their reputation from stellar performance, there is no evidence that star-family affiliated funds deliver superior performance. Nanda et al. (2004) show that a naïve strategy of pursuing star-family affiliated funds does not generate positive abnormal performance for investors. We hypothesize that funds with stellar fund performance attract sophisticated investors but funds with sheer visibility are likely to attract sentiment-driven investors.

We perform the following regressions to test the above hypotheses:

$$\begin{aligned}\text{Flow}_{i,t} = {} & \beta_1 \text{Star}_{i,t-1} + \beta_2 \text{Star Affiliation}_{i,t-1} + \beta_3 \text{Log(Family Size}_{i,t-1}) \\ & + \beta_4 \text{Marketing Expenses}_{i,t-1} + \beta_5 \text{Operating Expenses}_{i,t-1} + \beta_6 \alpha^{4F}_{i,t-1} \\ & + \beta_7 \text{Return}_{t-1,t-12} + \beta_8 \text{Log(Fund Size}_{i,t-1}) + \beta_9 \text{Log(Fund Age}_{i,t-1}) \\ & + \beta_{10} \text{Ret. Vol.}_{i,t-1} + \beta_{11} \text{Turnover}_{i,t-1} + \beta_{12} \text{ Style}_{i,t-1} + \beta_{13} \text{Past Flows}_{i,t-1} \\ & + \text{Intercept} + \epsilon_{i,t}, \end{aligned} \tag{5}$$

where Star (star fund) is a dummy variable that is set equal to 1 if a fund is in the top 10% of top performers in its style category. Specifically, each month and funds are ranked within each style based on the four-factor alpha during the past three years. Star Affiliation (star-family affiliation) is a dummy variable that is equal to 1 if a fund is affiliated with a family with star fund but is not a star itself. Family size and all other control variables are as in Section 2.2. Table 5 reports the results for retail investors and institutional investors.

The results in Table 5 show that for the whole sample period, fund flows are positively related to family size, a proxy for brand recognition, stellar performance (Star), and sheer visibility (Star Affiliation). That is, there is a greater inflow to funds with high visibility. Nevertheless, there is a significantly positive relation between fund flows and star manger (Star) during both high and low sentiment periods. Moreover, the difference in the coefficient estimates of Star is insignificant between high and low sentiment periods. Consistent with findings on the relation between fund flow and risk-adjusted fund returns, we interpret the finding as evidence that there is a rational component of fund flows driven by manager skill. The results in Table 5 also show that for retail funds, the positive relations between fund flows and Star Affiliation as well as fund Family Size are stronger during high sentiment periods than during low sentiment periods. The difference in the coefficient estimates of Star Affiliation between high and low sentiment periods is 0.001 (t-statistic = 2.12), and the difference in the coefficient estimates of Log(Family Size) between high and low sentiment periods is 0.002 (t-statistic = 3.78). The stronger sensitivity of flow to brand recognition during high sentiment period supports the notion that the relation between flow and family size is not entirely driven by rational decisions. That is,

TABLE 5 The effect of star fund and star-family affiliation on fund flows: High versus low sentiment periods

	Panel A: Retail funds				*Panel B: Institutional funds*			
	All periods	High sentiment	Low sentiment	Difference H-L	All periods	High sentiment	Low sentiment	Difference H-L
Star	0.003***	0.003***	0.002***	0.001	0.004***	0.005***	0.003***	0.002
	(9.43)	(8.97)	(5.65)	(1.26)	(5.44)	(3.60)	(4.37)	(1.32)
Star Affiliation	0.001***	0.001***	0.000**	0.001**	0.001**	0.001**	0.001	0.000
	(2.89)	(3.38)	(2.17)	(2.12)	(2.38)	(2.40)	(1.23)	(1.20)
Log(Family Size)	0.001**	0.002***	0.000	0.002***	0.002***	0.002**	0.002***	0.000
	(2.35)	(3.18)	(1.13)	(3.78)	(4.22)	(2.35)	(4.38)	(0.56)
Marketing Expenses	−0.115**	−0.018	−0.215***	0.197***	−0.262***	−0.207*	−0.282***	0.075
	(−2.41)	(−0.35)	(−4.46)	(3.09)	(−4.30)	(−1.82)	(−3.91)	(0.45)
Operating Expenses	−0.194***	−0.210***	−0.174***	−0.036	−0.251**	−0.300**	−0.208**	−0.092
	(−7.89)	(−6.05)	(−6.66)	(−0.57)	(−2.59)	(−2.05)	(−2.15)	(−0.54)
α^{4F}	0.315***	0.359***	0.285**	0.073	0.712***	0.532***	0.824***	−0.292
	(3.01)	(3.07)	(2.13)	(0.69)	(8.27)	(3.73)	(8.13)	(−1.53)
$\text{Return}_{t-1,t-12}$	0.070***	0.075***	0.064***	0.010**	0.073***	0.068***	0.075***	−0.008
	(13.29)	(9.07)	(10.76)	(1.94)	(9.12)	(4.35)	(8.51)	(−0.76)
Log(Fund Size)	−0.002***	−0.003***	−0.002**	−0.001***	−0.003***	−0.005***	−0.002***	−0.003***
	(−4.19)	(−5.55)	(−2.56)	(3.85)	(−5.27)	(−3.79)	(−4.80)	(−3.16)
Log(Fund Age)	−0.001***	−0.001**	−0.001***	−0.000	−0.003***	−0.004**	−0.002***	−0.002
	(−3.24)	(−2.56)	(−2.70)	(−0.38)	(−4.01)	(−2.49)	(−3.91)	(−1.05)
Ret. Vol.	−0.073***	−0.070**	−0.082***	0.012	−0.074	−0.168	−0.019	−0.149
	(−3.12)	(−2.21)	(−2.86)	(0.25)	(−1.37)	(−1.59)	(−0.42)	(−1.47)
Turnover	0.000*	0.001	0.000**	0.000	−0.001*	−0.001*	−0.000	−0.000
	(1.88)	(1.60)	(2.01)	(0.76)	(−1.89)	(−1.67)	(−1.20)	(−0.44)
Intercept	−0.003	−0.007***	0.001	−0.008***	0.003	−0.000	0.006	−0.006
	(−1.24)	(−2.79)	(0.60)	(−4.04)	(0.93)	(−0.03)	(1.43)	(−1.56)
Styles	Y	Y	Y		Y	Y	Y	
Past Flows	Y	Y	Y		Y	Y	Y	
N	2,126	1,652	2,605		608	423	729	
Adj. R^2	0.395	0.417	0.373		0.281	0.311	0.261	

Note. Each month, we perform cross-sectional regressions of monthly normalized fund flows on fund visibility measures proxied by star fund dummy (Star), and star-family affiliation dummy (Star Affiliation) and other fund characteristics included as in Table 4 for retail funds in Panel A and institutional funds in Panel B. Each month, funds are ranked according to their performance (α^{4F}) during the past 36 months within size × value category. Star is set equal to 1 if a fund is ranked in the top 10% of its category. Star Affiliation is set equal to 1 if a fund is in the same family of a star fund (excluding the star fund itself). The table reports time series averages of the coefficient estimates of the monthly cross-sectional regressions as well as their Newey and West (1987) *t*-statistics (in parentheses) for the whole sample period, and separately for high and low sentiment periods. The last column reports the difference of the coefficients between high and low sentiment periods. ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively. The sample period is from 1993 to 2014.

there is a significant portion of fund flows driven by investor sentiment. For institutional investors, we find no variation in brand recognition, stellar performance, or sheer visibility between high and low sentiment periods. Once again, this finding supports the view that institutional investors' fund purchasing decision is less subject to sentiment swings.

4 | FLOW-PERFORMANCE RELATION AND INVESTOR TIMING ABILITY: HIGH VERSUS LOW SENTIMENT

So far, our results show clear variations in fund flows across different sentiment periods, suggesting that sentiment plays an important role in investors' fund selection decisions. We now turn our attention to the effect of investor sentiment on the flow-performance relation. Gruber (1996) and Zheng (1999) find a significantly positive fund flow-performance relation and interpret this relation as evidence of the "smart-money" effect. That is, investors have the ability to pick funds with superior managers and invest accordingly. On the other hand, several studies propose an alternative explanation for the positive flow-performance relation based on the price pressure of flow-related trades. For example, Wermers (2003) shows that fund performance owes more to flow-related trades than to managers' skill. Likewise, Lou (2012) argues that better performing funds attract relatively higher flows, which are then reinvested by fund managers into their existing positions. This, in turn, drives up the fund's own performance. Likewise, mutual funds with poor performance tend to liquidate existing holdings to meet redemption. Price pressure from liquidation of recent losers drives down the performance of mutual funds. That is, the positive relation between fund flow and future fund performance is a simple mechanism of price pressure caused by flow-induced trades.

We argue that if the positive flow-performance relation is driven by investors' fund selection ability, we expect the relation between fund flow and performance to be stronger during low sentiment periods. This is because mutual fund investors are more likely to make rational decisions and pick superior funds when sentiment is low. On the other hand, if this relation is driven by flow-induced performance, a positive fund flow-performance relation should be stronger during high sentiment period. In addition, we expect the variation in flow-performance relation, if there is any, across different sentiment periods is more pronounced for retail funds since the participation of retail investors is more sensitive to market sentiment.

4.1 | Performance of fund flows: Portfolio approach

To examine the effect of sentiment on the flow-performance relation, we form positive and negative fund flow portfolios based on the sign of net flow by each fund during the previous month. We employ the "follow the money" approach of Elton, Gruber, and Blake (1996) and Gruber (1996) to deal with merged funds. This approach mitigates the survivorship bias and assumes that investors in merged funds put their money in the surviving fund and continue to earn the return on the surviving funds. Each month, returns of positive and negative flow portfolios are computed for both equal- and flow-weighted portfolios. The latter uses a fund's cash flows during the previous month as weights and, as a result, places greater emphasis on funds that experience larger fund inflows or outflows. The flow-weighted portfolios capture more accurately the performance of investor flow in and out of mutual funds. To evaluate the performance of the positive and negative flow portfolios, we estimate the Carhart (1997) four-factor model, which is specified as follows:

$$r_{p,t} = \alpha_p^{4F} + \beta_{1,p}MKT_t + \beta_{2,p}SMB_t + \beta_{3,p}HML_t + \beta_{4,p}UMD_t + \varepsilon_p, \quad (6)$$

where $r_{p,t}$ is the monthly return on a portfolio of funds in excess of the 1-month T-bill rate; MKT is the return on a value-weighted market portfolio excess of the 1-month T-bill rate; SMB, HML, and UMD are the returns on a zero-investment factor mimicking portfolios for size, book-to-market, and momentum, respectively.

Table 6 reports the performance of average, positive, and negative flow portfolios based on the four-factor model, as well as the difference in factor alpha (α^{4F}) between positive and negative flow portfolios. We note that all flow-sorted portfolios have negative abnormal returns, consistent with the literature that mutual funds, after expenses and accounting for momentum, on average underperform their benchmarks (Carhart, 1997; Jiang & Yuksel, 2017; Sapp & Tiwari, 2004). More importantly, Table 6 shows a positive relation between retail fund flow and future fund performance for retails funds during the whole sample period. Specifically, the difference in α^{4F} between positive and negative retail flow portfolios is significantly positive for flow-weighted portfolios. On the other hand, for institutional

TABLE 6 Performance of positive and negative fund flows: High versus low sentiment periods

	Whole sample period		High sentiment period		Low sentiment period	
	Equal-weighted α^{4F} (*p-value*)	Flow-weighted α^{4F} (*p-value*)	Equal-weighted α^{4F} (*p-value*)	Flow-weighted α^{4F} (*p-value*)	Equal-weighted α^{4F} (*p-value*)	Flow-weighted α^{4F} (*p-value*)
	Panel A: Retail funds					
Average	−0.114** (*.016*)	−0.119** (*.014*)	−0.140** (*.015*)	−0.156*** (*.006*)	−0.088 (*.152*)	−0.083 (*.211*)
Positive Flow	−0.076* (*.083*)	−0.048 (*.299*)	−0.062 (*.243*)	−0.010 (*.871*)	−0.089 (*.142*)	−0.084 (*.188*)
Negative Flow	−0.139** (*.016*)	−0.171*** (*.009*)	−0.193** (*.013*)	−0.264*** (*.004*)	−0.086 (*.203*)	−0.082 (*.279*)
Positive–Negative	0.063 (*.156*)	0.123* (*.060*)	0.131* (*.065*)	0.254** (*.014*)	−0.003 (*.947*)	−0.002 (*.975*)
	Panel B: Institutional funds					
Average	−0.100* (*.080*)	−0.142** (*.015*)	−0.113 (*.192*)	−0.181** (*.048*)	−0.091 (*.170*)	−0.111* (*.095*)
Positive Flow	−0.084 (*.107*)	−0.112** (*.049*)	−0.067 (*.432*)	−0.113 (*.260*)	−0.098 (*.115*)	−0.112* (*.082*)
Negative Flow	−0.112* (*.091*)	−0.152** (*.023*)	−0.138 (*.176*)	−0.189* (*.058*)	−0.092 (*.207*)	−0.123 (*.112*)
Positive–Negative	0.028 (*.528*)	0.039 (*.462*)	0.071 (*.368*)	0.076 (*.397*)	−0.006 (*.897*)	0.011 (*.856*)

Note. Each month, mutual funds are grouped to form portfolios based on the sign of flows during the previous month for retail funds in Panel A and institutional funds in Panel B. Performance is measured by the four-factor alpha of the monthly returns of portfolios. The table reports four-factor alphas (in percentage term) for equal- and flow-weighted portfolios for the whole sample period, and separately for high and low sentiment periods for retail funds and institutional funds. The difference in alphas between the positive and negative flows portfolio is also reported. ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively, and *p*-values. The sample period is from 1993 to 2014.

funds, we find no significant differences in α^{4F} between positive and negative flow portfolios. Overall, these results suggest the positive fund flow-performance relation is driven mainly by retail funds.

As pointed out earlier, the literature offers two competing explanations for the positive flow-future performance relation, namely the smart-money hypothesis and flow-induced performance hypothesis. To distinguish these two explanations, we examine flow-performance relation during different sentiment periods. Table 6 shows a significant difference in the predictability of investor flow for future fund performance across different sentiment periods. For retail funds, during high sentiment periods, the difference in α^{4F} between positive and negative flow portfolios is larger in magnitude and statistically significant for both equal- and flow-weighted portfolios. Specifically, the difference in α^{4F} between positive and negative retail flow portfolios is 0.131% per month (significant at 10% level) for equal-weighted portfolios, and 0.254% per month (significant at 5% level) for flow-weighted portfolios, respectively. In sharp contrast, during low sentiment periods, we find no significant difference in α^{4F} between positive and negative flow portfolios for retail funds. Table 6 also shows that unlike retail fund flow, institutional fund flow does not exhibit a significant variation in predicting future fund performance. Specifically, for both equal- and flow-weighted institutional fund portfolios, the differences in α^{4F} between positive and negative flow portfolios are not significant at any conventional level.

Overall, Table 6 shows that the positive flow-performance relation, particularly for retail funds, varies across different sentiment periods. The finding that the flow-performance relation is significant during only high sentiment periods contradicts the prediction of the smart-money hypothesis, but is consistent with the prediction of flow-induced performance hypothesis. These findings are in line with evidence in Akbas et al. (2015) who aggregate mutual fund flow exacerbate cross-sectional mispricing of individual stocks.

4.2 | Performance of unexpected fund flows: Portfolio approach

In this section, we perform additional analysis to test whether the positive flow-performance relation is due to smart money or flow-induced performance. Coval and Stafford (2007), Lou (2012), and Jiang and Yuksel (2017) show that fund flow is highly persistent, thus predictable. Following these studies, we decompose fund flows into expected and unexpected components. If the positive relation between fund flows and subsequent performance is due to an investors' ability to identify superior fund management, we should observe that unexpected flow also predicts subsequent fund performance. On the other hand, if this relation is due to the price pressure caused by flow-induced trades, the expected flow should predict subsequent fund performance. To test these conjectures, each month, we first compute expected flow (Flow^{E}) as the fitted values using the cross-sectional regression in Equation (3) separately for retail and institutional investors. Since Table 4 documents significant differences in flow sensitivity to fund characteristics across different sentiment periods, we estimate the regression coefficients within high and low sentiment periods, respectively. We then compute unexpected fund flow (Flow^{UE}) as the difference between normalized fund flow (Flow) and expected fund flow (Flow^{E}). Based on the sign of the unexpected flow (Flow^{UE}) of each fund during the previous month, we form positive and negative flow portfolios. Table 7 reports the performance of average, positive, and negative flow portfolios, as well as the difference in four-factor alphas between positive and negative flow portfolios.

Table 7 shows that neither positive nor negative flow portfolios deliver higher abnormal returns than their benchmark portfolios for retail funds over the whole sample period. Specifically, the difference in α^{4F} between equal-weighted (unexpected flow-weighted) positive and negative flow portfolios is not statistically significant at any conventional level for retail funds. When we examine the unexpected flow-performance relation between high and low sentiment periods, we find no significant difference in α^{4F} between positive and negative flow portfolios for both high and low sentiment subperiods for retail funds. These findings suggest that the unexpected component of retail flow does not predict subsequent fund performance. The analysis based on institutional investors reveals similar relations. That is, unexpected institutional flow has no predictive power for subsequent fund performance. These findings challenge the smart-money hypothesis, but support the flow-induced performance explanation.

TABLE 7 Performance of positive and negative unexpected fund flows: High versus low sentiment periods

	Whole sample period		High sentiment period		Low sentiment period	
	Equal-weighted α^{4F} (*p-value*)	$Flow^{UE}$-weighted α^{4F} (*p-value*)	Equal-weighted α^{4F} (*p-value*)	$Flow^{UE}$-weighted α^{4F} (*p-value*)	Equal-weighted α^{4F} (*p-value*)	$Flow^{UE}$-weighted α^{4F} (*p-value*)
	Panel A: Retail funds					
Average	−0.115** (*.015*)	−0.149*** (*.002*)	−0.139** (*.016*)	−0.197*** (*.003*)	−0.091 (*.133*)	−0.102* (*.062*)
Positive $Flow^{UE}$	−0.067 (*.299*)	−0.051 (*.438*)	−0.075 (*.412*)	−0.054 (*.591*)	−0.059 (*.413*)	−0.049 (*.487*)
Negative $Flow^{UE}$	−0.143*** (*.005*)	−0.176*** (*.005*)	−0.152** (*.011*)	−0.205*** (*.010*)	−0.133** (*.049*)	−0.148* (*.059*)
Positive–Negative	0.073 (*.166*)	0.128 (*.144*)	0.076 (*.384*)	0.159 (*.259*)	0.070 (*.136*)	0.096 (*.159*)
	Panel B: Institutional funds					
Average	−0.097* (*.079*)	−0.161*** (*.001*)	−0.106 (*.195*)	−0.204*** (*.007*)	−0.091 (*.163*)	−0.128** (*.031*)
Positive $Flow^{UE}$	−0.088 (*.155*)	−0.110* (*.092*)	−0.095 (*.339*)	−0.135 (*.227*)	−0.083 (*.225*)	−0.091 (*.182*)
Negative $Flow^{UE}$	−0.092 (*.108*)	−0.147** (*.014*)	−0.102 (*.212*)	−0.182** (*.024*)	−0.085 (*.214*)	−0.119 (*.104*)
Positive–Negative	0.004 (*.924*)	0.036 (*.562*)	0.006 (*.936*)	0.046 (*.694*)	0.002 (*.948*)	0.029 (*.557*)

Note. Each month, mutual funds are grouped to form portfolios based on the sign of unexpected fund flows during the previous month for retail funds in Panel A and institutional funds in Panel B. Performance is measured by the four-factor alpha of the monthly returns of portfolio. Unexpected fund flow is defined as the difference between monthly fund flows and expected fund flow, which is calculated as the fitted values in the cross-sectional regressions in Table 3. This table reports four-factor alphas (in percentage term) for equal- and unexpected flow-weighted portfolios for the whole sample period, and separately for high and low sentiment periods for retail funds and institutional funds. The difference in alphas between the positive and negative flows portfolio is also reported. ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively, and *p*-values. The sample period is from 1993 to 2014.

4.3 | Performance of new money flows: Fama-MacBeth regressions

We further extend our earlier analysis of the flow-performance relation in a multivariate framework. Specifically, we perform Fama-MacBeth regressions of future fund performance on fund flow, expected and unexpected component of fund flow, and other fund characteristics that are related to future fund performance. For each month t, we estimate the following regression:

$$\begin{aligned}\hat{\alpha}_{i,t}^{4F} = {} & \beta_1 \text{Flow}_{i,t-1} \left(\text{Flow}_{i,t-1}^{E} \text{ and } \text{Flow}_{i,t-1}^{UE}\right) + \beta_2 \alpha_{i,t-1}^{4F} + \beta_3 \text{Expense Ratio}_{i,t-1} \\ & + \beta_4 \text{Log(Fund Size}_{i,t-1}) + \beta_5 \text{Log(Fund Age}_{i,t-1}) + \beta_6 \text{Ret. Vol.}_{i,t-1} \\ & + \beta_7 \text{Turnover}_{i,t-1} + \beta_8 \text{Log(Family Size}_{i,t-1}) + \text{Intercept} + \varepsilon_{i,t}, \end{aligned} \tag{7}$$

where the dependent variable, $\hat{\alpha}_{i,t}^{4F}$, is the four-factor alpha estimated from the Carhart (1997) model. Specifically, the fund alpha is obtained as the fund excess return less the sum of the products of each of the four-factor realizations and corresponding factor loadings in Equation (2). The main explanatory variable is normalized fund flow ($\text{Flow}_{i,t-1}$). Other control variables include fund four-factor alpha, expense ratio, fund size, age, return volatility, portfolio turnover, and family size at month $t-1$ (Carhart, 1997; Chen et al., 2004; Gil-Bazo & Ruiz-Verdu, 2009; Gruber, 1996; Jiang & Yuksel, 2017). To distinguish between smart-money and flow-induced performance hypotheses, we further decompose fund flow into expected (or predictable) and unexpected components. Specifically, we first estimate the cross-sectional regressions of fund flows in Equation (3) separately during high and low sentiment periods. Table 3 shows that there are significant differences in fund flow sensitivity to past fund characteristics across different sentiment periods. We then compute expected fund flow ($\text{Flow}_{i,t-1}^{E}$) as the fitted value of Equation (3) based on past fund characteristics prior to month $t-1$. The unexpected fund flow ($\text{Flow}_{i,t-1}^{UE}$) is computed as the difference between normalized fund flow ($\text{Flow}_{i,t-1}$) and expected fund flow ($\text{Flow}_{i,t-1}^{E}$). Under the smart-money hypothesis, since the positive relation between fund flows and subsequent performance is driven by investors' ability to identify funds with superior managers, the unexpected fund flow ($\text{Flow}_{i,t-1}^{UE}$) should be positively associated with future fund performance. In contrast, under the flow-induced performance hypothesis, since flow-performance relation is driven by the price pressure of flow-related trades by fund managers, the expected fund flow ($\text{Flow}_{i,t-1}^{E}$) should be positively associated with future fund performance.

Table 8 reports the regression results estimated following the Fama-MacBeth (1973) procedure. In specification (1), over the whole sample period, we confirm a significantly positive flow-performance relation for both retail funds and for institutional funds. More importantly, Table 8 also highlights a significant variation in the predictability of $\text{Flow}_{i,t-1}$ for future fund performance. In particular, the well-documented relation between positive relation between fund flows and future fund performance is significant only during high sentiment period. In contrast, there is no significant relation between fund flow and future fund performance during low sentiment periods. More importantly, once we decompose fund flow into its expected and unexpected flow components, specification (2) shows that the positive flow-performance relation is solely driven by expected fund flow ($\text{Flow}_{i,t-1}^{E}$). Moreover, consistent with the prediction of the flow-induced performance hypothesis, the relation is stronger during high sentiment period. In sharp contrast, the results show no significant relation between unexpected fund flow and subsequent fund performance. The absence of any predictive relation between unexpected fund flow and fund performance is inconsistent with the predictions of smart-money explanation. These results hold for both retail funds and institutional funds. Overall, the findings of these Fama-MacBeth regressions provide evidence supporting the flow-induced performance explanation.

4.4 | Timing ability of mutual fund investors

The results in the previous subsection show that the positive flow-performance relation is significant only during high sentiment periods and, more importantly, is mainly driven by expected component of fund flows. This is evidence that investors do not seem to have the ability to pick funds with superior managers and move their money across funds

TABLE 8 Regressions of fund performance on fund flow, expected and unexpected flow

Panel A: Retail funds						
	All periods		**High sentiment**		**Low sentiment**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Flow	0.005***		0.009***		0.002	
	(2.90)		(3.88)		(0.67)	
$Flow^E$		0.006**		0.010***		0.003
		(2.21)		(2.63)		(0.74)
$Flow^{UE}$		0.003		0.004		−0.002
		(0.65)		(0.21)		(−0.30)
α^{4F}	0.135***	0.132***	0.173***	0.175***	0.096**	0.097***
	(3.75)	(3.29)	(3.86)	(3.44)	(2.48)	(2.49)
Expense Ratio	−0.069***	−0.070***	−0.073***	−0.072***	−0.065***	−0.067***
	(−5.15)	(−5.14)	(−4.32)	(−4.15)	(−5.18)	(−5.18)
Log(Fund Size)	−0.000**	−0.000*	−0.000**	−0.000*	−0.000	−0.000
	(−2.22)	(−1.95)	(−2.12)	(−1.85)	(−1.26)	(−1.12)
Log(Fund Age)	0.000	0.000	−0.000*	−0.000*	0.000*	0.001*
	(0.81)	(0.82)	(−1.77)	(−1.80)	(1.87)	(1.90)
Ret. Vol.	−0.028*	−0.026	−0.043	−0.039	−0.013	−0.012
	(−1.73)	(−1.56)	(−1.51)	(−1.38)	(−0.74)	(−0.62)
Turnover	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000
	(−0.71)	(−0.67)	(−0.20)	(−0.17)	(−1.12)	(−1.10)
Log(Family Size)	0.000**	0.000**	0.000	0.000	0.000*	0.000*
	(2.41)	(2.26)	(1.60)	(1.53)	(1.91)	(1.83)
Intercept	0.000	0.000	0.001	0.001	−0.001	−0.001
	(0.46)	(0.30)	(0.90)	(0.84)	(−0.79)	(−0.90)
N	2,125	2,125	1,697	1,697	2,559	2,559
Adj. R^2	0.081	0.085	0.085	0.089	0.076	0.081
Panel B: Institutional funds						
	All periods		**High sentiment**		**Low sentiment**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Flow	0.004*		0.006*		0.003	
	(1.68)		(1.98)		(1.12)	
$Flow^E$		0.014*		0.013*		0.014
		(1.89)		(1.69)		(1.64)
$Flow^{UE}$		0.003		0.002		−0.001
		(1.16)		(1.12)		(−0.45)
α^{4F}	0.086***	0.082***	0.090***	0.083**	0.082*	0.083*
	(3.32)	(3.13)	(2.55)	(2.35)	(1.72)	(1.78)
Expense Ratio	−0.029	−0.024	−0.002	0.013	−0.053	−0.056
	(−0.76)	(−0.59)	(−0.02)	(0.17)	(−1.52)	(−1.59)
Log(Fund Size)	−0.000***	−0.000**	−0.001***	−0.001**	−0.000	−0.000
	(−2.74)	(−2.38)	(−3.05)	(−2.62)	(−1.07)	(−0.66)

(Continues)

TABLE 8 (Continued)

Panel B: Institutional funds						
	All periods		**High sentiment**		**Low sentiment**	
	(1)	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
Log(Fund Age)	0.001**	0.001***	0.002*	0.002*	0.001***	0.001***
	(2.48)	(2.72)	(1.84)	(1.95)	(2.87)	(2.96)
Ret. Vol.	−0.017	−0.018	−0.015	−0.018	−0.019	−0.018
	(−0.80)	(−0.90)	(−0.38)	(−0.49)	(−0.75)	(−0.73)
Turnover	−0.000	0.000	0.000	0.000	−0.000	−0.000
	(−0.06)	(0.03)	(0.40)	(0.45)	(−1.27)	(−1.17)
Log(Family Size)	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000
	(−0.51)	(−0.73)	(−0.06)	(−0.11)	(−0.79)	(−1.16)
Intercept	−0.003	−0.003*	−0.005	−0.005	−0.001	−0.001
	(−1.54)	(−1.69)	(−1.36)	(−1.33)	(−0.83)	(−1.04)
N	512	512	305	305	694	694
Adj. R^2	0.086	0.091	0.099	0.105	0.074	0.079

Note. Each month, we perform cross-sectional regressions of fund performance ($\hat{\alpha}^{4F}$) on previous month's normalized fund flow (Flow), expected fund flow ($Flow^{E}$), unexpected fund flow ($Flow^{UE}$), and other fund characteristics for retail funds in Panel A and institutional funds in Panel B. Fund performance is measured by the four-factor alpha ($\hat{\alpha}^{4F}$). Expected and unexpected fund flows are defined as in Table 7. All other variables are defined as in Table 3. The table reports time series averages of the coefficient estimates of the monthly cross-sectional regressions as well as their Newey and West (1987) *t*-statistics (in parentheses) for the whole sample period, separately for high and low sentiment periods. ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively. The sample period is from 1993 to 2014.

accordingly. In this section we further investigate the timing ability of mutual fund investors at the individual fund level during different sentiment periods.[12] Friesen and Sapp (2007) propose a measure of investor timing ability based on the difference between the dollar-weighted fund return and the buy-and-hold fund return. They show that mutual fund investors on average have negative timing ability. In our analysis, we conjecture that since unsophisticated investors participate more in the market when sentiment is high, the poor timing ability of investors should be stronger during high sentiment periods. To test this hypothesis, we follow Friesen and Sapp (2007) and compute dollar-weighted returns (r_i^{DW}) as the solution of the following equation:

$$TNA_{i,0}\left(1+r_i^{DW}\right)^{T}+\sum_{t=1}^{T}Flow_{i,t}\left(1+r_i^{DW}\right)^{T-t}=TNA_{i,t}\,, \tag{8}$$

and the buy-and-hold returns:

$$r_i^{G}=\left(\prod_{t=1}^{T}(1+r_{it})\right)^{1/T}, \tag{9}$$

where TNA_t refers to the TNA of fund *i* at the end of month *t*, $Flow_{i,t}$ is investor flow (in dollars) of fund *i* at the end of the month *t*, and r_{it} is the monthly return of fund *i* in month *t*. Dollar-weighted return in Equation (8) reflects the actual performance of investors' capital into and out of the fund over time. On the other hand, buy-and-hold (geometric) return in Equation (9) measures the performance of the first dollar in the fund over time. Thus, the performance gap between dollar-weighted return and geometric return, denoted as PG_i, captures the timing ability of fund investors. A positive (negative) performance gap (PG_i) indicates a superior (poor) timing ability of fund investors. Since our focus is on the

[12] We wish to thank an anonymous referee for suggesting this analysis.

timing ability of mutual fund investors during different sentiment periods, each month we compute the performance gap over a 3-month horizon from month $t-2$ to t. We confirm that the results are consistent when we estimate the performance gap over longer horizons, for example, a 12-month horizon from month $t-11$ to t. The results are not reported for brevity.

Table 9 reports the average dollar-weighted (r_i^{DW}), geometric (r_i^{G}) returns, and performance gap (PG_i). For the whole sample period, Panel A confirms poor timing ability of retail fund investors as documented in Friesen and Sapp (2007). The performance gap for retail fund investors is significantly negative for both equal-weighted fund portfolios and TNA-weighted fund portfolios, −0.087% and −0.091% per month, respectively. More importantly, we show that the poor timing ability of retail investors is mainly driven by high sentiment. Panel A shows that for retail funds, there is no difference between dollar-weighted and geometric returns during low sentiment periods. However, the performance gap is −0.197% (significant at 1% level) for equal-weighted portfolios and −0.202% (significant at 1% level) for TNA-weighted portfolios during high sentiment periods.

Panel B of Table 9 presents the results for institutional investors. For the whole sample period, we find no significant difference between dollar-weighted and geometric returns. However, similar to the results for retail funds, the timing ability of institutional fund investors also varies across different sentiment periods. In particular, the performance gap is significantly negative when sentiment is high, −0.123% for equal-weighted portfolios and −0.113% for TNA-weighted portfolios. The results show that institutional fund investors also exhibit poor timing ability during high sentiment periods.

5 | ROBUSTNESS CHECKS

We perform a number of additional analyses to ensure the robustness of our main findings. First, we use alternative measures of investor sentiment and replicate our main analysis. Second, we exclude the financial crisis period and extremely low sentiment periods. For brevity, we only report the results for retail funds. The results for institutional funds are consistent with the main analysis.

5.1 | Results based on alternative measures of investor sentiment

In our main analysis, we use ICS index as our main proxy for investor sentiment. In this section, we replicate our analysis using alternative measures of investor sentiment, namely the Index of CBIND and the measure of investor sentiment proposed in Baker and Wurgler (2006) (BWIND). Similar to ICS, the CBIND survey is mailed to a random set of 5,000 households, a much larger pool of respondents than the ICS. The survey questions of CBIND are similar to those of ICS of the University of Michigan.[13] However, there are some differences between ICS and CBIND. First, the survey participants in ICS compare their present situation with that one year before, as a result, compared to CBIND, ICS is backward looking. In addition, relative to CBIND that measures survey participants' expectations over six months, ICS measures expectations over a longer horizons (one to five years). Finally, while CBIND is considerably more focused on job availability in survey participants' specific area of residence, ICS measures the individual's financial situation as well as the economic conditions in the country as a whole.

BWIND is a composite sentiment index based on the first principal component of six measures of market-based sentiment proxies: the closed-end fund discount, the NYSE share turnover, the number of initial public offerings (IPOs), the average first-day return of IPOs, the equity share in new issues, and the dividend premium. Since some sentiment proxies reflect economic fundamentals, they also regress each of the raw sentiment measures on a set of macroeconomic variables that includes industrial production index growth, durable consumption growth, nondurable consumption growth, service consumption growth, and a dummy variable for National Bureau of Economic Research recessions,

[13] Please see Ludvigson (2004) and Lemmon and Portniaguina (2006) for discussions on similarities and differences between CBIND and University of Michigan ICS.

TABLE 9 Timing ability of mutual fund investors: High versus low sentiment periods

	Whole sample period				High sentiment period				Low sentiment period			
	Equal-weighted		TNA-weighted		Equal-weighted		TNA-weighted		Equal-weighted		TNA-weighted	
	Mean	*(p-value)*	Mean	*(p-value)*	Mean	*(p-value)*	Mean	*(p-value)*	Mean	*(p-value)*	Mean	*(p-value)*
	Panel A: Retail funds											
R^{DW}	0.569***	*(.000)*	0.553***	*(.000)*	0.776***	*(.000)*	0.752***	*(.000)*	0.342***	*(.002)*	0.335***	*(.003)*
R^{G}	0.655***	*(.000)*	0.636***	*(.000)*	0.973***	*(.000)*	0.954***	*(.000)*	0.307**	*(.048)*	0.302**	*(.041)*
PG	−0.087***	*(.006)*	−0.091***	*(.000)*	−0.197***	*(.000)*	−0.202***	*(.000)*	0.035	*(.549)*	0.032	*(.580)*
	Panel B: Institutional funds											
R^{DW}	0.727***	*(.000)*	0.667***	*(.000)*	1.252***	*(.000)*	1.165***	*(.000)*	0.199***	*(.002)*	0.169***	*(.004)*
R^{G}	0.762***	*(.000)*	0.696***	*(.000)*	1.375***	*(.000)*	1.277***	*(.000)*	0.137*	*(.052)*	0.104	*(.102)*
PG	−0.035	*(.253)*	−0.028	*(.344)*	−0.123***	*(.000)*	−0.113***	*(.001)*	0.062	*(.244)*	0.065	*(.224)*

Note. Each month, for each fund we calculate the average monthly dollar-weighted return (R^{DW}) and geometric return (R^{G}) over the 3-month horizon for retail funds in Panel A and institutional funds in Panel B. Performance gap (PG) is the difference between dollar-weighted and geometric returns defined as in Section 4.4. This table reports the time series averages of monthly cross-sectional mean of dollar-weighted return, geometric return, and performance gap (in percentage term), and *p*-values for the whole sample period, and separately for high and low sentiment periods. ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively. The sample period is from 1993 to 2014.

and then use the residuals as the sentiment index.[14] Since ICS is based on a monthly survey that is mailed to random set of five hundred households and their views about the economy, relative to BWIND, ICS is less tied to the sentiment of stock market investors. Similar to our earlier analysis, we classify each month in our sample period as either a high or a low sentiment month based on median values of CBIND and BWIND, respectively.

The results are reported in Table 10, once again, show substantial variations in not only investor preference of fund characteristics, but also the relation between fund flow and subsequent fund performance across different sentiment periods based on CBIND or BWIND. In Panel A, we find that fund investors do not fully recognize the adverse effect of marketing expenses on fund performance and exhibit greater sensitivity to sheer visibility; that is, marketing expenses during high sentiment period. In addition, the sensitivity of fund flow to past performance is more pronounced for raw fund returns when sentiment is high. The only noticeable difference between our main results and sentiment measure based on Baker and Wurgler (2006) is that while positive, the difference in fund flow sensitivity to star affiliation is not significant across different sentiment periods. Finally, in Panel B, while expected fund flow predicts subsequent fund performance during high sentiment periods, there is no relation between expected fund flows and future performance when sentiment is low. More importantly, the results show that unexpected fund flow has no predictive power for subsequent fund performance. In addition, we confirm that the results on the timing ability of mutual fund investors are consistent when we use CBIND or BWIND as alternative measures of investor sentiment. These results are not reported for brevity.

The previous literature also finds that ICS contains information regarding future macroeconomic conditions, as well as investor sentiment that is unrelated to economic fundamentals. For example, Lemmon and Portniaguina (2006) find that ICS is significantly correlated to interest rate, unemployment rate, and real gross domestic product (GDP) growth. To mitigate the concern that ICS is related to economic fundamentals, we follow Lemmon and Portniaguina (2006) and regress ICS on contemporaneous and lagged values of number of macro variables; dividend yield (DIV) measured as the total cash dividend of the CRSP value-weighted index over the last four quarters and divided by the value of the index at the end of current quarter; default spread (DEF), measured as the difference between the yields to maturity on Moody's Baa-rated and Aaa-rated bonds; the yield on 3-month T-bills (YLD); GDP growth, labor income growth (LABOR); growth in unemployment rate (URATE), the inflation rate (CPI); and the consumption-to-wealth ratio (CAY).[15] We then treat the residual from this regression as our measure of sentiment measure: Orthogonalized Index of Consumer Sentiment ($ICS^{\perp}$). As reported in Panel A of Table 10, we find a clear variation in fund flow sensitivity to past performance, marketing expenses, brand recognition, and sheer visibility across different sentiment periods. Moreover, once again, we find expected fund flow predicts future performance only during high sentiment period in Panel B, providing further support on flow-induced performance hypothesis. The results confirm that our main findings are robust to the use of alternative measures of investor sentiment.

5.2 | Excluding financial crisis or extremely low sentiment periods

One underlying premise of our analysis is that investors behave more rationally when sentiment is low than when sentiment is high. We acknowledge that fund investors may exhibit behavioral biases during the financial crisis period or the extremely low sentiment periods. As additional robustness check, we exclude the recent financial crisis period of 2007–2009 or the bottom 5% of the ICS and reclassify each month in our remaining sample period as either a high or low sentiment month based on the median value of ICS. As shown in Table 11, excluding financial crises or extreme low sentiment periods does not have a material impact on our findings. Panel A shows that fund flow sensitivity to past performance, fund expenses, and visibility measures vary across different sentiment periods. Mutual fund investors, particularly retail investors, exhibit a stronger tendency to chase past performance, fail to minimize fund expenses, and are attracted more to funds with sheer visibility when sentiment is high. Similar to our earlier analysis

[14] The data are obtained from Jeffrey Wurgler's Web site (http://people.stern.nyu.edu/jwurgler/).

[15] We thank Martin Lettau for providing data on consumption-to-wealth ratio. The data are obtained from Martin Lettau's Web site (http://faculty.haas.berkeley.edu/lettau/data_cay.html).

TABLE 10 Robustness check: Alternative measures of investor sentiment

Panel A: Determinants of fund flows									
	CBIND			BWIND			$ICS^{\perp}$		
	High sentiment	Low sentiment	Difference H-L	High sentiment	Low sentiment	Difference H-L	High sentiment	Low sentiment	Difference H-L
Star	0.003***	0.003***	0.000	0.003***	0.003***	0.000	0.003***	0.003***	−0.000
	(6.83)	(7.20)	(0.21)	(7.86)	(5.85)	(1.07)	(6.79)	(5.05)	(−0.75)
Star Affiliation	0.002***	0.001***	0.001**	0.001***	0.001**	0.000	0.002***	0.001*	0.001**
	(3.23)	(2.71)	(2.01)	(3.22)	(2.39)	(0.36)	(3.43)	(1.84)	(1.94)
Log(Family Size)	0.002***	0.000	0.002***	0.002***	0.001**	0.001***	0.002**	0.001*	0.001**
	(3.94)	(1.36)	(4.17)	(3.14)	(2.07)	(2.50)	(2.09)	(1.77)	(2.03)
Marketing Exp.	−0.038	−0.191***	0.153**	−0.064	−0.194***	0.130**	−0.049	−0.241***	0.192***
	(−0.75)	(−4.37)	(2.41)	(−1.43)	(−3.43)	(2.13)	(−1.24)	(−3.27)	(2.48)
Operating Exp.	−0.142***	−0.147***	0.005	−0.147***	−0.241***	−0.094	−0.187***	−0.197***	0.010
	(−5.45)	(−5.34)	(0.54)	(−4.11)	(−6.66)	(−1.51)	(−4.43)	(−8.63)	(0.17)
α^{4F}	0.252***	0.378***	−0.126	0.277**	0.353***	−0.075	0.277***	0.368**	−0.091
	(2.83)	(2.75)	(−1.19)	(2.16)	(3.93)	(−0.71)	(2.99)	(2.38)	(−0.86)
$Return_{t-1,t-12}$	0.077***	0.062***	0.015***	0.079***	0.061***	0.018***	0.076***	0.063***	0.013**
	(12.09)	(12.33)	(2.64)	(14.20)	(10.89)	(2.99)	(11.50)	(16.35)	(2.27)
Unreported Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y

Panel B: Regression of fund performance on expected and unexpected flows						
	CBIND		BWIND		$ICS^{\perp}$	
	High sentiment	Low sentiment	High sentiment	Low sentiment	High sentiment	Low sentiment
$Flow^{E}$	0.011**	0.004	0.013**	0.006	0.010**	0.005
	(2.14)	(0.86)	(2.02)	(1.53)	(2.22)	(0.76)
$Flow^{UE}$	0.004	−0.001	0.002	−0.005	0.004	−0.001
	(1.03)	(−0.16)	(0.69)	(−0.90)	(1.32)	(−0.08)
Unreported Controls	Y	Y	Y	Y	Y	Y

Note. Each month in our sample period is classified as either high or low sentiment period based on the median of the Conference Board Consumer Confidence Index (CBIND), the measure of investor sentiment proposed by Baker and Wurgler, 2006 (BWIND), or the Orthogonalized Index of Consumer Sentiment ($ICS^{\perp}$). $ICS^{\perp}$ is the residual of regression of ICS on a set of macroeconomic indicators described in Section 5.1. For retail funds and separately for high and low sentiment periods, Panel A reports the cross-sectional regressions of monthly normalized fund flows on fund characteristics defined as in Table 5, as well as the difference of the coefficients between high and low sentiment periods. Panel B reports the cross-sectional regressions of fund performance on previous month's expected and unexpected fund flows, and other fund characteristics defined as in Table 8. We obtain time series averages of the coefficient estimates of the monthly cross-sectional regressions as well as their Newey and West (1987) *t*-statistics (in parentheses). ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively. The sample period is from 1993 to 2014.

of the flow-performance relation, Panel B shows that, inconsistent with the smart-money hypothesis, fund flow predicts subsequent performance only during high sentiment periods, and unexpected flow does not predict future fund performance. Again the results on the timing ability of fund investors across different sentiment periods remain the same when we exclude the financial crisis period of 2007–2009 or the extremely low sentiment periods. Overall, these findings suggest that our results reported earlier are robust to excluding the financial crisis of 2007–2009 or extreme low sentiment periods.

TABLE 11 Robustness check: Excluding financial crisis or extreme low sentiment period

Panel A: Determinants of fund flows						
	Excluding financial crisis (2007–2009)			Excluding bottom 5% of ICS		
	High sentiment	Low sentiment	Difference H-L	High sentiment	Low sentiment	Difference H-L
Star	0.003***	0.003***	0.001	0.003***	0.002***	0.000
	(7.41)	(4.20)	(0.70)	(7.00)	(5.36)	(1.22)
Star Affiliation	0.001***	0.001	0.001**	0.001***	0.000	0.001***
	(3.86)	(1.63)	(1.99)	(3.80)	(1.62)	(2.59)
Log(Family Size)	0.002***	0.001	0.001***	0.002***	0.001	0.002***
	(4.39)	(1.51)	(2.60)	(4.01)	(1.19)	(3.61)
Marketing Exp.	−0.013	−0.134***	0.121**	−0.004	−0.189***	0.184***
	(−0.26)	(−3.87)	(2.03)	(−0.09)	(−5.39)	(2.81)
Operating Exp.	−0.218***	−0.193***	−0.025	−0.221***	−0.174***	−0.046
	(−3.68)	(−5.65)	(−0.34)	(−4.49)	(−6.01)	(−0.72)
α^{4F}	0.333***	0.336**	−0.003	0.333***	0.340**	−0.007
	(2.87)	(2.15)	(−0.02)	(3.29)	(2.54)	(−0.06)
$Return_{t-1,t-12}$	0.075***	0.066***	0.008*	0.075***	0.064***	0.011**
	(10.32)	(11.54)	(1.79)	(10.55)	(11.66)	(1.99)
Unreported Controls	Y	Y	Y	Y	Y	Y

Panel B: Regression of fund performance on expected and unexpected flows				
	Excluding financial crisis (2007—2009)		Excluding bottom 5% of ICS	
	High sentiment	Low sentiment	High sentiment	Low sentiment
$Flow^{E}$	0.009**	0.004	0.010**	0.004
	(2.06)	(0.96)	(2.46)	(1.18)
$Flow^{UE}$	0.008	0.001	0.009	−0.001
	(1.11)	(0.19)	(1.29)	(−0.23)
Unreported Controls	Y	Y	Y	Y

Note. The financial turmoil of 2007–2009 and the bottom 5% of the Index of Consumer Sentiment (ICS) are excluded from our sample. Then, each month in our sample period is classified as either high or low sentiment period based on the median of the University of Michigan ICS. For retail funds and separately for high and low sentiment periods, Panel A reports the cross-sectional regressions of monthly normalized fund flows on fund characteristics defined as in Table 5, as well as the difference of the coefficients between high and low sentiment periods. Panel B reports the cross-sectional regressions of fund performance on previous month's expected and unexpected fund flows, and other fund characteristics defined as in Table 8. We obtain time series averages of the coefficient estimates of the monthly cross-sectional regressions as well as their Newey and West (1987) *t*-statistics (in parentheses). ***, **, * indicate statistical significance at the .01, .05 and .10 level, respectively. The sample period is from 1993 to 2014.

6 | CONCLUSION

The literature documents stylized findings on mutual fund flows and offers mixed arguments as to whether investor fund selection is driven by rational decisions or behavioral biases. We examine the extent to which the stylized empirical findings on mutual fund flow are driven by market sentiment. In particular, we examine variations of fund flow sensitivity to past performance, fund expenses, and fund visibility characteristics between high and low sentiment periods. We document significant variations in the preference of fund investors for fund characteristics across different sentiment periods. When sentiment is high, mutual fund investors exhibit a stronger tendency to chase past performance, fail to minimize fund expenses, and are attracted more to funds with sheer visibility. Compared to retail investors, institutional investors are less subject to behavioral biases and sentiment swings. These results suggest that sentiment

plays an important role in investor fund selection decisions. Our results also show that the positive relation between fund flows and performance is significant only when sentiment is high. Moreover, the predictive power of fund performance is mainly driven by expected fund flows; unexpected fund flows have no predictive power of future fund performance. These findings are inconsistent with predictions of the smart-money hypothesis but support the hypothesis that the positive flow-performance relation is driven by the flow-induced trades of mutual funds. Finally, our results show that the poor timing ability of fund investors at the individual fund level documented in the literature is mainly driven by high investor sentiment.

ACKNOWLEDGMENTS

We are grateful to (Editor) Srinivasan Krishnamurthy and an anonymous referee for helpful comments and suggestions that have helped to significantly improve the paper. We also wish to thank Ben Branch, Travis Box, Laura Cardella, Mine Ertugrul, Douglas J. Fairhurst, Xin Gao, Tyler Hull, Januj Juneja, Hayden Kane, Rui Li, Junghoon Lee, Jordan Neyland, Xuhui Pan, Jerome Taillard, Tong Yao, Yu Yuan, Chi Wan, Mengying Wang, Gulnara Zaynutdinova, and seminar participants at the 2016 Boston Area Finance Symposium, Institute of Financial Studies at SWUFE, Victoria University of Wellington, the University of Massachusetts Boston, and Washington State University for helpful comments and suggestions.

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How to cite this article: Jiang GJ, Yüksel HZ. Sentimental mutual fund flows. *Financial Review*. 2019;1–30. https://doi.org/10.1111/fire.12201