Behavioral Finance: *Are the Disciples Profiting from the Doctrine?*

COLBY WRIGHT, PRITHVIRAJ BANERJEE, AND VANEESHA BONEY

COLBY WRIGHT
is an assistant professor of finance at the department of finance and law, College of Business Administration, Central Michigan University in Mt. Pleasant, MI.
wrigh1ca@cmich.edu

PRITHVIRAJ BANERJEE
is an assistant professor of finance at the University of Akron in Akron, OH.
tuklu_2000@yahoo.com

VANEESHA BONEY
is an assistant professor of finance at the University of Denver in Denver, CO.
vaneesha.boney@du.edu

Behavioral finance has received a great deal of attention in academia over the past 15 years or so (see Hirshleifer [2001] for a survey). But attention in academia does not always correspond with real-world acceptance or success. Our objective is to measure how much acceptance and success behavioral finance is garnering in the practitioner sphere. To do so, we begin by identifying 16 self-proclaimed or media-identified "behavioral mutual funds" that implement a layer of behavioral finance in their investment strategies.

The self-proclaimed or media-identified association of these 16 mutual funds with behavioral finance motivates at least three practical questions. First, irrespective of their performance, are they successfully attracting investment dollars—are any investors buying into the notion of investing based on behavioral finance? Second, the key question, are they actually earning abnormal returns? Third, if they are earning abnormal returns, how do their investment strategies differ from matched, non-behavioral firms? We contend that the answer to the third question is interesting only if they are, in fact, earning abnormal returns. If funds visibly associated with behavioral finance cannot generate abnormal returns, their strategies are, in our opinion, of little interest.

Our study focuses on the first two questions. Our main findings can be summarized as follows.

1. The flow of funds into these behavioral funds is higher than the flow of funds into index and matched actively managed, non-behavioral funds, suggesting that behavioral mutual funds are effectively attracting capital.
2. They generally beat S&P 500 Index funds on a raw, net-return basis, which is not an easy task as shown in numerous previous studies (e.g., Wermers [2000]).
3. However, their risk-adjusted returns using the Carhart [1997] model are neither significantly better nor worse than their matched counterparts.
4. Most of their success relative to the S&P 500 is explained by their loading on the value factor (HML) from Fama and French's [1993] model. We conclude that however their investment strategies differ from non-behavioral funds the differences aren't providing their investors any abnormal returns, which makes the third question much less interesting.

MOTIVATION AND BACKGROUND

Behavioral finance is a relatively new alternative price-formation theory that attempts to explain market anomalies, which offer the potential for consistent, positive, risk-adjusted returns. Behavioral finance posits that psychology-related biases and tendencies cause investors to behave irrationally, which leads to

the systematic mispricing of assets, which is maintained for a time by limits to arbitrage (see Shleifer and Summers [1990]; Ritter [2003]; and Hirshleifer [2001]). Behavioral finance, then, implies opportunities for abnormal returns for those who can comprehend the systematic mispricings and overcome the obstacles to arbitrage.

The 16 funds in our sample are attempting to do just that. One behavioral mutual fund describes the investment philosophy of this new breed of mutual fund thusly:

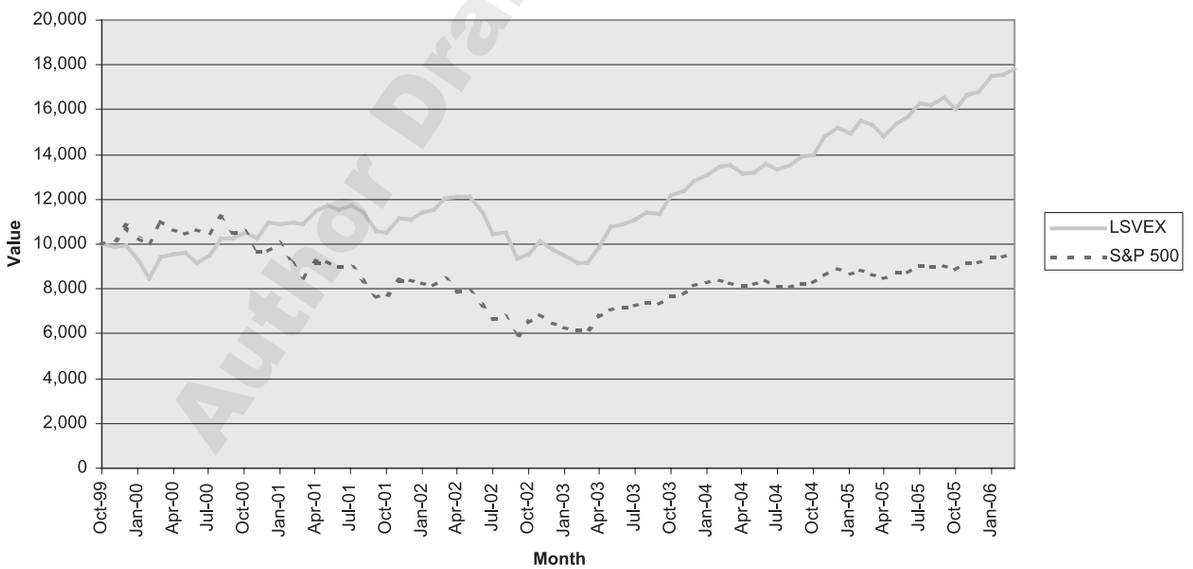
> Fuller & Thaler attempts to achieve above market returns by capitalizing on market inefficiencies caused by investors' mis-processing of information. We utilize a bottom-up investment approach that combines fundamental research with insights from behavioral finance to gain a competitive edge over the market. (See http://www.fullerthaler.com/.)

We first stumbled across this topic when analyzing the performance of one of these behavioral funds. Exhibit 1 contains this initial observation. It compares the performance of LSVEX, a behavioral mutual fund managed by LSV Asset Management that falls in the large-value Morningstar category, with the performance of the S&P 500 over the life of LSVEX. As demonstrated in Exhibit 1, $10,000 invested October 1, 1999 (the first full month after the date of inception) in LSVEX would have grown to $17,834 by March 1, 2006, while the same $10,000 invested on the same date in the S&P 500 would have decreased slightly to $9,560. After seeing this figure, we were highly motivated to do a more thorough analysis of the success of the practitioner disciples of behavioral finance to assess whether the returns to LSVEX are typical or anomalous.

OUR TESTING METHODS

All of our testing includes an analysis of the overall sample of 16 behavioral funds and a fund-level analysis of each of the 16 funds individually. Also, for all of our testing we benchmark our 16 behavioral funds against two matched samples. The first matched sample for the overall testing is the five largest S&P 500 mutual funds. For fund level testing, the benchmark fund is the Vanguard 500 Index Fund (VFINX). The second matched sample is composed of one actively managed mutual fund (AMMF) matched to each of the 16 funds in our sample based on Morningstar category, total net assets, and expense ratios in the month the behavioral funds enter our sample. Behavioral funds enter our sample two months after

EXHIBIT 1
LSVEX vs S&P 500, Growth of $10,000 Invested October 1, 1999



Note: The ending date is March 1, 2006.

inception. In some of the testing, our sample drops as low as 13 funds. This is a result of 1) insufficient data for the behavioral fund (some of them are very new, and our data for some portions of testing ends in 2004) and 2) the absence of an adequate matching fund.

Our testing methods fall into two broad categories: 1) analysis of the flow of funds into and out of the behavioral mutual funds relative to the S&P 500 funds and AMMF and 2) analysis of the monthly returns to behavioral mutual funds relative to the two matched samples.

We analyze the flow of funds to test whether behavioral mutual funds experience significantly more or less fund flows than their matched counterparts. This is an indication of how warmly investors are embracing behavioral finance in their investing strategies. We use a measure of the flow of funds for mutual funds introduced by Gruber [1996]. We carry out three forms of testing in our flow of funds analysis. First, we employ simple paired *t*-tests at the sample and fund level. Second, we regress fund flows onto a set of control variables and a dummy variable that distinguishes behavioral funds from matched funds. Lastly, we use coefficients from estimating our regression using a third and fourth set of matched funds to model predicted fund flows. We next deduct predicted fund flows from actual fund flows to obtain a measure of "abnormal" fund flows. We, then, repeat our simple paired *t*-tests using the abnormal fund flows, instead of the unadjusted measure of fund flows.

Our objective in studying the monthly returns is to assess whether behavioral mutual funds generate higher returns—raw and risk-adjusted—than their matched counterparts. This portion of our testing also has three main parts. First, we do a simple paired *t*-test comparing the monthly returns (net of expenses) of the behavioral mutual funds with the monthly returns (net of expenses) to the matched funds both at the sample and fund level. Second, at both the sample and fund level, we regress the post-expense-ratio monthly returns less the risk-free rate of our sample of behavioral mutual funds on the four factors in the Carhart [1997] model to determine if behavioral mutual funds earn abnormal returns. Third, we re-estimate the Carhart [1997] model with some modifications and using both the behavioral mutual funds and their matched counterparts on the four factors in the Carhart [1997] model. In this last regression we structure the model such that we are able to identify the loadings of the behavioral mutual funds separately from those of their matched counterparts, which allows us to 1) compare the abnormal returns of behavioral funds with those of their matched funds and 2) see if behavioral mutual funds load differently on the various risk factors of that model, which helps pinpoint how behavioral mutual funds differ from their matched counterparts (refer to Appendix A for a lengthier explanation of this final testing method).

OUR FINDINGS

For brevity, we include tables only for those results that we consider most insightful. Results not outlined in table format are explained in the text and are available upon request.

Results from the simple *t*-tests comparing Gruber's [1996] fund flows measure for sample firms to those of the matched firms suggest that behavioral funds are successfully attracting investment dollars relative to the sample of index funds and matched funds. The equal-weighted average monthly flow of funds into behavioral funds is significantly greater than the flow of funds into both index funds and AMMF at the 1% level. Of the 15 behavioral funds, 11 enjoy average monthly fund flows greater than the flow of funds into the Vanguard 500 Index Fund. Of the 11, 7 are significant at the 10% level or better, while only two funds have significantly lower fund flows. And 14 of the 15 behavioral funds experienced average monthly fund flows greater than the flow of funds into their respective AMMFs. Of the 14, 7 are significant at the 10% level or better, while none of the funds have significantly lower fund flows.

Exhibit 2 contains the results from regressing fund flows on control variables and a dummy indicating whether the fund is behavioral or not. Panel A contains results from estimating the flow-of-funds regression with the combined sample of behavioral and index funds, while Panel B contains results from estimating regression with the combined sample of behavioral funds and AMMFs. The variable of interest is the estimate for the coefficient on the behavioral dummy (β_6). Panel A shows no significant difference between the flow of funds into behavioral funds and index funds after controlling for relevant variables. Panel B, however, reveals that behavioral funds do, in fact, enjoy higher fund flows than their matched actively managed funds after controlling for significant variables.

Exhibit 3 contains the results of our analysis of the abnormal flow-of-funds and provides further evidence that behavioral funds are successfully attracting investment

EXHIBIT 2

Flow of Funds: Controlling for Relevant Variables

PANEL A: Behavioral vs. Index Funds

	β_0	β_1	β_2	β_3	β_4	β_5	β_6	R^2
Estimate	0.0666***	0.0692***	0.0000	0.0014	–4.8856	–0.0079***	0.0201	0.098
t	7.04	4.14	–0.45	0.24	–1.63	–3.98	0.48	
p	0.000	0.000	0.655	0.814	0.104	0.000	0.629	

PANEL B: Behavioral vs. Matched Funds

	β_0	β_1	β_2	β_3	β_4	β_5	β_6	R^2
Estimate	0.095***	0.067***	0.0000	0.0008	–0.9125	–0.0019	0.0107*	0.105
t	9.72	3.64	–1.02	0.87	–1.21	–1.45	1.93	
p	0.000	0.000	0.307	0.384	0.225	0.147	0.054	

This exhibits contains the parameter estimates and corresponding t-statistics and p-values from estimating the model shown below, which compares the flow of funds into the sample of behavioral funds against the flow of funds into the sample of index and matched funds at the aggregate level after controlling for other relevant variables. Panel A contains the results from estimating the model using the behavioral and index funds. Panel B contains the results from estimating the model using the behavioral and matched funds. The estimated coefficient on the binary variable (β_6) from the model represents a measure of the flow of funds into behavioral funds relative to the index funds in Panel A and relative to matched funds in Panel B after controlling for other relevant variables. FF_{it} is the flow of funds into fund i in month t, $FF_{it-4,t-1}$ is the total flow of funds into fund i over the months t − 4 to t − 1, $R_{it-4,t-1}$ is the total return to fund i from month t − 4 to month t − 1, MIR_i is the minimum investment requirement of fund i as of the end of the sample (we do not have data regarding the minimum investment requirement throughout the entire sample), TL_{it} is the total loads for fund i in month t, ER_{it} is the expense ratio for fund i in month t, and $LNTNA_{it-5}$ is the log of total net assets for fund i in month t − 5. To mitigate co-linearity, we use the net assets as of the end of month t − 5 since we also include the flow of funds beginning in month t − 4. BD_i is a binary dummy that takes the value of one if fund i is behavioral and zero otherwise.

$$FF_{it} = \alpha_i + \beta_0 FF_{it-4,t-1} + \beta_1 R_{it-4,t-1} + \beta_2 MIR_i + \beta_3 TL_{it} + \beta_4 ER_{it} + \beta_5 LNTNA_{it-5} + \beta_6 BD_i + u_{it}$$

*Notes: *Indicates statistical significance at the 0.1 level; **Indicates statistical significance at the 0.05 level; ***Indicates statistical significance at the 0.01 level.*

dollars relative to both the sample of index funds and AMMFs on the aggregate and fund levels after controlling for other relevant factors. Both the equal- and value-weighted average monthly abnormal fund flows into behavioral funds are significantly greater than the abnormal fund flows into index funds (Panel A) and AMMFs (Panel C) at the 1% level.

In addition, 8 of the 14 behavioral funds experienced average monthly abnormal fund flows greater than the abnormal flow of funds into the Vanguard 500 Index Fund (Panel B). Of the 8, 4 are significant at the 10% level or better, while only 2 funds have significantly lower abnormal fund flows. And 12 of the 13 behavioral funds (the matched fund for JPIAX had insufficient data) experienced average monthly abnormal fund flows greater than the abnormal flow of funds into their respective AMMFs (Panel D). Of the 12, 6 are significant at the 10% level or better, while none of the funds have significantly lower fund flows.

Exhibit 4 presents a comparison of average monthly returns net of expenses between the sample funds and their matched counterparts. In Panel A of Exhibit 4 the equally weighted average monthly returns to the behavioral funds are greater than the average monthly returns to the index funds at the 1% level. The value-weighted results are similar but with less significance. We note from Panel B of Exhibit 4 that 14 of the 16 behavioral funds enjoyed higher average monthly returns than the Vanguard 500 fund. We note further that 4 (JPIVX, KDSAX, LSVEX, and UBVLX) of the 14 positive differences are significant at the 10% level or better. We interpret this as evidence that the behavioral funds generally outperform the Vanguard 500 fund over the respective sample periods.

We note from Panel C that the equally weighted average monthly returns to the behavioral funds are greater than the average monthly returns to the AMMFs at the 1% level. Again, the value-weighted results suffer

EXHIBIT 3
Abnormal Flow of Funds

PANEL A: Aggregate Testing Behavioral vs. Index Funds

	n	Mean Difference	St. Dev.	*t*	*p*
Equally Weighted	139	0.015***	0.033	5.16	0.000
Value Weighted	139	0.007***	0.015	5.59	0.000

PANEL B: Fund-Level Testing Behavioral vs. Vanguard 500

Ticker	*n*	Mean Difference	St. Dev.	*t*	*p*
JIISX	7	–0.034**	0.026	–3.42	0.014
JPGSX	7	–0.016	0.043	–0.95	0.378
JPIAX	7	0.041*	0.045	2.38	0.055
JPIVX	7	–0.024	0.036	–1.80	0.122
KDFAX	55	–0.017***	0.023	–5.34	0.000
KDHAX	127	0.013***	0.038	3.85	0.000
KDSAX	31	0.002	0.020	0.63	0.532
LMVTX	138	0.006***	0.016	4.00	0.000
LOPEX	Insufficient Data				
LSVEX	55	0.026	0.192	1.00	0.321
NASSX	4	–0.025	0.030	–1.71	0.186
NLCIX	67	–0.006	0.137	–0.36	0.723
SSLAX	26	0.070***	0.107	3.32	0.003
UBRLX	67	0.016	0.097	1.36	0.178
UBVLX	55	0.005	0.040	0.96	0.344
WOOPX	Insufficient Data				

PANEL C: Aggregate Testing Behavioral vs. Matched Funds

	n	Mean Difference	St. Dev.	*t*	*p*
Equally Weighted	139	0.043***	0.0436	11.67	0.000
Value Weighted	139	0.039***	0.0237	19.88	0.000

PANEL D: Fund-Level Testing Behavioral vs. Matched Funds

Ticker	*n*	Mean Difference	St. Dev.	*t*	*p*
JIISX	7	0.160	0.212	1.85	0.124
JPGSX	7	0.044	0.115	1.01	0.352
JPIAX	Insufficient Data for Matched Fund				
JPIVX	7	0.028***	0.029	2.53	0.045
KDFAX	55	0.005	0.027	1.50	0.139
KDHAX	127	0.047***	0.057	9.26	0.000
KDSAX	31	0.010**	0.024	2.20	0.036
LMVTX	138	0.041***	0.024	20.20	0.000
LOPEX	Insufficient Data				
SMEX	55	0.041	0.218	1.37	0.175
NASSX	5	–0.012	0.028	–0.89	0.440
NLCIX	67	0.021	0.142	1.23	0.224
SSLAX	26	0.063	0.244	1.32	0.198
UBRLX	67	0.056***	0.108	4.28	0.000
UBVLX	55	0.038***	0.074	3.59	0.001
WOOPX	Insufficient Data				

This exhibit contains the difference between the average monthly abnormal flow of funds of the behavioral funds compared with the average monthly abnormal flow of funds of the sample of index funds and matched funds. Abnormal fund flows are the difference between actual fund flows and the predicted fund flows using parameter estimates from estimating the model in Exhibit 2 using the second-best matched sample and the next five largest S&P 500 funds. Panels A and C compare the behavioral sample to the index funds (Panel A) and matched funds (Panel C) at the aggregate level, while Panels B and D compare the average monthly abnormal flow of funds to each behavioral mutual fund in our sample with the average monthly abnormal flow of funds to the Vanguard 500 fund (VFINX) (Panel B) and to the respective matched funds (Panel D) over the same period.

*Notes: *Indicates statistical significance at the 0.1 level; **Indicates statistical significance at the 0.05 level; ***Indicates statistical significance at the 0.01 level.*

from a decrease in significance. We note from Panel D that 11 out of 15 (we were unable to find a matching fund for LOPEX) behavioral funds enjoyed higher average monthly returns relative to their respective matched funds. Of the 11, 2 are significant at the 10% level or better. Although less convincing than Panel B, this seems to be moderate evidence that the behavioral funds generally outperformed their AMMFs over the respective sample periods. Both of these analyses, however, are absent any consideration of risk.

The results of our first attempt to control for risk using the Carhart [1997] methodology, suggest behavioral mutual funds earn neither positive nor negative abnormal returns. The estimated intercept, which represents our measure of abnormal returns, is positive but not significant for the equal- and value-weighted sample of behavioral funds. At the individual fund level, only four behavioral funds have positive intercepts. The four funds that significantly outperformed the Vanguard 500 Fund in Exhibit 4 all have negative estimated intercepts. However, none of the estimated intercepts, positive or negative, are significant. Our first-pass risk-adjusted testing, then, fails to reject the null hypothesis that behavioral mutual funds earn zero abnormal returns.

We also note from our first-pass Carhart [1997] regressions that behavioral mutual funds load very heavily on the HML factor. Of the 16 behavioral funds, 9 load positively on the HML factor at the 10% level or better, 3 load negatively on the HML factor at the 10% level or better, while the remaining 4 load insignificantly on the HML factor. Perhaps the distinguishing characteristic of behavioral funds is their loading on the value premium.

The results from the first estimation of our modified version of the Carhart model, in which we attempt to obtain estimates of risk-adjusted abnormal returns for our behavioral funds relative to index funds, further corroborate the notion that behavioral funds do not earn risk-adjusted abnormal returns. The salient trend from

EXHIBIT 4
Monthly Returns: Net of Expense Ratios

PANEL A: Aggregate Testing Behavioral vs. Index Funds

	n	Mean Difference^	St. Dev.	*t*	*p*
Equally Weighted	158	0.0037***	0.016	2.94	0.004
Value Weighted	144	0.00265*	0.019	1.68	0.096

PANEL B: Fund-Level Testing Behavioral vs. Vanguard 500

Ticker	*n*	Mean Difference^	St. Dev.	*t*	*p*
JIISX	26	0.0024	0.012	1.01	0.323
JPGSX	26	0.0011	0.012	0.47	0.645
JPIAX	26	0.0021	0.013	0.81	0.426
JPIVX	26	0.0046*	0.014	1.71	0.100
KDFAX	74	0.0055	0.034	1.38	0.173
KDHAX	146	0.0014	0.030	0.54	0.589
KDSAX	50	0.0088*	0.032	1.92	0.060
LMVTX	158	0.0028	0.023	1.57	0.119
LOPEX	8	–0.0031	0.026	–0.34	0.746
LSVEX	74	0.0089***	0.029	2.68	0.009
NASSX	24	0.0051	0.026	0.96	0.347
NLCIX	86	–0.0034	0.046	–0.68	0.496
SSLAX	45	0.0002	0.018	0.08	0.933
UBRLX	86	0.0039	0.054	0.67	0.506
UBVLX	74	0.0121**	0.040	2.61	0.011
WOOPX	20	0.0078	0.019	1.83	0.083

PANEL C: Aggregate Testing Behavioral vs. Matched Funds

	n	Mean Difference^	St. Dev.	*t*	*p*
Equally Weighted	158	0.003***	0.013	2.90	0.004
Value Weighted	144	0.0038	0.033	1.42	0.157

PANEL D: Fund-Level Testing Behavioral vs. Matched Funds

Ticker	*n*	Mean Difference^	St. Dev.	*t*	*p*
JIISX	26	–0.0032	0.012	–1.39	0.175
JPGSX	26	0.0016	0.014	0.57	0.572
JPIAX	26	0.0012*	0.013	0.50	0.625
JPIVX	26	0.0069	0.017	2.02	0.054
KDFAX	74	0.0041	0.025	1.43	0.156
KDHAX	146	0.0019	0.018	1.33	0.184
KDSAX	50	0.0061	0.028	1.54	0.130
LMVTX	158	0.0047	0.036	1.64	0.102
LOPEX	No Matched Fund				
LSVEX	74	0.0014	0.013	0.91	0.365
NASSX	24	–0.0002	0.033	–0.03	0.977
NLCIX	86	–0.0031	0.036	–0.79	0.433
SSLAX	45	0.0029	0.021	0.94	0.350
UBRLX	86	–0.0011	0.032	–0.32	0.749
UBVLX	74	0.0067	0.036	1.60	0.114
WOOPX	20	0.0046*	0.012	1.74	0.098

This exhibit contains the difference between the average monthly return of the behavioral funds compared with the average monthly return of the sample of index funds and matched funds. Panels A and B compare the behavioral sample to the index funds and matched funds at the aggregate level, while Panels C and D compares the average monthly return to each behavioral mutual fund in our sample and the average monthly return to the Vanguard 500 fund (VFINX) (Panel C) and to the respective matched funds (Panel D) over the same period. The monthly returns are net of expense ratios.

*Notes: ^Differences in average monthly returns are in decimal format and net of expense ratios. For example, LSVEX earned an average monthly return that was 89 bps (0.89%) higher than the monthly return to the Vanguard 500 fund over the same period; *Indicates statistical significance at the 0.1 level; **Indicates statistical significance at the 0.05 level; ***Indicates statistical significance at the 0.01 level.*

this testing is that the estimates of the behavioral funds' abnormal returns relative to index funds (α_1) are all insignificant at both the aggregate and individual fund level. This suggests there is no difference in the abnormal returns to behavioral funds and the abnormal returns to index funds and specifically to the Vanguard 500 Fund.

The results from this testing also indicate that behavioral mutual funds load heavier on the HML and SMB factors than the index funds and the Vanguard 500 Fund in particular. The estimates of h_1 (the loading of behavioral funds on HML) are significant at the 1% level for both the equal- and value-weighted averages, while the estimate of s_1 (the loading of behavioral funds on SMB) is significant at the 1% level for the equal-weighted average. Similar to the earlier estimation of the Carhart model, 9 of the 16 individual behavioral funds load significantly more than the Vanguard 500 Fund on the HML factor at the 10% level or better, 3 load significantly less on the HML factor at the 10% level or better, while the remaining 4 funds load in a manner that is insignificantly different. Of the 16 funds, 8 loaded significantly more than the Vanguard 500 Fund on the SMB factor at the 10% level or better, while only 1fund loaded significantly less.

Exhibit 5 presents the results from the second estimation of our modified Carhart model, in which we attempt to obtain estimates of risk-adjusted abnormal returns for our behavioral funds relative to matched funds. Panel A presents results from estimating the model when comparing behavioral mutual funds and AMMFs at the aggregate level, while Panel B presents results from estimating the model when comparing behavioral mutual funds to their corresponding matched funds at the individual fund level. Again, the estimates of α_1 are all insignificant at both the aggregate and individual fund level. This

EXHIBIT 5
Comparative Carhart Model Testing: Behavioral vs. Matched Funds

PANEL A: Aggregate Behavioral vs. Matched

		α_0	b_0	s_0	h_0	u_0	α_1	b_1	s_1	h_1	u_1	R^2	n
Equally Weighted	Estimate^	–0.066	1.027***	–0.006	0.035	0.048**	0.213	0.069*	0.014	0.163***	–0.035	0.92	316
	p	0.545	0.000	0.854	0.356	0.023	0.170	0.095	0.748	0.002	0.240		
Value Weighted	Estimate^	–0.012	1.091***	–0.089*	–0.411***	0.020	0.191	0.050	–0.058	0.569***	–0.082	0.889	288
	p	0.943	0.000	0.051	0.000	0.510	0.418	0.420	0.369	0.000	0.061		

PANEL B: Fund Level Behavioral vs. Matched

Ticker		α_0	b_0	s_0	h_0	u_0	α_1	b_1	s_1	h_1	u_1	R^2	n
JIISX	Estimate^	0.160	1.16***	0.157	0.209	–0.053	–0.265	–0.309	0.167	–0.033	0.133	0.92	48
	p	0.488	0.000	0.323	0.179	0.629	0.418	0.107	0.458	0.881	0.395		
JPGSX	Estimate^	–0.044	0.974***	0.193	–0.281*	0.060	–0.070	0.042	–0.164	–0.023	0.261	0.9127	48
	p	0.860	0.000	0.260	0.094	0.613	0.842	0.835	0.496	0.920	0.124		
JPIAX	Estimate^	0.072	0.913	0.040	–0.157	–0.004	–0.393	0.170	–0.055	0.388**	0.170	0.928	48
	p	0.710	0.000	0.761	0.228	0.963	0.158	0.287	0.769	0.039	0.198		
JPIVX	Estimate^	–0.479**	0.785***	–0.272**	0.405***	–0.105	0.288	0.170	0.327*	0.101	0.218*	0.906	48
	p	0.011	0.000	0.032	0.002	0.226	0.261	0.249	0.066	0.549	0.077		
KDFAX	Estimate^	–0.390	0.946***	–0.167**	0.478***	–0.081*	0.498	–0.078	–0.099	–0.036	0.023	0.808	144
	p	0.145	0.000	0.015	0.000	0.055	0.188	0.401	0.301	0.749	0.702		
KDHAX	Estimate^	–0.113	0.925***	–0.095*	0.571***	–0.145***	0.137	0.050	–0.023	0.046	0.026	0.791	288
	p	0.527	0.000	0.053	0.000	0.000	0.587	0.457	0.738	0.600	0.586		
KDSAX	Estimate^	–0.067	1.01***	0.017	0.146	0.026	–0.242	–0.027	0.520***	0.648***	0.060	0.927	96
	p	0.722	0.000	0.816	0.116	0.618	0.364	0.753	0.000	0.000	0.413		
LMVTX	Estimate^	–0.002	1.123***	–0.107**	–0.553***	0.015	0.234	0.066	–0.067	0.622***	–0.080	0.862	312
	p	0.990	0.000	0.046	0.000	0.681	0.386	0.356	0.374	0.000	0.121		
LSVEX	Estimate^	0.089	0.937***	–0.102***	0.594***	–0.136***	–0.137	0.015	0.077	0.133***	0.101***	0.933	144
	p	0.556	0.000	0.009	0.000	0.000	0.522	0.781	0.157	0.038	0.003		
NASSX	Estimate^	0.731	0.358	0.794*	–0.508	0.281	–0.863	0.778	–0.264	0.527	0.068	0.718	44
	p	0.266	0.356	0.093	0.244	0.364	0.351	0.160	0.687	0.391	0.875		
NLCIX	Estimate^	–0.263	1.028***	0.012	–0.082	0.16***	–0.078	0.185*	–0.055	–0.432***	0.018	0.861	168
	p	0.347	0.000	0.865	0.327	0.000	0.844	0.076	0.577	0.000	0.774		
SSLAX	Estimate^	–0.500**	0.894***	–0.067	0.243**	–0.134**	0.418	0.208**	–0.340***	–0.124	–0.013	0.927	86
	p	0.014	0.000	0.437	0.019	0.015	0.139	0.027	0.006	0.389	0.868		
UBRLX	Estmate^	–0.097	1.089***	0.41***	–0.131	0.178***	–0.031	0.083	0.140	–0.049	–0.127*	0.87	268
	p	0.750	0.000	0.000	0.152	0.000	0.943	0.463	0.192	0.704	0.064		
UBVLX	Estimate^	–0.343	1.108***	0.565***	0.259***	0.092**	0.094	0.019	0.117	0.567***	0.228***	0.872	144
	p	0.234	0.000	0.000	0.003	0.043	0.818	0.854	0.259	0.000	0.001		
WOOPX	Estimate^	–0.267	1.082***	0.010	0.188	0.130	–0.045	0.218	0.063	0.284*	0.123	0.971	36
	p	0.196	0.000	0.943	0.105	0.127	0.876	0.189	0.750	0.084	0.304		

Exhibit 5 contains the parameter estimates and corresponding t-statistics and p-values from estimating Equation (1), which compares the sample of behavioral funds to the sample of matched funds at the aggregate level and which compares the individual behavioral funds to the corresponding matched fund at the fund level. The estimate for α_1 represents a measure of the risk-adjusted abnormal performance of the behavioral funds relative to the matched funds. Panel A contains the results from estimating Equation (1) at the aggregate level, while Panel B contains the results from estimating Equation (1) at the fund level. r_{pt} is the net return (return less the expense ratio) to portfolio p in month t less the risk-free rate; $RMRF_t$, SMB_t, and HML_t are the returns to Fama and French's factor-mimicking portfolios on the market, size, and book-to-market, respectively, in month t; UMD_t is the return to Carhart's factor mimicking portfolio on the past one-year momentum in stocks in month t; and B take the value of one for the behavioral sample and zero otherwise.

$$r_{pt} = \alpha_{0p} + b_{0p}RMRF_t + s_{0p}SMB_t + h_{0p}HML_t + u_{0p}UMD_t + \alpha_{1p}B + b_{1p}B(RMRF_t) + s_{1p}B(SMB_t) + h_{1p}B(HML_t) + u_{1p}B(UMD_t) + e_{pt} \quad (1)$$

*Notes: ^Estimates are in percentage format. For example, the estimate of α_1 of 0.213 for the EW Average indicates that after controlling for the four Carhart factors, the equally weighted average monthly return to behavioral funds was 0.213% (or 21.3 bps) higher than the return to the sample of matched funds; *Indicates statistical significance at the 0.1 level; **Indicates statistical significance at the 0.05 level; ***Indicates statistical significance at the 0.01 level.*

suggests there is no difference in the abnormal returns to behavioral funds and the abnormal returns to corresponding AMMFs, which again represents a failure to reject H3.

Exhibit 5 presents further evidence that the distinguishing feature of behavioral mutual funds is their loadings on the HML factor, while there is little difference in the loadings of behavioral and matched funds on the SMB factor. Again, the estimates of h_1 are significant at the 1% level for both the equal and value-weighted averages. However, the estimates of s_1 are insignificant in both. Of the 15 individual behavioral funds, 6 (including 3 of the 4 that significantly outperform the Vanguard 500 Index in Exhibit 4) load significantly more than their respective matched fund on the HML factor at the 10% level or better, only 1 loads less than its matched counterpart, and the remaining 8 funds load in a manner that is not

significantly different than their respective matched funds. Only 1 fund loads significantly more heavily on the SMB factor than its matched firm. These results suggest that the distinguishing feature between behavioral funds and their AMMFs is that behavioral funds load much more heavily on the HML factor.

An interesting point related to our estimations of risk-adjusted returns is that the behavioral funds (JPIVX, KDSAX, LSVEX, and UBVLX) that seem to significantly beat the S&P 500 on a non-risk-adjusted basis in Exhibit 4 all show no significant abnormal returns when implementing the Carhart [1997] methodology. The major commonality among the four funds, however, is they all load positively and significantly (at the 1% level) on the HML factor. This makes for an interesting interpretation: behavioral mutual funds in general slightly outperform index funds, four funds in particular significantly outperform the Vanguard 500, but their superior performance is entirely explained by four factors of the Carhart [1997] model, and the variable that seems to separate the superior performers from their non-superior behavioral counterparts is their high loadings on the HML factor.

In order for this proposition to hold, we expect the realization to the HML factor to be positive and significant over the sample period. This is, in fact, the case. Over the 1992–2005 period (KDSAX, UBVLX, LSVEX, and JPIVX were started in 1992, 1998, 1999, and 2003 respectively), the average monthly realization of the HML factor is 0.539%, which is significant at the 5% level. This compares to realizations of only 0.27% and 0.307% for the SMB and UMD factors, respectively, over the same period.

Both camps in the debate about market efficiency might embrace our findings. The efficient markets camp can point to the insignificant alphas and claim that the superior raw performance of the behavioral mutual funds is just compensation for the higher risk they are assuming. Conversely, the behavioralists can argue that behavioral funds are beating the Vanguard 500 on a net basis, an accomplishment per se, by capitalizing on the value premium, which is a direct result of psychological biases and heuristics.[1] Perhaps the most neutral summary of our findings is to say that behavioral funds are not earning any abnormal returns outside of the strategies that we already know have the potential to earn abnormal returns, which suggests the application of behavioral finance in the practical realm of mutual funds may be little more than value investing.

The idea that the practical implementation of behavioral finance is simply value investing is supported by the results of Exhibit 4. Two of the four funds that beat the Vanguard 500 Fund in Panel B are in value categories—LSVEX and UBVLX. If their success relative to the Vanguard 500 Fund is simply a function of their heavy loading on the HML factor, we might expect that other value funds would have similar success. Not surprisingly, Panel D in Exhibit 4 shows that while these two funds were able to beat the Vanguard 500 Fund in Panel B, they were not able to significantly outperform their respective matched funds that also fall in value categories and likely load heavily on the HML factor.

CONCLUSION

Behavioral finance has gained substantial attention in academia and seems to be gaining greater acceptance among practitioners. The mere existence of the 16 behavioral funds in our sample is a testament to the growing interest in the subject. The practitioner interest in behavioral finance is not surprising considering the underlying implication of behavioral finance—that abnormal returns are attainable provided the investor can 1) comprehend the systematic mispricing caused by psychological biases, traits, and heuristics and 2) overcome any perceived or real limits to arbitrage.

Through our analysis, we find the following in regards to behavioral mutual funds: 1) behavioral mutual funds are successful at attracting investment dollars relative to S&P 500 funds and AMMFs, 2) behavioral funds generally outperform S&P 500 funds and, to a lesser degree, outperform AMMFs on a non-risk-adjusted basis, 3) to this point, behavioral mutual funds have been unable to garner any positive abnormal returns outside of the four factors of the Carhart [1997] model, and 4) their ability to beat the S&P 500 funds seems to be a function of their relatively high loading on the HML factor of the Fama and French [1993] model during a period of time when the realization to the HML factor was relatively high.

Our ultimate conclusion is that behavioral mutual funds are virtually indistinguishable from a value investing strategy in the sense that the lion's share of their success relative to the S&P 500 is explained by their loading on the value factor (HML) from Fama and French's [1993] model. Publicizing and presumably using "behavioral finance" in a fund's investment strategy does seem to offer a significant advantage, however, in terms of attracting capital. Viewed together, these findings suggest that the practical application of behavioral finance may be best

asserted as a marketing tool rather than as a means of generating abnormal returns. Stated another way, behavioral finance seems to be receiving a warm embrace and positive acceptance in the practitioner world, but our findings suggest that behavioral funds do not generate abnormal returns over the Carhart [1997] model (although a few of them beat the Vanguard 500).

APPENDIX A

Explanation of Modified Carhart [1997] Regressions

Since this final portion of our testing may be unclear, we present the model here. We estimate two iterations of the following variation of the Carhart [1997] model first using the combination of our equally weighted sample of behavioral funds and the equally weighted sample of index funds and then using the combination of our equally weighted sample of behavioral funds and the equally weighted sample of matched funds:

$$r_{pt} = \alpha_{0p} + b_{0p}RMRF_t + s_{0p}SMB_t + h_{0p}HML_t + u_{0p}UMD_t + \alpha_{1p}B + b_{1p}B(RMRF_t) + s_{1p}B(SMB_t) + h_{1p}B(HML_t) + u_{1p}B(UMD_t) + e_{pt} \quad (1)$$

where r_{pt}, $RMRF_t$, SMB_t, HML_t, and UMD_t are the realizations of the four factors in the Carhart model and where B takes the value of one for the behavioral sample and zero otherwise. The estimate of α_1 in Equation (1) tests the significance of the difference between the abnormal returns to our behavioral sample and the abnormal returns to the sample of index funds in the first iteration and the difference between the abnormal returns to our behavioral sample and the abnormal returns to the matched sample in the second iteration. This comparison offers a reading on the risk-adjusted returns to behavioral funds relative to passively managed and non-behavioral actively managed funds. It also helps control for risk factors not captured by the four factors of the model in the spirit of Mitchell and Stafford [2000].

To test the relative abnormal performance of the individual behavioral funds, we estimate two iterations of Equation (1) for each behavioral fund. The first iteration includes the behavioral fund of interest and the Vanguard 500 fund. The second iteration includes the behavioral fund of interest and the corresponding matched fund. The estimate of α_1 from these two iterations tests the significance of the difference between the abnormal returns to our individual behavioral funds and the abnormal returns to the Vanguard 500 in the first iteration and the difference between the abnormal returns to our individual behavioral funds and the abnormal returns to the corresponding matched funds in the second iteration.

ENDNOTES

Comments from George Comer, Larry Holland, and Dave Peterson were especially beneficial and greatly appreciated. The authors also wish to thank Gary Benesh, James Doran, Bong-Soo Lee, Terry Odean, Brian Tarrant, Tom Zuehlke, and seminar participants at Florida State University and the Midwestern Finance Association 2007 Annual Meetings for helpful comments and perspectives on the topic and article. We also thank James Doran and Walt Reinhart for assistance with data.

[1]Although efficient-markets proponents might rebut by citing Zhang [2006], who argues that the value premium is a natural reward for risk tied to the difficulty in reducing tangible assets compared to growth options in hard economic times.

REFERENCES

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

Fama, Eugene F., and Kenneth R. French. "Common Risk Factors in the Returns on Bonds and Stocks." *Journal of Financial Economics*, 33 (1993), pp. 3–53.

Gruber, Martin. "Another Puzzle: The Growth in Actively Managed Mutual Funds." *Journal of Finance*, 51 (1996), pp. 783–811.

Hirshleifer, David. "Investor Psychology and Asset Pricing." *Journal of Finance*, 56 (2001), pp. 1633–1697.

Mitchell, Mark. L., and Erik Stafford. "Managerial Decisions and Long-Term Stock Price Performance." *Journal of Business*, 73 (2000), pp. 287–329.

Shleifer Andrei, and Lawrence Summers. "The Noise Trader Approach to Finance." *Journal of Economic Perspectives*, 4 (1990), pp. 19–33.

Wermers, Russ. "Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses." *Journal of Finance*, 55 (2000), pp. 1655–1695.

Zhang, Lu. "The Value Premium." *Journal of Finance*, Vol. 60, No. 1 (2006), pp. 67–103.