Behavioral Finance: Are the Disciples Profiting from the Doctrine?

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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 mispric-
ings and overcome the obstacles to arbitrage.

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

Fuller & Thaler attempts to achieve above market
returns by capitalizing on market inefficiencies
due to 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 thor-
ough 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

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**EXHIBIT 1**

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

![Chart showing the growth of $10,000 investment in LSVEX and S&P 500 from October 1, 1999 to March 1, 2006.]

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 (\(\beta_6\)). 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...
dollars relative to both the sample of index funds and AMMFs on the aggregate and fund levels after controlling for other relevant factors. 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 ($\beta_6$) 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 $t$, $F_{it-4,t-1}$ 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 $\log$ $NA_{it-5}$ 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.

$$FF_{it} = \alpha + \beta_0 F_{it-4,t-1} + \beta_1 R_{it-4,t-1} + \beta_2 MIR_i + \beta_3 TL_{it} + \beta_4 ER_{it} + \beta_5 \log NA_{it-5} + \beta_6 BD_i + u_i$$

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.

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
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 behav-
ioral mutual funds earn neither positive nor negative
abnormal returns. The estimated intercept, which repre-
sents 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. How-
ever, none of the estimated intercepts, positive or nega-
tive, 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 modi-
fied 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

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**EXHIBIT 3**

**Abnormal Flow of Funds**

**Panel A: Aggregate Testing Behavioral vs. Index Funds**

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<th>Ticker</th>
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<th>Mean Difference</th>
<th>St. Dev.</th>
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<th>p</th>
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**Panel B: Fund-Level Testing Behavioral vs. Vanguard 500**

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**Panel C: Aggregate Testing Behavioral vs. Matched Funds**

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**Panel D: Fund-Level Testing Behavioral vs. Matched Funds**

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EXHIBIT 4
Monthly Returns: Net of Expense Ratios

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 compare 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.

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 $h_i$ (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 $s_i$ (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, 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 SMB 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 1 fund 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 $\alpha_i$ 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 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

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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.

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. 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:

\[ r_p = \alpha_0 + \beta_1 \text{RMRF}_p + \beta_2 \text{SMB}_p + \beta_3 \text{HML}_p + \epsilon_p \]

where \( r_p \), \( \text{RMRF}_p \), \( \text{SMB}_p \), \( \text{HML}_p \), and \( \text{UMD}_p \) 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 \( \alpha_1 \) 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 \( \alpha_1 \) 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

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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.

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