

**COPYCAT FUNDS: INFORMATION DISCLOSURE  
REGULATION AND THE RETURNS TO  
ACTIVE MANAGEMENT IN THE  
MUTUAL FUND INDUSTRY\***

*MARY MARGARET FRANK,  
University of Virginia*

*JAMES M. POTERBA,  
Massachusetts Institute  
of Technology*

*DOUGLAS A. SHACKELFORD,      and  
University of North Carolina*

*JOHN B. SHOVEN  
Stanford University*

**ABSTRACT**

Current regulations require mutual funds to disclose their portfolio holdings twice yearly. For actively managed funds, disclosure tells the public which assets the manager views as undervalued. If other investors can copy the actively managed funds' investments without affecting asset values, the return on the manager's research is diminished. If buying by "copycat" investors drives up the prices of assets held by the actively managed fund, however, then the disclosing fund may benefit. This paper provides empirical evidence on one of the costs of disclosure by estimating the returns of copycat mutual funds, which purchase the same assets as actively managed funds as soon as those asset holdings are disclosed. Our results for a limited sample of high-expense funds in the 1990s suggest that while these actively managed funds earned higher returns before expenses than their associated copycat funds, after expenses copycat funds earned statistically indistinguishable, and possibly higher, returns.

**I. INTRODUCTION**

**T**HE Investment Company Act of 1940 regulates information disclosure by mutual funds. Investment companies must disclose both their performance and their current portfolio holdings in semiannual reports to shareholders that must be distributed no more than 60 days after the reporting period ends. Recent proposals to modify the existing disclosure rules would require quar-

\* We are grateful to Dan Bergstresser, John Chalmers, Joel Dickson, Austan Goolsbee, Owen Lamont, David Musto, John Rea, Jennifer Wilson, an anonymous referee, and especially Mark Wolfson for helpful discussions. We also thank Jennifer Blouin, V. J. Bustos, Rachel Ferguson, Michael Myers, Angel Townsend, and Candice Whitehurst for excellent research assistance; the Ernst & Young Foundation, the National Science Foundation (Poterba), and the University of Chicago (Frank) for research support; and John Rekenhaller and Annette Larson at Morningstar for providing mutual fund data.

[*Journal of Law and Economics*, vol. XLVII (October 2004)]  
© 2004 by The University of Chicago. All rights reserved. 0022-2186/2004/4702-0017\$01.50

terly instead of semiannual disclosure of portfolio holdings.<sup>1</sup> The Securities and Exchange Commission (SEC) has also proposed streamlining the disclosure process to provide summary information to all fund shareholders, along with access to more detailed information for those investors who desire it.

The SEC cited three arguments in support of more frequent disclosure. First, more frequent disclosure would facilitate investors' monitoring of the securities held in various funds and thereby improve the asset allocation and diversification choices for their overall portfolio. Second, more frequent disclosure would enhance shareholders' detection of changes in fund investment strategy. Finally, more frequent disclosure would make it more costly for fund managers to pursue trading strategies, sometimes labeled "window dressing," that generate differences between the portfolio held on the reporting date and the portfolio held at other times.

The fact that many mutual funds currently make disclosures more frequently than they are legally required to provides indirect evidence that some investors value information on fund holdings. It is also possible that voluntary disclosure is driven by a desire to convey information on a firm's past investments beyond that revealed by summary past return measures. Voluntarily disclosing product innovations or research results can raise firm value when investors favorably revise their estimates of the firm's research acumen, even when disclosure facilitates the competitive strategies of rivals.<sup>2</sup> Several studies of "window dressing" by investment managers suggest that managers believe that investors judge prospective performance not only on the basis of past returns but also by reviewing a fund's holdings at the end of the disclosure period.<sup>3</sup>

The SEC acknowledged that more frequent disclosure could potentially impose new costs on mutual funds and ultimately on their shareholders.<sup>4</sup> First, there are direct expenses associated with producing and disseminating information on investment positions. Current mandatory disclosure rules impose significant printing and mailing costs on mutual funds, although specific estimates of these costs vary.<sup>5</sup> More frequent disclosure, if it required printing and mailing additional reports to shareholders, would increase these costs.

<sup>1</sup> U.S. Securities & Exchange Commission, Proposed Rule: Shareholder Reports and Quarterly Portfolio Disclosure of Registered Management Investment Companies (SEC Release No. IC-25870, December 20, 2002).

<sup>2</sup> Robert Verrecchia, Discretionary Disclosure, 5 J. Acct. & Econ. 179 (1983).

<sup>3</sup> Mark Carhart *et al.*, Leaning for the Tape: Evidence of Gaming Behavior in Equity Mutual Funds, 57 J. Fin. 661 (2002); Josef Lakonishok *et al.*, Window Dressing by Pension Fund Managers, 81 Am. Econ. Rev. Papers & Proc. 227 (1991); and Edward O'Neal, Window Dressing and Equity Mutual Funds (unpublished manuscript, Wake Forest Univ. 2001).

<sup>4</sup> Various potential costs are discussed in Russ Wermers, The Potential Effects of More Frequent Portfolio Disclosure on Mutual Fund Performance, Investment Co. Inst. Persp., June 2001, at 1.

<sup>5</sup> Tom Lauricella & Aaron Lucchetti, Silence Is Golden to Mutual Fund Industry, Wall St. J., July 31, 2002, at C1, provides one estimate of current costs.

Second, when a fund discloses its holdings, it becomes easier for other investors to use information on fund inflows to “front run” the fund’s trades, thereby bidding up the prices of the securities that the fund manager wishes to buy and driving down the prices of those that the manager wishes to liquidate. If the disclosure occurs before the manager has completely accumulated or sold a position in a security, then other investors can potentially profit from trading against the fund. The length of time over which fund managers typically build or liquidate their positions is a critical variable for evaluating this argument. Some argue that most positions can be accumulated or sold in 10 days with limited market impact, so allowing a 60-day lag in disclosure requirements largely avoids this problem.<sup>6</sup> Other commentators on the SEC’s proposed ruling dispute this claim and argue that more frequent disclosure might expose funds to substantial market impact costs.<sup>7</sup>

Third, if disclosure permits other funds to mimic an actively managed fund’s holdings, it may narrow the return differential between a fund that carries out research and other funds. The value of research by active managers is a subject of ongoing debate. Numerous academic studies suggest that, net of expenses, most actively managed funds underperform market indices.<sup>8</sup> In spite of these findings, however, investor demand for actively managed funds remains strong. If disclosure permits a fund manager who does not pay for research to replicate the portfolio of a manager who does, investors may be able to earn higher returns net of expenses by investing with the “copycat” manager than with the manager who does research. This could reduce the demand for shares in actively managed funds. The SEC recognized this issue, noting that “some members of the fund industry . . . assert that more frequent portfolio disclosure would facilitate the ability of outside investors to free ride on a mutual fund’s investment strategies, by obtaining for free the benefits of fund research and investment strategies that are paid for by fund shareholders.”<sup>9</sup>

The impact of copycat investors on the prices of the securities held by the disclosing fund is an important factor in determining how disclosure affects the initial fund’s shareholders. If “copycat” buying of securities held by the disclosing fund drives up the price of these securities, then the disclosing fund’s returns will be enhanced by the presence of the copycats. In this case, disclosure accelerates the realization of favorable returns on the securities

<sup>6</sup> See U.S. Securities & Exchange Commission, *supra* note 1.

<sup>7</sup> Craig S. Tyle, Comment Letter Re: Shareholder Reports and Quarterly Portfolio Disclosure of Regulated Investment Companies (Investment Company Inst. 2003).

<sup>8</sup> Surveys include Martin Gruber, Another Puzzle: The Growth of Actively-Managed Mutual Funds, 51 J. Fin. 783 (1996); and Russ Wermers, Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses, 55 J. Fin. 1655 (2000).

<sup>9</sup> U.S. Securities & Exchange Commission, *supra* note 1.

that the research-based active manager chooses to buy, and the disclosing fund in effect front runs the investments of the copycats.

Fourth, disclosure may facilitate trading in the shares of a mutual fund by outside investors who seek to exploit the “wildcard option” that arises when the fund uses outdated last-trade prices in setting its end-of-day net asset value.<sup>10</sup> Such trading has recently been the subject of substantial regulatory inquiry, particularly with regard to mutual funds that hold international stocks. When “wildcard” traders have information that suggests that the actual value of a fund’s securities are above their reported net asset values, these traders buy fund shares. Disclosure facilitates such trading, since it improves the wildcard traders’ knowledge of the fund’s portfolio. Wildcard traders profit at the expense of other fund shareholders.

The problem of deciding how to regulate information flows between a mutual fund and its investors is an example of the general problem of optimal financial disclosure regulation. The externalities associated with financial reporting may lead firms to underprovide information in an unregulated market. Optimal disclosure regulation and the extent to which disclosure regulation can raise welfare depend on the firm-specific costs of disclosing information.<sup>11</sup>

This paper seeks to provide some evidence on one of the costs of disclosure discussed above, namely, the cost of copycat investors reproducing the returns of the disclosing fund. We create copycat funds that allocate assets to match the latest publicly disclosed holdings of actively managed funds, and we compare their returns with those of the “primitive” funds. The copycat fund manager trades on the active manager’s information, but does so with a lag. If the research of the actively managed fund is valuable in uncovering excess return opportunities and if timely trading is necessary to exploit these opportunities, then the copycat fund should earn lower returns before expenses than the primitive fund. The copycat’s potential disadvantage in timely access to research findings may be offset, however, by its lower research expenses. Thus, a copycat fund might match the primitive fund’s net-of-expenses returns, even if it earned lower returns before expenses.

Our empirical work is similar in spirit to earlier studies of whether the managers of actively managed mutual funds could generate excess returns.<sup>12</sup> One such study used quarterly SEC data on the equity holdings of a sample of mutual funds to calculate fund gross returns before expenses, trading costs, or transaction fees. Their analysis found that for some funds, if an investor

<sup>10</sup> John Chalmers, Roger Edelen, & Gregory Kadlec, *On the Perils of Financial Intermediaries Setting Security Prices: The Mutual Fund Wild Card Option*, 56 *J. Fin.* 2209 (2001).

<sup>11</sup> George Foster, *Externalities and Financial Reporting*, 35 *J. Fin.* 521 (1980); and Anat Admati & Paul Pfleiderer, *Forcing Firms to Talk: Financial Disclosure Regulation and Externalities*, 13 *Rev. Fin. Stud.* 479 (2000), are examples of research on this issue.

<sup>12</sup> One close antecedent is Mark Grinblatt & Sheridan Titman, *Mutual Fund Performance: An Analysis of Quarterly Portfolio Holdings*, 62 *J. Bus.* 393 (1989).

could have purchased the portfolio revealed in the quarterly holdings data on the date when the fund held it, the investor would have earned positive risk-adjusted gross returns.

Our research explores the gross return differential between actively managed funds and copycat funds and then compares this differential to plausible estimates of the difference in expenses between these two categories of funds. We investigate the viability of the copycat strategy by studying the returns to a set of actively managed funds between 1992 and 1999. If disclosure eliminates the capacity of actively managed funds to reap the potential benefits of their research findings, the before-expense returns of copycat funds would be indistinguishable from the analogous returns of the primitive funds. In this case, the net-of-expenses returns of the copycat funds would exceed those of the primitive funds.

The balance of the paper is structured as follows. We begin by explaining the selection process for our sample of actively managed funds and presenting summary statistics on their expenses and returns. We then summarize the disclosure regulations that currently apply to mutual funds. Next, we describe our algorithm for “managing” a copycat fund, including the frequency of portfolio adjustments and the relationship between disclosures by the primitive fund and rebalancing by the copycat fund. We then report our principal empirical findings. In most cases, we find that the returns before expenses on the primitive funds exceed those of the copycat funds. However, net of a plausible estimate of the expense differential between these two types of funds, returns on the copycat funds often exceed those on the primitive funds. A brief conclusion suggests several directions for future work.

## II. DATA SAMPLE AND FUND SELECTION

The net return advantage of a copycat fund is potentially greatest when it tracks a fund with a high expense ratio. We therefore focus on two samples of funds, one consisting of large, actively managed equity funds with high expenses and another consisting of a broader sample of actively managed funds. We focus on equity funds because it is relatively easy, using the Center for Research in Security Prices (CRSP) tapes, to track the return on these funds' investments. We draw our sample from the equity mutual funds included on Morningstar's July 1992 Principia database. The CRSP tapes report returns only for equity securities on domestic stock exchanges, so we eliminate international equity funds. We also exclude small-capitalization and specialty funds from our sample, which leaves us with a sample universe of 812 funds. From this universe, we draw two samples of funds.

### A. *The High-Expense-Fund Sample*

Our first sample comprises the 20 funds that appear to meet most closely the definition of large, actively managed diversified equity funds with high

investor fees. The sample excludes funds that invest in assets other than equities and cash and funds with a cash allocation above 10 percent. We exclude no-load funds, funds with expense ratios below 1 percent, index funds, funds with assets of less than \$200 million, and funds with more than half their assets allocated to equities in one industry. Funds were included in the sample if they met our restrictions in July 1992, even if they failed to meet some of the criteria in later years of the sample.

For these 20 mutual funds, we collected data from Morningstar for all of the SEC-mandated semiannual reporting periods between 1992 and 1999. The earliest possible reporting period for this sample ends on January 31, 1992, so 6-month buy-and-hold calculations commence on April 1, 1992. The latest possible reporting period ends on April 30, 1999, so the 6-month buy-and-hold calculations end on December 31, 1999. Only three funds in this high-expense subsample have data for 1999. We have 20 funds, our sample spans 6 years, and disclosures occur twice each year, so we could have as many as 240 ( $=20 \times 6 \times 2$ ) observations on fund disclosure. In fact, we have only 188 disclosures. Some disclosures during our sample were not reported by Morningstar, apparently because the fund family did not provide the required data. Concerns about survivorship bias or sample selection that arise in studies of the excess returns on mutual funds do not arise in our sample because we are not comparing the returns on our sample of actively managed funds with returns on the broad market. Rather, we are comparing returns on these funds with returns on copycat funds that correspond to them.

### *B. The Broader Sample of Equity Funds*

Our second sample is larger and is drawn with fewer restrictions. It includes the 100 largest funds, ranked by net asset value in 1992, that allocate less than 40 percent of their assets to bonds, preferred stock, or convertible securities. The Appendix lists the funds in this sample, as well as the 20 funds in our high-expense sample. Missing data again leave us with a sample with fewer disclosures than the theoretical maximum, which is 1,200 ( $=100 \times 6 \times 2$ ) in this case. Our sample includes 849 fund disclosures. In our empirical work, we consider each fund disclosure as an observation.

Table 1 provides descriptive statistics for the two fund samples. Equities tracked by CRSP average 91 percent of the assets of the high-expense sample's holdings and 84 percent of the holdings for the broader sample. Some funds in each sample hold leveraged equity positions and report equity shares of more than 100 percent. Average turnover is similar, at 89 and 81 percent, respectively, in the high-expense and broader samples. Funds in the high-expense sample have annual expense ratios that average 1.44 percent, compared with .91 percent for the broader fund sample. Funds in the sample

TABLE 1  
SUMMARY STATISTICS FROM JANUARY 1992–APRIL 1999 SAMPLES

	Mean	Minimum	1%	Median	99%	Maximum
High-expense-ratio funds ( <i>N</i> = 188):						
Share of holdings in equity	.93 (.09)	.06	.62	.95	1.02	1.14
Share of holdings in CRSP stock	.91 (.09)	.06	.62	.92	1.00	1.14
Share of holdings in foreign stock	.02 (.03)	0	0	.01	.15	.15
Annual turnover	.89 (.62)	.01	.03	.71	3.19	3.19
Annual expense ratio (%)	1.44 (.44)	.63	.63	1.33	2.37	2.37
Asset value (\$ billions)	2.16 (3.48)	.15	.16	.52	17.05	21.41
Median market capitalization, stocks held (\$ billions)	10.20 (10.59)	.43	.72	7.17	65.10	76.18
Manager's tenure in years	6 (4.80)	0	0	5	24	24
Number of disclosures over prior 12 months	2.04 (1.36)	0	0	2	7	9
Number of days between current and prior disclosure	159.12 (68.25)	29	30	182	547	547
Broader sample of funds ( <i>N</i> = 847):						
Share of holdings in equity	.84 (.14)	.16	.40	.89	1.00	1.05
Share of holdings in CRSP stock	.84 (.14)	.16	.40	.88	1.00	1.05
Share of holdings in foreign stock	.02 (.03)	0	0	.01	.14	.19
Annual turnover	.81 (.64)	0	.10	.62	2.97	3.74
Annual expense ratio (%)	.91 (.33)	.09	.13	.88	1.90	2.03
Asset value (\$ billions)	6.36 (8.99)	.25	.69	3.39	49.23	90.78
Median market capitalization, stocks held (\$ billions)	12.70 (12.33)	.24	.66	9.09	61.63	91.19
Manager's tenure in years	8 (7.90)	0	0	6	38	41
Number of disclosures over prior 12 months	2.49 (1.72)	0	0	2	9	11
Number of days between current and prior disclosure	144.25 (86.16)	28	30	181	366	1277

NOTE.—Values presented are authors' calculations using data collected from the Morningstar Principia database. CRSP = Center for Research in Security Prices.

with higher expense ratios are smaller than those in the broader sample, hold slightly smaller companies, and have portfolio managers with shorter tenure.

### III. DISCLOSURE REGULATIONS AND THE MUTUAL FUND INDUSTRY

Mutual funds are required to disclose the securities that they hold and the value of these securities every 6 months. Section 30(e) of the Investment Company Act of 1940 specifies that the list of securities held must be for a "reasonably current date." Securities and Exchange Commission Rule 30b1-1 is more specific in outlining the process of disclosure. Registered investment companies must file form N-SAR not more than 60 calendar days after the close of their fiscal year and again after the close of the second quarter of their fiscal year. Most funds appear to file their disclosure forms prior to the expiration of the 60-day grace period, typically 45 or 55 days after the close of the reporting period.

Fund families vary in their disclosure policies. Some, such as funds in the Fidelity family, do not make voluntary disclosures, while others, such as those in the Vanguard Group, disclose their holdings every quarter with a 1-month lag. Many fund families make quarterly or even more frequent disclosures of their holdings to Morningstar, which in turn sells information on holdings to interested investors. Some funds do not mail detailed disclosures to all investors more frequently than the law requires, but they provide a partial listing of their most significant holdings. Investors also may obtain information that is not mailed to all shareholders by contacting the fund manager directly. Fund Web sites increasingly disseminate additional portfolio information. The Open Fund, which began trading in August 1999, reported its entire portfolio in real time on its Web site.<sup>13</sup>

The fact that many funds disclose more frequently than they are required to supports the view that funds derive some private benefit from disclosure. This could be because investors believe that funds that disclose often are less likely to stray from their investment objectives, or because greater disclosure facilitates coverage by analytical services that assist mutual fund buyers, or because of some additional factor. The disparities in funds' disclosure patterns suggest that fund characteristics affect the net benefits of voluntary disclosure. The costs of disclosure may be related to fund size, the characteristics of the fund portfolio, and the investor mix in the fund. Large funds, for example, are more likely to be exploited by traders who seek to front run trades, since their potential market impact is greater than that for smaller funds. Large funds might consequently delay disclosure of their holdings or disclose only as frequently as necessary. Funds that invest in relatively illiquid securities, for which the market impact of fund trading

<sup>13</sup> Jeffrey M. Laderman, A Mutual Fund That Lets It All Hang Out, *Bus. Week*, September 27, 1999, at 126.



might be substantial, might also seek to avoid disclosure. By comparison, funds that track broad-based market indices or are invested primarily in large-capitalization stocks presumably have very little to lose by disclosing their holdings.

The characteristics of the fund's investor population may also affect the costs of disclosure. Funds with many shareholders face larger costs than funds with a smaller number of shareholders. Some fund families that disclose their holdings only semiannually cite distribution costs as the major impediment to more frequent disclosures. For instance, the Omni Investment Fund historically mailed monthly statements of fund holdings to its small group of shareholders. After Berger Associates fund family acquired Omni, disclosures were reduced to semiannual reports because of distribution costs.<sup>14</sup> The Vanguard Total Stock Market fund reported that it could save expenses of more than \$2 million each year if it were required to mail shareholders only a semiannual listing of the fund's top holdings, rather than a complete enumeration of holdings.<sup>15</sup>

The Investment Company Institute recently surveyed 100 large fund families to obtain systematic evidence on fund disclosure practices. Fifty-seven fund families, representing 73 percent of mutual fund assets, responded.<sup>16</sup> Among the responding families, 42 percent reported that they made routine disclosures to all shareholders, or would provide any interested shareholder with complete disclosure information, more frequently than every 6 months. Fifty-five fund families among the 57 respondents indicated that they disclose information on their largest investment positions, in most cases their 10 largest holdings, more frequently than the SEC requires. Thirty fund families, more than half of the respondents, indicated that they made such disclosures quarterly, while another 20 reported that they made monthly disclosures of large holdings. All of the fund families that reported making voluntary disclosures indicated that they did so with a lag, typically either 15 or 30 days. By disclosing only their largest holdings, funds make it possible for shareholders and analysts to develop broad measures of a fund's risk exposure and investment style, while still preserving the opportunity to accumulate new investment positions without being front run.

Table 1 reports summary statistics for the disclosure policies of funds in our two samples. The table shows that the average number of disclosures to Morningstar over the previous 12 months was 2.04 for the high-expense sample and 2.49 for the broader sample. The average number of days between disclosures, 159 and 144, respectively, shows that some funds in our samples are disclosing more than twice each year. In the high-expense sample, of 172

<sup>14</sup> Juliette Fairley, *Keeping More under Their Hats*, N.Y. Times, June 15, 1997, at F7.

<sup>15</sup> See Lauricella & Lucchetti, *supra* note 5.

<sup>16</sup> Investment Company Institute, *Survey of Fund Groups' Portfolio Disclosure Policies: Summary of Results* (2001).

fund disclosures for which we know the prior disclosure date, 118 (68.6 percent) are separated by between 181 and 185 days. Eleven disclosures (6.4 percent) were between 29 and 31 days apart, eight (4.7 percent) were between 59 and 61 days apart, and 24 (14 percent) were separated by either 90 or 91 days. There were 11 observations with other separations. In the larger sample, 53.6 percent of disclosures were separated by 181–185 days, 10.4 percent were 28–32 days apart, 4.5 percent were 59–62 days apart, and 23.6 percent were 89–92 days apart.

To investigate the patterns of disclosure in our sample of actively managed funds and to explore the role of interfund heterogeneity, we estimated linear regression models in which the dependent variable was the number of days between disclosures and the independent variables included the size of the fund, its expense ratio, manager tenure, and the median size of the stocks in the fund's portfolio. Table 2 presents the results. For both the high-expense and broader samples, we report two regression equations. In the first, we include all observations for which we can compute the number of days since the last disclosure. Some of these data values are greater than 190 days, which appears to be inconsistent with the reporting requirements of the 1940 act. For the second equation, we limit the sample to those observations for which the value of the dependent variable was less than 190 days. We have greater confidence in these results, which are reported in the second and fourth columns.

Consistent with the discussion above, the regression evidence suggests that larger funds disclose less frequently and that funds that hold widely traded stocks, as measured by the share of their portfolio in stocks that are included in the CRSP database, disclose more frequently. A 10-percentage-point change in the share of fund's assets that are included in the CRSP files is associated with between a 4-day (broad sample) and 9-day (high-expense sample) decline in the number of days between disclosures. Both of these findings are consistent with the hypothesis that the market impact cost of fund disclosure is related to the fund's portfolio characteristics. The only other clear relationship in the data is a trend decline in the number of days between disclosures. For the broad sample, the year intercepts suggest that the average time between disclosures was 60 days shorter in 1999 than in 1993. Securities markets may have become more liquid during this period, thereby reducing the potential cost of disclosure.

#### IV. PRIMITIVE AND COPYCAT FUNDS

To evaluate one of the potential costs of disclosure from the standpoint of actively managed funds, we construct hypothetical copycat funds that mimic actively managed fund portfolios. Copycat funds spend nothing on research; they buy the assets held by actively managed funds. Let the pre-expense return on the primitive actively managed fund equal  $R_{\text{primitive,pre-expense}}$ ,

TABLE 2  
DETERMINANTS OF THE NUMBER OF DAYS BETWEEN FUND DISCLOSURES

EXPLANATORY VARIABLE	HIGH-EXPENSE SAMPLE		BROADER SAMPLE	
	Full Sample	Excluding Disclosures >190 Days Apart	Full Sample	Excluding Disclosures >190 Days Apart
Constant	232.09 (71.71)	283.64 (52.15)	264.69 (25.19)	213.03 (15.84)
Share of holdings in CRSP stock	-64.90 (60.56)	-89.89 (44.14)	-69.66 (20.52)	-42.31 (13.02)
Annual turnover	-3.68 (9.49)	-8.73 (7.16)	-1.97 (4.73)	4.85 (2.96)
Annual expense ratio	5.08 (14.92)	-8.31 (10.88)	-13.55 (9.50)	2.60 (6.14)
Asset value (\$ billions)	.002 (.002)	.002 (.001)	.00078 (.00034)	.00124 (.00022)
Median market capitalization of stocks held (\$ billions)	.546 (.601)	.336 (.434)	.032 (.31)	-.033 (.195)
Manager's tenure in years	.151 (1.18)	-.152 (.856)	-1.73 (.39)	-1.02 (.25)
Year:				
1993	3.30 (24.28)	-33.78 (17.82)	-19.44 (16.42)	-28.76 (10.25)
1994	-22.05 (24.53)	-27.92 (17.78)	-35.63 (16.30)	-37.11 (10.13)
1995	-14.19 (24.05)	-14.28 (17.34)	-40.35 (16.19)	-40.80 (10.05)
1996	-41.28 (24.57)	-40.75 (17.17)	-32.03 (16.53)	-48.32 (10.29)
1997	-45.60 (25.81)	-46.90 (18.60)	-45.69 (16.70)	-60.61 (10.42)
1998	-91.74 (28.57)	-91.96 (20.59)	-74.88 (17.31)	-81.61 (10.77)
1999	-59.18 (47.23)	-56.31 (34.05)	-89.22 (25.41)	-88.83 (15.79)
Adjusted $R^2$	.0638	.124	.078	.167
$N$	172	167	787	765

NOTE.— Authors' estimates are based on samples of funds described in the text. Equations are estimated by ordinary least squares. Standard errors are shown in parentheses. CRSP = Center for Research in Security Prices.

and let its expenses equal  $e$  per period. The net-of-expenses pretax return to an investor in the primitive fund is

$$R_{\text{primitive,net}} = R_{\text{primitive,pre-expense}} - e. \quad (1)$$

The copycat fund aligns its holdings with those of the primitive fund at the date of disclosure, which we assume occurs every 6 months. The primitive fund is assumed to disclose exactly 60 days after the close of the second and fourth quarters of the fiscal year. This assumption implies that the copycat fund is always at least 2 months out of date in tracking the primitive fund's portfolio. Just before the primitive fund's disclosure, the copycat's holdings can be as much as 8 months out of date.

Given the possibility of being tracked by a copycat, an active fund manager may try to camouflage his or her fund's true portfolio holdings. Such camouflage activity will affect the portfolio of the copycat fund. It is not clear how often the managers at actively managed funds trade to disguise their holdings. While masking strategies can avoid informing competitors about current portfolio positions, they also confuse investors and impose transaction costs on the primitive fund. Recent research has investigated disclosure-related trading.<sup>17</sup>

If the active manager generates positive excess returns, then we would expect that

$$R_{\text{copycat,pre-expense}} < R_{\text{primitive,pre-expense}}, \quad (2)$$

where  $R_{\text{copycat,pre-expense}}$  denotes the before-expense return on the copycat fund. The critical question for investors, however, is whether the copycat fund's return net of expenses exceeds that of the primitive fund. If a fraction  $\lambda$  of the actively managed fund's expenses is associated with research and other costs of active management, such as trading that takes place between disclosure dates, then the copycat fund can generate an after-expense return of

$$R_{\text{copycat,net}} = R_{\text{copycat,pre-expense}} - (1 - \lambda)e. \quad (3)$$

Because it is difficult to estimate  $\lambda$ , we present pre-expense return differentials, which readers can adjust using their own estimates of the expense ratio difference between actively managed and copycat funds, as well as our estimate of the net-of-expenses return differential.

We focus on pretax returns but note that for taxable investors, the capital gains tax liability associated with investments in copycat funds might be lower than those for the actively managed primitive funds, since the copycat fund will presumably trade less than the primitive. By trading only twice each year, the copycat fund is less likely than the primitive fund to realize

<sup>17</sup> See David K. Musto, *Investment Decisions Depend on Portfolio Disclosures*, 54 J. Fin. 935 (1999); and O'Neal, *supra* note 3.

capital gains. This relationship could be reversed if the active manager pursues tax-minimizing trading strategies, such as loss harvesting.

We compare primitive- and copycat-fund returns on a pre-expense and a postexpense basis:

$$\Delta_{\text{pre-expense}} = R_{\text{primitive,pre-expense}} - R_{\text{copycat,pre-expense}} \quad (4)$$

and

$$\Delta_{\text{net}} = R_{\text{primitive,net}} - R_{\text{copycat,net}} \quad (5)$$

We define  $R_{\text{primitive, net}}$  as the change in the fund's per-share net asset value (NAV) during a month divided by the NAV at the beginning of the month, assuming reinvestment of dividends and capital gain distributions. The NAV equals the fund's total assets, less liabilities, divided by the number of shares outstanding. The change in the NAV from one month to the next is by definition net of expenses paid from fund assets, such as 12b-1 fees, commissions, and costs of management and administration. Morningstar is the data source for all the components of fund returns.

We compute primitive-fund returns before loads or other costs that do not easily convert to monthly returns. To the extent that actively managed primitive funds are burdened more with these additional costs than passive copycats,  $\Delta_{\text{net}}$  understates the potential advantages of the copycat fund. We define  $R_{\text{primitive,pre-expense}}$  as  $R_{\text{primitive,net}}$  plus 1/12 of the fund's annual expenses. For example, assume that a primitive fund has a return of 2.0 percent for a given month and that the fund's annual expense ratio is 1.2 percent. In this case, the estimated monthly expense ratio is .1 percent and the adjusted monthly pre-expense return is 2.1 percent ( $=2.0 + .1$ ).

We compute the copycat's pre-expense return,  $R_{\text{copycat,pre-expense}}$ , as the weighted sum of the value-weighted monthly returns for each stock held by the primitive fund. This assumes that the copycat fund can buy and sell securities at the prices listed in the CRSP tapes. In practice, actual copycat-fund returns are likely to be reduced by bid-ask spreads. The magnitude of this effect is likely to vary across funds and to be most pronounced for copycats that try to mimic actively managed funds that hold small and illiquid securities. The monthly returns for stocks are computed by compounding CRSP daily returns. If a stock is listed on CRSP, we use its daily returns including distributions. If a stock is not listed on CRSP, for example, if it is a closely held or foreign-controlled company, we assume that its daily return equals the distribution-inclusive return on the CRSP value-weighted market portfolio. If a stock held by the copycat fund drops from CRSP between information disclosures, we assume that the assets previously held in that stock earn the value-weighted market return until the primitive fund's next disclosure.

Many of the actively managed funds we analyze hold some of their assets in securities other than CRSP-listed corporate stocks. Computing the returns

on these assets is problematic because we often lack detailed information on the identity of the asset and its return. To estimate copycat-fund returns, we therefore make a range of assumptions about the returns on these assets. First, we assume that bonds earn the Ibbotson Associates monthly return on long-term corporate bonds. Second, we assume that cash earns the Treasury-bill monthly return. Third, we assume that the returns on common and preferred stock not listed on the CRSP files, and all other asset holdings, are the same as the return on the fund's other assets. We apply this imputed return to holdings of stock that fall below Morningstar's reporting threshold of .006 percent of a fund's portfolio value. Only about 1 percent of the equities held by funds in our sample have weights below this threshold, and the median fund in both samples had no holdings below this threshold. The maximum amount of assets in this category, for any fund in either of our samples, was 21.9 percent.

To illustrate our procedure for constructing copycat-fund returns, suppose that a fund's assets are invested 40 percent in common stock A, which is included in the CRSP files, 25 percent in common stock B, which is not listed in CRSP, 30 percent in bond C, and 4.98 percent in cash. The remaining .02 percent of the portfolio is invested in four stocks, each composing .005 percent of the portfolio. First, we drop the four stocks that compose only .005 percent of the fund, because Morningstar reports their portfolio weights as 0 percent, and reweight the remaining investments. Stock A's weight is now assumed to be 40.008 [ $=40/(100 - .02)$ ] percent, B's weight is 25.005 percent, C's weight is 30.006 percent, and the cash weight is now 4.981 percent. If A has a 4 percent return, the market return is 3 percent, the return on long-term corporate bonds is 2 percent, and the Treasury-bill rate is 1 percent, then the copycat fund return is  $(40.008 \times .04 + 25.005 \times .03 + 30.006 \times .02 + 4.981 \times .01)/100 = .03$ .

Morningstar does not always report simultaneous data on equity portfolio weights and the overall asset allocation from which we determine the portfolio share of bonds and cash. We therefore reweight the data on portfolio holdings to achieve a consistent outcome. For example, suppose that Morningstar releases equity portfolio weights that disaggregate 95 percent of a fund's equity holdings at year end, while it also reports that the fund's overall asset allocation is 97 percent equity and 3 percent bonds for the month prior to the year end. The portfolio weights would be adjusted by the ratio  $100/(95 + 3)$ , leaving the total equity holdings at 96.9 percent ( $95/98$ ) and the bond holdings at 3.1 percent ( $3/98$ ) of the fund. In practice, the dates of portfolio and asset allocation disclosure are rarely very different. The average difference between the sum of the portfolio equity weights and the reported allocation to equities is only 1 percent.

The SEC allows funds 60 days following the end of each reporting period to disclose their holdings. For example, a mutual fund with a calendar year end must disclose its year-end portfolio holdings by the end of February and

its June 30 portfolio holdings by the end of August. We assume that the copycat fund adjusts its holdings 2 months after the end of the reporting period. The copycat-fund returns for the March–August period use the primitive fund’s portfolio holdings reported at the end of February, and copycat-fund returns for September–February use the primitive fund’s disclosure from late August. The copycat-fund returns for each of these periods are then compared with the primitive fund’s returns for the same period.

Our assumption that the copycat fund can track only the primitive fund’s portfolio from the semiannual mandatory disclosure is conservative. If an actively managed fund makes more frequent voluntary disclosures, a copycat fund tracking this fund could adjust its asset holdings at higher frequency. In some cases, our copycat portfolio adjustment rule may rely on “stale” disclosure data. For example, if a primitive fund voluntarily discloses three times a year, at the end of April, August, and December, our February copycat portfolio adjustment will rely on data that was released in late December. The most common disclosure pattern for the primitive funds in our sample, however, is disclosure in February and August.

A critical issue in comparing the performance of primitive and copycat funds is the expense difference between these funds. We assume that for all years in our sample, each copycat fund incurs expenses equal to those of the Vanguard Total Stock Index fund in 2002, 20 basis points. This fund invests in both large- and small-capitalization stocks, so its brokerage costs and other expenses should reflect those for a broad cross section of possible copycat funds. Given the average expense ratio for funds in our two subsamples, we are assuming that copycat funds have expense ratios that are 1.24 percent per year lower than the funds in the high-expense-ratio subsample and .71 percent per year lower than those in the broader fund subsample. We report return differentials between primitive and copycat funds before expenses as well as after our estimate of expenses, so readers who wish to consider alternative expense assumptions for the copycat funds can do so by subtracting those expenses from our pre-expense return differential. We report monthly differential returns,  $\Delta_{\text{pre-expense}}$  and  $\Delta_{\text{net}}$ , for each of the 6 months between the disclosure dates of the primitive fund as well as cumulative return differentials for the 1–6-month intervals between disclosures.

## V. EMPIRICAL FINDINGS

We report our findings for our subsample of high-expense funds and then consider our broader sample of equity funds.

TABLE 3  
MONTHLY RETURNS ON PRIMITIVE FUNDS AND COPYCAT FUNDS, BY  
MONTHS SINCE DISCLOSURE, HIGH-EXPENSE-RATIO SAMPLE

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
A. Individual Month Returns January 1992–April 1999:						
Primitive-Fund Returns, before Expenses	1.55 (4.25) [1.89] {.84}	1.13 (4.19) [1.50] {.83}	1.51 (3.89) [1.61] {.85}	2.00 (3.61) [2.19] {-1.10}	1.52 (3.83) [1.46] {1.59}	1.01 (4.64) [1.38] {2.52}
Copycat-Fund Returns, before Expenses	1.50 (4.28) [1.77]	1.09 (4.13) [1.73]	1.46 (3.85) [1.37]	2.08 (3.61) [2.18]	1.40 (3.63) [1.45]	.82 (4.50) [1.22]
Primitive-Fund Return Less Copycat-Fund Return, before Expenses <sup>a</sup>	.05 [-.02] {.84}	.05 [.05] {.83}	.06 [-.00] {.85}	-.08 [-.08] {-1.10}	.12 [.08] {1.59}	.19 [.15] {2.52}
Primitive-Fund Return Less Copycat-Fund Return, Net of Expenses <sup>a</sup>	-.06 [-.13] {-1.03}	-.06 [-.03] {-1.03}	-.05 [-.08] {-.74}	-.19 [-.18] {-2.46}	.02 [-.04] {.27}	.09 [.04] {1.18}
B. Buy-and-Hold Returns January 1992–April 1999:						
Primitive-Fund Returns, before Expenses	1.55 (4.25) [1.89] {.84}	2.70 (5.98) [2.63] {1.12}	4.22 (6.90) [4.18] {1.44}	6.30 (8.08) [5.40] {.56}	7.91 (9.13) [6.90] {1.29}	8.94 (9.78) [8.12] {2.00}
Copycat-Fund Returns, before Expenses	1.50 (4.28) [1.77]	2.60 (5.96) [2.52]	4.06 (6.80) [3.83]	6.22 (7.90) [5.29]	7.68 (8.67) [7.47]	8.52 (9.38) [7.50]
Primitive-Fund Return Less Copycat-Fund Return, before Expenses <sup>a</sup>	.05 [-.02] {.84}	.09 [-.00] {1.12}	.15 [.03] {1.44}	.08 [-.09] {.56}	.22 [-.15] {1.29}	.42 [-.03] {2.00}
Primitive-Fund Return Less Copycat-Fund Return, Net of Expenses <sup>a</sup>	-.06 [-.13] {-1.03}	-.11 [-.21] {-1.37}	-.16 [-.26] {-1.52}	-.35 [-.43] {-2.58}	-.32 [-.68] {-1.91}	-.24 [-.73] {-1.13}

NOTE.—Each entry shows the value for the mean return or return differential indicated in the row heading. Standard errors are shown in parentheses, medians are shown in square brackets, and *t*-statistics for testing the null hypothesis that the relevant mean equals zero are shown in curly braces. See the text for further description of the data sample.

<sup>a</sup> Full sample, *N* = 188.

#### A. Results for the Sample of High-Expense-Ratio Funds

Table 3 summarizes our findings on the returns for primitive funds in the high-expense group and their copycats. Panel A reports mean and median returns in each of the 6 months between one disclosure date and the next, while panel B presents cumulative returns for periods of between 1 and 6 months. The first and second rows present summary statistics on returns for both primitive and copycat funds, while the third and fourth rows present return differentials both before and after expenses.

The results in panel A show that the mean actively managed fund return is greater than the mean copycat-fund return in all but 1 of the 6 months. However, only in month 6 is the return differential statistically significantly



different from zero at the .05 level. Here, and in all subsequent analysis, we use a two-tailed statistical test. Neither the absolute nor the median monthly return difference ever exceeds 20 basis points. Mean differences do not vary much over the 6 months. The standard deviation of the monthly difference between the primitive- and the copycat-fund return, while not shown in the table, averages 80 basis points in the first 3 months after the copycat rebalances and rises to 110 basis points in the next 3 months. Likewise, the correlation coefficient between the actively managed fund and the copycat-fund returns declines from .98 during the first 3 months after disclosure to .96 during the next 3 months.

When both the primitive- and copycat-fund returns are adjusted for our estimate of the differential in monthly expenses between these funds, the copycats outperform the primitive funds in 4 of the 6 months. The absolute value of the return differential is typically less than 20 basis points, and it is statistically insignificantly different from zero in all but 1 month. Recall that the average expense ratio for this sample of actively managed funds is 1.44 percent per year, compared with our estimate of .20 percent per year for the copycat fund, so our estimate of the monthly expense ratio difference between the primitive and the copycat funds is nearly 10 basis points.

In results not reported in Table 3, we explored alternative assumptions about the return that copycat funds earn on nonequity assets. Instead of setting the return on these assets equal to the copycat's return on other assets, we set it equal to the value-weighted equity return. We also tried setting this return to zero. Neither alternative assumption had a substantial impact on our findings or on the statistical significance of return differentials.

Panel A in Table 3 presents returns for individual months between disclosure dates. Panel B translates these monthly returns into cumulative buy-and-hold returns. Descriptive statistics are provided for returns over 1–6-month holding periods. The table shows that the difference between the primitive- and copycat-fund returns at the end of the 6-month holding period, net of expenses, is not statistically significantly different from zero. The mean difference at the end of 6 months on the before-expense return is 42 basis points, and this differential is statistically significantly different from zero, although none of the cumulative returns for shorter horizons are. On a net-of-expenses basis, however, the copycat-fund return exceeds the primitive-fund return by an average of 24 basis points, and we cannot reject the null hypothesis that the two cumulative returns are equal. Copycat funds would need to have expense ratios of at least 68 basis points per year, 48 basis points higher than what we assume, before their average net-of-expenses returns would fall below the average returns of the actively managed funds. Because the standard error of the difference between the average 6-month cumulative pre-expense return on the primitive funds and that on the copycat funds is .21 and the difference is .42, even if the expenses of the copycat fund were only slightly lower than those of the primitive, the net-of-expenses

TABLE 4  
MONTHLY RETURNS ON PRIMITIVE FUNDS AND COPYCAT FUNDS, BY  
MONTHS SINCE DISCLOSURE, BROADER SAMPLE

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
A. Individual Month Returns January 1992–April 1999:						
Primitive-Fund Returns, before Expenses	1.72 (3.70) [2.05] {.61}	1.36 (3.88) [1.62] {.47}	1.55 (3.99) [1.88] {-1.42}	1.71 (3.29) [1.78] {.43}	1.54 (3.68) [1.80] {1.49}	.90 (4.61) [1.40] {2.14}
Copycat-Fund Returns, before Expenses	1.71 (3.71) [1.87]	1.34 (3.79) [1.53]	1.60 (3.89) [1.90]	1.69 (3.26) [1.63]	1.49 (3.63) [1.64]	.82 (4.41) [1.20]
Primitive-Fund Return Less Copycat-Fund Return, before Expenses <sup>a</sup>	.02 [.05] {.61}	.01 [.04] {.47}	-.05 [-.02] {-1.42}	.02 [.09] {.43}	.05 [.03] {1.49}	.08 [.08] {2.14}
Primitive-Fund Return Less Copycat-Fund Return, Net of Expenses <sup>a</sup>	-.04 [-.01] {-1.64}	-.05 [-.01] {-1.43}	-.11 [-.08] {-3.18}	-.04 [.03] {-1.17}	-.01 [-.01] {-.24}	.02 [.02] {.50}
B. Buy-and-Hold Returns January 1992–April 1999:						
Primitive-Fund Returns, before Expenses	1.72 (3.70) [2.05] {.61}	3.10 (5.39) [2.82] {.67}	4.67 (6.51) [4.79] {-.34}	6.47 (7.72) [6.22] {-.05}	8.09 (8.52) [7.60] {.57}	8.99 (9.07) [9.33] {1.34}
Copycat-Fund Returns, before Expenses	1.71 (3.71) [1.87]	3.07 (5.38) [2.63]	4.69 (6.47) [4.64]	6.47 (7.69) [5.88]	8.04 (8.46) [7.45]	8.86 (8.91) [8.50]
Primitive-Fund Return Less Copycat-Fund Return, before Expenses <sup>a</sup>	.02 [.05] {.61}	.03 [.07] {.67}	-.02 [.02] {-.34}	-.00 [.08] {-.05}	.05 [.13] {.57}	.13 [.16] {1.34}
Primitive-Fund Return Less Copycat-Fund Return, Net of Expenses <sup>a</sup>	-.04 [-.01] {-1.64}	-.09 [-.04] {-2.02}	-.20 [-.13] {-3.40}	-.25 [-.17] {-3.12}	-.26 [-.14] {-2.84}	-.25 [-.19] {-2.49}

NOTE.—Each entry shows the value for the mean return or return differential indicated in the row heading. Standard errors are shown in parentheses, medians are shown in square brackets, and *t*-statistics for testing the null hypothesis that the relevant mean equals zero are shown in curly braces. See the text for further description of the data sample.

<sup>a</sup> Full sample, *N* = 847.

cumulative return differential would be statistically insignificantly different from zero.

### B. Results for the Broader Sample of Equity Funds

Table 4 presents both individual month returns and cumulative returns for our broader sample of actively managed funds. Our findings from the high-expense-ratio sample carry over to the broader sample as well. Table 4 shows that before expenses, primitive funds outperform their associated copycats in 5 of the 6 months between disclosure episodes. The only exception is the third month after disclosure. The difference in monthly returns, however, is never statistically significantly different from zero, and it is never substantively very large. When fund expenses are deducted from the returns of both

the primitive and copycat funds, the mean difference in the monthly returns is negative for 5 of 6 months, but the difference is statistically significant only in month 3. The copycat funds generate higher net-of-expenses returns in 5 of the 6 months between disclosure dates.

The cumulative returns in panel B of Table 4 show that before expenses, the returns to the primitive and copycat funds are very similar. After 6 months, there is only a 13-basis-point difference, on average, between the two sets of returns, and this difference is not statistically significantly different from zero. When we compute the difference in returns net of expenses, however, the average return on the copycat funds is higher than the average return on the primitive funds, and with our benchmark estimate of the difference in expenses between primitive and copycat funds, we can reject the null hypothesis of equality. Most of the differential return in favor of the copycat funds emerges in the first 4 months after the information disclosure. After 6 months, the cumulative return differential is 25 basis points in favor of the copycat funds, so the copycats' expense ratio would need to be 50 basis points per year higher than we assume to erase the net-of-expenses advantage of the copycat funds.

The evidence for the broader sample of funds provides stronger support for the view that copycat funds can outperform their primitive funds, net of expenses, than the results for the high-expense funds. This appears to be due to the greater sample size and correspondingly smaller standard errors in the broader fund sample. The cumulative net-of-expenses return differential between the primitive and copycat funds is similar in the two samples.

Our estimate of the expense ratio difference between primitive funds and prospective copycat funds is subject to substantial uncertainty.<sup>18</sup> Morningstar presents data on the average expense ratio for retail equity funds at the 25 largest mutual fund complexes at the end of 2003. Leaving aside Vanguard and weighting fund families by their assets under management, the average expense ratio is 1.63 percent per year. Including Vanguard reduces the average to 1.42 percent per year. These averages are higher than those for either of our subsamples because we focus on funds that are broadly diversified, and expense ratios tend to be higher for specialized funds. Statistics such as these support the plausibility of assuming that the expense ratio for copycat funds could be on the order of 70 basis points lower than that for primitive funds. If the expense ratio difference was only half as large as we assume in our benchmark case, the conclusion that copycat funds outperform primitive funds would still hold, but we would no longer be able to reject the null hypothesis of equal net-of-expenses returns for the two sets of funds.

<sup>18</sup> Riva D. Atlas, *Does the Expense Ratio Tell the Whole Story?* N.Y. Times, February 8, 2004, at 3.7, raises a number of issues about the measured expense ratio and actual costs of mutual fund investing.

### C. Risk and the Source of Return Differences

Our analysis so far has focused on the average returns on primitive and copycat funds. We now consider the risk properties of the two sets of funds. We begin by calculating the standard deviation of monthly returns for the primitive funds and the associated copycat funds over each 6-month holding period. The copycat funds had a slightly lower standard deviation, at 3.68 percent per month compared to 3.74 percent for the primitive funds, in the high-expense sample. The pattern is similar, 3.41 percent for the copycat funds and 3.49 percent for the primitive funds, in the larger sample. The standard deviation of the copycat fund return, relative to that of the primitive fund, is larger when the primitive fund holds a higher share of its portfolio in securities that we are not able to track, such as foreign and private stocks. The standard deviation of the copycat fund is lower, relative to the primitive fund, when the primitive fund exhibits a higher turnover rate.

We also estimated regression models designed to make a simple risk correction to the return differentials reported in Tables 3 and 4. We regressed the copycat-primitive return differential on an index of equity market returns:

$$\Delta_{\text{pre-expense},t} = \alpha_{\text{pre}} + \beta_{\text{pre}} \times R_{\text{Wilshire5000},t} + \varepsilon_t \quad (6)$$

and

$$\Delta_{\text{net},t} = \alpha_{\text{net}} + \beta_{\text{net}} \times R_{\text{Wilshire5000},t} + \varepsilon_t. \quad (7)$$

When the  $\beta$  coefficients in these models are constrained to equal zero, then the intercept terms simply measure what we report in Tables 3 and 4: the average return differential, before or after expenses, between primitive and copycat funds. When the  $\beta$  coefficients are not restricted, these models are one-factor models for analyzing the risk differentials between the primitive and copycat funds. We continue to focus on the estimates of  $\alpha_{\text{pre}}$  and  $\alpha_{\text{net}}$ , which correspond to the risk-adjusted return differential.

Table 5 reports the results of estimating these models using buy-and-hold returns over horizons from 1 to 6 months. The results for both the high-expense sample of funds and the broader sample of funds are consistent with our earlier findings. The estimated  $\alpha$  coefficients are not statistically significantly different from zero at any horizon, and the size and sign of the coefficients are very similar to the coefficients estimated without any risk correction. The results confirm our earlier finding that copycat funds can deliver returns net of expenses that exceed the returns on their primitive funds, although we cannot reject the null hypothesis that the two sets of funds have identical returns.

The estimated  $\beta$  coefficients in Table 5 provide some insight on the systematic risk of the difference in returns between the primitive and copycat funds. Most of the coefficient estimates are close to zero, and none of the estimates is statistically significantly different from zero at conventional sig-

TABLE 5  
RISK-ADJUSTED DIFFERENCE IN BUY-AND-HOLD RETURNS ON PRIMITIVE  
FUNDS AND COPYCAT FUNDS, JANUARY 1992–APRIL 1999

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
A. High-expense sample:						
$\alpha_{\text{pre-expense}}$	.07 (.06) {1.15}	.11 (.09) {1.15}	.19 (.13) {1.46}	.16 (.18) {.87}	.09 (.24) {.38}	.35 (.30) {1.17}
$\beta_{\text{pre-expense}}$	-.02 (.02) {-1.00}	-.01 (.02) {-.32}	-.01 (.02) {-.47}	-.01 (.02) {-.69}	.02 (.02) {.77}	.01 (.03) {.32}
$\alpha_{\text{net}}$	-.03 (.06) {-.60}	-.10 (.09) {-1.06}	-.13 (.13) {-.97}	-.26 (.18) {-1.46}	-.44 (.24) {-1.85}	-.28 (.30) {-.93}
$\beta_{\text{net}}$	-.02 (.02) {-.97}	-.01 (.02) {-.35}	-.01 (.02) {-.50}	-.02 (.02) {-.77}	.02 (.02) {.70}	.01 (.03) {.20}
B. Broader sample:						
$\alpha_{\text{pre-expense}}$	.04 (.03) {1.25}	.06 (.05) {1.23}	.05 (.07) {.71}	.08 (.11) {.76}	.14 (.13) {1.06}	.19 (.14) {1.34}
$\beta_{\text{pre-expense}}$	-.01 (.01) {-1.61}	-.01 (.01) {-1.29}	-.02 (.01) {-1.71}	-.01 (.01) {-1.23}	-.01 (.01) {-.93}	-.01 (.01) {-.58}
$\alpha_{\text{net}}$	-.02 (.03) {-.79}	-.06 (.05) {-1.06}	-.13 (.07) {-1.78}	-.17 (.11) {-1.56}	-.17 (.13) {1.33}	-.17 (.14) {-1.20}
$\beta_{\text{net}}$	-.01 (.01) {-1.61}	-.01 (.01) {-1.31}	-.02 (.01) {-1.71}	-.01 (.01) {-1.26}	-.01 (.01) {-.99}	-.01 (.01) {-.73}

NOTE.—Entries correspond to coefficients from regression models (6) and (7) in the text. Standard errors are shown in parentheses, and *t*-statistics for testing the null hypothesis that the relevant coefficient equals zero are shown in curly braces. See the text for further description of the data sample.

nificance levels. These findings do not suggest important differences in systematic risk between the returns on the primitive and copycat funds.

The foregoing description of the return differentials between primitive and copycat funds raises a question of whether the differentials can be explained by characteristics of the primitive fund. To address this issue, we estimated regression models that relate the cumulative pre-expense return differential to a small set of primitive fund characteristics. Results reported in an earlier version of this paper suggest that the difference in pre-expense returns is decreasing in the percentage of fund assets invested in equities covered by CRSP and that it is increasing in the primitive fund's turnover rate.<sup>19</sup> Neither finding is a surprise: when the copycat fund is able to positively identify a higher fraction of the primitive fund's assets and when the primitive fund's

<sup>19</sup> Mary Margaret Myers *et al.*, Copycat Funds: Information Disclosure Regulation and the Returns to Active Management in the Mutual Fund Industry (Working Paper No. 8653, Nat'l Bur. Econ. Res. 2001).

asset holdings are more stable, the copycat fund's return is closer to that of the primitive fund.

*D. What Would Happen If Disclosure Was Less Frequent?*

Although the disclosure requirements were static during our sample period, we can investigate the potential effects of less frequent disclosure on our copycat-fund returns. To do this, we repeat the analysis that we reported in Tables 3 and 4 but allow copycat funds to adjust their holdings only after every second disclosure by the primitive fund, that is, every 12 months. The results suggest that on a net-of-expenses basis, copycat funds outperform the actively managed funds by more at the 12-month horizon than at the 6-month horizon. This is primarily due to the larger cumulative-expenses charge against the primitive fund over this longer horizon rather than to differences in pre-expense returns. A copycat fund's ability to track the primitive fund's return should be lower in the 6 months before each disclosure than in the 6 months following a disclosure when such disclosures occur once a year.

## VI. CONCLUSIONS

We have constructed hypothetical copycat funds, each of which adjusts its portfolio to mimic that of a primitive fund when the latter discloses its portfolio holdings. Under the assumption that copycat funds incur expenses roughly equal to those of broad-based index funds, net-of-expenses returns are higher for the copycat funds than for the primitive funds. This is true for both a sample of high-expense-ratio funds and a larger sample of actively managed funds, although we reject the null hypothesis of equal returns only for the larger sample. The disparity between the net-of-expenses returns for the copycat and primitive funds is sensitive to our assumption about the expenses associated with managing a copycat fund. If the expenses associated with management of a copycat fund are larger than we assume, the corresponding net-of-expenses return differential between copycat and primitive funds would be smaller, and we would not be able to reject the null hypothesis of equal net-of-expenses returns for copycats and primitive funds.

Our findings suggest that disclosure may be costly to actively managed funds because it enables competitors to construct portfolios that mimic, with a lag, the primitive fund's holdings. If investors purchase actively managed funds primarily in pursuit of high net-of-expenses returns, then copycat funds could potentially erode their market share by offering comparable returns net of expenses. The extent to which such competition would reduce asset flows to actively managed funds is an open question.

Two features of our study design may lead us to overstate the feasible relative returns on copycat funds. First, if the security purchases by the copycat fund drive up the prices of securities held by the primitive fund, then the primitive fund can front run the copycat fund. This could increase

the returns on the primitive fund, particularly in the first month after it discloses its portfolio holdings. This magnitude of any such return effect would depend on the size of the copycat fund. Anecdotal evidence suggests that trading ahead of stock purchases by mutual funds can generate positive returns. The Vanguard Group stopped reporting information about the net cash flows into its funds because third parties were apparently using this information to trade ahead of Vanguard funds, thereby raising Vanguard's effective cost of executing stock transactions.<sup>20</sup> If a potential investor knew the largest holdings of a given Vanguard fund and also knew that the fund had experienced a large cash inflow, he might be able to identify securities for which there would be substantial demand in the near future. Fidelity, which once released daily information on the size of some of its sector funds, has stopped reporting this information because it may be of use to investors who are trying to profit from the fund's prospective purchases.

Second, if an active manager knew that her fund was being tracked by a copycat, she might act to reduce the information content of disclosure filings. Such actions could raise the standard deviation of the differential between the return on the primitive and the copycat funds. If actively managed funds earn positive returns as a result of their research, and if window dressing could conceal some of their holdings, such trading could increase the pre-expense return differential between the primitive and the copycat fund, although it might also increase the expenses of the primitive fund.

There is no consensus at present on the extent to which mutual fund managers engage in window dressing to change the composition of their portfolios near the end of a reporting period. The attractiveness of window dressing depends on its cost.<sup>21</sup> For large stocks, which are actively traded in liquid markets, these costs should be small. For smaller and less liquid securities, the transaction costs might outweigh the benefits.

Whether active fund managers currently engage in window dressing to mislead copycat traders is unclear, although there are some investors who currently follow strategies similar to our copycat funds. Some asset managers create "funds of funds" by tracking the portfolios of successful, actively managed funds. Several data services, including iDayo (Institutional Data Analysis Yields Opportunity), AMG Mutual Fund Holdings Databases, and B4UTrade.com currently offer investors the opportunity to evaluate data on mutual fund holdings and to form "buy indicators" based on substantial fund purchases in a particular stock. The aggregate importance of such investors in affecting trading behavior remains an open issue.

While ignoring the favorable return effect on primitive funds associated

<sup>20</sup> Charles Gasparino, Vanguard's Cutback of Fund Data May Mean It Fears a Market Drop, *Wall St. J.*, October 14, 1997, at C1.

<sup>21</sup> Musto, *supra* note 17, presents some evidence on window dressing among money market funds. O'Neal, *supra* note 3, discusses related issues for mutual funds that invest in stocks.

with copycat trading, as well as the opportunity for window dressing by primitive funds, may lead us to understate the return advantage of the primitive fund, our assumption that the copycat fund obtains information about the primitive fund's holdings only every 6 months may work in the opposite direction. As our data indicate, many actively managed funds reveal information more often than this, and presumably a copycat fund trying to mimic such a fund would be able to track the primitive fund's return performance more closely. It might also be possible for copycat funds to obtain more frequent disclosures from the primitive fund, for example, by purchasing primitive fund shares and asking the primitive fund manager for information on holdings.

Our analysis focuses on only one of the potential costs associated with disclosure of portfolio holdings. We have not considered other costs or tried to evaluate the benefits of more frequent disclosure. Quantitative measures of the benefits that investors receive from information disclosure are critically needed for policy design. While many of the public comments on proposed expansions of disclosure rules suggest that fund investors would gain by making more informed portfolio choices if funds disclosed more often, the quantitative importance of such gains are not clear. They are likely to depend on the probability that fund managers change their investment objectives without informing shareholders, on the fraction of fund investors who would use high-frequency disclosure to adjust their overall portfolio, and on the level of voluntary disclosure that would take place in the absence of regulatory requirements.

## APPENDIX

### HIGH-EXPENSE-RATIO SAMPLE

AAL Capital Growth	Keystone Custodian S-4
AIM Constellation	Merrill Lynch Fund for Tomorrow B
AIM Weingarten	Merrill Lynch Strategic Div. B
Alliance Quasar A	MFS Lifetime Capital Growth
American Cap. Pace	MFS Lifetime Managed Sector
Fidelity Blue Chip	Paine Webber Dividend Growth A
Growth Fidelity	Pasadena Growth
Growth Company	Pilgrim MagnaCap
Ivy Growth	Prudential Growth B
Kemper Investment Growth	Security Equity
Keystone Custodian S-3	

### BROADER SAMPLE

20th Century Select Inv.	AIM Weingarten
Affiliated	Alliance A
AIM Charter	American Cap. Comstock
AIM Constellation	American Cap Pace



American Mutual	Merrill Lynch Basic Value A
Brandywine	Merrill Lynch Basic Value B
Capital Income Builder	Merrill Lynch Capital A
Common Sense Growth	Merrill Lynch Capital B
Delaware Decatur Income	Merrill Lynch Growth B
Delaware DelCap Concept I	Mutual Qualified
Dreyfus	Mutual Shares
Elfun Trusts	Neuberger/Berman Guardian
Evergreen Total Return	Neuberger/Berman Partners
Fidelity	New Economy
Fidelity Asset Manager	Nicholas
Fidelity Contrafund	Oppenheimer Equity-Income
Fidelity Destiny I	Phoenix Balanced
Fidelity Equity-Income	Phoenix Growth
Fidelity Growth Company	Pioneer
Fidelity Growth & Income	Pioneer II
Fidelity-Income II	Prudential Equity B
Fidelity Magellan	Putnam
Fidelity Puritan	Fund for Growth/Income A
Fidelity Retirement Growth	Putnam Investors
Fidelity Trend	Putnam Option Income II
Financial Industrial Income	Putnam Voyager A
Fundamental Investors	Scudder Capital Growth
General Electric S & S Program	Scudder Growth & Income
Growth Fund of America	Selected American
IDS Growth	Shares
IDS Managed Retirement	Sequoia
IDS Mutual	Thomson Growth B
IDS New Dimensions	TNE Growth
IDS Stock	T. Rowe Price Equity-Income
Janus	T. Rowe Price Growth/Income
Janus Twenty	T. Rowe Price Growth Stock
Kemper Growth	United Accumulative
Kemper Total Return	United Income
Keystone Custodial K-1	United Vanguard
Legg Mason Value	Vanguard/Morgan Growth
Lindner	Vanguard US Growth
Mass. Investors	Washington Mutual Investors
Mass. Investors Growth Stock	Wellington
Merrill Lynch Balanced B	Windsor II

## BIBLIOGRAPHY

- Admati, Anat, and Pfleiderer, Paul. "Forcing Firms to Talk: Financial Disclosure Regulation and Externalities." *Review of Financial Studies* 13 (2000): 479-519.
- Atlas, Riva D. "Does the Expense Ratio Tell the Whole Story?" *New York Times*, February 8, 2004.
- Carhart, Mark; Kaniel, Ron; Musto, David; and Reed, Adam. "Leaning for

- the Tape: Evidence of Gaming Behavior in Equity Mutual Funds.” *Journal of Finance* 57 (2002): 661–93.
- Chalmers, John; Edelen, Roger; and Kadlec, Gregory. “On the Perils of Financial Intermediaries Setting Security Prices: The Mutual Fund Wild Card Option.” *Journal of Finance* 56 (2001): 2209–36.
- Fairley, Juliette. “Keeping More under Their Hats.” *New York Times*, June 15 1997.
- Foster, George. “Externalities and Financial Reporting.” *Journal of Finance* 35 (1980): 521–33.
- Gasparino, Charles. “Vanguard’s Cutback of Fund Data May Mean It Fears a Market Drop.” *Wall Street Journal*, October 14, 1997.
- Grinblatt, Mark, and Titman, Sheridan. “Mutual Fund Performance: An Analysis of Quarterly Portfolio Holdings.” *Journal of Business* 62 (1989): 393–416.
- Gruber, Martin J. “Another Puzzle: The Growth of Actively-Managed Mutual Funds.” *Journal of Finance* 51 (1996): 783–810.
- Investment Company Institute. *Survey of Fund Groups’ Portfolio Disclosure Policies: Summary of Results*. Washington, D.C.: Investment Company Institute, 2001. [http://www.ici.org/statements/cmltr/01\\_sec\\_port\\_disclos\\_surv.html](http://www.ici.org/statements/cmltr/01_sec_port_disclos_surv.html).
- Laderman, Jeffrey M. “A Mutual Fund That Lets It All Hang Out.” *Business Week*, September 27, 1999.
- Lakonishok, Josef; Shleifer, Andrei; Thaler, Richard; and Vishny, Robert. “Window Dressing by Pension Fund Managers.” *American Economic Review, Papers and Proceedings* 81 (1991): 227–31.
- Lauricella, Tom, and Lucchetti, Aaron. “Silence Is Golden to Mutual Fund Industry.” *Wall Street Journal*, July 31, 2002.
- Musto, David K. “Investment Decisions Depend on Portfolio Disclosures.” *Journal of Finance* 54 (1999): 935–52.
- Myers, Mary Margaret; Poterba, James; Shackelford, Douglas; and Shoven, John. “Copycat Funds: Information Disclosure Regulation and the Returns to Active Management in the Mutual Fund Industry.” Working Paper No. 8653. Cambridge, Mass.: National Bureau of Economic Research, December 2001.
- O’Neal, Edward. “Window Dressing and Equity Mutual Funds.” Unpublished manuscript. Winston-Salem, N.C.: Wake Forest University, Babcock Graduate School of Management, 2001.
- Tyle, Craig S. “Comment Letter Re: Shareholder Reports and Quarterly Portfolio Disclosure of Registered Investment Companies.” Washington, D.C.: Investment Company Institute, 2003. [http://www.ici.org/dis/arc-pro/03\\_sec\\_shreport\\_com.html](http://www.ici.org/dis/arc-pro/03_sec_shreport_com.html).
- U.S. Securities and Exchange Commission. “Proposed Rule: Shareholder Reports and Quarterly Portfolio Disclosure of Registered Management

- Investment Companies.” SEC Release No. IC-25870. Washington, D.C.: U.S. Securities and Exchange Commission, December 20, 2002.
- Verrecchia, Robert. “Discretionary Disclosure.” *Journal of Accounting and Economics* 5 (1983): 179–94.
- Wermers, Russ. “Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transactions Costs, and Expenses.” *Journal of Finance* 55 (2000): 1655–94.
- Wermers, Russ. “The Potential Effects of More Frequent Portfolio Disclosure on Mutual Fund Performance.” *Investment Company Institute Perspective*, June 2001, pp. 1–12.