Risk, Return, and Diversification of Specialty Mutual Funds

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Abstract

This study examines the risk, return, and diversification of specialty mutual funds compared to traditional mutual funds. Until recently, lack of data has precluded examination of the performance of a number of categories of specialty funds. Over the period studied, specialty funds as a whole appeared to earn returns comparable to those of traditional equity mutual funds. On the other hand, most categories of specialty funds were found to have greater total risk and retain significantly more unsystematic risk than traditional equity mutual funds.

Introduction

Specialty mutual funds offer the small investor the opportunity to invest in specific categories of stocks. Examples include funds which invest in small-capitalization stocks and those which invest in stocks of specific industries. Specialty funds may be attractive for high total return (for example, small-firm, technology, or health care mutual funds), income (for example, utility mutual funds), or diversification beyond that available in traditional equity mutual funds (for example, precious metal funds). In addition, funds which concentrate in specific industries may provide diversification to investors whose current portfolios are poorly diversified.

While there have been numerous studies examining mutual fund performance (for example, Jensen (1968), Kuhle (1988), Madura and Cheney (1989), and Mc-Donald (1974)), lack of data has thus far precluded examination of the performance of a number of categories of specialty funds. Because specialty funds restrict their investments to non-random subsets of the equity market, they may retain more unsystematic risk (and thus, be more poorly diversified) than traditional equity funds. This would suggest that they underperform traditional equity funds after adjusting for total risk. Therefore, individual investors who do not possess superior selection or timing ability should not restrict themselves to a single specialty fund.

The extent to which specialty funds are more poorly diversified than traditional funds is not clear. Evidence of industry factors in addition to the market factor is mixed. King (1966) and Elton and Gruber (1973), for example, find that the addition of industry indices leads to little improvement in the explanatory power of the market model. On the other hand, Farrell (1974), Martin and Klemkosky (1976), and Livingston (1977)

find evidence of industry or "pseudo-industry" effects. Thus, funds which concentrate in specific industries may be substantially less-diversified that those which place less emphasis on industry classification in selecting stocks.

The purpose of this study is twofold. First, this study provides descriptive statistics relating to the risk and return of these funds relative to those of traditional growth and growth/income funds. Second, this study examines the magnitude and the economic significance of the differences between the diversification of specialty funds and that of traditional equity funds. Theory would suggest that specialty funds would be expected to retain more unsystematic risk than traditional funds and, consequently, underperform traditional funds on a risk-adjusted basis. However, the magnitude of this underperformance has not been examined and thus remains an empirical question.

Methodology

The methodology employed in this study has three major steps. First, measures of return, risk, and diversification are calculated for each fund in the following categories: small firm, financial, utilities, precious metals, health care, natural resources, technology, and miscellaneous specialty. Measures of return examined in this study are the raw return, Jensen's (1968) alpha, and Fama's (1972) net selectivity measure. Risk is measured by the standard deviation of return and the beta. Diversification is measured by the r^2, that is, the ratio of the systematic risk to total risk. In addition, this study examines the extent to which imperfect diversification of mutual funds results in the investors earning lower returns than they would on perfectly-diversified

(i. e., no unsystematic risk) portfolios with comparable levels of total risk. Second, these procedures are applied to samples of traditional equity funds--growth and growth/income funds. Third, Mann-Whitney tests are used to test for significant differences between the results for the specialty funds and those for the index, growth, and growth/income funds.

Mutual Fund Performance Evaluation

The continuously-compounded return earned by a shareholder of mutual fund i in period t, ignoring the front-end load (if any) can be calculated as follows:

$$R_{it} = \ln[(NAV_{it} + D_{it})/NAV_{it\text{-}1}], \qquad (1)$$

where

NAV_{it} = net asset value of fund i at the end of period t

D_{it} = dividend for fund i during period t.[1]

A benchmark portfolio is defined as a combination of the risk-free asset and the market portfolio. Such a portfolio is perfectly diversified, that is, it contains no unsystematic risk. The performance of fund i in period t, after adjusting for systematic risk, can be expressed as follows:

α_{it} = Fund Excess Return - Excess Return on Benchmark Portfolio of Equal ß

$$= \quad (R_{it} - R_{ft}) \quad - \quad ß_i(R_{mt} - R_{ft}) \qquad (2)$$

where

R_{ft} = the risk-free rate in period t
R_{mt} = the market return in period t
$ß_i$ = the beta coefficient of fund i.

α_{it}, which is the Jensen's (1968) alpha of fund i for period t, measures how well the fund performed relative to a perfectly-diversified portfolio with equal systematic risk.

Specialty funds may retain more unsystematic risk than traditional funds do. This could be due to extra-market covariation or to unsystematic factors found in the individual securities held by the mutual fund. It could be argued that mutual fund performance should also reflect the fund's unsystematic risk which was not diversified away.[2] One can express the fund performance, after adjusting for total risk, as

NS_{it} = Fund Excess Return - Excess Return on Benchmark Portfolio of Equal σ

$$= \quad (R_{it} - R_{ft}) \quad - \quad \sigma_i/\sigma_m(R_{mt} - R_{ft}) \qquad (3a)$$

$$= \quad (R_{it} - R_{ft}) \quad - \quad ß_i/r_i(R_{mt} - R_{ft}) \qquad (3b)$$

where

σ_i = the standard deviation of return of fund i
σ_m = the standard deviation of return of the market portfolio
r_i = the correlation coefficient between R_i and R_m.

NS_{it} is Fama's (1972) net selectivity, and measures how well fund i performed in period t relative to a perfectly-diversified portfolio with equal total risk. If diversification is considered to be the responsibility of the fund manager, the diversification premium measures the additional return required because of the manager's failure to diversify perfectly. (Diversification may not be the portfolio manager's responsibility in the case of specialty funds, which are intended to target a specific sector.) The diversification premium can be calculated as follows:

$$DP_{it} = \quad \alpha_{it} - NS_{it} \qquad (4a)$$

$$= \quad (ß_i/r_i - ß_i)(R_{mt} - R_{ft}). \qquad (4b)$$

In this study, this breakdown is applied to analysis of n-period performance by substituting $\Sigma R_{it}/n, \Sigma R_{ft}/n$, and $\Sigma R_{mt}/n$ (t=1,...,n) for R_{it}, R_{ft}, and R_{mt}, respectively. In the n-period case, a fund's Jensen's alpha can be calculated as follows:

$$\hat{\alpha}_i = \Sigma R_{it}/n - \Sigma R_{ft}/n - ß_i(\Sigma R_{mt}/n - \Sigma R_{ft}/n), \quad t=1,...,n, \qquad (5)$$

where ßi is the ordinary least squares estimate of $ß_i$ based on observations 1 through n. The fund's net selectivity can be calculated as follows:

$$NS_i = \Sigma R_{it}/n - \Sigma R_{ft}/n - (ß_i/\hat{r}_i)(\Sigma R_{mt}/n - \Sigma R_{ft}/n), \quad t=1,...,n, \qquad (6)$$

where $\hat{r}_i$ is the estimate of the correlation between the excess return on the mutual fund and the excess return on the market over periods 1 through n.

The degree of diversification of a mutual fund can be measured by $\hat{r}_i^2$.

Hypotheses, Tests, Expectations

To compare the risk of specialty funds with that of the traditional funds, the following null hypotheses are

tested for each category of specialty funds:

H^1: standard deviation of return of the specialty funds = standard deviation of return of the traditional funds

H^2: beta of the specialty funds = beta of the traditional funds

To compare the diversification of the specialty funds with that of the traditional funds, the following null hypothesis is tested for each category of specialty funds:[3]

H^3: r^2 of the specialty funds = r^2 of the traditional funds

To compare the performance of the specialty funds with that of the traditional funds, the following null hypotheses are tested for each category of specialty funds:

H^4: average return of the specialty funds = average return of the traditional funds

H^5: Jensen's alpha of the specialty funds = Jensen's alpha of the traditional funds

H^6: Fama's net selectivity of the specialty funds = Fama's net selectivity of the traditional funds

To compare the diversification premium of the specialty funds with that of the traditional funds, the following null hypothesis is tested for each category of specialty funds:

H^7: Diversification premium of the specialty funds = Diversification premium of the traditional funds

Because of possible nonnormality in the statistics, particularly the standard deviations and the r^2s, Mann-Whitney tests are used instead of traditional two-sample t-tests. A priori, the specialty funds may be expected to retain a higher proportion of unsystematic risk than the traditional funds. This suggests that one would expect the specialty funds to have higher standard deviations, higher diversification premia, lower r^2s, and lower Fama's net selectivity measures than traditional funds. The a priori expectations regarding average return, beta, and Jensen's alpha, on the other hand, are unclear. Thus, one-tailed tests are used for hypotheses 1, 3, 6, and 7 and two-tailed tests are used for hypotheses 2, 4, and 5.[4]

Sample Description

The sample consists of all specialty mutual funds (including small firm funds) for which dividends and monthly net asset values are available for the period to be analyzed, December 31, 1986 through June 30, 1989.[5] Net asset values were obtained from Standard and Poor's *Daily Stock Price Record*. Dividends were ob-

tained from the Media General mutual fund tape. In all, these data were available for 39 small firm funds, 7 financial funds, 7 utilities funds, 22 precious metals funds, 7 health care funds, 8 natural resource funds, 14 technology funds, and 10 miscellaneous specialty funds. In addition, net asset values and dividends for samples of 30 growth funds and 37 growth/income funds were obtained for this period. The Standard and Poor's 500 was used as the market proxy, and the effective monthly yield on Treasury bills with between 85 and 91 days was used as the risk-free rate. Continuously-compounded returns were used in all cases.

Results

Table 1 presents the median r^2s for each fund category. In addition, to get an idea of the dispersion (and skewness, where sample size permits) of the distribution of r^2s, the first and third quartiles are presented. As Table 1 shows, the hypothesis that the r^2 of the specialty funds equals the r^2 of the traditional funds (H^3) is rejected. That is, the median r^2s of all the specialty fund categories are significantly below that of the traditional funds. The most notable cases are the precious metal and utility fund categories. Since the betas of specialty funds appear to be no more unstable than those of traditional equity funds[6], this suggests that specialty funds in general, and precious metal and utility funds in particular, retain a significantly higher proportion of unsystematic risk than traditional funds do. This finding is consistent with the findings of industry or pseudo-industry effects reported by Farrell (1974), Martin and Klemkosky (1976), and Livingston (1977), and suggests that, for the period studied, the most distinct of the pseudo-industry classifications reported by Farrell is the "stable" (defensive) classification.

The distribution of r^2s for the traditional funds appears to be more skewed that those of the specialty funds. One possible reason for this is that r^2 has an upper bound of 1; thus, the possible range of r^2s above the median is smaller for traditional equity funds than for specialty funds. It is also possible that traditional funds are more heterogeneous in terms of diversification than specialty funds are.

As Table 2 shows, the hypothesis that the beta of the specialty funds equals the of the traditional funds (H^2) is rejected for five of the specialty fund categories. That is, five of the specialty fund categories have significantly higher betas than traditional equity funds. Not surprisingly, the fund categories with the higher betas appear to be those most associated with growth. Financial funds have a median beta slightly (but not significantly) lower than that of the traditional equity funds. Utility

Table 1
r^2s, by Objective

Objective	Number of Funds	1st Quartile	Median	3rd Quartile
Traditional Funds:				
Growth	30	0.719	0.875	0.936
Growth/Income	37	0.781	0.933	0.952
Total	67	0.772	0.907	0.945
Specialty Funds:				
Small Company	39	0.792	0.829***	0.850
Financial	7	0.669	0.736**	0.797
Health Care	7	0.751	0.809*	0.879
Natural Resource	8	0.689	0.799**	0.848
Precious Metals	22	0.143	0.176***	0.206
Technology	14	0.744	0.786***	0.861
Utility	7	0.134	0.306***	0.411
Miscellaneous	10	0.803	0.847*	0.873

   * significantly different from traditional equity funds at the .10 level
  ** significantly different from traditional equity funds at the .05 level
 *** significantly different from traditional equity funds at the .01 level

funds and precious metal funds have median betas significantly lower than that of the traditional equity funds, which suggests that an equity investor may find them useful for reducing risk. In general, the distributions of betas appear to be roughly symmetric.

A fund's standard deviation measures its total risk. Total risk is directly related to beta and inversely related to r^2. Table 2 shows that for all specialty fund categories except financial and utility, the null hypothesis that the standard deviation of the specialty funds equals the standard deviation of the traditional funds (H^1) is rejected in favor of the hypothesis that the standard deviation of the specialty funds is greater than the standard deviation of the traditional funds. Since the small company, health care, natural resource, technology, and miscellaneous specialty funds have higher betas and lower r^2s than traditional equity funds, one would expect them to have higher standard deviations than traditional equity funds. The precious metal fund category is the highest of all the categories in total risk, despite having a relatively low beta. This is due to the large amount of unsystematic risk inherent in precious metals funds. On the other hand, financial and utility funds appear to have lower total risk than traditional funds, although the test used in testing H^1 does not allow a statement as to the statistical significance of this finding.[7]

Table 3 presents median raw returns for the mutual fund categories examined in this study. While health care, natural resource, and miscellaneous specialty funds

earned higher average monthly returns than traditional funds, the hypothesis that the average return of the specialty funds equals the average return of the traditional funds (H^4) is rejected only for the miscellaneous, precious metals, and utility funds.

The miscellaneous specialty fund category was the only category for which the median monthly return was greater than the average monthly market return of .0119.[8] Two categories, precious metal funds and utility funds, had median returns which were significantly lower than that of the traditional equity funds. In fact, the median return for the precious metals funds was lower than the average T-Bill return of .0056.

Table 4 presents the median Jensen's alphas for the mutual fund categories. The null hypothesis that the Jensen's alpha of the specialty funds equals the Jensen's alpha of the traditional funds (H^5) is rejected for four of the seven specialty fund categories.

Only one group, the miscellaneous specialty funds, had a positive alpha, although two others had median alphas that were no lower than that of the traditional funds. Of the five groups which had median alphas lower than that of the traditional funds, three of these had alphas which were significantly lower at the .05 level. Perhaps the most notable of these is the small company group. Given the evidence on small-company stock returns presented by Reinganum (1981), the small company mutual funds may have been expected to have higher alphas than traditional equity funds. Two

Table 2
Risk Measures, by Objective

a.   Betas

Objective	Number of Funds	1st Quartile	Median	3rd Quartile
Traditional Funds:				
Growth	30	0.837	0.902	1.038
Growth/Income	37	0.756	0.866	0.970
Total	67	0.761	0.892	0.994
Specialty Funds:				
Small Company	39	0.995	1.151***	1.292
Financial	7	0.689	0.739	0.930
Health Care	7	1.022	1.038***	1.244
Natural Resource	8	0.889	0.974*	1.224
Precious Metals	22	0.542	0.692***	0.834
Technology	14	1.108	1.311***	1.542
Utility	7	0.275	0.349***	0.383
Miscellaneous	10	0.850	1.032*	1.199

b.   Standard Deviations of Monthly Return

	Number of Funds	1st Quartile	Median	3rd Quartile
Traditional Funds:				
Growth	30	0.0589	0.0672	0.0843
Growth/Income	37	0.0525	0.0598	0.0679
Total	67	0.0547	0.0622	0.0720
Specialty Funds:				
Small Company	39	0.0720	0.0802***	0.0902
Financial	7	0.0515	0.0580	0.0703
Health Care	7	0.0704	0.0770***	0.0919
Natural Resource	8	0.0622	0.0699**	0.0891
Precious Metals	22	0.0983	0.1093***	0.1240
Technology	14	0.0769	0.0951***	0.1092
Utility	7	0.0335	0.0352	0.0717
Miscellaneous	10	0.0619	0.0718*	0.0830

   *   significantly different from traditional equity funds at the
       .10 level
  **   significantly different from traditional equity funds at the
       .05 level
 ***   significantly different from traditional equity funds at the
       .01 level

possible explanations why these findings differ from Reinganum's are that (1) this study covers a different period than Reinganum's, and (2) Reinganum's study examined common stocks, while this study examines mutual funds. The alphas for most categories appear to be roughly symmetric, the major exceptions being financial and technology funds. This is largely because the only funds in these groups with negative average returns had the highest betas.

Table 4 also presents the median Fama's net selectivities for the mutual fund categories, as well as the results from testing H[6], the hypothesis that the net selectivity of the specialty funds equals the net selectivity of the traditional funds. This hypothesis is rejected for three

of the seven specialty fund categories--small company, precious metals, and technology[9].

As Table 4 shows, the median Fama's net selectivity measures generally parallel the median alphas. Except for the utility funds, all fund categories with higher (lower) median alphas than that of the traditional funds had median net selectivity measures which were above (below) that of the traditional equity funds. The median net selectivity for the utility funds was less than that of the traditional equity funds, even though the median alpha was higher. This is due to the low R^2s of the utility funds. Furthermore, all specialty fund groups which had significantly lower median alphas than the traditional fund group also had significantly lower

Table 3
Average Monthly Returns, by Objective

Objective	Number of Funds	1st Quartile	Median	3rd Quartile
Traditional Funds:				
Growth	30	0.0063	0.0087	0.0111
Growth/Income	37	0.0071	0.0104	0.0111
Total	67	0.0070	0.0091	0.0110
Specialty Funds:				
Small Company	39	0.0051	0.0083	0.0119
Financial	7	0.0040	0.0081	0.0091
Health Care	7	0.0062	0.0093	0.0126
Natural Resource	8	0.0046	0.0111	0.0134
Precious Metals	22	-0.0011	0.0047***	0.0079
Technology	14	-0.0019	0.0068	0.0112
Utility	7	0.0038	0.0078*	0.0080
Miscellaneous	10	0.0068	0.0154**	0.0179

  * significantly different from traditional equity funds at the
    .10 level
 ** significantly different from traditional equity funds at the
    .05 level
*** significantly different from traditional equity funds at the
    .01 level

median net selectivity measures than that of the traditional equity fund group.

Table 5 presents the monthly diversification premia for the categories of funds examined in this study. For all categories of specialty funds, the null hypothesis that the diversification premium of the specialty funds equals the diversification premium of the traditional funds (H^7) is rejected.

Except for the precious metal funds, however, the median diversification premium was less than .16 percent per month. For the traditional equity funds, the median diversification premium was 0.026 percent per month. This suggests that if one were to invest in a perfectly-diversified portfolio with the same total risk as the traditional equity funds, his expected return would be about 0.026 percent per month, or 0.312 percent per year, greater than that of the fund. These distributions appear to be highly skewed, however, a finding consistent with the skewness in the r^2s reported in Table 1. On the other hand, precious metal funds contained so much unsystematic risk that if an investor were to hold a perfectly-diversified portfolio with the same total risk as precious metal funds, his expected return would be about .635 percent per month, or 7.62 percent per year higher than from the precious metal funds.

Summary and Conclusion

This study has examined the risk, return, and diversification characteristics of specialty mutual funds over the period December 31, 1986 through June 30, 1989. Over

the period studied, specialty funds as a whole appeared to earn returns comparable to those of traditional equity mutual funds, although the hypothesis that the average return of the specialty funds equals the average return of the traditional funds was rejected for a number of the specialty fund categories. Almost all groups of funds, including the traditional equity fund groups, underperformed the market on a risk-adjusted basis. Given the instability of mutual fund performance measures over time (Carlson (1970), Dunn and Theisen (1983), and Klemkosky (1977)), however, these conclusions must be regarded as tentative. In addition, the performance of the specialty funds likely reflects unsystematic factors present during the period under study.

On the other hand, one can have more faith in the findings regarding risk and diversification.[10] This is because (1) risk measures appear to be fairly stable over time (Bauer, Hays, and Upton (1987) and Modani, Cooley, and Roenfeldt (1983)) and (2) the market risk premium over the period averaged 0.63 percent, which is comparable to the long-run market risk premium found by studies such as Ibbotson and Sinquefield (1982). In this sense, the period represented typical market conditions.

As hypothesized, specialty funds on average were found to have greater total risk and retain significantly more unsystematic risk than traditional equity mutual funds. This is consistent with findings of extra-market covariation reported by Farrell (1974) and Martin, Keown, and Farrell (1982). Because of the unsystematic risk retained, precious metals funds could be expected

Table 4
Risk-Adjusted Returns, by Objective

a. Jensen's Alphas

Objective	Number of Funds	1st Quartile	Median	3rd Quartile
Traditional Funds:				
Growth	30	-0.0052	-0.0029	-0.0006
Growth/Income	37	-0.0029	-0.0008	0.0005
Total	67	-0.0043	-0.0013	-0.0001
Specialty Funds:				
Small Company	39	-0.0079	-0.0045**	-0.0007
Financial	7	-0.0072	-0.0024	-0.0017
Health Care	7	-0.0072	-0.0028	0.0001
Natural Resource	8	-0.0085	-0.0006	0.0022
Precious Metals	22	-0.0106	-0.0047**	-0.0016
Technology	14	-0.0172	-0.0066***	-0.0006
Utility	7	-0.0040	-0.0002	0.0007
Miscellaneous	10	-0.0054	0.0024**	0.0067

b. Fama's Net Selectivity Measures

Traditional Funds:				
Growth	30	-0.0069	-0.0033	-0.0007
Growth/Income	37	-0.0039	-0.0012	0.0001
Total	67	-0.0054	-0.0019	-0.0003
Specialty Funds:				
Small Company	39	-0.0086	-0.0055**	-0.0015
Financial	7	-0.0079	-0.0035	-0.0024
Health Care	7	-0.0080	-0.0052	-0.0009
Natural Resource	8	-0.0101	-0.0014	0.0015
Precious Metals	22	-0.0182	-0.0111***	-0.0074
Technology	14	-0.0186	-0.0079***	-0.0011
Utility	7	-0.0055	-0.0040	-0.0012
Miscellaneous	10	-0.0065	0.0018	0.0064

   * significantly different from traditional equity funds at the
.10 level
   ** significantly different from traditional equity funds at the
.05 level
   *** significantly different from traditional equity funds at the
.01 level

to earn annual returns 7 to 8 percentage points below that expected from a perfectly-diversified portfolio with the same level of total risk during typical market conditions. This compares with approximately 1 to 2 percentage points for other categories of specialty funds and approximately 0.3 percentage points for traditional equity funds. This may be unavoidable, because of the need for specialty fund managers to restrict themselves to certain industries. Still, the extent to which investors are sympathetic to this restriction is not clear.

Suggestions for Future Research

An issue not examined in this study is why investors voluntarily take on the higher levels of unsystematic risk associated with specialty funds. If the specialty fund is not part of a well-diversified portfolio, this would appear to represent irrational behavior unless the investor believes he or she can predict which industries will outperform the market. On the other hand, if the specialty fund makes up only a part of a well-diversified portfolio held by the investor, one could expect its performance to be comparable to that of traditional equity funds.

In addition to the examining this issue, suggestions for further study include replicating this study in the future when longer time series of data are available to see whether the relationships found in this study still hold and examining the extent to which the unsystematic risk retained by specialty funds reflects extra-market covariation, rather than firm-specific factors.   ❧

Footnotes

1. In calculating the returns from the viewpoint of the

Table 5
Diversification Premia, by Objective

Objective	Number of Funds	1st Quartile	Median	3rd Quartile
Traditional Funds:				
Growth	30	0.00020	0.00032	0.00083
Growth/Income	37	0.00013	0.00022	0.00070
Total	67	0.00014	0.00026	0.00076
Specialty Funds:				
Small Company	39	0.00057	0.00067***	0.00093
Financial	7	0.00067	0.00072**	0.00104
Health Care	7	0.00045	0.00084**	0.00120
Natural Resource	8	0.00047	0.00080**	0.00129
Precious Metals	22	0.00562	0.00635***	0.00689
Technology	14	0.00060	0.00106***	0.00132
Utility	7	0.00123	0.00154***	0.00487
Miscellaneous	10	0.00046	0.00060**	0.00079

* significantly different from traditional equity funds at the
  .10 level
** significantly different from traditional equity funds at the
  .05 level
*** significantly different from traditional equity funds at the
  .01 level

fund, the inflows and outflows of cash by investors would have to be considered. The focus in this paper, however, is on the investor, in particular, the individual investor.

2. This assumes that the fund is the investor's sole asset. If the fund makes up only a part of the investor's portfolio, the fund's contribution to the risk of the investor's portfolio is the relevant risk measure from the investor's perspective.

3. If beta is unstable, part of the systematic risk is erroneously classified as unsystematic risk (Chen and Keown, 1981; Kon and Jen, 1978). This tends to bias the R^2 downward. However, because the period studied is short (30 months, with one observation per month), and in light of the findings of Theobald (1982), it appears unlikely that attempting to detect and correct for beta changes would improve the estimates of systematic or unsystematic risk.

4. One could argue that the existence of specialty funds (other than utility or precious metal funds) suggests that fund managers expect particular industries to outperform the market as a whole. However, given the evidence that mutual funds do not tend to outperform the market, H^4 is tested as a two-tailed hypothesis.

5. Although 30 months is a considerably shorter period than is typically used in examining mutual fund performance, it was used to preserve sample size. If the beginning of the period under study were June 30, 1986, thus resulting in 36 months of data, the sample would have included only four natural resource funds, five funds in three categories (finan-

cial, utility, and health care), and eight miscellaneous specialty funds.

6. To examine this possibility, the 30-month period examined in this study was subdivided into two consecutive 15-month subperiods. For each fund, the F-value for the difference in betas between the two subperiods was calculated. A Mann-Whitney test found the F-values for the specialty funds to be higher, but the difference was not statistically significant. Thus, the betas of the specialty funds were not significantly more unstable than those of the traditional funds.

7. If a two-tailed test had been used, it would indicate that utility funds have lower total risk than traditional funds at the .05 significance level. However, the a priori expectation that specialty funds have higher standard deviations than traditional funds dictates the a test which is one-tailed to the right.

8. The leisure funds, with average monthly returns of over 1.6 percent, and the communication funds, with average monthly returns of over 2 percent, largely account for the good performance of this category.

9. If a two-tailed test had been used, it would indicate that miscellaneous specialty funds have higher net selectivities than traditional funds at the .05 significance level. However, the a priori expectation that specialty funds have lower net selectivities than traditional funds dictates the a test which is one-tailed to the left.

10. This includes the diversification premium. Equation 4b shows that a fund's diversification premium is a function only of the market risk premium and the fund's beta and its correlation with the market.

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