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Performance persistence and management skill in nonconventional bond mutual funds

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Abstract

Recent empirical research has identified a tendency for equity mutual funds to provide consistent performance relative to other funds over time. Studies of bond funds have centered around investment grade, straight bonds and have concluded that fund managers outperform indexes on a gross (although not net) basis, but that performance is hampered by high expense levels. We examine nonconventional bond funds (high-yield bonds, global issues and convertible bonds) and find that short-term performance persistence is present, but limited to the high-yield bond subsample. Fund managers are unable to distinguish themselves in the long term, despite the diverse nature of the funds they oversee.

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1. Introduction

Mutual fund relative performance persistence and management effectiveness are controversial and popular topics in the finance literature. Several empirical studies identify a tendency for mutual funds to provide consistent returns performance over time relative to

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other funds (e.g., Grinblatt and Titman, 1992, Hendricks et al., 1993, Brown and Goetzmann, 1995). Although research (Hendricks and Patel, 1997, Brown and Goetzmann, 1997) has yet to establish whether the persistence phenomenon is the result of management skill or biases in the data, Gruber (1996) shows that investors who "chase past performance" are rational wealth maximizers.

The preponderance of mutual fund studies either sample all mutual fund types or focus solely on equity mutual funds. The study of bond mutual funds as a separate group has been limited, largely because of (until recently) limited sample size. Those studies that have examined the performance of investment grade, straight bond mutual funds have found that: (1) these funds in the aggregate outperform appropriate indexes on a gross, but not net, basis (Gudikunst and McCarthy, 1992); and (2) bond fund performance is hampered by high expenses and not correlated with prior returns (Blake et al., 1993, Philpot et al., 1998). The study of nonconventional bond mutual fund performance has been limited, with results to date indicating that high-yield bond mutual funds do not outperform relevant indexes (Gudikunst and McCarthy, 1992).

We extend current knowledge by examining management skill in managing nonconventional bond mutual funds, defined as speculative grade, global or convertible bond funds, using a performance persistence and performance-related variables approach. We find that relative performance persistence is at best a short-run phenomenon limited to our high-yield bond fund sample. Performance persistence is no more likely among funds that had no changes in management than in funds that changed managers during the sample period. Further, among high-yield bond funds, risk-adjusted performance is inversely related to portfolio turnover.

2. Management effectiveness and determinants of performance

The existence of a consistent skill level among conventional bond mutual fund managers has been evaluated in several ways. One approach is to compare the aggregate performance of the mutual fund industry or industry segment to the returns of appropriate market indexes. Gudikunst and McCarthy (1992) examine the risk and return characteristics of a sample of 25 bond mutual funds over the time period 1976–1989. They find that, on average, the funds in their sample provided risk-adjusted gross returns that were greater than the returns to a broad bond market index. However, after subtracting fees and expenses, the funds' returns only matched that of the index. Blake et al. (1993) further examine bond fund performance using a survivorship bias-adjusted sample of 41 bond mutual funds and a larger nonadjusted sample of bond funds and find that bond mutual fund average net risk-adjusted returns are lower across samples and subsamples than the returns to the relevant indexes.

Another common approach is to examine relative fund performance persistence through time. While efficient markets theory predicts that individual mutual fund returns will be uncorrelated over time, a positive serial correlation in individual mutual fund returns may indicate that mutual fund managers are consistent in their ability to generate returns relative to their peers. Grinblatt and Titman (1992), Hendricks et al. (1993) Brown and Goetzmann (1995) and Gruber (1996) all find strong persistence of fund relative performance over varied

time horizons. These findings (which examine either equity funds or all categories of mutual funds together) support the presence and persistence of management skill. However, when bond mutual funds are examined by themselves, Blake et al. (1993) find no evidence of interperiod consistency in either the performance ranking or the risk-adjusted returns of the 41 bond mutual funds in their sample. Philpot et al. (1998) affirm this result, finding in a sample of 27 investment grade, nonconvertible bond mutual funds, that risk-adjusted performance does not predict future performance.

In addition to examining serial correlation in returns, mutual fund management can be evaluated by examining the relation between mutual fund returns and individual fund attributes that represent the manager's activity, such as portfolio turnover and the level of fund expenses. In an efficient market with costly information, resources spent on security analysis and portfolio management should not increase risk-adjusted net portfolio returns. Alternatively, when mutual fund managers are able to increase returns beyond their expenses, fund management activity adds value. Carhart (1997) finds that mutual fund expenses decrease fund performance and concludes that there is no benefit from active management. In bond mutual funds specifically, recent studies have found negative relations between bond mutual fund performance and fund expenses and fees (Blake et al., 1993; Philpot et al., 1998). Another measure of management activity is a mutual fund's portfolio turnover rate. Actively managed mutual funds exhibit high turnover rates, while passively managed funds tend to report low portfolio turnover. Empirical studies are yet to categorically discern the effects of portfolio turnover on mutual fund returns. Grinblatt and Titman (1989) examine the risk-adjusted returns to the quarterly-updated portfolios of aggressive growth mutual funds versus the returns to the funds' initial portfolios. They find that the updated portfolios provided the greater returns, and thus they conclude that active portfolio management generated at least some of the returns to the funds. In a more recent study, Carhart (1997) finds a negative relation between portfolio turnover and risk-adjusted returns. When investment grade bond funds are examined separately, this negative relation persists (Philpot et al., 1998).

A final way to test for management skill is to determine whether managers learn by experience. Golec (1996) examines the effects of management characteristics on a sample of equity and balanced mutual fund risk-adjusted returns. He finds that the most significant predictor of mutual fund performance is the amount of time a manager has been with a particular fund. This result may indicate a learning effect, with managers increasing their ability to manage a particular fund over time.

Several additional mutual fund attributes have been hypothesized to be related to relative returns. The most common include fund size and the presence of sales or distribution fees. There is evidence to suggest that as mutual funds grow in size, their ability to provide commensurate returns becomes handicapped. This is especially true for equity funds. Grinblatt and Titman (1989) find that in their sample of aggressive growth mutual funds, small funds have higher risk-adjusted gross returns than large funds, and they conclude that mutual funds lose market mobility and the ability to take positions in small-capitalization issues as they increase in size. These empirical findings corroborate an increasing tendency for large equity mutual funds (such as Fidelity Magellan and Janus Twenty) to end share sales to new investors. Bond mutual funds, however, have been shown to have positive economies of

scale as evidenced by a positive relationship between fund size and risk-adjusted returns (Gudikunst and McCarthy, 1992, Philpot et al., 1998). Most studies show that loads and distribution (12b-1) fees have little impact on net mutual fund performance. (See Golec, 1996 for recent evidence.)

3. Nonconventional bond funds

Extant studies cast doubt upon the ability of conventional bond mutual fund managers to consistently outperform either a relevant market index or their manager peers. However, there is both conventional wisdom and some empirical evidence to suggest that nonconventional bonds (high-yield, global, and convertibles) as a group have considerably different investment characteristics than conventional bonds. For instance, a convertible bond's conversion feature essentially transforms the bond into a type of equity call option, with equity-like characteristics. Global bonds expose the domestic investor to additional risks, including exchange rate risks and country-specific risks. High-yield bonds in particular have been shown to have returns characteristics more similar to equity than to investment-grade debt (Bookstaber and Jacob, 1986). Blume et al. (1991) examine the performance of high-yield bonds, finding that high-yield bonds have lower risk and higher returns over their sample period than investment grade bonds and that high-yield bonds behave like both bonds and stocks. Also, Brister et al. (1994) show that the market for high-yield bonds is a distinct debt market segment with its own default structure of interest rates.

This study examines management effects in high-yield, convertible and global bond funds. Current research has compared the average performance of high yield bond (Gudikunst and McCarthy, 1997) and global bond (Detzler, 1999) mutual funds to relevant indexes, finding that in the aggregate, these funds do not offer superior returns. However, no study evaluates management skill in nonconventional bonds by examining performance persistence or management activity. As stated earlier, nonconventional bonds have characteristics that make them different from straight domestic bonds. If these characteristics of the nonconventional debt markets create enough diversity among the individual issues in these markets, then professional managers may display consistent relative performance and performance that is commensurate with measures of management activity and tenure.

4. Sample

We examine a sample of 73 nonconventional bond mutual funds obtained from Morningstar OnDisc over the period 1988–1997. The sample includes 53 high-yield, 10 convertible and 10 global bond funds. (Morningstar OnDisc reports that in 1988, there were a total of 90 such funds, including 62 high-yield, 16 convertible and 12 global bond funds. Thus our sample includes a substantial number of the then-existing funds.) We calculated the funds' Sharpe performance measure over one- and five-year time horizons using quarterly returns. The Sharpe measure uses the standard deviation of returns to adjust for risk and provides a risk-adjusted relative performance measure that best suits this study.

Table 1
Sample and Morningstar OnDisc population mean annual mutual fund returns over the period 1988–1997, by fund type. t-statistics test the null hypothesis of equal population and sample means.

Fund Type	Sample Mean	Population Mean	t-statistic
High Yield	11.45%	10.63%	0.01
Convertible	13.69%	13.24%	0.01
World Bond	7.58%	8.13%	−0.02

Using data from such a long time period may increase the risk of survivorship bias in the sample. The risk of bias is greatest in studies that primarily seek to measure aggregate mutual fund performance against an unmanaged index over time, because the best performing funds are the ones most likely to continue in independent operation. Brown and Goetzmann (1997) and Hendricks and Patel (1997) suggest that survivorship may also cause spurious performance persistence estimates. We acknowledge the possibility of survivor bias in our data set. Because survival bias in mutual funds is largely a function of returns differences among funds, we compare the mean annual returns of our sampled funds to population means reported by Morningstar over the sample period. Table 1 shows the mean returns of the sampled funds and the population means. Hypothesis tests show no significant differences in the sample and population means for any of the fund types. This observation and the fact that our sample includes a large proportion of the population at the beginning of the sample period suggest that any bias present is likely to be small.

5. Analysis

We begin by examining the tendency of nonconventional bond mutual fund managers to maintain their risk-adjusted performance ranking from period to period. Under the hypothesis of no performance persistence, a mutual fund's ranking in one period should be independent of its ranking in the prior period. That is, a fund in one quintile rank in one period should be equally likely to be in any quintile in a following period.

Table 2 shows contingency tables of prior and following one-year quintile ranks of nonconventional mutual fund Sharpe measure performance over the sample period. Panel A contains results for the full sample of 73 funds. A χ^2 test rejects the hypothesis of a uniform distribution in the table. Inspection of the table values reveals, most notably, that funds performing in the bottom quintile in the first year are likely to remain poor relative performers. There appears to be a very weak tendency for funds in the top or second quintiles to remain good performers. Middle-performing funds tend to remain in the middle in the subsequent one-year period.

The apparent persistence seems to be driven by the high-yield bond mutual funds. Panel B of Table 2 shows the contingency table test with one-year Sharpe measures for the 53 high-yield funds. The Panel B results roughly mirror those of the full sample. Panels C and D of Table 2 show, respectively, the same contingency table tests for the convertible bond and global bond funds. Unlike the high-yield funds, these mutual funds exhibit a uniform

Table 2
Chi-squared tests of non-conventional bond mutual fund relative performance persistence in one-year increments over the period 1988–1997 using the Sharpe measure. The number in each cell indicates the number of funds in each prior year's quintile grouping and subsequent year quintile rank.

Panel A: Non-conventional bond funds, 73 funds, 9 time periods, 657 observations

Prior Year Quintile	Quintile Rank 1	2	3	4	5	Total
1	28	28	27	32	20	135
2	34	24	34	27	16	135
3	20	34	37	26	18	135
4	26	27	19	27	27	126
5	27	22	18	14	45	126
Total	135	135	135	126	126	657

Test for uniform distribution: χ^2 (16) = 46.86; p < 0.0001

Panel B: High-yield bond funds, 53 funds, 9 time periods, 477 observations.

Prior Year Quintile	Quintile Rank 1	2	3	4	5	Total
1	23	18	24	20	14	99
2	27	21	18	18	15	99
3	17	21	23	19	19	99
4	13	26	16	19	16	90
5	19	13	18	14	35	90
Total	99	99	99	90	90	477

Test for uniform distribution: χ^2 (16) = 33.16; p = 0.007

Panel C: Convertible funds, 10 funds, 9 time periods, 90 observations.

Prior Year Quintile	Quintile Rank 1	2	3	4	5	Total
1	5	3	3	4	3	18
2	3	3	4	6	2	18
3	3	7	5	1	2	18
4	4	2	3	4	5	18
5	3	3	3	3	6	18
Total	18	18	18	18	18	90

(continued on next page)

distribution. Thus, it appears that in the near term (based on one-year returns) there is weak evidence of performance persistence among high-yield bond funds, but not the other fund types.

Recognizing that mutual funds may change managers and that manager change may affect performance consistency, we tested only the 24 nonconventional bond funds that had the same manager throughout the sample period. Panel E of Table 2 contains these results. χ^2 tests are unable to reject the hypothesis of a uniform distribution. Thus, even when man-

Table 2 *(continued)*

Panel D: Global funds, 10 funds, 9 time periods, 90 observations.

Prior Year Quintile	Quintile Rank 1	2	3	4	5	Total
1	3	6	4	1	4	18
2	5	3	4	3	3	18
3	3	3	1	5	6	18
4	6	3	5	4	0	18
5	1	3	4	5	5	18
Total	18	18	18	18	18	90

Test for uniform distribution: χ^2 (16) = 17.78; p = 0.03369

Panel E: Non-conventional bond funds having no management change, 24 funds, 9 time periods, 216 observations.

Prior Year Quintile	Quintile Rank 1	2	3	4	5	Total
1	13	7	11	7	7	45
2	14	9	6	10	6	45
3	7	13	10	7	8	45
4	6	9	13	10	7	45
5	5	7	5	11	8	36
Total	45	45	45	45	36	216

Test for uniform distribution: χ^2 (16) = 13.47; p = 0.6379

Panel F: Non-conventional bond funds having highest average annual expenses, 35 funds, 9 time periods, 315 observations.

Prior Year Quintile	Quintile Rank 1	2	3	4	5	Total
1	14	11	7	15	16	63
2	11	19	12	13	8	63
3	12	9	18	14	10	63
4	16	16	14	8	9	63
5	10	8	12	13	20	63
Total	63	63	63	63	63	315

Test for uniform distribution: χ^2 (16) = 24.76; p = 0.0741

agement is constant, short-term management relative performance is not consistent. It is also well established that high expense ratios diminish bond mutual fund performance (Blake et al.., 1993, and Philpot et al.., 1998). We separately examined the 35 funds in our sample with the highest average expense ratios to see whether they showed performance persistence. As Panel F of Table 2 shows, there is weak, but not statistically significant, evidence of performance persistence. Most notably, there is some tendency for the worst funds to remain poor performers.

Table 3
Chi-squared tests of non-conventional bond mutual fund relative performance persistence in five-year increments over the period 1988–1997 using the Sharpe measure. The number in each cell indicates the number of funds in each prior year's quintile grouping and subsequent year quintile rank.

Panel A: Non-conventional bond funds, 73 funds.

Prior Five-Year Quintile	Five-Year Quintile Rank 1	2	3	4	5	Total
1	5	2	1	4	3	15
2	1	4	2	3	5	15
3	3	4	4	2	2	15
4	3	5	1	4	1	14
5	3	0	7	1	3	14
Total	15	15	15	14	14	73

Test for uniform distribution: χ^2 (16) = 22.5; p = 0.1278

Panel B: High-yield bond funds, 53 funds.

Prior Five-Year Quintile	Five-Year Quintile Rank 1	2	3	4	5	Total
1	3	2	2	2	2	11
2	2	2	3	2	2	11
3	3	4	2	0	2	11
4	2	3	1	1	3	10
5	1	0	3	5	1	10
Total	11	11	11	10	10	53

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The tests were repeated using Sharpe measures from two five-year periods, 1988–1992 and 1993–1997, to determine whether there is evidence of persistence over longer time horizons. Table 3 shows these results. Tests conducted with the full sample, the subsample of high-yield bond funds, and the funds with no management change (see Panels A, B and C of Table 3), showed no significant departure from a uniform distribution. Tests conducted with the high-expense funds (Panel D of Table 3) reject the hypothesis of a uniform distribution. Interestingly, the presence of larger numbers in the off-diagonal cells of the table indicates an apparent mean reversion in relative fund performance of this group. These results indicate that over longer time periods, there is no performance persistence among the nonconventional bond funds. Thus fund managers do not show consistent relative performance—a finding consistent with the Philpot et al. (1998) findings for domestic straight bond funds. Also, the discrepancy between the one and five-year results for the full sample and the high-yield bond funds is consistent with the findings of Hendricks et al. (1993) that performance persistence is strongest when measured over relatively short periods of time.

We next employ a cross-sectional regression model similar to Philpot et al. (1998) to analyze relations between a mutual fund's five-year Sharpe measure and five independent

Table 3 *(continued)*

Panel C: Non-conventional bond funds with same manager, 24 funds.

Prior Five-Year Quintile	Five-Year Quintile Rank 1	2	3	4	5	Total
1	1	1	1	1	1	5
2	0	0	2	1	2	5
3	2	0	2	1	0	5
4	1	3	0	0	1	5
5	1	1	0	2	0	4
Total	5	5	5	5	4	24

Test for uniform distribution: χ^2 (16) = 17.33; p = 0.3645

Panel D: Non-conventional bond funds with high expenses, 35 funds.

Prior Five-Year Quintile	Five-Year Quintile Rank 1	2	3	4	5	Total
1	0	1	4	1	1	7
2	2	1	2	2	0	7
3	1	0	0	1	5	7
4	2	2	1	2	0	7
5	2	3	0	1	1	7
Total	7	7	7	7	7	24

Test for uniform distribution: χ^2 (16) = 27.14; p = 0.0399

variables, including the fund's lagged Sharpe measure, its expense ratio, its portfolio turnover rate, and the natural logarithm of its net assets.

Similar to Philpot et al., we estimated a pooled time series-cross sectional regression model using one-year time periods. Chow tests indicated that the regression parameters were not stable over time; thus inferences from the pooled data are invalid. This result held for the full sample and all sub samples. In each case, ignoring the Chow test results, the pooled regression results failed to indicate any performance persistence.

Following Golec (1996) we also include the mutual fund manager's tenure. We omit loads and distribution fees because virtually all the funds in our sample charged such fees. The regression equation is estimated as:

$$RETURN_i = B_0 + B_1(LSHARPE) + B_2(EXPENSE_i) + B_3(TURNOVER_i) + B_4(ASSETS_i) + B_5(TENURE_i) + e_i, \quad (1)$$

where

RETURN = the fund's five-year Sharpe measure;

i = 1, . . . 73, the number of mutual funds in the regression, and denotes the individual fund;

Table 4
Results from regression of five-year Sharpe performance measure on independent variables for non-conventional bond mutual funds, 1988–1997, 73 funds.

Independent Variable	Parameter Estimate	t-statistic
LSHARPE	−0.0427	−0.3561
EXPENSE	−0.0360	−0.5829
TURNOVER	−0.0007	−2.4148**
ASSETS	−0.0001	−0.6861
TENURE	0.0085	1.5442*

Model F = 2.6625, p = 0.0296.
Model adjusted R^2 = 0.1035.

* significant at 0.10 level
** significant at 0.01 level
LSHARPE = the fund's prior five-year period Sharpe measure.
EXPENSE = the fund's average expense ratio.
TURNOVER = the fund's average portfolio turnover rate.
ASSETS = the fund's total assets at the beginning of the period.
TENURE = the fund manager's tenure in years.

B_0 = an intercept term;
LSHARPE = the fund's prior five-year period Sharpe measure;
EXPENSE = the fund's average expense ratio;
TURNOVER = the fund's average portfolio turnover rate;
ASSETS = the fund's total assets at the beginning of the period;
TENURE = the fund manager's tenure in years;
e = A residual term.

Table 4 shows regression results using the full sample. Diagnostic tests showed no violations of OLS assumptions. The regression results indicate that for nonconventional bond funds over a five-year horizon, risk-adjusted returns are unrelated to any of the independent variables, with the exception of portfolio turnover. The results provide no evidence of consistency in relative performance by nonconventional bond mutual fund managers. The insignificant EXPENSE variable (t = −0.5829) and negative TURNOVER variable (t = −2.4148) indicate that resources and effort spent by management are not rewarded with increased net returns. Nonconventional bond mutual funds appear to neither benefit from economies of scale nor suffer from scale diseconomies based on large asset size. The management TENURE variable, significant at the 0.10 level (t = 1.5442), provides only weak evidence of increased management expertise with increased time managing a particular fund.

We repeated the regression model estimation for the high-yield bond fund subsample and the subsample of funds that had no managerial change over the sample period. In both of these cases, the regression model itself was insignificant, meaning that fund returns were not

a function of any of the independent variables. Thus there is again no evidence of performance persistence or management effectiveness.

6. Conclusion

Prior work has shown that there is persistence in relative performance in equity mutual funds. This has led to speculation that there are systematic and persistent differences in skill levels among mutual fund managers. These skill differences have not shown up in studies of straight bond funds, perhaps due to the relative homogeneity of investment grade bonds.

Although managers of high-yield, convertible and global bond funds may face more diverse investment opportunities, we find that there is at best a very modest short-run persistence in relative fund performance of such funds, and this appears limited to the high-yield fund subset. Examination of returns over a longer time period shows no evidence of management skill or performance persistence in nonconventional bond mutual funds.

Given these results and those of other studies, it is apparent that the growth in the bond sector of the mutual fund industry is not the result of expertise in professional management. Rather, it appears that rational investors may invest in bonds through mutual funds merely to take advantage of the financial intermediary functions (diversification, liquidity, and so forth) these funds perform.

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