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Stock selection based on Morningstar's ten-year, five-star general equity mutual funds

Anthony L. Loviscek[a,*], W. John Jordan[b,1]

[a]*Department of Finance and Legal Studies, Seton Hall University, South Orange, NJ 07079, USA*
[b]*Department of Economics, Seton Hall University, South Orange, NJ 07079, USA*

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Abstract

Recent research suggests that the individual investor can build stock portfolios that outperform broad market indices. Based on this research and on evidence supporting the persistence of mutual fund performance, we test whether or not the individual investor can build market-superior portfolios from stocks selected from the top holdings of Morningstar's ten-year, five-star general equity mutual funds. We use modern portfolio theory to construct the portfolios. Although the portfolios tend to outperform the S&P 500 for the 1990s, we conclude that the evidence is not strong enough to recommend this stock selection strategy to the individual investor.

JEL classification: G11

Keywords: Portfolios; Ten-year, five-star funds

1. Introduction

A successful stock selection strategy is indispensable to active stock investment management. With advances in communications technology and computer software, the individual investor can now implement any one of many strategies, or a combination of them, such as monitoring analysts' ratings of stocks, tracking financial and economic variables, charting

* Corresponding author. Tel.: +1-973-761-9127; fax: +1-973-761-9217.
E-mail address: loviscto@shu.edu (A.L. Loviscek).
[1] W. John Jordan died unexpectedly during the revision of this paper. This paper is dedicated to him.

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stock prices, using asset pricing models, reading investment newsletters, following the activities of portfolio managers, and implementing stock screening programs.

Which of these strategies helps the individual investor outperform passive investment alternatives (e.g., investing in a stock index mutual fund), however, is certainly a contested issue. From an efficient markets perspective, Fama (1995) provides a lucid summary of why stock selection strategies are generally found wanting. As additional support, Metrick (1999) finds no evidence of superior stock selection from among 153 investment newsletters. Walker and Hatfield (1996) conclude that the individual investor is unlikely to profit from analysts' recommendations published in *U.S.A. Today*. Chandy, Peavy and Reichenstein (1993) demonstrate that the potential to earn excess returns from Value Line's "Stock Highlight" section is short-lived at best. Fromme (1993) and Michaud (1998) assert that popular stock selection variables, such as the dividend-yield, the price-earnings ratio, and the price-book ratio, may well be too simplistic to be consistently effective, a conclusion that Chan (1992) reaches when examining the use of beta. Zimmerman and Zogg-Wetter (1992) present results that question the efficacy of market timing techniques and tests used to detect market timing ability. Rohweder (1998) provides evidence that quantitative portfolio construction methods, because they require accurate forecasts of returns and covariances, may deliver disappointing results.

An emerging literature, however, suggests that the profession may have, in some cases, underestimated the efficacy of stock selection methods. For example, Gold and Lebowitz (1999) show that computerized stock screening programs contain stock selection strategies that can help the individual investor significantly exceed the performance of market indices and professional money managers. Sahu and Kleiman (1998) uncover evidence of superior stock selection ability among portfolio managers at bank trust departments. Rich and Reichenstein (1993), using Value Line's projections, find that market timing based on the expected market risk premium, dividend yield, and the earnings-price ratio may enable the individual investor to beat the S&P 500. Mann and Solberg (1991) also suggest the potential of using a risk premium to track stocks.

In addition, new stock selection strategies are not hard to find. Badrinath and Kini (1992) show the potential of constructing portfolios from stocks selected on the basis of CAPM anomaly variables, such as firm size, the earnings-price ratio, and the price-book ratio. Dennis, Perfect, Snow and Wiles (1995) uncover similar evidence, while Barbee, Mukherji and Raines (1996) offer support for the sales-price ratio. Herzberg (1998) argues that economic value-added may be an accurate measure of a firm's ability to generate abnormal earnings. Wong, Wang, Goh and Quek (1992) demonstrate the potential of fuzzy neural systems for selecting stocks and forecasting market returns.

Additional support for active management is found in the mutual fund literature. As evidence, using an optimal weighting method based on modern portfolio theory, Elton, Gruber and Blake (1996) find that historical risk-adjusted returns for common stock funds contain predictive power for up to three years. Volkman and Wohar (1996) also find evidence of persistence in mutual fund performance. Khorana and Nelling (1998) show that Morningstar's rating system provides the individual investor with valuable information about the future performance of mutual funds. They discover that higher-rated funds, such as those

with four and five stars, tend to have a higher risk-adjusted performance, and one that persists for several years.

Khorana and Nelling's study is instructive in at least one more way. It provides further justification for advertisements and media reports that highlight five-star funds. Often included in these advertisements and reports are the respective track records of the funds and their top holdings. Oliver (1992), in fact, states that some investors construct portfolios by selecting stocks from the published holdings in these highly rated funds. The appeal of this selection strategy for the individual investor is seen not only in its ease of implementation, but also in the fact that the portfolio manager has actually purchased the stocks (as opposed to the individual investor selecting stocks based only on, for example, an analyst's recommendation).

In summary, although the evidence on the efficacy of stock selection strategies, and in turn active stock portfolio management, has often been found wanting, there is emerging evidence that some stock selection strategies may be able to help the individual investor outperform broad market indices. This study tests one such strategy. Guided by the application of modern portfolio theory used by Elton, Gruber and Blake (1996), the findings of Khorana and Nelling (1998), and the observation by Oliver (1992), it tests the efficacy of building stock portfolios from the top holdings in Morningstar's highest-rated general equity mutual funds. The issue is whether or not these portfolios can help the individual investor outperform a broad index of the U.S. stock market.

The hypothesis under test is that the portfolios constructed from these highest-rated funds will not systematically offer a risk-adjusted performance that exceeds that of the broad domestic market. As part of the test, and in line with Barber and Odean (1999) and Odean (1999) that the individual investor should avoid frequent trading, we test the risk-adjusted performance of the portfolios using a series of *ex ante* one-to-five year buy-and-hold strategies.

The analysis is conducted as follows: (a) the selection of the top stocks from Morningstar's highest-rated funds; (b) the application of an optimal portfolio construction approach to these selections; and (c) the drawing of inferences from the *ex ante* tests.

2. Stock selection and data

Morningstar's ten-year, five-star, general equity mutual funds serve as the source for our stock selection. This is the company's highest rating and is one that it has typically awarded to only about 2% of the approximately 2,000 mutual funds that it evaluates. If Elton, Gruber and Blake (1996) and Khorana and Nelling (1998) are right, then it should be the case that the application of modern portfolio theory to the top holdings of the ten-year, five-star funds stands the best chance of outperforming a broad market index. The index used in this study is the S&P 500, a standard benchmark used to assess portfolio performance.

To construct the portfolios, we begin by selecting the top five holdings (i.e., stocks that have the largest percentage of a fund's total assets) in each ten-year, five-star fund for the years 1989 through 1993. The reasons for using the top five are threefold. First, not only are these holdings easily identified, but they also represent the fund manager's top selections.

Second, by order of weight, these holdings have the largest impact on a mutual fund's performance. Third, anything other than a small number of stocks selected from each fund makes the analysis unmanageable for the individual investor.

The stock selections come from the end-of-year composition of the ten-year, five-star funds provided in *Mutual Funds* (Morningstar, 1994) and *Mutual Fund Sourcebook* (Morningstar, 1989–1994). For each stock, monthly rates of return, which include dividends and adjustments for stock splits, are computed from six years of monthly closing prices, as taken from Dow Jones News Retrieval, a source (at the time of this study) readily available to the individual investor. We obtain the monthly rates of return on the S&P 500 from Ibbotson Associates' *Stocks, Bonds, Bills, and Inflation* (2000). Following the literature, we express the returns in excess form by subtracting an estimate of a monthly risk-free rate of return, which is calculated from the monthly closing rate on the three-month U.S. Treasury bill. The source is the *Wall Street Journal.*

By relying on the fourth-quarter holdings of the funds, we encounter the possibility of a bias. In this study a bias may arise, for example, if a fund manager, late in the fourth quarter, engages in trading activity known as "window dressing." In this case, a fund manager adds current stock favorites and drops unfavorable ones, presumably to give the appearance that the fund has been invested in successful stocks. Although these newly added stocks were not the basis for the fund's most recent performance, they become candidates for inclusion in the portfolios used in this study. As long as these stocks reflect the fund manager's expectations for the forthcoming quarters, and are not dropped at the beginning of the next quarter, no significant bias should occur. Moreover, the cost of adding to and subtracting from the top holdings of a fund can be significant, especially for large-cap funds. If done frequently, window dressing could lead to a drop in a fund's performance and the loss of its prestigious five-star rating. Thus, all things considered, in this study we judge that the impact of window dressing on the results is unlikely to be material.

The number of top five stocks, across the years, is as follows: 95 (1989), 100 (1990), 143 (1991), 109 (1992), 84 (1993). We are able to obtain data on approximately 92% of all the stocks. Foreign listings and newly issued stocks, for which the data are not sufficiently available, account for the rest. Two reasons explain the difference in the number of stocks per year: (a) the variation in the number of ten-year, five-star funds and (b) the degree of commonality in the top five stocks across the ten-year, five-star funds. For example, there were 28 ten-year, five-star general equity funds each in 1989 and 1990, 39 in 1991, 33 in 1992, and 25 in 1993. There is also a similarity in the investment style across the ten-year, five-star general equity funds. In fact, about 91% of all the stocks come from funds that fit four closely related classifications that Morningstar uses: "growth," "growth and income," "equity-income," and "balanced," with "growth" and "growth and income" accounting for the majority of the stocks. About 6% come from "income" funds and about 3% come from "small company" funds. No stocks come from "aggressive growth." The similarity in investment objective leads to a commonality in the holdings, especially in large-cap stocks such as Coca Cola, Ford, General Electric, Intel, Motorola, and Philip Morris.

We should also point out that Morningstar's classification system (e.g., "aggressive growth," "growth," "growth and income," etc.) plays no role in this study's stock selection process. This is because these fund classifications do not explicitly consider a specific stock's

return to risk, as specified in modern portfolio theory, a point that Elton, Gruber and Blake (1996) and Bogle (1998) underscore. Thus, while one would expect the return on a stock selected from, say, a growth fund to be higher than the return on a stock chosen from, say, an income fund, the same may not be true for the expected return to risk on each stock.

3. Portfolio construction and estimation

The construction of the portfolios follows the work of Elton, Gruber, and Padberg (EGP) (Elton and Gruber, 1995, chapter 9) and Elton, Gruber, and Blake (1996). Three reasons support the use of their method. First, it offers the individual investor an intuitive interpretation for the decision rules. Second, the solution is easily obtained from spreadsheet programs because the EGP approach relies on betas and simple equations, and avoids the more demanding, iterative, mathematical programming solutions of the Markowitz (1991) full-covariance method. These are features that the individual investor should find attractive. Third, as shown by Nawrocki (1996), the EGP approach gives satisfactory results relative to the full-covariance method.

The EGP approach, which in this study excludes short sales, is based on modern portfolio theory. The approach consists of four steps: (a) the estimation of the single-index model to obtain systematic and unsystematic risks; (b) the ranking of the stocks by excess return to beta; (c) the calculation of a cutoff level to determine the composition of the portfolio; and (d) the determination of the proportion of the portfolio invested in each security. In equations, the steps are as follows:

$$\text{Single-index model: } (R_{it} - R_F) = \alpha_i + \beta_i(R_{mt} - R_F) + e_{it} \tag{1}$$

$$\text{Excess return to beta: Ret./risk}_i = \frac{\overline{R}_i - R_F}{\beta_i} \tag{2}$$

$$\text{Cut-off level: } C_i = \frac{\sigma_m^2 \sum_{j=1}^{i} \frac{(\overline{R}_j - R_F)\beta_j}{\sigma_{ej}^2}}{1 + \sigma_m^2 \sum_{j=1}^{i} \left(\frac{\beta_j^2}{\sigma_{ej}^2}\right)} \tag{3}$$

$$\text{Proportions: } W_i = Z_i / \sum_{j=1}^{n} Z_j, \text{ where} \tag{4}$$

$$Z_i = \beta_i/\sigma_{ei}^2((\overline{R}_i - R_F)/\beta_i - C^*)$$

where

R_i = return on stock i;
R_m = return on the market;
$\overline{R}_i$ = expected return on stock i;
R_F = return on a riskless asset;

β_i = beta of stock i;
σ_m^2 = variance of the market;
σ_{ei}^2 = unsystematic risk of stock i;
W_i = proportion invested in stock i; and
C^* = maximum value of C_i

4. Application and results

To apply the EGP approach, we use four steps. First, following Haugen and Baker (1991), Markowitz and Xu (1994), Elton, Gruber and Blake (1996), and Thaler (1999), we compute monthly rates of return on each stock from six years of monthly historical stock prices. Following this literature, we then subtract the respective monthly Treasury bill rates of return from the monthly returns on each stock to express the stock returns in excess form. For each stock, the arithmetic mean of the monthly excess returns serves as the expected return. For example, as part of building the 1989 portfolio, which begins with 95 stocks, we compute the monthly returns on each of these stocks from 1984 through 1989, subtract the respective monthly Treasury bill returns, and find the arithmetic mean of the excess returns. For the 1990 portfolio, which begins with 100 stocks, we compute the monthly returns on each of these stocks from 1985 through 1990, followed by subtracting the respective monthly Treasury bill returns and finding the arithmetic mean of the excess returns. The same logic applies to the 1991, 1992, and 1993 portfolios.

Second, by regressing the monthly excess returns on each stock against the monthly excess returns on the S&P 500, we estimate Eq. (1), the single-index model. It provides the estimates of each stock's beta and unsystematic risk. The latter is obtained by squaring the standard error of the regression. To improve the accuracy of these historical betas as estimates of future betas, following Kolb and Rodriguez (1990) and Tucker, Becker, Isimbabi and Ogden (1994), we adjust the historical betas for the possibility of nonstationarity by using the standard formula 0.343 + 0.677 x (historical beta). This formula is designed to account for the observed tendency of betas to regress to 1.

Third, following Eq. (2), we rank the stocks, from highest to lowest, in terms of each stock's excess return to beta. In doing so, we are following the principles of modern portfolio theory in that we are attempting to maximize a portfolio's return for a given level of risk. For example, for the 1989 portfolio, we rank the 95 stocks in terms of excess return to beta. For the 1990 portfolio, we rank the 100 stocks in terms of excess return to beta, and so on for the 1991, 1992, and 1993 portfolios. For each ranking of stocks, the task now becomes one of determining which of the stocks make up each portfolio.

Fourth, to determine the composition of each portfolio, we apply Eq. (3), the cutoff formula. The rule is that a stock is included in the portfolio as long as its excess return to beta exceeds its cutoff value, C_i. An interpretation of this step is that the more a stock is expected to perform relative to that of the portfolio, the more likely the stock will be included in the portfolio. After determining the composition of each portfolio, we determine how much to invest in each stock by following Eq. (4). An interpretation of this equation is that the higher a stock's expected excess return to beta and the lower its unsystematic risk, the greater the

Table 1
Composition of the portfolios built from the top five holdings of Morningstar's ten-year, five-star funds using the Elton-Gruber-Padberg approach

1989 Portfolio	1992 Portfolio
Ameritech	Bombay
De Beers	Coca Cola
Dillard's	Conseco
P.H. Glatfelter	Harley Davidson
GPU	Intel
Houston Industries	International Game Technology
Merck	Microsoft
Philip Morris	Minorco
Pacific Telesis	Weatherford International
Pacificorp	
Waste Management	1993 Portfolio
	Chevron
1990 Portfolio	DSC Communications
Atlantic Richfield	Entergy
Central and South West	Intel
DQE	MCI Communications
GPU	Microsoft
McCormick	Motorola
Merck	Scimed Life Systems
Minorco	
Pepsico	
Philip Morris	
Royal Dutch Shell	
Schering Plough	
Texaco	
Union Electric	
1991 Portfolio	
Amgen	
Biomet	
Coca Cola	
De Beers	
GPU	
Medtronic	
Merck	
Philip Morris	
Royal Dutch Shell	
The Gap	
Unilever	

percentage that will be invested in the stock. As an additional test of the results, we construct a set of portfolios without using Eq. (4). The result is a set of portfolios of stocks that have equal weights.

The composition of each of the EGP portfolios is shown in Table 1. The 1990 portfolio has the largest number of stocks; thirteen have excess returns to beta that exceed the cutoff values. The 1993 portfolio has the smallest number, with only eight stocks exceeding the cutoff levels. Regardless of the number, the composition of each portfolio tends to be

dominated by large-cap stocks, such as Chevron, Coca Cola, Intel, Medtronic, Merck, Pepsico, Philip Morris, and Royal Dutch Shell.

After building a portfolio for a given year (i.e., 1989, 1990, 1991, 1992, and 1993), we track its annual *ex ante* performance for five years, beginning on January 1. To test the hypothesis, we calculate the geometric means of the risk-adjusted excess returns on each portfolio and the corresponding geometric means of the risk-adjusted excess returns on the S&P 500. We then compare the two. For example, with respect to the 1989 portfolio, we compute the geometric means for the risk-adjusted excess returns for 1990 through 1991, 1990 through 1992, 1990 through 1993, and 1990 through 1994. The geometric mean for each of these holding periods is then compared to the geometric mean for the S&P 500 for each of the same holding periods.

In tracking the performance of each portfolio, we find that two companies, DSC Communications and Scimed Life Systems, were acquired during the testing period. Both companies are part of the 1993 portfolio. We assume liquidation of the stock at the closing price of the month that the acquisition occurred and the earning of the risk-free rate for the remainder of the testing periods.

To test for a difference in the performance between the geometric means for the portfolios and those for the S&P 500, following Kolodny, Laurence and Ghosh (1989) and Higgins and Peterson (1998), we use the probability values associated with the Wilcoxon signed-ranks test. We use this test, as opposed to using t values, because, as Higgins and Peterson point out, the power of a test involving t values is highly questionable with a sample of five observations (i.e., one-year to five-year buy-and-hold periods) and a nonnormal distribution. The probability values associated with the Wilcoxon test that are positive and significant at the 5% level support the observation that the performance of the EGP portfolios exceeds that of the S&P 500. The negative values that are significant at the 5% level confirm the opposite observation.

The returns, which are risk adjusted and annualized, are shown in Tables 2 and 3. The reason for the difference in the two sets of results lies in the weights assigned to the stocks that make up the portfolios. The portfolios in Table 2 are constructed by using Eqs. (1) through (4). Thus, the stocks that make up these portfolios have unequal weights. The portfolios in Table 3, however, are built by using only Eqs. (1) through (3). Thus, the stocks that make up the portfolios in Table 3 have equal weights. We examine the portfolios of equally weighted stocks to see to what extent the performance of the EGP portfolios varies with changes in the weights.

Because the EGP approach inherently uses the Treynor measure of portfolio performance (Elton and Gruber, 1995, p. 645), all numbers in the tables are expressed in terms of this measure. In the upper part of each table, the column on the left represents the years for which the portfolios are built; the top row refers to the years for which the portfolios are tested; and the bottom row represents the excess return divided by beta (=1) for the S&P 500. This manner of presentation permits the examination of one-year, two-year, three-year, four-year, and five-year buy-and-hold strategies for both the EGP portfolios and the S&P 500. Note that the diagonal elements (e.g., in Table 2, -0.0039, 0.5740, -0.2618, 0.1023, and 0.0944) illustrate the one-year strategy.

In Table 2, an examination of the results across the five buy-and-hold categories (one year,

Table 2
Portfolio performances: S&P 500 versus portfolios built from the top holdings of Morningstar's ten-year, five star funds using the Elton-Gruber-Padberg approach, equations 1 through 4

Portfolio Building Year	Annual Risk-Adjusted Excess Returns of the EGP Portfolios and the S&P 500[1] Portfolio Testing Year								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
1989	−0.0039	0.3630	−0.0747	−0.0847	−0.0716	—	—	—	—
1990	—	0.5740	−0.0058	0.0830	−0.0986	0.6108	—	—	—
1991	—	—	−0.2618	−0.0159	0.1153	0.5370	0.0394	—	—
1992	—	—	—	0.1023	−0.0046	0.1284	0.4867	0.2455	—
1993	—	—	—	—	0.0944	0.3496	0.3544	0.2538	0.4535
S&P 500	−0.1072	0.2411	0.0379	0.0690	−0.0174	0.3192	0.1818	0.2843	0.2333

Geometric Means of the Annual Risk-Adjusted Excess Returns: S&P 500 Versus EGP Portfolios[2]

	1990	1991	1992	1993	1994	P-value
1989 Portfolio	−0.0039	0.1652	0.0790	0.0355	0.0132	0.1125
S&P 500	−0.1072	0.0526	0.0477	0.0530	0.0385	
	1991	1992	1993	1994	1995	P-value
1990 Portfolio	0.5740	0.2509	0.1922	0.1117	0.1973	0.0212*
S&P 500	0.2411	0.1350	0.1125	0.0785	0.1229	
	1992	1993	1994	1995	1996	P-value
1991 Portfolio	−0.2618	−0.1476	−0.0648	0.0564	0.0530	−0.0212#
S&P 500	0.0379	0.0533	0.0292	0.0951	0.1119	
	1993	1994	1995	1996	1997	P-value
1992 Portfolio	0.1023	0.0475	0.0738	0.1648	0.1805	0.2502
S&P 500	0.0690	0.0249	0.1149	0.1312	0.1603	
	1994	1995	1996	1997	1998	P-value
1993 Portfolio	0.0940	0.2154	0.2601	0.2585	0.2953	0.0212*
S&P 500	−0.0174	0.1385	0.1528	0.1843	0.1940	

[1,2] The annual risk-adjusted excess returns are the portfolio (and the S&P 500) returns minus the annual three-month U.S. Treasury Bill rate divided by the portfolio's beta. To illustrate the geometric means, the 1989 portfolio's geometric mean through 1991, a two-year holding period, is 0.1652, the geometric mean of −0.0039 and 0.3630. The corresponding value for the S&P 500 is 0.0526, the mean of −0.1072 and 0.2411. The probability values (i.e., "P-values") are based on the Wilcoxon signed-ranks statistic, where "*" indicates significance at the 5% level in favor of the EGP portfolios and "#" indicates significance at the 5% level in favor of the S&P 500.

two years, etc.) leads to three conclusions. First, based on a comparison of the 25 geometric means for the EGP portfolios (i.e., five portfolios and five holding periods) versus the 25 geometric means for the S&P 500, the EGP portfolios outperform the S&P 500 in 17 instances. Several of the differences are large, in excess of ten percentage points, with the largest being over 33 percentage points (i.e., 1990 portfolio, one year). Second, both the 1990 portfolio and the 1993 portfolio outperform the S&P 500 across all five holding periods. At the 5% level of significance, the probability values from the Wilcoxon test confirm this observation. Third, the S&P 500 outperforms the 1991 portfolio for all five holding periods, as the probability value confirms.

A major reason for the 1991 portfolio's subpar performance relative to that of the S&P

Table 3
Portfolio performances: S&P 500 versus portfolios built from the top holdings of Morningstar's ten-year, five star funds using the Elton-Gruber-Padberg approach, equations 1 through 3

Portfolio Building Year	Annual Risk-Adjusted Excess Returns of the EGP Portfolios and the S&P 500[3] Portfolio Testing Year								
	1990	1991	1992	1993	1994	1995	1996	1997	1998
1989	0.0104	0.3217	−0.1412	0.0412	−0.1014	—	—	—	—
1990	—	0.5921	0.0222	−0.0164	−0.1297	0.4973	—	—	—
1991	—	—	−0.1934	0.0377	0.0712	0.4943	0.1297	—	—
1992	—	—	—	0.1858	0.0343	0.0881	0.3877	0.1792	—
1993	—	—	—	—	0.0708	0.3022	0.2854	0.1462	0.3644
S&P 500	−0.1072	0.2411	0.0379	0.0690	−0.0174	0.3192	0.1818	0.2843	0.2333

Geometric Means of the Annual Risk-Adjusted Excess Returns: S&P 500 Versus EGP Portfolios[4]

	1990	1991	1992	1993	1994	P-value
1989 Portfolio	0.0104	0.1556	0.0468	0.0454	0.0142	0.3430
S&P 500	−0.1072	0.0526	0.0477	0.0530	0.0385	
	1991	1992	1993	1994	1995	P-value
1990 Portfolio	0.5921	0.2757	0.1698	0.0864	0.1584	0.0212*
S&P 500	0.2411	0.1350	0.1125	0.0785	0.1229	
	1992	1993	1994	1995	1996	P-value
1991 Portfolio	−0.1934	−0.0851	−0.0357	0.0759	0.0864	−0.0212#
S&P 500	0.0379	0.0533	0.0292	0.0951	0.1119	
	1993	1994	1995	1996	1997	P-value
1992 Portfolio	0.1858	0.1074	0.1010	0.1665	0.1690	0.0690
S&P 500	0.0690	0.0249	0.1149	0.1312	0.1603	
	1994	1995	1996	1997	1998	P-value
1993 Portfolio	0.0780	0.1809	0.2147	0.1972	0.2293	0.0212*
S&P 500	−0.0174	0.1385	0.1528	0.1843	0.1940	

[3,4] The annual risk-adjusted excess returns are the portfolio (and the S&P 500) returns minus the annual three-month U.S. Treasury Bill rate divided by the portfolio's beta. To illustrate the geometric means, the 1989 portfolio's geometric mean through 1991, a two-year holding period, is 0.1556, the geometric mean of 0.0104 and 0.3217. The corresponding value for the S&P 500 is 0.0526, the mean of −0.1072 and 0.2411. The probability values (i.e., "P-values") are based on the Wilcoxon signed-ranks statistic, where "*" indicates significance at the 5% level in favor of the EGP portfolios and "#" indicates significance at the 5% level in favor of the S&P 500.

500 is its negative performance in 1992. Table 2 illustrates that -0.2618 is by far the worst risk-adjusted excess return of any of the portfolios and, as a result, one that is difficult to offset relative to the performance for the S&P 500. For example, while the 1991 portfolio soundly beats the S&P 500 in 1994 and 1995, registering performances of 0.1153 and 0.5370, respectively, these performances are not enough to help the 1991 portfolio outperform the S&P 500 across any of the buy-and-hold strategies.

There is some evidence that the 1989 and 1992 portfolios come fairly close to outperforming the S&P 500. The 1989 portfolio actually does it in three instances, but the overall difference, as shown by the probability value, is not significant at the 5% level. A similar conclusion is reached with the 1992 portfolio. It actually beats the S&P 500 in four of the five cases, but the probability value of 0.2502 casts some doubt on the efficacy of this

portfolio. The reason for this high value is seen in the portfolio's performance during 1995. While its risk-adjusted excess return is a respectable 0.1284, the S&P 500's is 0.3192. As a result, by 1995 the geometric mean of this EGP portfolio has underperformed the S&P 500 by over four percentage points, the largest difference (in absolute terms) across the five pairwise comparisons. Using the Wilcoxon test, we find that the size of the (negative) performance relative to that of the S&P 500 makes it impossible to reject the null hypothesis that no significant difference exists in the results.

Turning to Table 3, the results based on equally weighted stocks, we find similar results. The geometric mean performance for the EGP portfolios exceeds that of the S&P 500 in 16 of the 25 possible pairwise comparisons. Both the 1990 and 1993 portfolios beat the S&P 500 for all holdings periods, as the probability values confirm. Once again, the 1991 portfolio underperforms the S&P 500 across all holding periods. As before, the 1989 portfolio does not outperform the S&P 500. The 1992 portfolio outperforms it in four of the five holding periods. Unlike in Table 2, however, the difference across the periods is significant at the 10% level. This is because the difference in performance by 1995 is smaller than it is in Table 1.

Do the results suggest how long the individual investor should hold a portfolio? This question motivates an examination of the performances by holding period. As a guide to answering the question, Elton, Gruber and Blake (1996), based on evidence of persistence in mutual fund performance, suggest a holding period of up to three years. In both Tables 2 and 3, there is some evidence that tends to support this observation. For example, moving down the first column of the geometric means in Table 2, we find that during the one-year holding period the EGP portfolios outperform the S&P 500 in four of the five instances (i.e., -0.0039 vs. -0.1072; 0.5740 vs. 0.2411; 0.1023 vs. 0.0690; and 0.0940 vs. -0.0174). The same pattern exists when moving down the second column of the geometric means. When moving down the third column, we find that the geometric means exceed those for the S&P 500 in three of the five cases. Taken together, the EGP portfolios outperform the S&P 500 in 11 of the 15 cases. Applying the Wilcoxon test to these results, however, reveals a probability value of only about 0.11, which is not significant at the 5% level. This insignificance is traced to the subpar performances of the 1991 portfolio. A similar conclusion is drawn from the Wilcoxon test for the one-year and two-year holding periods.

Overall, the results suggest that selecting stocks from the top holdings of Morningstar's ten-year, five-star funds has some potential to help the individual investor outperform the S&P 500. We conclude, however, that the evidence is not strong enough for us to reject the null hypothesis; namely, that the portfolios will not outperform the S&P 500. At least two reasons support this conclusion. First, according to the Wilcoxon tests, only two of the five portfolios clearly beat the S&P 500. Moreover, although the EGP portfolios outperform the S&P 500 in 17 of the 25 pairwise comparisons, the overall evidence is probably not convincing enough to motivate the individual investor who buys into index funds to adopt the stock selection strategy tested here. This point is reinforced by the composition of the ten-year, five-star funds, which is the second reason supporting our conclusion. These funds are generally large-cap funds (e.g., Fidelity Magellan) whose top holdings are large-cap stocks, such as Coca Cola, Intel, Merck, and Philip Morris. These stocks are the largest contributors to a broad market index like the S&P 500. Consequently, the selection of the top

holdings in these highest rated funds may not often perform much better than a broad market index. This point is buttressed by Bogle (1998), who finds that index funds, for the period of 1992 through 1996, have generally delivered the highest risk-adjusted returns among Morningstar's equity fund categories.

5. Conclusion

Recent research suggests that the individual investor can construct stock portfolios that outperform broad market indices. Based on this research and on the evidence that supports the persistence of mutual fund performance, we test whether or not the individual investor can build market-superior portfolios from stocks selected from the top holdings of Morningstar's ten-year, five-star general equity mutual funds. We use the Elton-Gruber-Padberg approach, which is founded on modern portfolio theory, to construct the portfolios for the years 1989 through 1993. We test the performance of the portfolios against that of the S&P 500 by using a series of one-year to five-year buy-and-hold strategies from 1990 through 1998. We find some evidence that the portfolios tend to outperform the S&P 500. We conclude, however, that the evidence is not strong enough to recommend the stock selection strategy to the individual investor.

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