Evaluating Fund Performance in a Dynamic Market

Wayne E. Ferson and Vincent A. Warther

Previous studies show that interest rates, dividend yields, and other commonly available variables are useful market indicators, but until now, measures of fund performance have not used the information. This article modifies classical performance measures to take account of well-known market indicators. The conditional performance evaluation approach avoids some of the biases that plague traditional measures. Applied to a sample of mutual funds, the conditional measures make the funds' performance look better.

Standard measures of fund manager performance are known to suffer from a number of problems in practice. Many of the problems reflect the inability of traditional measures to handle the dynamic behavior of returns. An approach called conditional performance evaluation addresses this problem.

Traditional approaches to performance measurement are unconditional, which means that they use historical average returns to estimate expected performance. For example, an “alpha” may be calculated as the historical average return of a fund in excess of a beta-adjusted historical average for a benchmark portfolio, such as the Standard & Poor’s 500 Index. (Sometimes, the beta is simply assumed to equal 1.0.) Unconditional measures do not account for the fact that risk and expected returns may vary with the state of the economy. In particular, traditional performance measures ignore the evidence that expected returns in the stock market are higher at the beginning of an economic recovery, when dividend yields are high and interest rates are low.1 If the market exposure of a managed portfolio varies predictably with the business cycle but the manager does not have superior forecasting ability, a traditional approach to performance measurement will confuse the common variation between fund risk and expected market returns with truly superior information and abnormal performance.

The conditional performance evaluation approach we advocate takes the view that a managed portfolio strategy that can be replicated using information readily available to the public should not be judged as having superior information. For example, in a conditional approach, a mechanical market-timing rule using lagged interest rate data does not add value. Only managers who correctly use more information than is generally publicly available are considered to have potentially superior ability. Conditional performance evaluation is, therefore, consistent with a version of market efficiency in the semistrong form sense of Fama (1970).

The beauty of a conditional approach to performance evaluation is that it can accommodate whatever standard of superior information is held to be appropriate by the choice of the lagged instruments used to represent the public information. By incorporating a given set of lagged instruments, managers who trade mechanically in response to these variables should be unable to “game” the performance measure. In practice, the trading behavior of managers may overlay complex portfolio dynamics on the underlying assets they trade. The desire to handle such dynamic strategies further motivates a conditional approach. In this article, we illustrate the conditional performance evaluation approach using lagged dividend yields and short-term interest rates as the conditioning information.2

A conditional performance evaluation would seem to raise the hurdle on managers seeking abnormal positive performance, because it gives them no credit for using readily available variables. We show that a conditional analysis actually makes the performance of a typical mutual fund during the 1970s and 1980s look better. The more-pessimistic results of the traditional measures are attributed to the fact that they ignore common dependencies between mutual fund betas and expected market returns, which are captured by a market dividend yield and a short-term interest rate. This negative

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correlation seems to reflect higher cash holdings when expected market returns are high, as investors pour new money into mutual funds.

A NUMERICAL EXAMPLE

The appeal of a conditional model for performance evaluation can be illustrated with a numerical example. Assume that investors' expectations reflect two equally likely states of the market—say, a bull state and a bear state. In a bull market, assume that the expected return of the S&P 500 is 20 percent and in a bear market, it is 10 percent. The risk-free return to cash is 5 percent. Assume that all investors share these views—the current state of expected market returns is always common knowledge. An investment strategy using only this information will not, on average, yield abnormal returns and so should have an alpha of zero.

Now, imagine a mutual fund that holds the S&P 500 in a bull market and holds cash in a bear market. Conditional on a bull market, the beta of the fund is 1.0, the fund's expected return is 20 percent, equal to the S&P 500, and the fund's alpha is zero. Conditional on a bear market, the fund's beta is zero, the expected return of the fund is the risk-free return, 5 percent, and the alpha is, again, zero. The conditional approach to performance evaluation correctly reports an alpha of zero.

By contrast, an unconditional approach to performance evaluation incorrectly reports an alpha greater than zero for this hypothetical mutual fund. The unconditional beta of the fund is 0.6. The fund's unconditional expected return is 0.5(0.20) + 0.5(0.05) = 0.125. The unconditional expected return of the S&P 500 is 0.5(0.20) + 0.5(0.10) = 0.15, so the fund's unconditional alpha is therefore (0.125 - 0.05) - 0.6(0.15 - 0.05) = 0.015. The unconditional approach leads to the mistaken conclusion that the manager has positive abnormal performance. The manager's performance, however, does not reflect superior skill or ability; it just reflects the fund's decision to take on more market risk in times when risk is more highly rewarded in the market. Investors, who are assumed to have access to the same information about the economic state, would not be willing to pay the fund management fees to use this common knowledge.

Investors who wish to make optimal portfolio decisions need to avoid the errors that a traditional performance measure is likely to make in classifying portfolio performance. If expectations of future returns and risks vary with publicly available economic information, then conditional expectations should determine the relevant alphas. A conditional performance measure should be a more reliable guide for allocating funds to managers in order to get the highest return for the risk. Relying on the traditional unconditional alphas, however, is likely to produce inferior investment decisions.

DATA

We studied monthly returns for 63 open-end mutual funds from January 1968 to December 1990, a total of 276 observations. The returns include reinvestment of all distributions (e.g., dividends) and are net of expenses, but they disregard load charges and exit fees.

The funds are primarily equity funds, classified by objective as reported in Wiesenberger. The funds are grouped by their stated objectives at a point near the middle of the sample period in 1982. Eight funds are classified as maximum capital gains, 20 are growth-income, 21 are growth funds, and 14 are income funds. Excess returns are measured net of the monthly return of investing in the one-month Treasury bill from Ibbotson & Associates.

Our sample has survivorship biases because it contains only surviving funds. Survivorship bias is expected to make the surviving funds look better than funds as a group (see Grinblatt and Titman 1988; Brown, Goetzmann, Ibbotson, and Ross 1992; and Malkiel 1995). If survivorship bias is important, our estimates of the performance of the mutual funds are too optimistic. We found, however, that the traditional measures suggest poor performance for the funds in our sample and that the performance looks better after controlling for public information variables. Because we used the same sample in both cases, our results are not likely to be driven by survivorship biases.

The S&P 500 was used as the market factor, or benchmark portfolio. To measure the state of the stock market, we used two well-known, traditional market indicators. The lagged level of the one-month Treasury bill yield and the lagged dividend yield of the CRSP value-weighted NYSE and Amex stock indexes are our lagged instruments.

If a particular measure shows simple passive or naive investment strategies to have abnormal performance, it would call into question the quality of that performance measure. We therefore constructed a naive buy-and-hold strategy for comparison that enters 1968 with an arbitrary initial set of weights in four asset classes: 65 percent for large stocks, 13 percent for small stocks, 20 percent for government bonds, and 2 percent for low-grade bonds. The buy-and-hold strategy weights change over time as the relative values of the four asset classes evolve.
TRADITIONAL MEASURES OF PERFORMANCE

A traditional approach to measuring performance is to regress the excess return of a portfolio on the market factor. Assuming that the market beta is constant, the slope coefficient, β, is the market beta and the intercept, α, is the unconditional alpha coefficient, which measures average performance (see Jensen 1968); that is,

\[ RP_t = α + β \cdot RM_t + \text{error}, \]  

where \( RM \) is the return of the market benchmark and \( RP \) is the return of the fund's portfolio, and both are measured in excess of a short-term bill return.

Performance measures often attempt to distinguish security selection or stock-picking ability from market timing, or the ability to predict market returns. Alpha, typically, reflects both types of ability. Market-timing models represent an attempt to separate these two aspects of performance. Traditional market-timing models, however, have taken the view that any information correlated with future market returns is superior information. In other words, they are unconditional models.

A classic market-timing regression is the quadratic regression of Treynor and Mazuy (1966): \(^7\)

\[ RP_t = α + β \cdot RM_t + δ \cdot RM_t^2 + \text{error}, \]  

where the coefficient \( δ \) measures market-timing ability. The \( δ \) coefficient is positive if the manager increases beta when receiving a positive signal about the market. The hypothesis of no timing ability implies that \( δ = 0 \).

Table 1 shows the results of estimating the traditional unconditional models of performance using our sample of mutual funds. The coefficients are reported for equal-weighted averages of the funds in each group. Based on the \( t \)-statistics for the group averages, only a few coefficients are significant, but two-thirds of the individual fund alphas are negative. Among the maximum-gain funds, 75 percent of the alphas are negative, and among the growth funds, 81 percent of the alphas are negative. Taken at face value, the traditional alphas suggest that too many of these mutual funds do not match the performance of the S&P 500 on a risk-adjusted basis.

The results of the unconditional market-timing model are even more striking. More than two-thirds of the timing coefficients of the individual funds are negative, including more than 70 percent of the growth funds and 100 percent of the maximum-gain funds. The market-timing coefficient of the portfolio of maximum capital gain funds is significant and negative, with a \( t \)-statistic of -2.64. These findings are similar to those of previous studies using unconditional models (see, e.g., Henriksson 1984, Chang and Lewellen 1984, Lehmann and Modest 1987, Grinblatt and Titman 1988, and Cumby and Glen 1990).

Taken at face value, the results of Table 1 suggest that many funds, especially the more aggressive equity funds, have systematically perverse market-timing abilities. That interpretation, however, is subject to a number of criticisms. First, if the funds actually have superior information about future market moves but systematically get the direction wrong, then astute investors could take the opposite position and profit. A second problem is that market-timing models are known to be distorted if funds are picking stocks or are using leverage, options, or other derivative strategies.

Table 1. Unconditional Measures of Performance

<table>
<thead>
<tr>
<th>Fund Objective</th>
<th>Jensen's Alpha(^a)</th>
<th>Market-Timing Model(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>( t )-Ratio</td>
</tr>
<tr>
<td>Maximum gain</td>
<td>-0.085</td>
<td>-0.59</td>
</tr>
<tr>
<td>Growth</td>
<td>-0.084</td>
<td>-1.17</td>
</tr>
<tr>
<td>Growth/income</td>
<td>-0.065</td>
<td>-1.34</td>
</tr>
<tr>
<td>Income</td>
<td>0.024</td>
<td>0.34</td>
</tr>
<tr>
<td>All funds</td>
<td>-0.054</td>
<td>-0.43</td>
</tr>
<tr>
<td>Buy-and-hold(^c)</td>
<td>-0.005</td>
<td>-0.10</td>
</tr>
</tbody>
</table>

\(^a\)Jensen's alpha is the average excess return of an equal-weighted portfolio of funds with the stated objective less the beta times the average excess return of the S&P 500 taken over a period from 1968 to 1990, a total of 276 monthly observations. The units are percent per month.

\(^b\)The market-timing models are based on a multiple regression of the funds returns on the excess return of the S&P 500 and its square. The market-timing coefficients are the regression coefficients on the squared term.

\(^c\)The buy-and-hold comparison strategy enters 1968 with the following initial set of weights: 65 percent large stocks, 13 percent small stocks, 20 percent government bonds, and 2 percent low-grade bonds. The buy-and-hold strategy weights change over time as the relative values of the four asset classes evolve.
Perhaps the most telling piece of evidence that the traditional market-timing models give false signals about performance is the results for the buy-and-hold strategy. The timing coefficient of the buy-and-hold strategy is significant and negative, with a t-statistic equal to -3.10. Obviously, a buy-and-hold strategy does not involve significant market-timing information. The obvious flaws of the unconditional models provide strong motivation to look to conditional models for improvement.

CONDITIONAL PERFORMANCE EVALUATION

A conditional performance evaluation can be set up using basically the same theoretical assumptions as traditional models. Traditional approaches, however, assume that the consumer of the performance evaluation does not use public information on the economy to form expectations, whereas a conditional approach assumes market efficiency with respect to the particular market indicators. In a conditional market-timing model, the idea is to distinguish market timing based on public information from market-timing information that is truly superior to the public information.

A technical assumption required for our approach is a functional form for the betas or factor sensitivities of a managed portfolio. Time variation in a managed portfolio beta may arise for three distinct reasons. First, the betas of the underlying assets may change over time such that even a passive strategy, such as buy and hold, will experience changes in beta. Second, a manager can actively manipulate the portfolio weights, departing from a buy-and-hold strategy, and thereby create changes in the portfolio beta. Third, a mutual fund may experience net cash inflows or outflows, which the manager does not directly control. If such flows affect the cash holdings of the fund, then beta will fluctuate as the percentage of cash held by the fund fluctuates.

The combined effect of these various factors on the conditional beta is modeled as a “reduced form.” As a very simple illustrative model, we use the following linear function, which is a natural extension of traditional models for mutual fund risk (see, e.g., Admati and Ross 1985 and Admati et al. 1986):

\[ \beta = b_0 + b_1(D/P) + b_2(TB), \]  

where \((D/P)\) is the lagged value of the market dividend yield and \(TB\) is the lagged value of a short-term Treasury yield. A linear function may be motivated by a Taylor series approximation. A linear function is also attractive because it results in simple regression models that are easy to interpret. Although we use simple linear functions to illustrate the conditional approach, the correct specification of the conditional beta is an empirical issue. The general approach can accommodate other choices for the functional form, so it should be possible to improve upon our example in actual applications.

The conditional model uses the following regression for the managed portfolio return:

\[ R_{p_t} = \alpha + b_0 RM_t + b_1 [RM_t \times (D/P)_{t-1}] + b_2 [RM_t \times (TB)_{t-1}] + \text{error}. \]  

The conditional model adds two additional predictors to the regression traditionally used to estimate the unconditional alpha. These variables, \([RM_t \times (D/P)_{t-1}]\) and \([RM_t \times (TB)_{t-1}]\), are essentially interaction terms between the return of the S&P 500 benchmark and the lagged values of the market indicators. These interaction terms pick up the movements through time of the conditional betas as they relate to the market indicators. The coefficients \(b_1\) and \(b_2\) measure the change in the conditional betas to the lagged market indicators. The intercept, \(\alpha\), is the conditional alpha, which measures the abnormal performance.

The conditional alpha model of Equation 4 may also be interpreted as a multiple factor model, where the market index is the first factor and the product of the market and the lagged market indicators are the additional factors. The additional factors may be interpreted as the returns to dynamic strategies, which hold the market index long, financed by borrowing or selling an equal amount of Treasury bills. The amounts are determined by the values of the market indicators. The dynamic strategies are constructed to replicate the dynamic behavior of the fund’s market beta through time. The conditional alpha is the expected difference between a fund’s excess return and the excess return to the particular combination of the market index and the dynamic strategies, which replicate the fund’s time-varying risk exposure. A manager with a positive conditional alpha is one whose average return is higher than the average return of the combination with the same dynamic beta.

Table 2 summarizes the results of estimating the conditional alpha model. The results are quite different from those in Table 1. Only 52.4 percent of the funds’ conditional alphas are negative overall. The percentage of negative alphas varies among the fund groups from 35.7 percent for the income funds to 62.5 percent for the maximum-gain funds. Unlike the unconditional models, the conditional models do not suggest that the funds routinely underperform the S&P 500 on a risk-adjusted basis. The performance is essentially neutral, as would be expected in an efficient market.
Table 2. Conditional Alphas and Betas

<table>
<thead>
<tr>
<th>Fund Objective</th>
<th>Conditional Alpha&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Conditional Beta&lt;sup&gt;b&lt;/sup&gt; = b&lt;sub&gt;0&lt;/sub&gt; + b&lt;sub&gt;1&lt;/sub&gt; (D/P) + b&lt;sub&gt;2&lt;/sub&gt; TB</th>
<th>Significance Level&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum gain</td>
<td>0.063</td>
<td>b&lt;sub&gt;0&lt;/sub&gt; = 1.55, t&lt;sub&gt;b0&lt;/sub&gt; = 10.2, b&lt;sub&gt;1&lt;/sub&gt; = -0.16, t&lt;sub&gt;b1&lt;/sub&gt; = -0.413, b&lt;sub&gt;2&lt;/sub&gt; = 0.40, t&lt;sub&gt;b2&lt;/sub&gt; = 3.37</td>
<td>0.0003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.45)</td>
<td></td>
</tr>
<tr>
<td>Growth</td>
<td>-0.013</td>
<td>b&lt;sub&gt;0&lt;/sub&gt; = 1.22, t&lt;sub&gt;b0&lt;/sub&gt; = 15.2, b&lt;sub&gt;1&lt;/sub&gt; = -0.06, t&lt;sub&gt;b1&lt;/sub&gt; = -0.285, b&lt;sub&gt;2&lt;/sub&gt; = 0.11, t&lt;sub&gt;b2&lt;/sub&gt; = 1.72</td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.65)</td>
<td></td>
</tr>
<tr>
<td>Growth/income</td>
<td>-0.029</td>
<td>b&lt;sub&gt;0&lt;/sub&gt; = 1.04, t&lt;sub&gt;b0&lt;/sub&gt; = 22.0, b&lt;sub&gt;1&lt;/sub&gt; = -0.04, t&lt;sub&gt;b1&lt;/sub&gt; = -0.319, b&lt;sub&gt;2&lt;/sub&gt; = 0.01, t&lt;sub&gt;b2&lt;/sub&gt; = 1.81</td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.28)</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>0.069</td>
<td>b&lt;sub&gt;0&lt;/sub&gt; = 0.74, t&lt;sub&gt;b0&lt;/sub&gt; = 8.28, b&lt;sub&gt;1&lt;/sub&gt; = -0.05, t&lt;sub&gt;b1&lt;/sub&gt; = -0.193, b&lt;sub&gt;2&lt;/sub&gt; = 0.01, t&lt;sub&gt;b2&lt;/sub&gt; = 1.42</td>
<td>0.049</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.87)</td>
<td></td>
</tr>
<tr>
<td>All funds</td>
<td>0.003</td>
<td>b&lt;sub&gt;0&lt;/sub&gt; = 1.00, t&lt;sub&gt;b0&lt;/sub&gt; = 7.39, b&lt;sub&gt;1&lt;/sub&gt; = -0.06, t&lt;sub&gt;b1&lt;/sub&gt; = -0.144, b&lt;sub&gt;2&lt;/sub&gt; = 0.01, t&lt;sub&gt;b2&lt;/sub&gt; = 1.01</td>
<td>0.146</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.62)</td>
<td></td>
</tr>
<tr>
<td>Buy-and-hold&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.048</td>
<td>b&lt;sub&gt;0&lt;/sub&gt; = 0.90, t&lt;sub&gt;b0&lt;/sub&gt; = 17.1, b&lt;sub&gt;1&lt;/sub&gt; = -0.04, t&lt;sub&gt;b1&lt;/sub&gt; = -0.295, b&lt;sub&gt;2&lt;/sub&gt; = 0.02, t&lt;sub&gt;b2&lt;/sub&gt; = 3.67</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<sup>a</sup>The conditional alpha is the intercept in a regression of an equal-weighted portfolio of funds with the stated objective regressed on the excess return of the S&P 500, the product of the S&P 500 with the lagged dividend yield (D/P), and the product of the S&P 500 with the lagged one-month Treasury bill yield (TB). The sample period is 1968 to 1990, a total of 276 monthly observations. The units are percent per month.

<sup>b</sup>The figures denoted as t(b) are the t-ratios for the coefficients. The t-ratios in brackets measure the significance of the difference between the coefficients for the fund group and the coefficients for the buy-and-hold strategy. The t-ratios that are not in brackets measure the significance of the coefficients relative to zero. All of the t-ratios are heteroscedasticity consistent.

<sup>c</sup>The right-tail areas of the F-test for the hypothesis that the predetermined market indicators enter the model with zero coefficients. For example, the figure 0.009 shows that the market indicators are significant in the conditional beta model for income funds at the 5 percent significance level.

<sup>d</sup>The buy-and-hold comparison strategy enters 1968 with an initial set of weights: 65 percent large stocks, 13 percent small stocks, 20 percent government bonds, and 2 percent low-grade bonds. The buy-and-hold strategy weights change over time as the relative values of the four asset classes evolve.

Why do the conditional models produce such a strikingly different impression about alphas than the unconditional models? The statistical reason is that there is common variation through time in the funds’ betas and in the expected market return. This variation is captured by the interaction terms in the conditional model. In contrast, the unconditional alpha interprets the common variation as abnormal performance. A comparison of Equations 1 and 4 shows that the difference between the two measures of alpha is determined by the average values of the interaction terms. These terms measure the covariance between the conditional beta and the expected value of the market return formed using the lagged instruments. If this covariance is positive (negative), the unconditional alpha will be lower (higher) than the unconditional alpha. Therefore, the key to understanding the different results about alpha is the behavior of the conditional betas.

Table 2 also records the coefficients of the conditional beta models for the fund groups and their t-ratios. For each fund group, the market indicators that allow for time variation in the funds’ betas are statistically significant at the 5 percent level or better. The coefficients on the Treasury bill are positive, whereas those on the dividend yield are negative. Both coefficients are statistically significant for most of the groups. Because high dividend yields are a positive market indicator and high short-term interest rates predict low stock returns, the coefficients say that the betas of the funds tend to be negatively correlated with future stock returns. Using the parameters of the model to estimate the correlation between the funds’ betas and the expected market return in our sample, the correlation varies between -0.283 and -0.315 among the fund groups.

**EXPLAINING BETA CHANGES**

Why would mutual fund managers tend to reduce their market betas when public information implies relatively high expected market returns and/or raise them when expected returns are low? Two explanations are considered:

- The betas of the underlying assets change over time, such that even a buy-and-hold strategy has changing betas.
- Fund portfolio weights depart from a buy-and-hold strategy because of flows of cash into the funds or active management behavior.

Table 2 provides evidence on the first of these potential explanations. Estimating the conditional betas for the buy-and-hold strategy produces a negative coefficient on the dividend yield and a positive coefficient on the Treasury bill rate, a similar pattern as for the mutual funds. This finding
suggests that some of the beta variation is the result of time-varying conditional betas for the underlying assets. Table 2 also shows, however, that the coefficients of the funds’ betas are significantly different from those of the buy-and-hold strategy for the more aggressive funds. Movements in the betas of the assets held by the mutual funds do not fully explain the patterns of time variation in the betas for mutual funds.

The second explanation for the movements in mutual fund betas involves the flow of money into mutual funds. It money flows into funds when the public perceives expected stock returns to be high and if managers take some time to allocate new money according to their usual investment styles, then the funds would have large cash holdings at such times. Large cash holdings imply low betas. The effects of new money flows on the funds’ betas will depend on the magnitudes of the flows, the size of the asset holdings, and the speed with which new monies are invested.

Warther (1995) reported a study of net cash flows for mutual funds. Net cash is defined as new sales (excluding reinvested dividends minus withdrawals, plus net transfers between funds), normalized by the lagged aggregate stock market value. A strong correlation is found between net cash flows and concurrent stock market returns, which suggests a connection between cash flows to funds and expected returns. New money flows are also strongly correlated with the portfolio weight in cash. When inflows are large, cash balances at mutual funds tend to increase. On average, funds invest about 62 cents of each new dollar in the concurrent month; 38 cents goes to increased cash balances.

Table 3 offers further evidence of a link between mutual fund inflows and conditional betas.

Table 3. Mutual Fund Sales, Conditional Betas, and Market Indicators

<table>
<thead>
<tr>
<th>Fund Objective</th>
<th>$b_0$</th>
<th>$t(b_0)$</th>
<th>$b_1$</th>
<th>$t(b_1)$</th>
<th>$b_2$</th>
<th>$t(b_2)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutual fund sales and conditional betas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum gain</td>
<td>0.0003</td>
<td>0.06</td>
<td>-0.5002</td>
<td>-3.72</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Growth</td>
<td>0.0001</td>
<td>0.06</td>
<td>-0.5527</td>
<td>-5.26</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Growth/income</td>
<td>0.0001</td>
<td>0.08</td>
<td>-0.3761</td>
<td>-2.87</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mutual fund sales and market indicators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum gain</td>
<td>0.00001</td>
<td>0.00</td>
<td>0.0596</td>
<td>7.04</td>
<td>-0.0039</td>
<td>-1.83</td>
</tr>
<tr>
<td>Growth</td>
<td>0.00008</td>
<td>0.16</td>
<td>0.0201</td>
<td>5.91</td>
<td>-0.0012</td>
<td>-1.44</td>
</tr>
<tr>
<td>Growth/income</td>
<td>0.00007</td>
<td>0.20</td>
<td>0.0089</td>
<td>3.92</td>
<td>0.0000</td>
<td>0.05</td>
</tr>
</tbody>
</table>

$\Delta$ Conditional beta = $b_0 + b_1 \Delta$ Sales. The conditional beta is estimated as the average fitted conditional beta of all funds in the particular category. The sample period is January 1976 through December 1990. $\Delta$ denotes first-differencing of the series. Regressions use the Cochrane-Orcutt procedure to correct for autocorrelation in the residuals. $t$-Statistics for coefficient $b$ are denoted $t(b)$.

$\Delta$ Sales = $b_0 + b_1 \Delta(D/P) + b_2 \Delta TB$. $D/P$ is the dividend yield of the S&P 500 lagged one period, and $TB$ is the three-month Treasury bill yield lagged one period.
Overall, the evidence of Table 3 supports the hypothesis that mutual fund flows partly explain the changes in betas over time, which are captured by the lagged market indicators and therefore affect the performance results. Cash flows into funds increase when public expectations of market returns increase, and as a result, cash balances increase and betas decrease. This relationship offers a simple interpretation for the otherwise puzzling result that funds have low market exposure when expected market returns are high.

**CONDITIONAL MARKET TIMING**

Ferson and Schadt (1996) proposed the following conditional version of the Treynor–Mazuy market-timing regression:

\[
RF_t = \alpha + b_0 \cdot RM_t + b_1 [RM_t \times (D/P)_{t-1}] \\
+ b_2 [RM_t \times (TB)_{t-1}] + \gamma \cdot RM_t^2 + \text{error},
\]

where the coefficients \(b_1\) and \(b_2\), as before, capture the response of the manager’s beta to the public information. In the conditional model, any ability to predict the market that can be matched using the public information is not considered to reflect market-timing ability. The coefficient \(\gamma\) measures the sensitivity of the manager’s beta to any private market-timing signal, which should be more informative about the future market return than are the dividend yield and interest rate.

Table 4 presents the results of the conditional market-timing model. The results are very different from those of the unconditional model in Table 2. The conditional-timing model produces much more reasonable results. First, the coefficients of the buy-and-hold strategy are not statistically significant. This finding is good news for the conditional model because it shows that the model avoids the obvious mistake made by the unconditional model of attributing market timing to a buy-and-hold strategy. In the conditional model, none of the timing coefficients for the fund groups are statistically significant, and the point estimates are positive for every fund group except the maximum-gain funds. Overall, only 41.3 percent of the funds generated negative timing coefficients, much less than in Table 2. Therefore, there is no evidence of perverse, negative timing ability in these groups of funds.

**Table 4. Results for the Conditional Market-Timing Model**

<table>
<thead>
<tr>
<th>Fund Objective</th>
<th>Alpha</th>
<th>t-Ratio</th>
<th>Timing Coefficient</th>
<th>t-Ratio</th>
<th>Fraction &lt; 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum gain</td>
<td>0.101</td>
<td>0.68</td>
<td>-0.002</td>
<td>-0.53</td>
<td>75.0%</td>
</tr>
<tr>
<td>Growth</td>
<td>-0.046</td>
<td>-0.60</td>
<td>0.001</td>
<td>0.37</td>
<td>42.9</td>
</tr>
<tr>
<td>Growth/income</td>
<td>-0.044</td>
<td>-0.75</td>
<td>0.001</td>
<td>0.38</td>
<td>30.0</td>
</tr>
<tr>
<td>Income</td>
<td>-0.001</td>
<td>-0.01</td>
<td>0.004</td>
<td>1.68</td>
<td>35.7</td>
</tr>
<tr>
<td>All funds</td>
<td>-0.015</td>
<td>-0.17</td>
<td>0.001</td>
<td>0.33</td>
<td>41.3</td>
</tr>
<tr>
<td>Buy-and-hold</td>
<td>0.082</td>
<td>1.68</td>
<td>-0.003</td>
<td>-1.07</td>
<td>—</td>
</tr>
</tbody>
</table>

CONCLUSIONS

The incorporation of lagged market-indicator variables into the analysis of investment performance, an approach called *conditional performance evaluation*, takes the view that a managed portfolio strategy using only readily available public information does not imply abnormal performance. To illustrate this approach, we used monthly data for 63 mutual funds and lagged dividend yields and Treasury bill yields as the market indicators. There is strong evidence that the funds’ market risk exposures change in response to the market indicators. The conditioning information is important, both in statistical and in practical terms.

The traditional, unconditional measures of average performance (Jensen’s alpha) are negative more often than positive for the funds, which has been interpreted as inferior performance. Using the conditional models, however, the alphas are centered near zero. The relatively pessimistic results of the traditional measures are attributed to common time variation in the conditional betas and the expected market return. When the common variation is controlled, using the market indicators, the conditional models make the funds’ performance during the sample period—the 1970s and 1980s—look better than do the unconditional models. Some of the common variation is explained by new cash flows into mutual funds, which are higher when the indicators predict higher market returns.

Traditional measures of market timing suggest that the typical mutual fund increases its market exposure when stock returns are low. This phenomenon is called “pervasive” market-timing ability, but this interpretation is plausible because it suggests that one could profit by reversing the funds’ timing strategies.

Furthermore, traditional market-timing models are misspecified when applied to naive strategies, and conditional versions of these models are an improvement. Using conditional market-timing models for U.S. equity funds removes the evidence of pervasive market timing for the typical fund. These results suggest that incorporating public information variables into the analysis of investment performance is important and should improve upon current practice.9
NOTES

1. For evidence that high interest rates are bad news for stocks, see Fama and Schwert (1977); Ferson (1989); and Breen, Glosten, and Jagannathan (1989). For evidence that stock returns are expected to be high when dividend yields are high, see Fama and French (1988) and Campbell and Shiller (1988).

2. For evidence that these variables capture variation in both risk and expected returns, see Ferson and Harvey (1991) and Ferson and Korajczyk (1995).

3. The calculation is as follows. The unconditional beta is

\[ \text{Cov}(F,M)/\text{Var}(M), \]

where \( F \) is the fund return and \( M \) is the market return. The numerator is

\[ \text{Cov}(F,M) = E[(F - E(F))(M - E(M))], \]

where \( E(\cdot) \) is the unconditional expected value. Thus,

\[ \text{Cov}(F,M) = E[(F - E(F))(M - E(M)) \cdot \text{Prob}(\text{Bull})] + E[(F - E(F))(M - E(M)) \cdot \text{Prob}(\text{Bear})] \]

\[ = \{0.20 - 0.125\{0.20 - 0.15\} \cdot 0.5 \}

\[ + (0.05 - 0.125\{0.10 - 0.15\} \cdot 0.5 \]

\[ = 0.00375. \]

The denominator is

\[ \text{Var}(M) = E[(M - E(M))^2 \cdot \text{Prob}(\text{Bull})] + E[(M - E(M))^2 \cdot \text{Prob}(\text{Bear})] \]

\[ = \{0.20 - 0.15\}^2 \cdot 0.5 + (0.05 - 0.15)^2 \cdot 0.5 \]

\[ = 0.00625. \]

The beta is, therefore, 0.00375/0.00625 = 0.6.

4. See Ferson and Schadt (1996), from which much of this article was drawn, for details on the fund classification.

5. Ferson and Schadt (1996) also used the CRSP value-weighted market index and a four-factor model with an expanded set of market indicators and obtained results similar to ours.

6. Similar variables have been discussed as stock market indicators since as early as 1920. Persand and Zimmermann (1993) cited a number of studies from the 1930s to the early 1960s that emphasize stock market predictability based on interest rates, dividend yields, and other cyclical indicators.

7. An alternative model of market timing is developed by Merton and Henriksson (1981). Ferson and Schadt (1996) developed a conditional version of the market-timing model of Merton and Henriksson. They found similar results for this model as for the Treynor-Mazuy model described here.

8. In fund portfolios are concentrated in large stocks, the patterns of beta variation are consistent with time variation in large stock betas, which are shown to be negatively correlated with expected market returns in the studies by Chan and Chen (1988), Ferson and Harvey (1991), and Jagannathan and Wang (1996).

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