Abnormal Returns to a Fundamental Analysis Strategy

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ABSTRACT: We examine whether the application of fundamental analysis can yield significant abnormal returns. Using a collection of signals that reflect traditional rules of fundamental analysis related to contemporaneous changes in inventories, accounts receivables, gross margins, selling expenses, capital expenditures, effective tax rates, inventory methods, audit qualifications, and labor force sales productivity, we form portfolios that earn an average 12-month cumulative size-adjusted abnormal return of 13.2 percent. We find evidence that the fundamental signals provide information about future returns that is associated with future earnings news. Moreover, a significant portion of the abnormal returns is generated around subsequent earnings announcements. These findings are consistent with the underlying focus of fundamental analysis on the prediction of earnings. Significant abnormal returns to the fundamental strategy are not earned after the end of one year of return cumulation, indicating little support for the idea that the signals capture information about multiple-year-ahead earnings not immediately impounded in price or about long-term shifts in firm risk. Additional analysis on a holdout sample suggests that the strategy continues to generate abnormal returns in a period subsequent to the introduction of the fundamental signals in the literature, and contextual analyses indicate that the strategy performs better for certain types of firms (e.g., firms with prior bad news).

Key Words: Fundamental analysis, Market efficiency, Stock returns, Contextual analysis.

Data Availability: All data are available from public sources.

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1. INTRODUCTION

We examine whether the application of fundamental analysis can yield significant abnormal returns. This question is motivated by growing evidence in the accounting and finance literature that prices fail to immediately reflect publicly available information, especially earnings news (Bernard and Thomas 1989; Sloan 1996). The exploitation of such “market mispricing” is often cited as a justification for engaging in fundamental analysis—a practice that relies heavily on the analysis of current and past financial statement data to identify when underlying firm value differs from prevailing market prices.

Our work begins where Lev and Thiagarajan (1993) (hereafter LT) and Abarbanell and Bushee (1997) (hereafter AB) leave off. LT introduce several empirical proxies, referred to as fundamental signals, that reflect relations in current accounting data that are purported to predict future earnings changes. The collection of signals, which includes information about changes in inventories, accounts receivables, gross margins, selling expenses, capital expenditures, effective tax rates, inventory methods, audit qualifications, and labor force sales productivity, represent traditional rules of fundamental analysis employed by professional financial analysts to predict future firm performance. LT demonstrate the value relevance of these signals by showing they are significantly associated, in the directions predicted, with stock returns calculated contemporaneously with disclosure of the signals.

AB test whether the signals’ association with contemporaneous returns can be explained by their ability to predict future earnings—an underlying premise of fundamental analysis. They present evidence that many of the fundamental signals are associated with subsequent actual earnings changes. They also show that analysts’ revisions of earnings forecasts subsequent to the signals’ disclosure underreact to information in the signals, leading to predictable forecast errors. Analyst underreaction suggests the possibility that contemporaneous stock price adjustment to the information in the signals may not be complete. In this paper, we carry out the next logical step in the analysis by devising an investment strategy based upon fundamental analysis that should yield abnormal returns as earnings are realized in the future if contemporaneous stock price reactions to the signals are incomplete. We show that an average 12-month cumulative size-adjusted abnormal return of 13.2 percent is earned on hedge portfolios formed on the basis of the decile ranks of the fundamental signals over the sample period 1974–1988.

We also perform tests to discriminate between mispricing as an explanation for observed abnormal returns to the strategy and alternative explanations, including the signals’ association with shifts in (or misestimation of) expected returns attributable to unknown risk factors and/or institutional obstacles to exploiting mispricing (Ball 1992). Our results indicate that abnormal returns are highly associated with the realization of one-year-ahead earnings changes, do not persist into the second year of the strategy, are unusually concentrated around the subsequent quarterly earnings announcements, and are unaffected by controls for Fama and French’s (1992) risk factors. These results suggest that “unaccounted for risk” is not a complete explanation for the success of the strategy. Similarly, the strategy appears to perform well when trading is restricted to large firms (ameliorating potential price pressure effects) and when short selling is eliminated. Moreover, optimal weights determined from our regressions indicate abnormal returns are not driven by extreme portfolio positions, adding support to the exploitability of the strategy.

Using these results and lessons from AB, we apply a refined version of our fundamental strategy on a hold-out sample that covers 1989–1993, a period subsequent to introduction of the fundamental signals in the accounting literature. Though the implementation of the strategy includes conservative elements, such as limiting trades in a firm’s security to no
more than once each year, investing in only large firms, and exploiting only contextual refinements that do not require forecasts of macroeconomic variables, we nevertheless find evidence that adherence to the strategy over several years can earn abnormal returns without generating large losses in any given year.

Our study contributes to the body of work that attempts to describe how current and past outputs of financial reporting systems translate into firm value, including Ohlson (1995) and Feltham and Ohlson (1995) who follow an analytical approach, and Ou and Penman (1989a, 1989b), Penman (1992), LT and AB who employ empirical methodologies. The relations between fundamental signals and contemporaneous price changes reported in prior empirical studies suggest that detailed information captured by accounting provides value-relevant information. The mere association between accounting information and contemporaneous prices, however, is not sufficient to pronounce the market efficient with respect to this information. To the extent that prices do not immediately impound all the information relevant to valuing a firm, our future return results suggest that some of the tools required to improve the efficiency of prices (or alternatively, exploit mispricing) may be found in the practice of fundamental analysis. Furthermore, our work identifies specific rules of fundamental analysis supported by straightforward economic reasoning that are not completely reflected in market prices. Thus, our work extends knowledge of relations between accounting numbers and firm value.

The next section provides a brief background of prior research related to the current study. In section III, we describe the accounting signals on which our fundamental strategy is based and the simple fundamental strategy we employ to construct annual hedge portfolios. Section IV reports the results of our empirical tests. Sensitivity tests are discussed in section V. We summarize our findings and conclude the paper in section VI.

II. RELATED RESEARCH

In this study, we build on prior research to test the possibility that abnormal stock returns can be earned using fundamental analysis. One condition for earning abnormal returns is that the information generated by a fundamental analysis predicts future economic variables that will eventually be priced by the market. Earlier work by LT introduces a collection of “fundamental signals” that reflect relations in current accounting data that are purported to predict future earnings changes. They demonstrate the value relevance of these signals by showing they are significantly associated, in the directions predicted, with stock returns calculated contemporaneously with the disclosure of the signals. AB find direct evidence that both future earnings and, to a lesser extent, analysts’ forecast revisions of future earnings are significantly associated with several of the signals over the sample period they examine. This direct evidence of a relation between individual signals and future earnings suggests that the observed association between contemporaneous returns and the fundamental signals reflects, in part, the signals’ ability to predict value-relevant information.

A second condition for earning abnormal returns using fundamental analysis is that the market temporarily underuses the information in the fundamental signals about future economic variables. AB present indirect evidence of this possibility by examining ex post analysts’ forecast errors. Their results reveal that analysts’ forecasts do not reflect, on a timely basis, all of the information about future earnings contained in the fundamental signals. The finding that relatively sophisticated analysts appear to underuse systematically the information in the fundamental signals when producing earnings forecasts raises the possibility that security prices also fail to reflect fully this information. Additional tests in AB suggest that contemporaneous stock prices reflect some of the information underused
by analysts in revising their forecasts of future earnings, but their tests cannot confirm whether all of the information in the signals is impounded immediately into price.\footnote{Abarbanell (1991) also shows that while analysts’ forecasts are positively related to prior stock returns, their forecasts do not fully reflect the information in price changes. Conversely, other evidence indicates that analysts are more efficient than the market in certain cases. For example, Abarbanell and Bernard (1992) present evidence that analysts’ earnings forecast errors cannot account entirely for mispricing in the form of post-earnings-announcement drift. This empirical evidence suggests that analysts’ forecast errors are not, at any given time, sufficient for price corrections and that price corrections are not sufficient for the errors in analysts’ forecasts. Even if all future price corrections could be completely explained by analysts’ \textit{ex post} earnings forecast errors (which are, in turn, explained, \textit{ex ante}, by information underutilized in the fundamental signals), the formulation of an implementable investment strategy to exploit this information is still required to demonstrate the magnitude and significance of trading profits.}

Our approach to identifying temporary mispricing using fundamental analysis emphasizes the prediction of future earnings, similar to Ou and Penman (1989a). However, our approach differs from theirs in two important ways. First, Ou and Penman (1989a) do not attempt to identify \textit{a priori} conceptual arguments for studying any of their explanatory variables or to test competing hypotheses for how they might be related to future earnings. They start with an exhaustive list of accounting ratios that have been used to describe firms’ leverage, activity and profitability, and rely on univariate associations between these variables and future earnings changes to limit the number of predictors on which to focus. Nevertheless, their approach retains a fairly large number of explanatory variables, some of which fail to inspire any obvious logic as to why they would be good predictors of future earnings. Moreover, the set of predictors changes from one short estimation period to the next without any follow-up analysis to explain why, making it both difficult to pinpoint the economic forces reflected in these variables and to exploit a consistent strategy across time. In contrast, we focus our strategy on a small number of variables specifically motivated by arguments for why these signals would be expected, \textit{a priori}, to be related to future earnings changes.\footnote{A potentially adverse consequence of ignoring conceptual links between the signals and future earnings or of failing to perform follow-up analyses is evident from the results reported by Holthausen and Larcker (1992). They report that the Ou and Penman (1989a) strategy for predicting the sign of earnings changes fails to earn abnormal returns in sample years subsequent to the original estimation periods. They also show that bypassing the earnings prediction step and moving to a direct prediction of future returns is an effective strategy for earning abnormal returns, suggesting the serious effects from overfitting data in the Ou and Penman (1989a) program. Though our less data-intensive approach to identifying earnings predictors may fail to consider all possible relevant accounting data, we are able to interpret our results in light of a set of hypothesized relations motivated by economic reasoning.} In cases where a hypothesized relation was opposite to that expected, we rely on the results of supplemental contextual analyses performed by AB to justify our attempts to exploit that observed relation in a subsequent period.

Second, Ou and Penman (1989a) combine their predictors into a single summary measure, Pr, obscuring the individual signals’ contribution to earning abnormal returns and limiting the extent of knowledge gained about fundamental analysis. By maintaining a focus on individual signals throughout our analysis, we can evaluate the robustness of each signals’ predictive power and explore contextual factors that influence their informativeness. We believe that such a systematic program of hypothesis development and directed empirical testing is a more effective approach to discriminating among alternative explanations for observed relations.

A common criticism of strategies that purport to exploit pricing anomalies is that they actually identify changes in expected returns brought on by shifts in unexplained risk factors (Ball 1992; Stober 1992). Though identification of shifts in firm risk through the practice of fundamental analysis is interesting and deserving of future research attention, if observed “abnormal” returns are solely attributable to a strategy’s ability to reflect changes in risk,
the traditional arguments for advocating such analyses would not be justified. Therefore, a second purpose of the study is to assess the extent to which the fundamental signals’ association with abnormal returns coincides with their ability to convey information about future earnings rather than shifts in risk.

Finally, the recent documentation of several instances in the accounting and finance literature where stock prices fail to immediately reflect publicly available information raises a question about the independence of our evidence from that previously reported pricing anomalies (Lakonishok et al. 1994; Sloan 1996). Many of the fundamental signals we study are comprised of working capital items, suggesting the possibility that returns to the fundamental strategy may be related to the market’s failure to recognize that the accrual component of earnings is of lower persistence than the cash flows component, a phenomenon documented by Sloan (1996). Robustness tests confirm that controls for Sloan’s accrual anomaly, as well as the book-to-market and size effects, do not impact our results. Thus, the strategy’s success appears to be independent of previously reported anomalies.

III. METHODOLOGY

The Fundamental Signals

We examine nine fundamental signals used by LT and AB as predictors of contemporaneous returns, future earnings and analysts’ forecast revisions. These signals are described in table 1. To simplify exposition, the signals have been defined to produce variables that are identical in magnitude to those created from the definitions in table 1 of both LT and AB, but of opposite signs. This table also summarizes the signals’ observed relations to both current returns and future earnings as reported by AB (adjusted for the sign change just described) for the sample period studied in this paper.

The percentage difference between sales and its expected value less an analogous measure for the value of inventory is denoted INV. When finished goods inventory increases faster than sales, it is conjectured to be bad news for earnings and vice versa. An increase (decrease) in the percentage change in gross margin relative to sales, GM, indicates an improvement (deterioration) in the firm’s terms of trade and, hence, expected operating performance. The labor force variable, denoted LF and calculated as the change in sales per employee, measures the effects of restructuring activities. Reductions in labor force for a given scale of operations are usually described in a positive light by analysts. The variable ETR measures the effective tax rate. It is intended to capture changes in the effective tax rate not attributable to permanent factors such as statutory rate changes. Thus, a decline (increase) in the effective tax rate indicates that earnings will not persist at current levels and this bodes poorly (well) for future economic performance. As seen in table 1, the evidence supports these signals’ hypothesized relations to future earnings and, with the exception of the LF signal, to contemporaneous returns.

The AR signal represents the change in accounts receivable relative to the change in sales. As defined in this paper, a decrease in the AR signal was expected to indicate cash collection difficulties and larger bad debts expenses in the future or, alternatively, an early warning of a sales slowdown. Contrary to expectation, table 1 reveals (as reported in AB) that the AR signal, as defined here, has an observed negative association with future earnings, suggesting that an expansion of accounts receivables relative to sales, on average, is

1 A recent “Heard on the Street” column in the Wall Street Journal, “Bloated Inventories at Retailers May Mean Trouble for Investors,” is representative of arguments made by analysts for interpreting a decrease in the inventory signal as bad news (Pulliam 1997). A detailed discussion of the potential information conveyed by the fundamental signals can be found in LT (192–198).
TABLE 1
Definitions of Fundamental Signals and Observed Empirical Relations Between Signals and Current Stock Returns and Future Earnings

<table>
<thead>
<tr>
<th>Signal</th>
<th>Measurementa</th>
<th>Observed Relation with Current Stock Returnsb</th>
<th>Observed Relation with One-Year-Ahead Earnings</th>
<th>Observed Relation with Long-Term Earnings Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory (INV)c</td>
<td>$\Delta$ Sales (12)d $- \Delta$ Inventory (78 or 3)</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Accounts Receivable (AR)</td>
<td>$\Delta$ Sales $- \Delta$ Accounts Receivable (2)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Capital Expenditures (CAPX)</td>
<td>$\Delta$ Firm CAPX (30) $- \Delta$ Industry CAPXc</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Gross Margin (GM)</td>
<td>$\Delta$ Gross Margin (12-41) $- \Delta$ Sales</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Selling and Administrative Expenses (S&amp;A)</td>
<td>$\Delta$ Sales $- \Delta$ S&amp;A (189)</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective Tax Rate (ETR)</td>
<td>$\left[ \frac{\text{ETR}<em>t - \left( \frac{1}{3} \sum</em>{i=1}^{3} \text{ETR}_{t-i} \right)}{\text{CHGEP}_t} \right]$</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>where $\text{ETR}_t = \frac{\text{TaxExpense(16)}}{\text{EBT(170 + 65)}}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earnings Quality (EQ)</td>
<td>1 for LIFO, 0 for FIFO or other (59)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit Qualification (AQ)</td>
<td>1 for Unqualified, 0 for Qualified or other (149)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor Force (LF)</td>
<td>$\left( \frac{\text{Sales}<em>t - \text{Sales}</em>{t-1}}{#\text{Employees}(29)} \right) / \left( \frac{\text{Sales}<em>{t-1}}{#\text{Employees}</em>{t-1}} \right)$</td>
<td>+</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a The $\Delta$ operator represents a percentage change in the variable from its average over the past two years; e.g., $\Delta$ Sales = [Sales$_t$ - $E$(Sales$_t$)]/$E$(Sales$_t$), where $E$(Sales$_t$) = (Sales$_{t-1}$ + Sales$_{t-2}$)/2. The variables are defined such that their expected relation with current stock returns and future earnings is positive, contrary to the definition of the signals used in Lev and Thiagarajan (1993) and Abarbanell and Bushee (1997), who define the signals to have negative relations.
b The empirical relations are based on a sample of 14,453 firms between 1974 and 1988.
c The Inventory variable is finished goods when available, total inventory otherwise.
d Numbers in parentheses represent Compustat item numbers.
e Industry Capital Expenditures were calculated by aggregating firm figures for all firms with the same two-digit SIC code.
f CHGEP$_t$ is the change in earnings per share between years $t-1$ and $t$, deflated by stock price at the end of year $t-1$. 
a leading sales and earnings indicator. Similarly, the CAPX signal, which was constructed to test the notion that it is good news for future earnings when firm-specific capital expenditures outpace industry average capital expenditures, yields results directly opposite to what was hypothesized.

Increases (decreases) in selling and administrative expenses relative to the percentage change in sales, denoted S&A, signal increases (decreases) in the indirect cost structure of the firm and, thus, decreases (increases) in future earnings. Two dummy variables are used to test general notions of earnings quality. The LIFO dummy variable, EQ, quantifies the belief that LIFO-based earnings are of higher quality than FIFO-based earnings, indicating greater sustainable earnings in the future. Audit qualifications, denoted AQ, capture the idea that firms unable to avoid qualification will have lower sustainable earnings in the future. Table 1 shows there is little empirical support for these hypotheses to be found in the signals' relations to returns and future earnings over the period we examine.

**Hedge Portfolio Construction and the Fundamental Strategy**

We wish to determine if the fundamental signals described above contain information not immediately impounded in price. Evidence that the market underreacts to accounting information has been apparent in the literature since Ball and Brown (1968) and consistently supported in subsequent research; see e.g., Bernard and Thomas (1989, 1990) and Ou and Penman (1989a, 1989b). In addition, AB report that analysts' forecasts appear to underreact, specifically, to the information in the fundamental signals we examine in this study. Therefore, we form an investment strategy assuming that the market underreacts to the information in the signals and determine the abnormal returns to such a strategy. Furthermore, because all of the fundamental signals are motivated by their implications for future earnings, we predict that subsequent prices will capture the information in the fundamental signals as actual earnings are revealed. We examine post-signal-announcement return cumulation periods of up to 36 months for evidence of price corrections.

The strategy we implement relies on the construction of zero-investment portfolios (Fama and Macbeth 1973). Portfolios are formed as follows:

1. For each of the years 1974–1988, select firms with December fiscal year-ends that announce their earnings (according to Compustat) prior to March 31.5
2. Compute the values of the fundamental signals, contemporaneous earnings change and beta for each firm.
3. Calculate the scaled decile rank for each variable described above (except the dummy variables AQ and EQ) by ranking the values of the variables into deciles (0,9) each year and dividing the decile number by nine so that each signal observation takes on a value ranging between zero and one. The AQ and EQ signals retain their values of zero or one.
4. Determine the weights to be assigned to each security in an annual portfolio by means of the following regression:

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4 Abarbanell and Bernard (1992, 1185) point out that though there is evidence of overreaction in prices, it has not been shown to be associated with earnings or other accounting information.

5 If a firm changes its fiscal year-end during the sample period, we drop only the observation from the year in which the change occurred. This screen avoids the distorting effect of short fiscal years on the computation of the fundamental signal variables.
\[ \text{BHAR}(+m)_{it} = a_0 + \sum_{k=1}^{q} a_k \text{RSIGNAL}_{k, it} + a_{10} \text{RBETA}_{it} + a_{11} \text{RCEPS}_{it} + e_{it} \]  

(1)

where:

- \( \text{BHAR}(+m)_{it} \) is the size-adjusted, buy-and-hold abnormal return of firm \( i \) cumulated from the fourth month after the fiscal year-end of year \( t \) through \( m \) subsequent months;
- \( \text{RSIGNAL}_{k, it} \) is the scaled decile rank of fundamental signal \( k \) for firm \( i \) in year \( t \);
- \( \text{RBETA}_{it} \) is the scaled decile rank of beta for firm \( i \) at the end of fiscal year \( t \). Betas are calculated by regressing monthly firm returns on a value-weighted market index over a prior 36-month estimation period; and
- \( \text{RCEPS}_{it} \) is the scaled decile rank of the change in earnings between years \( t - 1 \) and \( t \), deflated by stock price at the end of year \( t - 1 \), for firm \( i \).

An individual coefficient represents the abnormal return to a zero-investment portfolio optimally formed to exploit the information in the associated independent variable that is orthogonal to the information in the other independent variables. In other words, the weighted average of the associated independent variable (measured in scaled decile ranks) is one and the weighted averages of the other independent variables are zero. These portfolios are constructed with OLS-derived weights for each independent variable for each firm that are given by the rows of the matrix \( (X'X)^{-1}X' \), where \( X = [1, \text{RSIGNAL}_k, \text{RBETA}, \text{RCEPS}] \). Because the portfolio weights do not require knowledge of the future abnormal returns, we are investigating implementable investment strategies.

The inclusion of an intercept in equation (1) ensures that the portfolio weights for the slope coefficients sum to zero, implying zero investment portfolios (see Fama and Macbeth (1973) for details). The inclusion of \( \text{RCEPS} \) implies that abnormal returns to a signal can be interpreted as arising from information about future economic conditions that are not reflected in current earnings.\(^6\) Finally, because we have included \( \text{RBETA} \) in the regressions, this implies all other regression coefficients can be interpreted as abnormal returns to zero-beta portfolios.\(^7\)

Our strategy involves positions in only December fiscal-year-end firms that have reported results by April to allow for the determination of the portfolio weights from \( (X'X)^{-1}X' \) used to determine investment positions. Firms receiving negative weights are sold short and firms with positive weights are purchased. The long and short positions are

\(^6\) Both \( LT \) and \( AB \) include contemporaneous earnings changes in their price association tests to determine if the fundamental signals have incremental explanatory power for contemporaneous returns. Because some studies report evidence of market underreaction to current year's earnings news (Klein 1990), we incorporate contemporaneous earnings changes as a control variable.

\(^7\) The results reported below are similar when actual betas, rather than their scaled decile ranks, are included in the regressions.
closed after specified common periods have elapsed (e.g., one year). The abnormal return to our fundamental strategy is the sum of the coefficients on the fundamental signals.8

Note that AB reports the AR and CAPX signals, as defined in this study, are actually negative predictors of contemporaneous returns and one-year-ahead earnings over a period covering the second half of the 1970s and all of the 1980s, suggesting that the ranked values of these variables should be reversed if the strategy is to exploit underreaction. However, because these relations were verified using data from the same sample period we employ for testing our strategy, we avoid introducing hindsight biases by adhering to the relations originally hypothesized. This feature of our design works against finding significant underreaction in the portfolios we construct. We take advantage of the empirical relations reported by AB in subsequent tests that evaluate the fundamental strategy in the early 1990s.

Data and Sample Selection

Data used to compute the fundamental signals are taken from the 1995 Compustat PST Active and Research files. The definitions in table 1 include a description of the Compustat data items required to calculate the fundamental signals. The yearly distributions of fundamental signal values are truncated according to the program outlined in LT (199) to eliminate extreme values caused by small denominators. The source of return data was the 1995 CRSP daily NYSE/AMEX File. Our main sample includes observations from 1974–1988. Our holdout sample covers the 1989–1993 period.

To avoid the possibility of survivorship biases, we include data from the Compustat Research file to calculate the fundamental signals for delisted firms. Return data for delisted-firm observations are identified through historical CUSIPS on CRSP. Requiring a complete set of fundamental variables leaves a sample size for 1974–1988 of 16,538, with yearly numbers of observations between 815 and 1,352. No single variable accounts for a significant diminution of sample size. Limiting our tests to December 31 fiscal-year-end firms with Compustat earnings announcements dates on before March 31 reduces the total sample size to 9,764, ranging between 469 and 785 observations in each year.

Daily size-adjusted abnormal returns are cumulated through the third month of the following year. To calculate the abnormal returns, we compound the daily returns to a security over given cumulation periods and then subtract the mean daily compounded return of the value-weighted firm-size decile to which the security belongs over the same period.9 That is:

\[
BHAR(\pm m), t = \prod_{j=1}^{M} (1 + R_{ij}) - \prod_{j=1}^{M} (1 + SAR_{ij})
\]  

(2)

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8 The portfolio weights determined by the regressions in equation (1) are optimal assuming a linear relationship between the dependent and independent variables. Nevertheless, we replicated all of the tests in the paper employing hedge portfolios formed by subtracting the average return from buying securities in the highest decile of the distributions of each fundamental signal from the return earned by selling securities in the lowest decile of the distribution of each fundamental signal. These portfolio returns were summed to obtain the return to the strategy. The method is analogous to that used by Sloan (1996). After controlling for the contemporaneous earnings change by calculating the hedge portfolio returns within earnings change deciles, our results were similar to those generated from the regression approach in equation (1).

9 The use of size-adjusted returns does not ensure a perfect control for size. Bernard et al. (1997, 103) argue that this control can "leave traces of the size effect that could influence the results in unpredictable ways." Our tests were re-estimated using raw returns and market-adjusted returns (raw returns less a value-weighted index). Results for these measures were uniformly stronger than those reported below for size-adjusted returns. Thus, it appears that our results are not induced by the manner in which abnormal returns are calculated.

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where $R_{ij}$ represents the return to security $i$ on day $j$, $SAR_{kj}$ is the mean return on day $j$ to the size portfolio, $k$, to which security $i$ belongs, and $M$ is the number of trading days in the $m$ month cumulation period. For firms that delist, we include the delisting return and, thereafter, the returns for the firm are reinvested in the size portfolio to which it belongs (implying zero abnormal returns for the remainder of the year). For long-window return results, the portfolios are re-formed at the end of each 12-month period on the basis of the original signal disclosure, using only those firms still remaining in the data set.

IV. EMPIRICAL RESULTS

Returns to the Portfolio Strategy

Column 1 of table 2, panel A presents the average portfolio returns to the fundamental strategy over the 1974–1988 period for cumulation periods ending within the first 12 months following the disclosure of the fundamental signals. Yearly portfolio returns within each cumulation period were obtained from the regression given in equation (1) by summing the individual coefficients on the nine signals. We include the number of years that the portfolio returns are positive (and significant) and results of t-tests of the significance of the portfolio mean returns over the 15 years. The t-statistic on the average return is positive and highly significant for all cumulation periods after the sixth month of cumulation. The mean return peaks after 11 months and levels off at 13.2 percent after one year. Returns to the strategy after 12 months of cumulation are positive in 10 of 15 individual years and significantly different from zero at or below the five percent level in five of these years. None of the negative abnormal returns were large or significant in the five years in which the strategy failed.10

To provide a benchmark for assessing the magnitude of returns to future earnings news, we rank the sample firms’ earnings changes from the year subsequent to the fundamental signal disclosure into deciles, and scale the decile numbers to take on values between zero and one. We then run the regression in equation (3) below and interpret the slope coefficients as a portfolio return in the manner described earlier.

$$BHAR(+m)_{it} = \gamma_0 + \gamma_1BETA_{it} + \gamma_2RCEPS_{it+1} + e_{it}$$

(3)

where:

$RCEPS_{it+1} =$ the scaled decile rank of the change in earnings between years $t$ and $t + 1$, deflated by stock price at the end of year $t - 1$, for firm $i$ (other terms are defined previously).

Column 2 of table 2, panel A presents the returns to this perfect foresight (with respect to one year-ahead-earnings) portfolio for increasingly longer cumulation periods. The size-adjusted return to the portfolio is approximately 13 percent at the end of one quarter of cumulation, increases to 23 percent after six months, and reaches 42 percent by the end of one year. The perfect foresight returns in the first year are comparable to those reported by Beaver et al. (1979) for a combined long position in the top two (out of 25) ranked earnings change portfolios and a short position in the bottom two portfolios. Comparing these perfect foresight abnormal returns in column 2 to those generated by the fundamental strategy

10 The average adjusted $R^2$ for this regression is 2.9 percent. The average adjusted $R^2$ for a model containing only the current earnings change and beta is 1.3 percent. Average adjusted $R^2$s for subsequent regressions are similar in magnitude and are not reported.
TABLE 2
Mean Size-Adjusted Portfolio Returns to Fundamental Signal Strategy and to Perfect Foresight Strategy

Fundamental Signal Strategy:

\[ BHAR(+m)_{p,t} = \sum_{i=1}^{\gamma} \hat{\alpha}_i , \text{ where } \hat{\alpha}_i \text{ is estimated from } BHAR(+m)_{i,t} = \alpha_0 + \sum_{i=1}^{\gamma} \alpha_{RSIGNAL_{i,t}} + \alpha_{RBETA_{i,t}} + \alpha_{RCEPS_{i,t}} + e_{i,t} \]

Perfect Foresight Strategy:

\[ BHAR(+m)_{p,t} = \hat{\gamma}_i , \text{ where } \hat{\gamma}_i \text{ is estimated from } BHAR(+m)_{i,t} = \gamma_0 + \gamma_{RBETA_{i,t}} + \gamma_{RCEPS_{i,t}} + e_{i,t} \]

Panel A: Mean Size-Adjusted Portfolio Returns to Strategies

<table>
<thead>
<tr>
<th>Cumulation Period</th>
<th>Overall Mean*</th>
<th>Positive Years</th>
<th>Overall Mean*</th>
<th>Positive Years</th>
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<tbody>
<tr>
<td>BHAR(+1)_p</td>
<td>0.032**</td>
<td>10 (6)</td>
<td>0.056**</td>
<td>15 (15)</td>
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<td>BHAR(+2)_p</td>
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<td>0.089**</td>
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<td>BHAR(+3)_p</td>
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<td>0.184**</td>
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<td>11 (7)</td>
<td>0.232**</td>
<td>15 (15)</td>
</tr>
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<td>11 (5)</td>
<td>0.273**</td>
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</tr>
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<td>0.092**</td>
<td>11 (6)</td>
<td>0.333**</td>
<td>15 (15)</td>
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<td>0.350**</td>
<td>15 (15)</td>
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<td>BHAR(+10)_p</td>
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<td>0.367**</td>
<td>15 (15)</td>
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<td>0.400**</td>
<td>15 (15)</td>
</tr>
<tr>
<td>BHAR(+12)_p</td>
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<td>10 (5)</td>
<td>0.419**</td>
<td>15 (15)</td>
</tr>
</tbody>
</table>

(Continued on next page)
TABLE 2 (Continued)

Panel B: Mean Coefficients on Fundamental Signals (t-statistics in parentheses)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Intercept</th>
<th>RINV</th>
<th>RAR</th>
<th>RCAPX</th>
<th>RGM</th>
<th>RS&amp;A</th>
<th>RETR</th>
<th>EQ</th>
<th>AQ</th>
<th>RLF</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHAR(+6),i</td>
<td>-0.031</td>
<td>0.019</td>
<td>-0.000</td>
<td>-0.014</td>
<td>0.012</td>
<td>0.015</td>
<td>0.001</td>
<td>0.002</td>
<td>0.019</td>
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</tr>
<tr>
<td>(-1.578)</td>
<td>(2.063)*</td>
<td>(-0.015)</td>
<td>(-1.709)</td>
<td>(1.304)</td>
<td>(1.363)</td>
<td>(0.116)</td>
<td>(0.260)</td>
<td>(0.997)</td>
<td>(1.113)</td>
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</tr>
<tr>
<td>BHAR(+12),i</td>
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<td>0.038</td>
<td>0.020</td>
<td>-0.040</td>
<td>0.024</td>
<td>0.038</td>
<td>-0.017</td>
<td>0.022</td>
<td>0.036</td>
<td>0.011</td>
</tr>
<tr>
<td>(-2.225)</td>
<td>(2.372)*</td>
<td>(1.622)</td>
<td>(-2.914)‡</td>
<td>(1.857)*</td>
<td>(2.069)*</td>
<td>(-1.468)</td>
<td>(1.599)</td>
<td>(1.589)</td>
<td>(0.610)</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at or below the 0.05 level using a one-tailed test.
** Significant at or below the 0.01 level using a one-tailed test.
‡ Mean coefficient is more than two standard deviations away from zero.

BHAR(±m),i, is the m-month portfolio return, calculated from the sum of the estimated coefficients on the scaled decile ranks of the fundamental signals in the above regression. BHAR(±m),i, represents m-month buy-and-hold size-adjusted returns for firm i compounded from the fourth month after the end of fiscal year t (all firms have December fiscal year-ends). Size-adjusted returns are calculated by subtracting the buy-and-hold return on a portfolio of firms in the same size decile as a given firm (as of the beginning of the year) from the given firm’s raw buy-and-hold return. RSIgnal,k,i, represents the scaled decile rank of signal k, k = 1 to 9, for firm i in year t (see table 1 for signal definitions). RCEPS,i (RBEAt,i) is the scaled decile rank of the change in earnings (market-model beta) for firm i in year t.

The overall mean portfolio return is the average of the 15 yearly portfolio returns calculated from 1974 to 1988. Significance tests are based on a standard error calculated from the distribution of the individual yearly coefficients. The total sample size is 9,764 firm-years, with the yearly sample sizes ranging between 469 and 785.

This column gives the number of times the yearly portfolio return is positive. The number of times the yearly portfolio return is significantly greater than zero at or below the 0.10 level using a one-tailed t-test is given in parentheses.

The mean coefficient is calculated from 15 yearly regressions from 1974 to 1988. The t-statistic is calculated as the ratio of the mean coefficient to a standard error calculated from the distribution of the individual yearly coefficients.
portfolios reported in column 1, we see that the latter returns are roughly 30 percent of the former returns throughout the first year of the strategy.

**Returns to the Individual Fundamental Signals**

Panel B of table 2 reports the mean regression coefficients and t-statistics for the scaled decile rank values of the fundamental signals for 6- and 12-month intervals subsequent to the disclosure of the fundamental signals. The mean coefficients of the RINV, RGM and RS&A signals are positive and significant after one year, the first reaching significance after six months of return cumulation. The results reported by AB support the hypothesis that these fundamental signals are related to contemporaneous returns as hypothesized over the sample period examined in this study. Therefore, the relations we observe between subsequent returns and these signals indicate a market underreaction to the information that begins to be resolved after the signals are disclosed and continues over the period that next year’s earnings are revealed.

The sign of the mean RCAPX signal coefficient is negative and over two standard deviations from zero, opposite to what would be predicted based on analysts’ pronouncements. We note that AB report that, over the same sample period, the RCAPX signal is also associated with contemporaneous returns and one-year-ahead earnings in directions opposite to what had been hypothesized. This evidence indicates that when the average firms’ capital expenditures are above (below) an industry benchmark this actually represents bad (good) news. In view of this fact, the sign and magnitude of the RCAPX coefficient in the future returns regressions reported in table 2, panel B are consistent, once again, with market underreaction to the earnings information communicated by this variable.

**Association Between the Abnormal Returns to the Fundamental Strategy and Future Earnings**

AB report evidence that the fundamental signals’ relation to contemporaneous returns can be partially attributed to their ability to predict one-year-ahead earnings, indicating market recognition of their forward-looking nature. If price corrections take place in response to the resolution of short-run earnings information that was predictable from the fundamental signals, a large share of abnormal returns to the strategy should be associated with one-year-ahead earnings changes. If abnormal returns are observed but not related to the revelation of earnings information, this would be inconsistent with the existence of temporary mispricing and suggest that other explanations, such as mismeasurement of firm risk, may be responsible for the apparent mispricing documented in table 2.

In this section, we attempt to gauge how much of the future abnormal returns to the fundamental strategy reported in table 2 are associated with one-year-ahead earnings changes. Our approach requires a decomposition of the abnormal returns into two components. The first component represents the returns associated with actual one-year-ahead earnings changes. A relation between this component and the fundamental signals would be consistent with the existence of predictable price corrections based on the realization of short-term earnings. We calculate this component for each year/return cumulation interval by multiplying the scaled decile ranks of one-year-ahead earnings changes by the slope

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11 The t-tests are based on the ratio of the mean fundamental signal coefficients to a standard error calculated from the distribution of individual yearly coefficients. This test overcomes bias in standard errors caused by cross-sectional correlation among the observations within a year (see Bernard 1987).

12 In subsequent robustness tests, we also attempt to distinguish mispricing from risk as an explanation for abnormal returns by examining three-day quarterly earnings announcement periods for unusual return concentrations and by examining abnormal returns to the strategy when holding positions through a second year.
coefficient estimated from equation (3). This yields one-year-ahead “earnings-based” firm abnormal returns for each year/return cumulation period combination, denoted $\text{EBHAR}^{(m)}_{it}$ (i.e., $\text{EBHAR}^{(m)}_{it} = \hat{\gamma}_2 \cdot \text{RCEPS}_{it+1}$). The difference between the firm’s total abnormal returns and earnings-based returns for a given year/return cumulation period, denoted $\text{OBHAR}^{(m)}_{it}$, represents the abnormal returns to other factors (i.e., $\text{OBHAR}^{(m)}_{it} = \text{BHAR}^{(m)}_{it} - \text{EBHAR}^{(m)}_{it}$). A significant relation between these returns and the fundamental signals would be consistent with price corrections to the long-term earnings implications of the realization of short-term earnings or with evidence of the signals’ ability to reflect shifts in risk and/or mismeasurement of expected returns.

Panel A of table 3 presents the decomposition of the average size-adjusted returns to the portfolio strategy for cumulation periods beginning four months after the signal values are realized. The total returns to the strategy reported earlier are included in column 1 to facilitate comparison. While the earnings-based abnormal return from the fundamental strategy rises over the year, it achieves a level of only 1.2 percent for the period over which the subsequent year’s earnings are revealed to the market. Although 11 of 15 sample years produce positive earnings-based abnormal returns, only two are individually significant. Two of the four negative abnormal returns are significant.

The return directly associated with one-year-ahead earnings changes only represents approximately ten percent of the total abnormal return to the portfolios formed on the fundamental strategy. At first glance, this result appears less consistent with the strategy capturing price corrections associated with the revelation of short-term earnings than it is with the possibility that abnormal returns to the strategy are attributable to changes or misestimation of firm risk. However, this appearance is misleading based on the evidence in panel B of table 3. Here we present the individual coefficients from regressing the $\text{EBHAR}^{(m)}_{it}$ and $\text{OBHAR}^{(m)}_{it}$ components of total returns on the scaled decile ranks of the fundamental signals.

The key result in panel B of table 3 is that the RAR and RCAPX earnings-based returns are both negative and over two standard deviations from zero in the first year of the strategy. Given the findings of AB, who report that both signals are associated with contemporaneous returns and one-year-ahead earnings changes in the direction opposite to what was hypothesized, the results are consistent with underreaction to one-year-ahead-earnings news. However, because the strategy is implemented based on the hypothesized relations between these signals and earnings, these portfolios actually reduce the total return to the strategy and understate the percentage of the return that is associated with future earnings changes. In contrast, the RINV and RETR signals are reliably positive and increasing in each cumulation period of the first year of the strategy, consistent with findings in AB that both variables are positive predictors of one-year-ahead earnings changes. The results for these four variables strongly indicate underreaction to the information in the signals that is corrected as next year’s earnings are revealed.

The RS&A and RGM signal portfolios also contribute significant abnormal returns to the strategy. Moreover, AB reports these signals are also associated with one-year-ahead earnings in the directions hypothesized. Thus, as in the cases of the RINV and RETR signals, we expected to find evidence of a significant earnings-based returns, indicating a

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13 AB provides evidence from contextual analyses that the observed relation between CAPX and future earnings is driven by prior bad-news firms suggesting that firms that have fallen behind industry competitors may be attempting to catch up with major acquisition programs. The observed relation between AR and future earnings is driven by prior and expected good-news firms which supports the “sales momentum hypothesis” that receivables balances indicate the level of sales for the last few weeks of a quarter and, hence, expected sales and earnings for the next year (Stober 1993).
TABLE 3
Mean Size-Adjusted Portfolio Returns to Fundamental Signal Strategy:
Total Portfolio Returns Decomposed into Returns Based on One-Year-Ahead Earnings and Returns Based on Other Factors

\[
BHAR(\pm m)_{p,t} = \sum_{i=1}^{\infty} \hat{\alpha}_i, \text{ where } \hat{\alpha}_i \text{ is estimated from } BHAR(\pm m)_{i,t} = \alpha_{\mu} + \sum_{i=1}^{\infty} \alpha_i R\text{SIGNAL}_{a,i} + \alpha_i R\text{BETA}_{a,i} + \alpha_i R\text{CEPS}_{a,i} + e_{i,t}
\]

Panel A: Mean Size-Adjusted Portfolio Returns to Strategy

<table>
<thead>
<tr>
<th>Cumulation Period</th>
<th>Overall Meana</th>
<th>Positive Yearsd</th>
<th>Overall Mean</th>
<th>Positive Years</th>
<th>Overall Mean</th>
<th>Positive Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHAR(+1)ₚ</td>
<td>0.032**</td>
<td>10 (6)</td>
<td>0.001</td>
<td>11 (2)</td>
<td>0.032**</td>
<td>12 (7)</td>
</tr>
<tr>
<td>BHAR(+2)ₚ</td>
<td>0.011</td>
<td>10 (3)</td>
<td>-0.001</td>
<td>11 (2)</td>
<td>0.012</td>
<td>10 (3)</td>
</tr>
<tr>
<td>BHAR(+3)ₚ</td>
<td>0.017</td>
<td>10 (4)</td>
<td>0.001</td>
<td>11 (2)</td>
<td>0.016</td>
<td>10 (4)</td>
</tr>
<tr>
<td>BHAR(+4)ₚ</td>
<td>-0.006</td>
<td>8 (4)</td>
<td>0.004</td>
<td>11 (2)</td>
<td>-0.011</td>
<td>8 (4)</td>
</tr>
<tr>
<td>BHAR(+5)ₚ</td>
<td>0.032</td>
<td>10 (5)</td>
<td>0.006</td>
<td>11 (2)</td>
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<td>11 (7)</td>
<td>0.008</td>
<td>11 (2)</td>
<td>0.056</td>
<td>10 (7)</td>
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<tr>
<td>BHAR(+7)ₚ</td>
<td>0.063*</td>
<td>11 (5)</td>
<td>0.008</td>
<td>11 (2)</td>
<td>0.055*</td>
<td>11 (6)</td>
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<tr>
<td>BHAR(+8)ₚ</td>
<td>0.092**</td>
<td>11 (6)</td>
<td>0.013</td>
<td>11 (2)</td>
<td>0.079**</td>
<td>12 (6)</td>
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<td>BHAR(+9)ₚ</td>
<td>0.132**</td>
<td>11 (9)</td>
<td>0.013</td>
<td>11 (2)</td>
<td>0.119**</td>
<td>11 (7)</td>
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<tr>
<td>BHAR(+10)ₚ</td>
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<td>10 (7)</td>
<td>0.013</td>
<td>11 (2)</td>
<td>0.110*</td>
<td>10 (6)</td>
</tr>
<tr>
<td>BHAR(+11)ₚ</td>
<td>0.142**</td>
<td>10 (8)</td>
<td>0.013</td>
<td>11 (2)</td>
<td>0.129*</td>
<td>10 (6)</td>
</tr>
<tr>
<td>BHAR(+12)ₚ</td>
<td>0.132**</td>
<td>10 (5)</td>
<td>0.012</td>
<td>11 (2)</td>
<td>0.119*</td>
<td>10 (5)</td>
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</table>

(Continued on next page)
## TABLE 3 (Continued)

**Panel B: Mean Coefficients on Fundamental Signals (t-statistics in parentheses)**

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Intercept</th>
<th>RINV</th>
<th>RAR</th>
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<td>-0.014</td>
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<td>-0.000</td>
<td>0.008</td>
<td>0.000</td>
<td>0.006</td>
<td>0.003</td>
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<td></td>
<td>(-10.803)*</td>
<td>(6.958)*</td>
<td>(-3.928)*</td>
<td>(6.653)*</td>
<td>(-0.541)*</td>
<td>(-0.106)*</td>
<td>(2.406)*</td>
<td>(0.053)*</td>
<td>(1.498)*</td>
<td>(1.153)*</td>
</tr>
<tr>
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<td>0.038</td>
<td>-0.025</td>
<td>-0.024</td>
<td>-0.002</td>
<td>0.000</td>
<td>0.012</td>
<td>-0.001</td>
<td>0.009</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>(-8.888)*</td>
<td>(7.051)*</td>
<td>(-3.884)*</td>
<td>(-6.520)*</td>
<td>(-0.220)*</td>
<td>(0.051)*</td>
<td>(2.291)*</td>
<td>(-0.165)*</td>
<td>(1.298)*</td>
<td>(1.293)*</td>
</tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OBHAR(+6),i</td>
<td>0.093</td>
<td>-0.003</td>
<td>0.014</td>
<td>-0.000</td>
<td>0.014</td>
<td>0.016</td>
<td>-0.007</td>
<td>0.002</td>
<td>0.013</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>(4.090)*</td>
<td>(-0.327)*</td>
<td>(1.928)*</td>
<td>(-0.036)*</td>
<td>(1.523)*</td>
<td>(1.468)*</td>
<td>(-0.994)*</td>
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<td>OBHAR(+12),i</td>
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<td>0.000</td>
<td>0.045</td>
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<td>0.038</td>
<td>-0.029</td>
<td>0.023</td>
<td>0.027</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(2.911)*</td>
<td>(0.004)*</td>
<td>(3.538)*</td>
<td>(-1.179)*</td>
<td>(1.794)*</td>
<td>(1.776)*</td>
<td>(-2.209)*</td>
<td>(1.873)*</td>
<td>(1.232)*</td>
<td>(0.286)*</td>
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</tbody>
</table>

* Significant at or below the 0.05 level using a one-tailed test.
** Significant at or below the 0.01 level using a one-tailed test.
† Mean coefficient is more than two standard deviations away from zero.
* See Table 2 for definitions of variables in the regression.
* Total returns for each firm are split into the portion of returns due to one-year-ahead earnings ("earnings-based returns") and the portion of returns due to other factors ("other factor returns") in the following manner. Total returns are regressed on the scaled decile rank of one-year-ahead earnings changes, and the estimated coefficient is multiplied by the scaled decile rank of those earnings changes for each firm i to yield the earnings-based returns (EBHAR(+m),i). The remaining portion of returns, which includes the intercept and the firm-specific error term from the regression, is denoted as the returns due to other factors (OBHAR(+m),i).
* The overall mean portfolio return is the average of the 15 yearly portfolio returns calculated from 1974 to 1988. Significance tests are based on a standard error calculated from the distribution of the individual yearly coefficients. The total sample size is 9,764 firm-years, with the yearly sample sizes ranging between 469 and 785.
yect This column gives the number of times the yearly portfolio return is positive. The number of times the yearly portfolio return is significantly greater than zero at or below the 0.10 level using a one-tailed t-test is given in parentheses.
* The mean coefficient is calculated from 15 yearly regressions from 1974 to 1988. The t-statistic is calculated as the ratio of the mean coefficient to a standard error calculated from the distribution of the individual yearly coefficients.
price correction coinciding with the revelation of next year’s earnings. Surprisingly, this result was not observed. Instead the abnormal returns to these signal portfolios appear to be driven by other-factor returns suggesting that these signals reflect “unaccounted for risk” or information about multiple-year ahead earnings.\textsuperscript{14} Table 4 restates the total, earnings-based and other factor returns generated from portfolio positions taken for each fundamental signal based on its observed average relation to future earnings rather than the relation subscribed to by analysts (i.e., the signs on the RCAPX and RAR signals are reversed). Total returns increase to 17.2 percent and are positive (significant) in 12 (7) of 15 years after 12 months of cumulation under this alternative strategy, with no instances of significant negative returns in the years the strategy failed.

Clearly, reliance on the average relations between the fundamental signals and future earnings over the sample period introduces hindsight bias into the alternative strategy, implying that the strategy was not implementable.\textsuperscript{15} We stress, however, that the primary purpose of this step in the analysis was to shed light on the nature and timeliness of information conveyed to the market through the fundamental signals. This point is highlighted in columns 2 and 3 of table 4 which restate the results of the decomposition test when returns to the fundamental strategy are determined based on the actual sign of the average relations between the fundamental signals and future earnings. Earnings-based returns are positive in 14 of 15 years for all cumulation periods in the first year and are significant in 13 years. Depending on the cumulation period considered, the abnormal return to the other factor component is positive in the range of eight to 12 years and significant in approximately one-half the cases.

Basing the strategy on the signals’ observed average relation to future earnings leads to a substantial increase in the relative percentage of the total return attributable to one-year-ahead earnings. In fact, earnings-based returns account for 65 percent of the total returns to the portfolio strategy after 12 months, suggesting that most of the underreaction to the accounting information is associated with one-year-ahead earnings changes. While some of this explanatory power may also be a reflection of the signals’ correlation with risk changes and/or misestimation of expected returns, it is difficult to understand why this association would not have a similar impact on other factor returns which, in principle, should capture persistent effects applicable to subsequent years.

\textsuperscript{14} Potential explanations for the lack of significance of the earnings-based returns to these signals are that the empirical representations of the economic reasoning underlying the GM and S&A signals are not specified in a manner that would capture the earnings information contained in them, or that the market impounds all of the one-year-ahead information in these signals. Because there appears to be very little slippage between the underlying economic reasoning behind the GM and S&A signals and their empirical representation, we doubt the descriptive validity of the first explanation. The second explanation appears to be more plausible though it requires the market to be efficient with respect to the one-year-ahead earnings information in the GM and S&A signals, but not the INV, ETR, CAPX and AR signals. The market may efficiently process the information in one signal but not in another because of differential complexity involved in extracting the information in the signal. For example, Plumlee (1997) indicates that the level of complexity in calculating the effective tax rate impacts the magnitude of analysts’ tax rate and earnings forecast errors.

\textsuperscript{15} Another strategy we analyzed eliminates the need to know the signals’ average relation over the entire sample period before forming portfolios. The strategy is executed by forming portfolios every year based on the sign of each fundamental signal’s relation to contemporaneous returns. Like the original strategy, this one exploits the potential for underreaction by assuming that whatever the market’s initial response to the signals, it did not completely impound the information into contemporaneous returns, implying positions analogous to those taken in post-earnings-announcement drift strategies. This strategy yields very similar results to those just described for the alternative strategy.
TABLE 4
Mean Size-Adjusted Portfolio Returns to Alternative Fundamental Signal Strategy*
Total Portfolio Returns Decomposed into Returns Based on One-Year-Ahead Earnings
and Returns Based on Other Factors

$$BHAR(+m)_{t} = \sum_{k=1}^{g} \delta_{k}$$ where $\delta_{k}$ is estimated from

$$BHAR(+m)_{t} = \alpha_{0} + \sum_{k=1}^{g} \alpha_{k}RSIGMAk_{t} + \alpha_{R}RBETA_{t}$$

$$+ \alpha_{R}RCEPS_{t} + e_{t}$$

<table>
<thead>
<tr>
<th>Cumulation Period</th>
<th>Overall Returns</th>
<th>Earnings Based Returns</th>
<th>Other Factor Returns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall Mean*</td>
<td>Positive Years*</td>
<td>Overall Mean</td>
</tr>
<tr>
<td>BHAR (+1)_{p}</td>
<td>0.052**</td>
<td>14 (7)</td>
<td>0.015**</td>
</tr>
<tr>
<td>BHAR (+2)_{p}</td>
<td>0.043*</td>
<td>11 (7)</td>
<td>0.023**</td>
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<tr>
<td>BHAR (+3)_{p}</td>
<td>0.047</td>
<td>11 (5)</td>
<td>0.034**</td>
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<td>BHAR (+4)_{p}</td>
<td>0.034</td>
<td>10 (7)</td>
<td>0.049**</td>
</tr>
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<td>BHAR (+5)_{p}</td>
<td>0.074*</td>
<td>12 (8)</td>
<td>0.055**</td>
</tr>
<tr>
<td>BHAR (+6)_{p}</td>
<td>0.092*</td>
<td>12 (9)</td>
<td>0.063**</td>
</tr>
<tr>
<td>BHAR (+7)_{p}</td>
<td>0.106**</td>
<td>13 (8)</td>
<td>0.073**</td>
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<td>0.147**</td>
<td>14 (8)</td>
<td>0.090**</td>
</tr>
<tr>
<td>BHAR (+9)_{p}</td>
<td>0.181**</td>
<td>14 (9)</td>
<td>0.095**</td>
</tr>
<tr>
<td>BHAR (+10)_{p}</td>
<td>0.170**</td>
<td>12 (6)</td>
<td>0.100**</td>
</tr>
<tr>
<td>BHAR (+11)_{p}</td>
<td>0.195**</td>
<td>13 (9)</td>
<td>0.108**</td>
</tr>
<tr>
<td>BHAR (+12)_{p}</td>
<td>0.172**</td>
<td>12 (7)</td>
<td>0.110**</td>
</tr>
</tbody>
</table>

* Significant at or below the 0.05 level using a one-tailed test.
** Significant at or below the 0.01 level using a one-tailed test.
* The alternative strategy treats the RAR and RCAPX coefficients as if their hypothesized sign is negative based on their observed association with one-year-ahead earnings during 1974 to 1988.
* See table 2 for definitions of variables in the regression.
* See table 3 for the definitions of earnings-based returns and other factor returns.
* The overall mean portfolio return is the average of the 15 yearly portfolio returns calculated from 1974 to 1988. Significance tests are based on a standard error calculated from the distribution of the individual yearly coefficients. The total sample size is 9,764 firm-years, with the yearly sample sizes ranging between 469 and 785.
* This column gives the number of times the yearly portfolio return is positive. The number of times the yearly portfolio return is significantly greater than zero at or below the 0.10 level using a one-tailed t-test is given in parentheses.

V. SUPPLEMENTAL TESTS
Risk vs. Mispricing as an Explanation for Abnormal Returns
Persistence of Abnormal Returns

Stober (1992) reports that abnormal returns to the Ou and Penman (1989a) strategy continue to increase up to 72 months following the earnings announcement date and infers that their predictors measure risk shifts. The persistence of significant abnormal returns should not be used as the sole criterion for discerning whether the signals identify mispricing or shifts in firm risk because it is possible for subsequent returns to reflect both effects. However, the absence of persistent returns does argue against risk as a complete
explanation for pricing anomalies. We test for persistence of abnormal returns by reinvesting funds after 12 months in the firms that remain in our sample at the end of the year and cumulating returns through a second 12-month period.

Unreported results indicate that returns to maintaining positions in the strategy for a second year are economically inconsequential. This evidence indicates that abnormal returns do not persist beyond one year from the inception of the strategy. A third year of the strategy also produces no reliable evidence of abnormal returns. The same conclusion is drawn from the returns to the alternative strategy after a second and third year of execution.

Abnormal Returns to the Fundamental Strategy Around Earnings Announcements

If the results reported thus far represent evidence of mispricing based on market underreaction to detailed accounting information that predicts future earnings, then it is reasonable to expect that a disproportionate share of the abnormal returns will be concentrated around information events concerning the realization of future earnings. These events include newspaper stories, analyst and management forecasts, information transfers from competitors, and actual earnings announcements. We limited our search for concentrated abnormal returns to the four three-day periods surrounding quarterly earnings announcements in the first year of the strategy. Each three-day announcement period begins two trading days prior to the Compustat announcement date. Announcement period abnormal returns for a given quarter are calculated as three-day buy-and-hold size-adjusted returns surrounding an earnings announcement.

The results for the alternative strategy (i.e., where positions have been taken based on the signals' observed empirical relation with future earnings) are presented in column 1 of table 5. Each successive quarterly announcement period return is added to the sum of all previous announcement returns. The cumulative abnormal return for the announcement period is greatest after the third quarter earnings announcement, reaching a level of approximately 2.5 percent. This represents approximately 14 percent (three times the expected percentage) of the total abnormal return to the alternative strategy through the third quarter of the fiscal year and 26 percent of the earnings-based return cumulated to that point (see table 4). By way of comparison, the announcement period cumulative abnormal return to a perfect foresight strategy is 6.8 percent at the end of the third quarter (column 2 of table 5). Surprisingly, the announcement period cumulative return declines in the fourth quarter (inconsistent with similarly calculated returns for perfect foresight strategy).

The evidence of announcement period returns, in addition to the evidence related to the alternative strategy in table 4, supports the interpretation that abnormal returns to the fundamental strategy described in the paper are the result of price corrections of initial underreactions to detailed accounting information about one-year-ahead earnings. While a failure to properly measure near-term risk faced by the firm might explain some of the abnormal returns observed in table 2, there is no obvious risk-based explanation that accounts for the concentration of abnormal returns around earnings announcements.

Controlling for the Fama and French Risk Factors

Prior research has demonstrated that future abnormal returns are associated with other variables, among them firm size and the book-to-market ratio. It has been conjectured that

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16 It is possible that some of the signals have time-series properties similar to quarterly earnings, and that this result reflects the pattern of post-earnings announcement drift reported in Bernard and Thomas (1990). However, Raedy (1997) demonstrates that our strategy neither subsumes, nor is subsumed by, a post-earnings-announcement drift strategy, making it less likely that the results in table 5 are due to the signals proxying for post-earnings-announcement drift.


**TABLE 5**

Mean Size-Adjusted Portfolio Returns to Alternative Fundamental Signal Strategy and to Perfect Foresight Strategy Around Quarterly Earnings Announcements

Fundamental Signal Strategy:

\[
BHAR(Q + q)_{jt} = \frac{\sum_{k=t}^{q} \hat{\alpha}_t}{q-t} \text{ where } \hat{\alpha}_t \text{ is estimated from} \\
BHAR(Q + q)_{jt} = \alpha_0 + \sum_{i=1}^{q} \alpha_i RSIGNAL_{it} + \alpha_{RBETA, i} + \alpha_{RCEPS, i} + e_{jt}
\]

Perfect Foresight Strategy:

\[
BHAR(Q + q)_{jt} = \hat{\gamma}_t \text{ where } \hat{\gamma}_t \text{ is estimated from} \\
BHAR(+m)_{jt} = \gamma_0 + \gamma_{RBETA, i} + \gamma_{RCEPS, i} + e_{jt}
\]

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<tr>
<th>Cumulation Period</th>
<th>Overall Mean</th>
<th>Positive Years&lt;sup&gt;4&lt;/sup&gt;</th>
<th>Total Returns</th>
<th>Overall Mean</th>
<th>Positive Years&lt;sup&gt;4&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHAR(Q + 1) &lt;sub&gt;p&lt;/sub&gt;</td>
<td>0.017**</td>
<td>13 (4)</td>
<td>0.023**</td>
<td>15 (15)</td>
<td></td>
</tr>
<tr>
<td>BHAR(Q + 2) &lt;sub&gt;p&lt;/sub&gt;</td>
<td>0.019**</td>
<td>11 (4)</td>
<td>0.047**</td>
<td>15 (15)</td>
<td></td>
</tr>
<tr>
<td>BHAR(Q + 3) &lt;sub&gt;p&lt;/sub&gt;</td>
<td>0.025**</td>
<td>10 (6)</td>
<td>0.068**</td>
<td>15 (15)</td>
<td></td>
</tr>
<tr>
<td>BHAR(Q + 4) &lt;sub&gt;p&lt;/sub&gt;</td>
<td>0.014</td>
<td>8 (3)</td>
<td>0.088**</td>
<td>15 (15)</td>
<td></td>
</tr>
</tbody>
</table>

<sup>*</sup> Significant at or below the 0.05 level using a one-tailed test.
<sup>**</sup> Significant at or below the 0.01 level using a one-tailed test.
<sup>4</sup> The alternative strategy treats the RAR and RCAPX coefficients as if their hypothesized sign is negative based on their observed association with one-year-ahead earnings during 1974–1988.

BHAR(Q + q) <sub>p</sub>, is the portfolio return over q three-day quarterly earnings announcement periods subsequent to year t, calculated from the sum of the estimated coefficients on the scaled decile ranks of the fundamental signals in the above regression. BHAR(Q + q) <sub>t</sub>, represents buy-and-hold size-adjusted returns over each three-day period around the quarterly earnings announcements prior to and including quarter q for firm i subsequent to year t. Each three-day period begins two days prior to the earnings announcement date and ends on the earnings announcement date, as reported by Compustat. Size-adjusted returns are calculated by subtracting the buy-and-hold return on a portfolio of firms in the same size decile as a given firm (as of the beginning of the year) from the given firm’s raw buy-and-hold return. Other variables in the regression are defined in table 2.

The overall mean portfolio return is the average of the 15 yearly portfolio returns calculated from 1974 to 1988. Significance tests are based on a standard error calculated from the distribution of the individual yearly coefficients. The total sample size is 9,764 firm-years, with the yearly sample sizes ranging between 469 and 785.

<sup>4</sup> This column gives the number of times the yearly portfolio return is positive. The number of times the yearly portfolio return is significantly greater than zero at or below the 0.10 level using a one-tailed t-test is given in parentheses.

These variables, along with beta, reflect unknown risk factors and hence, are associated with future expected returns (Fama and French 1992). It is possible that the fundamental signals are related to these other variables and, in turn, the returns to the fundamental strategy are not independent of the returns observed in connection with the Fama and French (1992) variables. To determine if the returns to the fundamental strategy are distinct from those
generated in prior studies, we added firm-size and book-to-market variables to the RHS of equation (1) and reran the tests summarized in tables 2 and 4.\textsuperscript{17}

The size variable produced a significant average coefficient over the sample period and the book-to-market variable did not (not reported in tables).\textsuperscript{18} However, the inclusion of both variables did not materially affect the magnitude of the fundamental signal coefficients, indicating that the abnormal returns to the fundamental strategy are distinct from those generated by variables associated with previous pricing anomalies.\textsuperscript{19}

**Relation to an Accrual Accounting-Based Anomaly**

Our work is also related to Sloan (1996). He conjectures that investors underutilize the information about future earnings embedded in accounting accruals and shows that a strategy designed to exploit information in accruals can generate significant abnormal returns. We constructed an abnormal accrual variable similar to Sloan’s and employed it in our regressions, which also control for beta and the change in earnings in forming portfolios. The results confirm Sloan’s (1996) findings as the strategy yields a 12-month abnormal return of 7.5 percent, compared to the 10.4 percent he reports.\textsuperscript{20} We also decomposed the total abnormal returns to portfolios formed on this variable into a one-year-ahead earnings-based and other factor components. Similar to the results we report in table 4, approximately 60 percent of the return to Sloan’s (1996) accrual strategy is related to one-year-ahead-earnings. Nevertheless, when we re-estimate equation (1) including Sloan’s (1996) abnormal accrual variable on the RHS, both the fundamental signals and abnormal accrual variable generate significant abnormal returns (not reported in tables).\textsuperscript{21}

**Exploitability of Mispricing**

**Impact of Institutional Constraints**

It is axiomatic that the magnitude of returns to fundamental strategies earned on paper is greater than what can be achieved in practice. A number of market factors militate against exploitation of mispricing. One factor is restrictions on short sales. To the extent that our strategy identifies negative weights for securities not held at the beginning of the year, short selling is implied. As a rough measure of the impact of short sale restrictions, we summed the weighted returns of securities with positive weights (i.e., buys) and found that these

\textsuperscript{17} The book-to-market variable was based on stock price and book value per share on the first day of the first fiscal year over which abnormal returns were calculated. Firm size was calculated as the market value of equity as of that date. As in the case of the fundamental signals, scaled decile ranks of these variables were used in the regression tests.

\textsuperscript{18} These results are consistent with our findings when the fundamental signals are excluded from the regressions as well. The absence of the book-to-market effect in our data is partially attributable to the time period we are considering, as the magnitude of this effect becomes substantially attenuated starting in the mid- to late-1980s. However, the use of size-adjusted returns on the LHS of the regressions is the most important factor behind the failure to observe the anticipated relations.

\textsuperscript{19} The robustness of the returns to the fundamental strategy after controlling for a number of well-known pricing anomalies is confirmed in an exhaustive study conducted by Raedy (1997).

\textsuperscript{20} The mean return to accrual variable strategy is 9.2 percent when, following Sloan’s (1996) approach, we do not restrict our sample to December fiscal year-end firms.

\textsuperscript{21} To explore why both variables generate abnormal returns, we decomposed the accrual variable into current asset, depreciation and current liability components as in equation (1) of Sloan (1996). The results reveal that the first two components generate marginal and insignificant abnormal returns, respectively. In contrast, the current liability component of the accrual variable generates a strongly significant abnormal return. The strength of this latter variable’s association with returns combined with the absence of current liabilities in the calculation of the fundamental signals supports the notion that different phenomenon drive abnormal returns in the two studies.
securities contributed 57 percent (70 percent) of the returns to the original (alternative) strategy.\textsuperscript{22} Another factor that affects the ability to earn abnormal returns is the impact of price pressure from trading. The problem is most pronounced for trading in small firms where large trades by investors may have a substantial effect on bid-ask spreads and, hence, the ability to actually exploit mispricing. To address this issue, we repeated the steps of our strategy after first limiting our sample to firms in the three top size (market value of equity) deciles of the NYSE/AMEX population. For these firms, the strategy produces an abnormal return of 8.4 percent (14.2 percent) or approximately 75 percent (80 percent) of the total generated by the original (alternative) strategy.

**Extreme Portfolio Positions**

A potential trading obstacle to earning abnormal returns could arise if our trading strategy required large portions of an investor’s wealth to be committed to a small number of securities, a condition unacceptable to most professional portfolio managers and a likely proxy for an uncontrolled risk in a research design. To check for this possibility, we summed the weights across all nine fundamental portfolios for each firm and examined the net positions. The strategy required no net positions in a firm greater than 0.6 percent of total wealth. As it turns out, our strategy produces less extreme net positions than those implied by hedging the equally weighted observations in the top and bottom deciles of individual signal portfolios.

**Transactions Costs**

The buy-hold element of the fundamental strategy requires no more than a single trade in a given security in each year. Though nine “separate” portfolios—one for each signal—are formed, this feature of the strategy does not increase the number of trades to be implemented. Because portfolio weights are determined \textit{ex ante} for each portfolio, the positions in the same firm across all nine portfolios can be netted, requiring a single trade to achieve the optimal weights in all portfolios. Though not exploited in our approach, existing portfolio positions could allow for some securities to be sold rather than shorted and others to be rolled over rather than purchased, further reducing transactions costs. As a practical matter, the majority of securities receive zero or negligible weights in the strategy, implying a very small potential impact on portfolio returns if positions in these firms were avoided to minimize trading costs.\textsuperscript{23} Based on the combined costs of bid-ask spreads and commissions, Stoll and Whaley (1983) estimate average trading costs for small and large firm stocks at approximately four percent and two percent, respectively. The implementation of our strategy on a holdout sample described below limits trading to only firms in the top three size deciles, implying transactions costs should be at the low end of this range.

The analysis of firms with positive and negative weights in the portfolios also shows that long/hold positions produce a greater percentage of abnormal returns reported in tables 2 and 3 than sale/short-sale positions. If transactions costs were greater for short-sale firms,

\textsuperscript{22} Some of these buys would be financed through the sale of securities already held and some would represent holds on securities in the portfolio at the start of the year. If remaining buys could not be financed through short sales, the strategy would no longer be zero-investment. These results are reported simply to show the potential to earn returns on the buy-side of the portfolio strategy, not as an indication of the actual return that could be earned.

\textsuperscript{23} As indicated earlier, our results were similar following a strategy in which hedge portfolios were formed by subtracting the average return from buying securities in the highest decile of the distributions of each fundamental signal from the return earned by selling securities in the lowest decile of the distribution of each fundamental signal. This approach requires a small fraction of the trades required in the approach just described.
we would have expected the opposite result to hold, reflecting compensation for trading restrictions. Overall, the transactions costs required to exploit underreactions to the information in the fundamental signals appear to be well below the returns achieved.

*Exploitability of the Strategy in a Holdout Sample*

We attempt to ameliorate effects of hindsight bias in the identification of the signals by carrying out our strategy on a holdout sample covering the period 1989–1993. This period does not overlap with that examined by LT and did not influence their definitions of the fundamental signals. To simulate an actual investment setting in which the number of different fundamental strategies employed would likely be limited, we commit to a simple preset program that simultaneously exploits (1) the observed empirical relations between the fundamental signals and future returns over the period 1974–1988, (2) firm-specific contextual information based on prior and expected earnings news as reported by AB, and (3) trading only in firms in the largest three NYSE/AMEX size deciles.\(^{24}\) The first two elements of this program attempt to take advantage of the observed relations between the signals and both future earnings and returns reported earlier and in AB.\(^{25}\) The third element attempts to ensure that any abnormal returns from the strategy are actually exploitable by avoiding potential complications from price pressure and unidentified risks associated with trading in small firms.

Table 6 presents results for the four “contextual” strategies implied by the preset program. Column 1 presents returns to the strategy achieved by limiting the sample to firms that experienced “bad” prior earnings news, where bad news is defined as a negative prior year earnings change. Based on results from contextual analyses over the 1974–1988 period, this strategy establishes positions in the RINV, RGM, RS&A, RETR and EQ variables consistent with the original, hypothesized strategy, takes positions opposite to those originally hypothesized for RCAPX, and takes no positions in the RAR, AQ and RLF variables. Column 2 presents returns when only “good” prior earnings news firms are considered. Based on contextual analyses between 1974 and 1988, the strategy employs RINV and RETR in the manner originally hypothesized but takes positions opposite to those originally hypothesized for the RAR variable.\(^{26}\) Portfolios are not established for the remaining signals.

The average returns to the bad prior earnings news strategy are steadily increasing, leveling off at an impressive 31 percent after 12 months. The mean return is reliably positive after the seventh month of the strategy. Five (three) of five years produce a positive (significant) return after 12 months. The average size-adjusted return for the good prior earnings news strategy was a statistically insignificant negative 6 percent. The only significant return

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\(^{24}\) To the extent that the implementation of our strategy for the holdout sample exploits the observed empirical association between the AR and CAPX signals and one-year-ahead earnings, our approach suffers from the potential shortcomings of “letting the data speak” identified earlier in Ou and Penman’s (1989a) approach. The problem is somewhat mitigated by the fact that the length of the sample period over which these relations are estimated is over three times the length examined in either Ou and Penman’s (1989a) estimation periods. More important, additional contextual analysis performed in AB provides explanations for observed relations between the signals and future earnings in directions opposite to what had been hypothesized by LT, lending additional conceptual support for refinements to the strategy.

\(^{25}\) We limit the contextual element of the program to the prior earnings news and future earnings news (historical P/E) firm-specific variables in large part for simplicity in the execution and evaluation of the strategy. We do not attempt to exploit the macroeconomic contextual variables of inflation and GDP explored by AB as this would force us to rely on forecasts of these variables, likely adding substantial noise to the process. Although some results from AB’s analysis suggests the possibility that industry membership might be exploited in our strategy, we do not pursue this path so as to avoid the potential criticism that observed abnormal returns capture payoffs to inadvertent sector bets over our short hold-out period.

\(^{26}\) Our treatment of the RAR and RCAPX variables for these contextual strategies is also consistent with these variables’ relations to future earnings as reported in AB.
**TABLE 6**
Mean Size-Adjusted Portfolio Returns to Contextual Fundamental Signal Strategies Using Only Large Firms in a 1989 to 1993 Holdout Sample

\[ BHAR(+m)_{jt} = \sum \hat{\alpha}_r \text{, where } \hat{\alpha}_r \text{ is estimated from } BHAR(+m)_{jt} = \alpha_0 + \sum \alpha_{RSIGNAL}Q_{jt} + \alpha_{RBETA}R_{jt} + \alpha_{RCEPS}Q_{jt} + e_{jt} \]

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<th>Cumulation Period</th>
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<th>Positive Mean</th>
<th>Overall Positive</th>
<th>Overall Mean</th>
<th>Positive Mean</th>
<th>Overall Mean</th>
<th>Positive Mean</th>
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<th>Positive Mean</th>
<th>Overall Mean</th>
<th>Positive Mean</th>
<th>Original Strategy</th>
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<td>BHAR(+1)_{t-1}</td>
<td>0.062**</td>
<td>5 (1)</td>
<td>0.029</td>
<td>4 (2)</td>
<td>0.036*</td>
<td>5 (1)</td>
<td>0.008</td>
<td>2 (0)</td>
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<td></td>
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<td>-0.008</td>
<td>2 (1)</td>
<td>-0.027</td>
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<tr>
<td>BHAR(+3)_{t-1}</td>
<td>0.068</td>
<td>4 (2)</td>
<td>0.001</td>
<td>3 (2)</td>
<td>0.009</td>
<td>3 (0)</td>
<td>0.019</td>
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<td>BHAR(+4)_{t-1}</td>
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<td>0.031</td>
<td>3 (1)</td>
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<td>0.063</td>
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<td>BHAR(+5)_{t-1}</td>
<td>0.118</td>
<td>3 (3)</td>
<td>0.022</td>
<td>3 (1)</td>
<td>0.011</td>
<td>3 (0)</td>
<td>0.112</td>
<td>4 (2)</td>
<td>0.084</td>
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<td>BHAR(+6)_{t-1}</td>
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<td>0.088</td>
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<td>BHAR(+8)_{t-1}</td>
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<td>5 (2)</td>
<td>0.006</td>
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<td>0.013</td>
<td>3 (0)</td>
<td>0.091</td>
<td>4 (1)</td>
<td>0.135*</td>
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<td>BHAR(+9)_{t-1}</td>
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<td>-0.002</td>
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<td>0.011</td>
<td>3 (1)</td>
<td>0.091</td>
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<td>0.144*</td>
<td>4 (3)</td>
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<td></td>
</tr>
<tr>
<td>BHAR(+10)_{t-1}</td>
<td>0.239*</td>
<td>5 (2)</td>
<td>0.019</td>
<td>1 (0)</td>
<td>0.005</td>
<td>3 (1)</td>
<td>0.099</td>
<td>4 (1)</td>
<td>0.111</td>
<td>4 (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHAR(+11)_{t-1}</td>
<td>0.270*</td>
<td>5 (3)</td>
<td>-0.044</td>
<td>1 (0)</td>
<td>0.033</td>
<td>3 (1)</td>
<td>0.112*</td>
<td>4 (1)</td>
<td>0.129</td>
<td>4 (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BHAR(+12)_{t-1}</td>
<td>0.312*</td>
<td>5 (3)</td>
<td>0.062</td>
<td>1 (0)</td>
<td>0.020</td>
<td>3 (1)</td>
<td>0.083</td>
<td>3 (0)</td>
<td>0.132</td>
<td>4 (2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at or below the 0.05 level using a one-tailed test.
** Significant at or below the 0.01 level using a one-tailed test.
+ See table 2 for definitions of variables in the regression.
+ The contextual strategies treat the fundamental signal coefficients as if their hypothesized sign is based on their observed association with one-year-ahead earnings during 1974–1988, as summarized in the following table:

<table>
<thead>
<tr>
<th>RINV</th>
<th>RAR</th>
<th>RCAPX</th>
<th>RGM</th>
<th>RSGA</th>
<th>RETR</th>
<th>EQ</th>
<th>AQ</th>
<th>RLF</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad news firms</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>920</td>
</tr>
<tr>
<td>Good news firms</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>1168</td>
</tr>
<tr>
<td>Low P/E firms</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>789</td>
</tr>
<tr>
<td>High P/E firms</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>1299</td>
</tr>
</tbody>
</table>

The table also includes respective sample sizes. The strategies are only executed on large firms, defined as firms in the top three size deciles in the CRSP database.

The original strategy uses the original hypothesized relations (i.e., all relations expected to be positive), as in table 2. This strategy is only executed on firms in the top three deciles of the CRSP database, resulting in a sample size of 2,088.

The overall mean portfolio return is the average of the five yearly portfolio returns calculated from 1989 to 1993. Significance tests are based on a standard error calculated from the distribution of the individual yearly coefficients.

This column gives the number of times the yearly portfolio return is positive. The number of times the yearly portfolio return is significantly greater than zero is at or below the 0.10 level using a one-tailed t-test is given in parentheses.
to the good news strategy in the five years was a negative 33 percent in 1990. Assuming equal investment in each strategy, the combined good news/bad news strategy yields a positive abnormal return in each year after 12 months, with two of those years achieving significant returns individually.

Column 3 presents results for the low P/E (low expected earnings growth) context. The mean return to the strategy for this context is two percent over five years. Only three (one) of the five years produce a positive (significant) return. The negative returns in the other two years are not reliably different from zero. Column 4 reports the results for the high P/E strategy. The mean return reaches a level of 11 percent before leveling off at 8.3 percent after 12 months. The same three years that produce a positive return in the low P/E strategy also produce positive returns for this context.

Column 5 presents the returns had we chosen to bypass the contextual analysis elements of the strategy and had taken positions based on the originally hypothesized relations (but still only invested in large firms). Mean returns to this strategy would have increased to a high of 14 percent after nine months and settled at 13.2 percent (significant at the .06 level with four degrees of freedom) after 12 months. Four (two) of five years would have produced a positive (significant) return. Thus, even had we chosen to ignore information about the individual signals' relations to future earnings over 1974 to 1988 in various contexts, it appears that abnormal profits could still have been earned.

VI. SUMMARY AND CONCLUSIONS

In this paper, we present evidence that accounting-based signals defined to reflect familiar concepts of fundamental analysis can be used to predict future abnormal returns. Among the collection of signals we examine, relative changes in inventories, capital expenditures and effective tax rates appear to be particularly strong indicators of one-year-ahead earnings information to which the market underreacts. The signals pertaining to changes in gross margin and selling expenses also appear to capture information underused by the market about earnings beyond one year and/or risk.

The finding that abnormal returns to the fundamental strategy are associated with one-year-ahead earnings changes is consistent with prior work by Ou and Penman (1989a). However, unlike Ou and Penman (1989a), the explanatory variables selected for our fundamental strategy are directly motivated by economic arguments posited by practicing financial analysts. Thus, they provide a basis for furthering our knowledge of the relation between the output of accounting systems, future earnings and stock prices. This is highlighted by our ability to identify individual signals' contribution to the success of the fundamental strategy, a fact which would be obscured by relying on summary measures of accounting predictors or on aggregate earnings to generate returns.

Prior studies have suggested the possibility that so-called fundamental strategies actually identify changes in firm risk or misestimation of expected returns. It is possible that risk shifts may ultimately be shown to explain a large part of the success of fundamental strategies. Our results show: (1) a large percentage of the abnormal returns to the fundamental strategy outlined in this paper can be attributed to one-year-ahead earnings news, (2) there is an unusual concentration of abnormal returns around subsequent earnings announcements, (3) cumulative returns to the fundamental strategy level off after one year of the signals' disclosure, and (4) the returns to the strategy do not appear to be closely related to abnormal returns associated with book-to-market or firm-size variables. These findings argue against risk as a complete explanation for the abnormal returns we observe. Furthermore, though care must be exercised when interpreting the results from relatively short sample periods, a strategy that was based on the signals' relations to future earnings produces positive 12-month size-adjusted returns in 12 of 15 years and insignificant negative
returns in the remaining years. Thus, the consistent profitability of the alternative fundamental strategy makes it less plausible the high mean returns could be explained as a premium for risk.

The fact that large firms, less susceptible to price pressure from trading, account for a sizable portion of the abnormal return to the strategy and that short-sale restrictions would not appear to preclude the strategy’s ability to earn profits, suggest potential mispricing is exploitable. Though only a short, five-year holdout sample period was examined, the results from application of a refined version of the fundamental strategy indicate the potential for patient investors to profit from market underreaction to the future earnings information captured in the signals.

REFERENCES


