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Author(s): Victor L. Bernard and Jacob K. Thomas

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# Post-Earnings-Announcement Drift: Delayed Price Response or Risk Premium?

VICTOR L. BERNARD\* AND JACOB K. THOMAS†

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## 1. Introduction

This study seeks to discriminate between competing explanations of “post-earnings-announcement drift.” Ball and Brown [1968] were the first to note that even after earnings are announced, estimated cumulative “abnormal” returns continue to drift up for “good news” firms and down for “bad news” firms. Foster, Olsen, and Shevlin [1984] (henceforth FOS) are among the many who have replicated the phenomenon.<sup>1</sup> FOS estimate that over the 60 trading days subsequent to an earnings announcement, a long position in stocks with unexpected earnings in the highest decile, combined with a short position in stocks in the lowest decile, yields an annualized “abnormal” return of about 25%, before transactions costs.

Competing explanations for post-earnings-announcement drift fall into two categories. One class of explanations suggests that at least a portion of the price response to new information is delayed. The delay

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<sup>1</sup> Among the others are Watts [1978] and Rendleman, Jones, and Latane [1982].

might occur either because traders fail to assimilate available information, or because certain costs (such as the costs of transacting or the opportunity costs of implementing and monitoring a trading strategy) exceed gains from immediate exploitation of information for a sufficiently large number of traders. A second class of explanations suggests that, because the capital-asset-pricing model (*CAPM*) used to calculate abnormal returns is either incomplete or misestimated, researchers fail to adjust raw returns fully for risk. As a result, the so-called abnormal returns are nothing more than fair compensation for bearing risk that is priced but not captured by the *CAPM* estimated by researchers. In the case of post-earnings-announcement drift, this explanation requires that firms with unexpectedly high (low) earnings become more (less) risky on some unrecognized dimension.<sup>2</sup>

Several of the results in this paper are difficult to reconcile with plausible explanations based on incomplete risk adjustment. However, they are consistent with a delayed response to information.

What is less clear is why a delayed price response would occur. While abnormal returns to trading on postannouncement drift may be within the transactions costs for small individual investors, a transactions-cost-based explanation raises several difficult unanswered questions. Moreover, one of our tests suggests an alternative explanation for a delay: that prices are affected by investors who fail to recognize fully the implications of current earnings for future earnings.

Section 2 summarizes the current state of understanding of post-earnings-announcement drift and presents arguments for delayed price response and *CAPM* misspecification as explanations for the drift. Section 3 describes the sample and some of the methods used in our empirical tests. The tests themselves are summarized in section 4. A discussion of the evidence and some conclusions are presented in section 5.

## 2. *Post-Earnings-Announcement Drift: The Nature of the Phenomenon*

The postannouncement drift documented by FOS is duplicated in our figure 1. The figure shows the cumulative abnormal returns (*CARs*) for ten portfolios with different earnings news. To generate the *CAR* plots, FOS used a statistical earnings forecast to estimate unexpected earnings for a sample of NYSE and AMEX firms. The unexpected earnings, scaled by the standard deviation of prior forecast errors, were then compared to the cross-sectional distribution of scaled unexpected earnings for the prior quarter. Based on their standing relative to that distribution, firms were assigned to one of ten portfolios. Finally, the abnormal (size-

<sup>2</sup> Finally, a third explanation—bias resulting from research design problems other than *CAPM* misspecification—is always possible. However, FOS do much to dismiss this possibility. Our study also dismisses some research design problems as potential explanations for the drift.

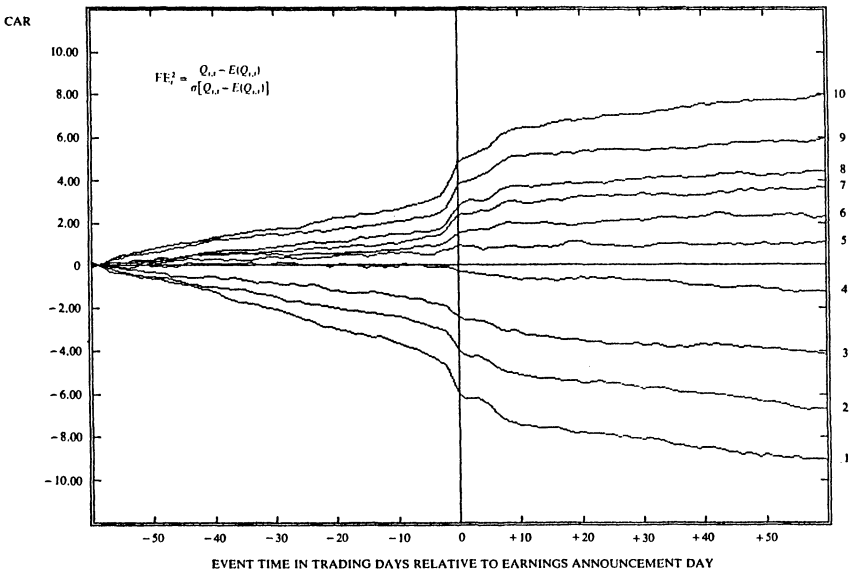


FIG. 1.—Cumulative abnormal returns for FOS earnings-based model (EBM) tests. Earnings announcements are assigned to deciles based on standing of standardized unexpected earnings (*SUE*) relative to prior-quarter *SUE* distribution. Portfolio 10 includes firms with the highest *SUE* ranking. Based on data from 1974–81. Cumulative abnormal returns are the sums over 120 trading days surrounding the earnings announcement, of the difference between daily returns and returns for NYSE firms in the same size decile. *SUE* represents forecast error from a first-order autoregressive earnings expectations model (in seasonal differences) scaled by its estimation-period standard deviation. (Reprinted, by permission of the publisher, from G. Foster, C. Olsen, and T. Shevlin, “Earnings Releases, Anomalies, and the Behavior of Security Returns,” *The Accounting Review* [October 1984]: 589.)

adjusted) returns on those ten portfolios were plotted over the 120 trading days surrounding the earnings announcement date.

In figure 1, the estimated post-earnings-announcement abnormal returns vary monotonically with the *SUE* deciles. A long position in portfolio 10 (that with the highest unexpected earnings), combined with a short position in portfolio 1 (that with the lowest), yields an estimated abnormal return of 6.31% over the 60 trading days after the earnings announcement, or about 25% on an annualized basis. The issue we now address is whether this estimated abnormal return reflects an incomplete adjustment for risk or a delayed price response.

## 2.1 THE CASE FOR CAPM MISSPECIFICATION

Ball [1988] argues that there is good reason to believe stock markets to be efficient on a priori grounds, because such markets are “paradigm examples of competition.” Some years earlier Ball [1978] argued that even in an efficient market, trading strategies based on earnings numbers might *appear* to generate abnormal returns, because of misspecifications

in the *CAPM* used to measure the abnormal returns. There is some evidence consistent with this explanation in Ball, Kothari, and Watts [1988] (henceforth BKW) and FOS [1984].

BKW suggest that betas shift upward (downward) for firms with high (low) unexpected earnings. Since some prior studies assumed for purposes of estimation that betas were stationary, this caused an upward (downward) bias in estimated abnormal returns. To overcome this bias, BKW use an estimation approach that permits betas to shift annually. In so doing BKW find that the postannouncement drift is no longer significant.

The question is whether BKW's failure to detect a significant drift in the year after annual earnings announcement extends to other sample firms and shorter postannouncement periods. Since (as will be shown later) most of the drift occurs within three months of the earnings announcement, quarterly return periods should provide a more powerful test. In addition, BKW's sample includes primarily large firms, and FOS [1984] have shown that the absolute magnitude of the drift is inversely related to firm size. We examine whether beta shifts can explain much of postannouncement drift in a design that uses quarterly data and a sample that is not dominated by large firms.<sup>3</sup>

A second source of evidence consistent with *CAPM* misspecification is the major result in FOS [1984]. FOS contrast two alternative approaches to analyzing the postannouncement behavior of stock returns. The first is that used to generate figure 1: the earnings-based model (*EBM*) approach. The second approach assigns firms to portfolios on the basis of firms' estimated abnormal stock returns over the 60 days prior to and including the earnings announcement day.<sup>4</sup> This is labeled the *SRM* (security-return model) approach. The essential result of the *SRM* tests is that there is no indication of post-earnings-announcement drift. Thus, postannouncement drift was observed only under the first (*EBM*) approach.

The results of the *SRM* tests in FOS have been interpreted by some as indicating that postannouncement drift reflects some problem in risk measurement. For example: "Using the (*SRM*) method of forming portfolios yields no unusual return behavior following the earnings announce-

<sup>3</sup> We have learned in private conversations with BKW that our results motivated them to extend their tests to quarterly data. In contrast to their earlier results, their tests based on quarterly data indicate significant postannouncement drift, even after adjusting for beta shifts.

<sup>4</sup> FOS also examined tests based on abnormal returns over the two-day window ending on the earnings announcement day and obtained similar results. We do not focus on these short-window tests, however, because in addition to the issues discussed below, they are affected by a bias that would tend to obscure part of the drift. Specifically, when stock returns are ranked over an interval as short as two days, good (bad) news stocks tend to be those that closed on the second day at the ask (bid). Subsequent movement to an average price between the ask and the bid causes an artificial "return reversal" that offsets a portion of any drift.

ment and suggests again that the results of previous studies are caused by a misspecified pricing model" (Dyckman and Morse [1986, p. 58]).

Although the same conclusion was not drawn by FOS, it is understandable that readers of FOS could draw such an inference. FOS explain that the *EBM* tests are vulnerable to certain problems in risk adjustment discussed by Ball [1978]; the *SRM* tests were motivated as one approach to mitigate these problems. Given that the drift vanishes in the *SRM* tests, the results could suggest that the drift in the *EBM* tests reflects a premium for some unidentified risk.

However, Bernard and Thomas [1989] suggest that any such inference is unwarranted. The reason is that the FOS results are consistent not only with certain explanations under which the drift represents a risk premium but also with certain other explanations where the drift is a delayed price response. Specifically, they show that if (1) there exists some delay in the response to earnings news, and (2) the fraction of the *total* response that is *delayed* varies sufficiently across firms, then it is possible simultaneously to detect a drift in the *EBM* tests but not detect a drift in the *SRM* tests.<sup>5</sup> As a result, Bernard and Thomas suggest that a more appropriate interpretation of FOS's *SRM* test is that, rather than discriminating between *CAPM* misspecification and delayed price response, it imposes restrictions on the nature of *CAPM* misspecifications, and on the delayed price response, that could explain the drift. Hence the overall results from FOS still leave open the question of what causes postannouncement drift.

## 2.2 THE CASE FOR A DELAYED PRICE RESPONSE

That post-earnings-announcement drift could represent a delayed response to information has been viewed as plausible by some academics. For example, Lev and Ohlson [1982, p. 284] describe the evidence of post-earnings-announcement drift as the "most damaging to the naive and unwavering belief in market efficiency." However, it is difficult to explain why the market would fail to respond immediately to earnings information.

One possibility is that transactions costs inhibit a complete and immediate response to earnings news. Examples of such costs include the bid-ask spread, commissions (for some investors), the costs of selling short, and the costs of implementing and monitoring a strategy (including opportunity costs). We turn to a detailed discussion of this possibility later in the paper.

A second possibility is that market prices are influenced by investors who fail to appreciate the full implications of earnings information. That is, some investors may fail to form an unbiased expectation of future

<sup>5</sup> The analysis also requires a third (mild) assumption, that there is no positive serial correlation in the component of stock returns not associated with earnings news.

earnings immediately upon revelation of current earnings, with some portion of the response not occurring until analysts' forecasts are revised or future earnings are realized.<sup>6</sup> Although this possibility departs dramatically from most academics' view of market efficiency, there presently is little evidence on this specific issue. Kormendi and Lipe [1987] and Freeman and Tse [1989] indicate that responses to current earnings reflect at least *some* of the implications for future earnings, but that does not necessarily imply that the immediate response is *complete*. This and other competing explanations are the focus of our empirical tests in section 4.

### 3. *Sample and Estimation Procedures*

#### 3.1 SAMPLE SELECTION

Our sample includes 84,792 firm-quarters of data for NYSE/AMEX firms for 1974–86. We also conduct some supplementary tests based on 15,457 firm-quarters of data for over-the-counter stocks on the NASDAQ system for 1974–85. Criteria for inclusion in the sample are the same as those used by FOS, who studied NYSE/AMEX firms for the period 1974–81. We require that the firm be listed on the *CRSP* daily files, and that the firm's earnings before extraordinary items and discontinued operations be available for at least ten consecutive quarters on *Compustat*. Our NYSE/AMEX sample includes only firms that appeared on any of the *Compustat* files released from 1982 through 1987.<sup>7</sup> Since firms included in earlier files but dropped from *Compustat* before 1982 are excluded from the sample, there is a potential for a survivorship bias in the first half of our data set. However, FOS conducted tests which indicated that postannouncement drift is not sensitive to this form of bias. Moreover, our conclusions are insensitive to whether we include or exclude "nonsurvivors" dropped from the *Compustat* files between 1982 and 1987.

#### 3.2 ESTIMATION PROCEDURES

*3.2.1. Estimation of abnormal returns.* For the NYSE/AMEX sample, cumulative abnormal returns are calculated using an approach like that of FOS. FOS use a companion portfolio approach designed to control for

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<sup>6</sup> Clearly, an efficient market may resolve uncertainty about the implications of a previously released earnings number when future earnings are released (Freeman and Tse [1989]). Nevertheless, regardless of how much uncertainty surrounds current earnings, stock prices in an efficient market should immediately reflect an unbiased expectation of future earnings. If information uncertainty is not "priced out," this implies no predictable postannouncement drift. If information uncertainty is priced out, this implies positive postannouncement drift for both good and bad earnings news, which is inconsistent with the data.

<sup>7</sup> The NASDAQ sample was selected from the 1987 *Compustat* file only.

the Banz-Reinganum size effect.<sup>8</sup> Under this approach, abnormal returns are calculated as follows:

$$AR_{jt} = R_{jt} - R_{pt} \quad (1)$$

where  $AR_{jt}$  = abnormal return for firm  $j$ , day  $t$ ;

$R_{jt}$  = raw return for firm  $j$ , day  $t$ ;

$R_{pt}$  = equally weighted mean return for day  $t$  on the NYSE/AMEX firm size decile that firm  $j$  is a member of at the beginning of the calendar year. Firm size is measured by the market value of common equity.

In our tests based on abnormal returns, we preserve comparability with FOS and sum abnormal returns over time to obtain cumulative abnormal returns (*CARs*). One problem with summing abnormal returns over time is that it implicitly assumes daily rebalancing and leads to an upward bias in the returns cumulated over long periods (Blume and Stambaugh [1983] and Roll [1983]). However, since this bias affects both the primary and the companion portfolios, there may be no bias in our estimated abnormal returns. In fact, we have conducted analyses that indicate that the difference between abnormal returns on extreme good news and bad news firms is similar, whether the returns are summed or compounded.<sup>9</sup> In addition, we describe in section 3.2.4 an alternative abnormal return calculation that is free from the bias described by Blume and Stambaugh [1983].

Observations were excluded from the analysis if the return for the earnings announcement day was missing on *CRSP*, or if the *CRSP* returns series did not encompass the 160 trading days surrounding the earnings announcement.

**3.2.2. Estimation of standardized unexpected earnings (*SUE*).** Procedures for estimating unexpected earnings were patterned after those used by FOS for the *EBM* Model 2. That is, earnings were forecasted by estimating the Foster [1977] model with historical data.<sup>10</sup> The difference

<sup>8</sup> This approach to measuring abnormal returns makes no attempt to control for systematic risk. Since our conclusions are based on comparisons of abnormal returns on high and low unexpected earnings portfolios, this introduces a bias if systematic risk differs between those two. We test for such a possibility in section 4.2.1.

<sup>9</sup> If anything, our use of summed returns may understate the extent of postannouncement drift. The indicated abnormal returns are about 10% larger when we employ the FOS approach but compound returns over time (using portfolios that are initially equal-weighted). Details are available upon request.

<sup>10</sup> The Foster model assumes that earnings follow a first-order autoregressive process in seasonal differences. FOS indicate [1984, p. 582] that they used a maximum of 20 observations to estimate the Foster model. We used a maximum of 24 observations. FOS indicate [1984, p. 581] that firms were included in the sample even if only ten consecutive quarters of data were available. We retained such firms also, but where fewer than 16 observations were available, we assumed that earnings followed a seasonal random walk. FOS indicate [1984, p. 582] that they obtained essentially the same results when this model was substituted for the Foster model.



between actual and forecasted earnings was then scaled by the standard deviation of forecast errors over the estimation period to obtain standardized unexpected earnings or *SUE*.

3.2.3. *Portfolio assignment.* Holthausen [1983] and FOS describe a bias that is introduced when firms are assigned to portfolios. When those assignments are based on rankings of unexpected earnings within the distribution for *all* firms, including some that have *not yet announced* earnings for the quarter, there is a hindsight bias that tends to magnify the drift. Like FOS, we overcome that bias by assigning firms to portfolios on the basis of their standings relative to the distribution of unexpected earnings in the *prior* quarter.

3.2.4. *Alternative abnormal return calculation: continuously balanced SUE strategy.* Abnormal returns are typically viewed as returns in excess of some benchmark, such as the market model. The FOS size-control portfolio approach yields abnormal returns that can be interpreted in this way. However, in the case of the FOS approach, an alternative interpretation is also possible. Because FOS always offset a position in a given firm with the position in a size-control portfolio, the resulting abnormal returns represent the return on a zero-investment trading strategy. The advantage of this interpretation is that, if the offsetting positions are of equivalent risk, any nonzero expected return on the zero-investment portfolio contradicts the implications of market efficiency (at least before considering transactions or other costs).

The difficulty with this interpretation is that the FOS strategy may be difficult to implement as it stands. The strategy requires an investor to take new positions in size-control portfolios every day, with each control portfolio containing hundreds of stocks. Thus, results based on this approach leave open the question of whether similar returns could be generated by an easily implemented, zero-investment strategy.

To assess the sensitivity of our results to this issue, we replicated some of our tests based on a zero-investment strategy that would be easier to implement. Since it involves having the same amount invested in good news and bad news firms at all points in time, we label this strategy the “continuously balanced” *SUE* strategy. (To differentiate it, we sometimes label the FOS approach the “FOS control portfolio” *SUE* strategy.)

The continuously balanced *SUE* strategy works as follows. On a given trading day, we identify any firms that announced earnings, and where standardized unexpected earnings fall in the upper quintile (good news) or lower quintile (bad news) of the prior-quarter distribution. If both good news and bad news firms exist for that day, we assume a long position in the former and a short position in the latter. The long (short) positions are initially equally weighted across the available good (bad) news firms, with the total amount of the long position exactly offsetting the total amount of the short position. We then compute buy-and-hold (i.e., continuously compounded) returns on each of the stocks in the long

and short position, over the 60 trading days subsequent to the earnings announcement.

On 14% of trading days, there were either no new good news or no bad news firms available, and so no match could be created. In such cases, we “wait” until a match becomes available. For example, if two good news firms announced earnings on day 1, but no bad news firms announced, we would wait until at least one bad news firm announced earnings. If the first available bad news firm announced on day 4, it would be matched with all good news firms announcing from days 1 through 4, and we would then compound returns from day 5 through day 64. In 97% of all cases, a match became available within two days.

To provide some control for the Banz-Reinganum size effect, this matching process was always conducted within groups of small, medium, and large firms. Small firms are those whose January 1 market value of equity was among the lowest four deciles of the NYSE/AMEX, whereas large firms are those among the highest three deciles. Using only three size groups increased the probability of finding matches of good news and bad news firms within a short period of time. Since we used only three size groups (versus ten in the FOS control portfolio approach), our control for size is not as precise. However, if we assume that smaller firms are as likely to announce bad news as good news, this introduces no bias in the results.<sup>11</sup>

The continuously balanced *SUE* strategy is much easier to implement than that used by FOS but would still be costly to the extent that short selling must be used. There would be no significant difficulty, however, for investors who already own the stocks that announce bad news.

## 4. Empirical Results

### 4.1 DESCRIPTIVE RESULTS

*4.1.1. Magnitude of the drift.* FOS [1984] provide estimates of the magnitude of post-earnings-announcement drift and show that the drift varies inversely with firm size. In this and the following section, we replicate those results and demonstrate that they persist over a longer time period. Unless otherwise specified, the results in this section are based on the procedures used by FOS, to maintain comparability; results based on the continuously balanced *SUE* strategy are reported only as supplement information.

Figure 2 presents *CAR* plots for the sample, after assigning firms to portfolios on the basis of standardized unexpected earnings. In contrast to the format used by FOS in figure 1, figure 2 separates *CAR* plots for

<sup>11</sup> If bad news firms are more likely to be small, due to price declines in anticipation of the earnings announcement (and vice versa for good news firms), then the Banz-Reinganum size effect would impart a *downward* bias in our estimated abnormal returns. That is, the bias would tend to offset any postannouncement drift.

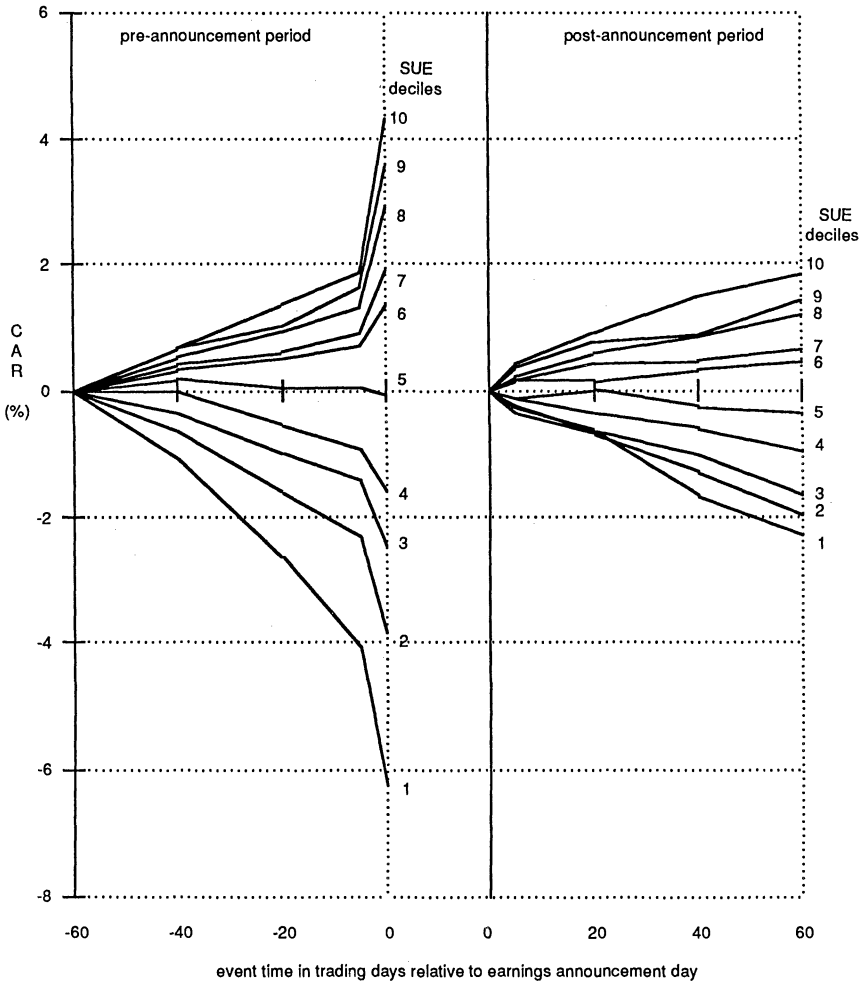


FIG. 2.—Cumulative abnormal returns (CARs) for *SUE* portfolios: all announcements. Earnings announcements are assigned to deciles based on standing of standardized unexpected earnings (*SUE*) relative to prior-quarter *SUE* distribution. Based on 84,792 announcements from 1974 to 1986. CARs are the sums over pre- and postannouncement holding periods (beginning day -59 and day 1, respectively) of the difference between daily returns and returns for NYSE/AMEX firms of the same size decile. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details).

the pre- and postannouncement periods, to make the postannouncement abnormal returns easier to gauge. Our results for 1974–86 are similar to those obtained by FOS for 1974–81. That is, there is a pronounced post-earnings-announcement drift, increasing monotonically in unexpected earnings. A long position in the highest unexpected earnings decile and a short position in the lowest decile would have yielded an estimated abnormal return of approximately 4.2% over the 60 days subsequent to

the earnings announcement, or about 18% on an annualized basis. (The annualized abnormal return on the continuously balanced *SUE* strategy is 17%.) For the 1974–81 period studied by FOS, we obtain an annualized return of 19%, which is less than the 25% implied by their results.<sup>12</sup>

*4.1.2. Relation of drift to firm size.* Figures 3 and 4 indicate how the drift varies by firm size, by presenting results for large and small firms.<sup>13</sup> As noted by FOS, the postannouncement drift is larger for smaller firms. Among small firms, a long position in the highest unexpected earnings decile and a short position in the lowest decile yielded an abnormal return of approximately 5.3% over the 60 days subsequent to the earnings announcement. Comparable abnormal returns for medium-sized firms (not shown) and large firms are 4.5% and 2.8%, respectively.

Results based on the continuously balanced *SUE* strategy are similar. For 60-day holding periods, mean abnormal returns for small, medium, and large firms are 5.1%, 4.3%, and 2.8%.

In regressions not reported here, we use the approach of FOS [1984, p. 595] to test the statistical significance of the postannouncement drift and the effect of firm size. Our results confirm that the magnitude of the drift is related to the magnitude of unexpected earnings, and that the absolute magnitude of the drift is inversely related to firm size, both at significance levels less than .01.

We do not present comparable plots of NASDAQ firms. However, the same phenomenon observed for NYSE/AMEX firms was observed for that sample. The magnitude of the drift for NASDAQ firms lies between that observed for small and medium-sized firms on the NYSE/AMEX. This is as expected, given that approximately 70% of our NASDAQ firms would be classified as small (relative to the NYSE/AMEX firms), 20% would be classified as medium, and 5% would be classified as large.

*4.1.3. Longevity of the drift.* Table 1 provides information about the longevity of the postannouncement drift for stocks ranked in the lowest and highest *SUE* decile, broken down by size and by subperiods extending two years beyond the earnings announcement date.

Most of the drift occurs during the first 60 trading days (about three months) subsequent to the earnings announcement, and there is little evidence of statistically significant drift beyond 180 trading days. If we assume all of the drift occurs within 480 days, then the fraction of the

<sup>12</sup> Differences between our results and those of FOS are most pronounced for small, good news firms. A possible explanation for the difference involves how control portfolios were constructed. It appears that FOS included only NYSE firms in their control portfolios [1984, p. 585], whereas we included both NYSE and AMEX firms.

<sup>13</sup> Firms were assigned to *SUE* deciles before segregation by size. The large firms are more heavily represented in the extreme deciles; in figure 3, *SUE* deciles 5 and 6 contain approximately 2,400 observations each, while *SUE* deciles 1 and 10 contain approximately 3,100 observations each. For small firms, the reverse relation holds; in figure 4, *SUE* deciles 5 and 6 contain approximately 3,400 observations each, while *SUE* deciles 1 and 10 contain approximately 2,700 observations each.

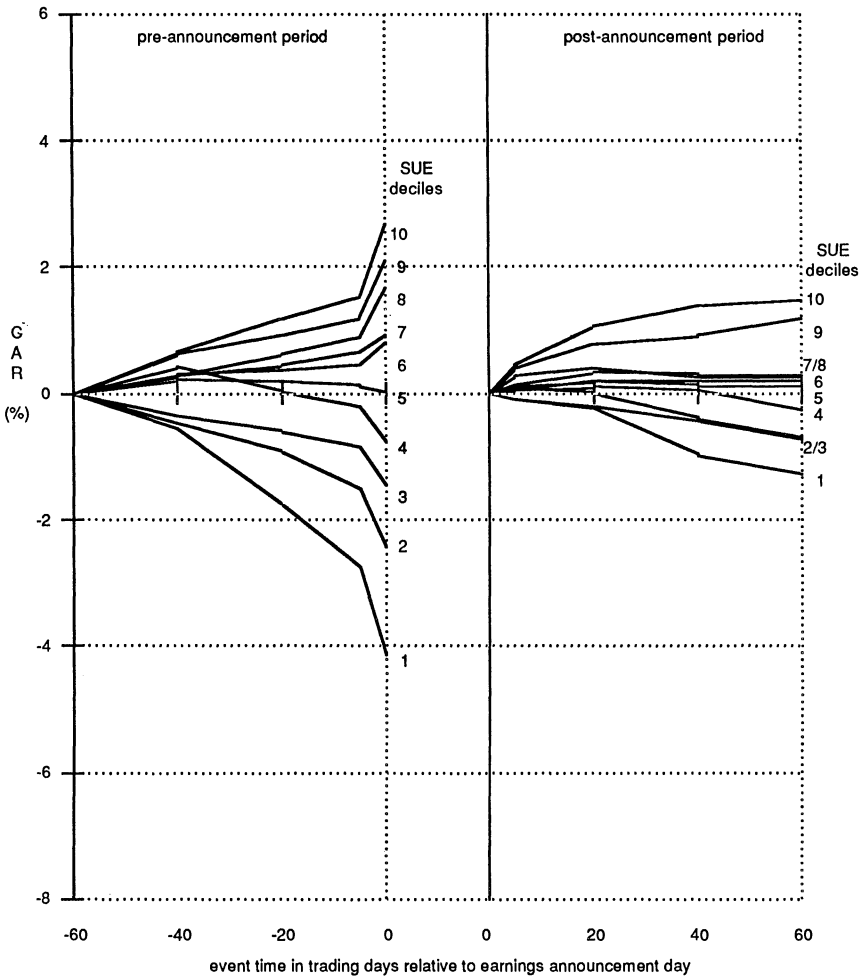


FIG. 3.—Cumulative abnormal returns (CARs) for *SUE* portfolios: large firms only. Earnings announcements are assigned to deciles based on standing of standardized unexpected earnings (*SUE*) relative to prior-quarter *SUE* distribution. Based on 27,584 announcements from 1974 to 1986. Large firms are in size deciles 8 to 10, based on January 1 market values of equity for all NYSE and AMEX firms. *CARs* are the sums over pre- and postannouncement holding periods (beginning day -59 and day 1, respectively) of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details).

drift experienced within 60 days is 53%, 58%, and 76% for small, medium, and large firms, respectively. Approximately 100% of the drift occurs within nine months for small firms and within six months for large firms. This result is consistent with the findings of Watts [1978], who found a

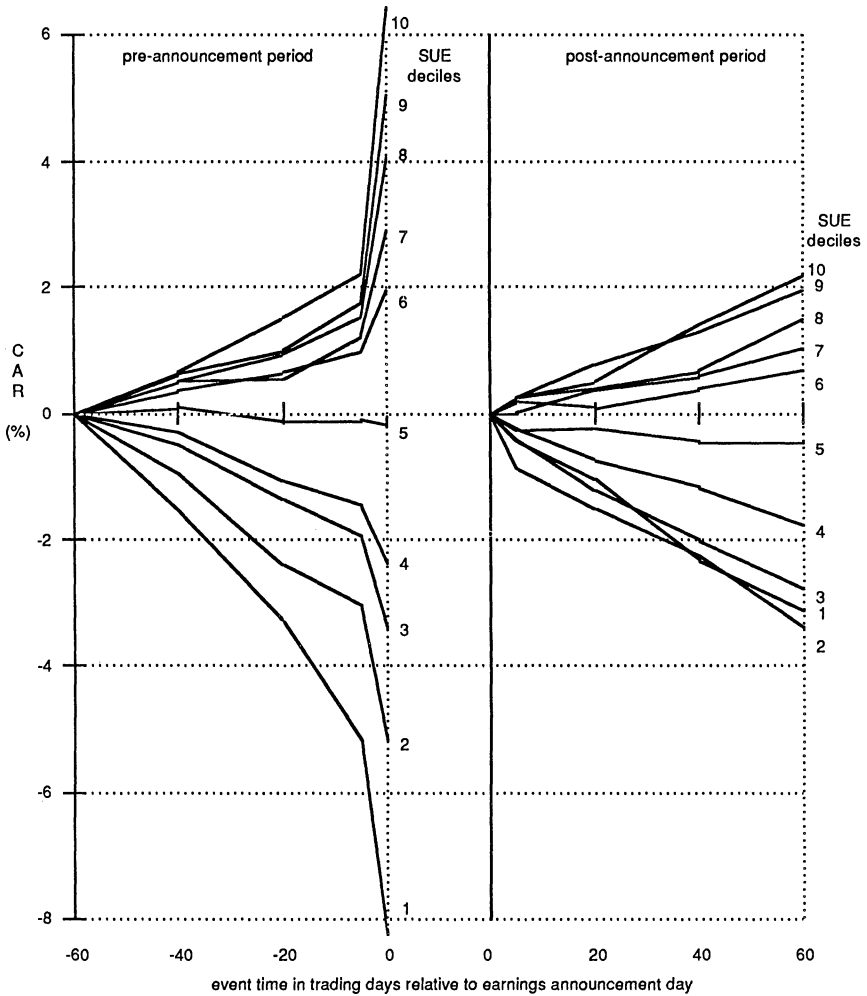


FIG. 4.—Cumulative abnormal returns (CARs) for *SUE* portfolios: small firms only. Earnings announcements are assigned to deciles based on standing of standardized unexpected earnings (*SUE*) relative to prior-quarter *SUE* distribution. Based on 29,796 announcements from 1974 to 1986. Small firms are in size deciles 1 to 4, based on January 1 market values of equity for all NYSE and AMEX firms. CARs are the sums over pre- and postannouncement holding periods (beginning day  $-59$  and day 1, respectively) of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details).

significant drift lasting six months in his sample consisting primarily of large firms.

A disproportionately large amount of the 60-day drift occurs within 5 days of the earnings announcement. If the drift were constant over the

**TABLE 1**  
*Longevity of Post-Earnings-Announcement Drift*  
*Cumulative abnormal returns (CAR) for high and low standardized unexpected earnings (SUE) portfolios<sup>1</sup>*  
*(Those with SUE ranked in the highest and lowest deciles)*

Holding Period (Trading Days, Relative to Announcement)	Small Firms			Medium Firms			Large Firms		
	High SUE	Low SUE	Diff. (Hi-Lo)	High SUE	Low SUE	Diff. (Hi-Lo)	High SUE	Low SUE	Diff. (Hi-Lo)
	Cumulative Abnormal Returns (%)								
-59 to 0	6.42*	-8.27*	14.70*	4.15*	-6.81*	10.96*	2.71*	-4.13*	6.84*
1 to 60	2.19*	-3.13*	5.32*	1.93*	-2.58*	4.51*	1.45*	-1.29*	2.74*
61 to 120	0.38	-2.24*	2.62*	0.33	-2.22*	2.55*	0.51**	-0.76*	1.27*
121 to 180	0.03	-1.93*	1.95*	0.18	-1.61*	1.79*	-0.20	-0.66*	0.45
181 to 240	0.20	-0.38	0.58	-0.40	-0.58***	0.18	-0.45**	-0.44***	-0.01
241 to 300	-1.22*	0.56	-1.77*	-0.88*	0.16	-1.04**	-0.62*	0.23	-0.85*
301 to 360	-0.54	-0.96*	0.42	-0.36	-0.71**	0.35	-0.64*	-0.16	-0.48
361 to 420	-0.27	-0.33	0.06	-0.18	-0.37	0.18	-0.55*	-0.71*	0.17
421 to 480	0.29	-0.51	0.80	-0.43	0.37	-0.80***	-0.42**	-0.73*	0.31
	Postannouncement Drift (Cumulative Abnormal Returns, %)								
1 to 60			5.32*			4.51*			2.74*
1 to 120			7.95*			7.06*			4.02*
1 to 180			9.90*			8.85*			4.47*
1 to 480			9.99*			7.72*			3.61*
	Postannouncement Drift (as a Fraction of 480-Day Drift)								
1 to 60			0.53			0.58			0.76
1 to 120			0.80			0.91			1.11
1 to 180			0.99			1.15			1.24
1 to 480			1.00			1.00			1.00

<sup>1</sup> CARs are the sums over specified holding periods of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. SUE represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details). Small, medium, and large firms are in size deciles 1 to 4, 5 to 7, and 8 to 10, respectively, based on January 1 market value of equity for all NYSE and AMEX firms.

Significance levels for two-tailed tests of the hypotheses that abnormal returns equal zero are coded as follows:

\* Significant at the 1% level.

\*\* Significant at the 5% level.

\*\*\* Significant at the 10% level.

60-day interval, we would expect 8% of the drift to arise within 5 days. However, the actual percentage of the 60-day drift that occurs within 5 days (not shown in table 1) is 13%, 18%, and 20% of the 60-day drift for small, medium, and large firms, respectively.

Table 1 suggests that, if the drift is explained by an incomplete adjustment for risk, the risk must exist only temporarily and must persist longer for small firms than for large firms.

#### 4.2 TESTS OF RISK PREMIUMS AS EXPLANATION FOR THE DRIFT

*4.2.1. Shifts in betas as a potential explanation.* We now present results from a battery of tests designed to assess the plausibility of incomplete risk adjustment as an explanation for postannouncement drift. We first consider BKW's [1988] suggestion that betas increase for firms with high unexpected earnings and decrease for firms with low unexpected earnings.

Beta shifts are obviously a concern in a design that estimates betas in one period and then uses those estimates in a different period. Such was the case in much of the early research on postannouncement drift. However, that is not a concern in the FOS design that we adopt, since this design does not rely on estimates of betas. Instead, we *assume* that betas for our long and short positions are equal during the postannouncement period. Under this assumption, the combined long and short positions have zero systematic risk. Thus, while we examine the BKW hypothesis that betas *shift* around the time of earnings announcements, our ultimate concern is with any differences in the *levels* of betas for high- and low-*SUE* firms in the postannouncement period.

Before turning to the tests, we should note that there are indications that failure to account for beta is unlikely to explain postannouncement drift. If mismeasured betas are the explanation, then the sign of the drift should vary according to whether the excess return on the market is positive or negative. Specifically, good news stocks, which would have to be riskier than assumed, should have positive estimated abnormal returns in up markets but negative estimated abnormal returns in down markets. The opposite should hold for bad news stocks. In contrast to this prediction, however, the postannouncement estimated abnormal returns for good news (highest *SUE* decile) stocks are actually positive in both up and down markets. Similarly, estimated abnormal returns for bad news stocks (lowest *SUE* decile) are actually negative in both up and down markets.<sup>14</sup>

Our tests are presented in table 2. Beta estimates were derived using

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<sup>14</sup> For good news stocks, the estimated abnormal returns over days (1, 60) are 2.5% (1.1%) when the value-weighted market return is greater (less) than the risk-free rate. For bad news stocks, the estimated abnormal returns are -2.3% (-2.4%) when the value-weighted market return is greater (less) than the risk-free rate. We thank George Foster for suggesting this test.



TABLE 2  
*Beta Estimates by SUE Category, in Periods Surrounding Earnings Announcement<sup>1</sup>*

SUE Decile (1 = low; 10 = high)	Preannouncement Period		Postannouncement Period			
	(-119, 60)	(-59, 0)	(1, 60)	(61, 120)	(121, 180)	(181, 240)
Beta estimates						
1	1.16	1.22	1.17	1.17	1.23	1.31
2	1.11	1.17	1.15	1.08	1.19	1.25
3	1.16	1.21	1.13	1.11	1.14	1.22
4	1.24	1.18	1.21	1.15	1.19	1.18
5	1.23	1.26	1.24	1.30	1.19	1.24
6	1.31	1.27	1.28	1.24	1.26	1.23
7	1.30	1.24	1.23	1.26	1.25	1.24
8	1.28	1.34	1.30	1.30	1.30	1.20
9	1.26	1.31	1.29	1.26	1.20	1.23
10	1.32	1.31	1.38	1.30	1.31	1.23
Rank correlation, SUE and beta						
	.83*	.84*	.90*	.77*	.66*	-.38
Jensen's alpha						
SUE = 1	-3.7%*	-5.3%*	-1.6%*	-0.8%*	-0.8%*	0.6%*
SUE = 10	3.4*	6.1*	3.0*	1.4*	0.7*	0.7*
Combined	7.1*	11.4*	4.6*	2.2*	1.5*	0.1

<sup>1</sup> For each 60-day window, we calculate compounded daily returns for individual stocks, the value-weighted CRSP index, and the treasury-bill rate. These data constitute a single observation in a regression of individual stock returns against market returns, both expressed in terms of differences from the treasury-bill rate. Such regressions are estimated within each SUE category. There are approximately 8,500 (overlapping and thus nonindependent) observations underlying estimates for the (-59, 0) and (1, 60) windows, and slightly fewer for other windows. The standard error for each estimate in the table is approximately 0.02. Cross-sectional dependence in the data may cause downward bias in the estimated standard error (Bernard [1987]).

\* Significantly different from zero, .05 level (two-tailed test).

the BKW methodology for permitting betas to shift through time. For each of several 60-day windows surrounding the earnings announcement, we compounded total returns on individual stock ( $R_{it}$ ), treasury bills ( $R_{ft}$ ),<sup>15</sup> and the valued-weighted CRSP index ( $R_{mt}$ ). These three data points constitute a single observation for a regression based on the Sharpe-Lintner-Mossin CAPM:

$$R_{it} - R_{ft} = a + b (R_{mt} - R_{ft}) + e_{it}. \tag{2}$$

The regression was estimated by pooling all observations for a given SUE decile, within six 60-trading-day windows surrounding the earnings announcement date. This approach permits the betas to shift from one window to the next and to vary across SUE categories.

The estimates in table 2 show distinct evidence of the positive relation between SUEs and betas predicted by BKW [1988]. The rank correlation between beta and SUE is .83 in the (-119, -60) window, .84 in the (-59,

<sup>15</sup> The treasury-bill returns are derived on a daily basis from weekly returns calculated by Gautam Kaul for bills in their final week before maturity. Kaul's weekly returns were allocated to days assuming the same return for each day within the week.

0) window, .90 in the (1, 60) window, and .77 in the (61, 120) window. Also consistent with BKW, the relation first appears during the fiscal period in which the earnings are generated. That fiscal quarter would typically bridge the  $(-119, -60)$  window and the  $(-59, 0)$  window; there is no significant relation between *SUE* and beta in windows prior to day  $-119$ . Finally, and again consistent with BKW, the relation is temporary (it becomes insignificant beyond day 180).

Even though we find evidence of a positive relation between *SUE* and betas, it is much smaller than would be necessary to explain fully the magnitude of the drift. The difference between the excess returns  $(R_{jt} - R_{ft})$  on *SUE* 10 firms and *SUE* 1 firms over days (1, 60) is 4.3%. (This is slightly larger than the 4.2% abnormal return reported in section 4.1.1, which was size-adjusted.) The corresponding mean excess market return  $(R_{mt} - R_{ft})$  is 1.65%. Thus, if betas are to explain postannouncement drift, the difference between betas for the *SUE* 10 firms and *SUE* 1 firms would have to be 2.6  $(= 4.3/1.65)$ . In fact, the difference is only 0.21, or less than 10% as large as required.

The failure of betas to explain the magnitude of the drift can be confirmed by examining the "Jensen's alpha" in equation (2). If beta risk could fully explain the drift, then Jensen's alpha should be zero. However, in the 60-day postannouncement period, alpha is  $-1.6\%$  for *SUE* portfolio 1,  $3.0\%$  for *SUE* portfolio 10, and  $4.6\%$  for a combined position (significant at the .0001 level). On an annualized basis, this represents an abnormal return of approximately  $18\%$ .<sup>16</sup>

We conclude that while there is some merit to the BKW claim that betas shift around earnings announcements, the magnitude of the shifts falls far short of the amounts necessary to explain the magnitude of the drift.<sup>17</sup>

*4.2.2. Other commonly discussed asset-pricing factors as potential explanations: APT risk factors as potential explanations.* In this section, we test for the possibility that trading strategies based on *SUEs* are risky on dimensions not captured by beta. The risk factors we consider are those found in the literature on arbitrage-pricing theory. Chen, Roll, and Ross [1986] provide evidence that risks associated with industrial production, changes in default risk premiums, and changes in term structure appeared to be priced. They found weaker evidence that risks associated with unanticipated inflation and changes in expected inflation also affected asset prices.

<sup>16</sup> Results based on the equally weighted market index yield similar conclusions. The rank correlation between beta and *SUE* decile is weaker but still significant at the .05 level in the  $(-119, -60)$  window, the  $(-59, 0)$  window, and the (1, 60) window. The difference between betas for *SUE* 10 firms and *SUE* 1 firms in the (1, 60) window is 13% as large as required to explain the drift; Jensen's alpha indicates an annualized abnormal return of 16%.

<sup>17</sup> Subsequent to conducting these tests, we became aware of similar evidence in Mendenhall [1986].

In table 3, we regress calendar-quarter returns<sup>18</sup> on the FOS control portfolio *SUE* strategy (*CAR* for *SUE* decile 10 minus *CAR* for *SUE* decile 1) against quarterly measures of the five risk factors studied by Chen, Roll, and Ross.<sup>19</sup> In addition, we consider a regression that also includes the return on the NYSE index (net of the treasury-bill rate). Table 3 indicates whether a positive or negative correlation with a particular factor would indicate that the portfolio is “risky,” as opposed to offering a “hedge” against risk. The evidence from Chen, Roll, and Ross suggests that assets with returns that are *positively* correlated with unanticipated growth in industrial production (*QP*) and unanticipated changes in the default risk premium (*UPR*) are risky and have correspondingly higher required returns, as do assets with returns that are *negatively* correlated with changes in expected inflation (*DEI*), unanticipated inflation (*UI*), and unanticipated changes in the term structure (*UTS*).

Table 3 provides no evidence that the returns on the *SUE* strategy are significantly correlated with any of the five risk factors proposed by Chen, Roll, and Ross. (Three of the five coefficients are both insignificant and have the “wrong” sign.) Moreover, the five factors as a group do not explain a significant fraction of the variance in the strategy’s return.

If the right-hand-side variables in table 3 accurately measure ex post premiums on all risk factors that are priced, then the intercept in the regression provides a test of market efficiency. Given that the dependent variable is the return on a zero-investment portfolio, the intercept should be zero under the efficient markets hypothesis. However, the estimated intercepts indicate an abnormal return of 4% per quarter, with *t*-values of 8.63 and 8.70.

Results from the same tests based on the continuously balanced *SUE* strategy are similar to those in table 3.

*Dividend yield as a potential explanation.* We also examined changes in dividend yields on good news and bad news portfolios. If dividend yields affect asset pricing, as predicted by the Brennan [1970] “after-tax” *CAPM*, then they could conceivably explain post-earnings-announcement drift. But this would require a sufficiently large increase in the difference between dividend yields on good news and bad news stocks. Although we detect such a change, the magnitude (4/10 of 1% of price)

<sup>18</sup> Generally, a position held for 60 trading days spans two calendar quarters. Thus, calculation of calendar-quarter returns requires determination of how much of the 60-day return was generated in each of the two quarters.

<sup>19</sup> The variables were measured using the procedures of Chen, Roll, and Ross [1986] as they would be applied to quarterly data, with the following exceptions. First, for convenience, we used the GNP deflator as our measure of inflation rather than the Consumer Price Index and used ASA-NBER forecasts as our measure of expected inflation. (Chen, Roll, and Ross used the Fama-Gibbons inflation forecasting model.) Second, our measure of the unanticipated default risk premium was the difference between the return on low-grade and high-grade corporate bonds rather than the difference between low-grade corporate and government bonds. See table 3 for further information.

**TABLE 3**  
*Sensitivity of Drift to Risk Factors Used in Studies of Arbitrage-Pricing Theory<sup>1</sup>*  
*(Returns based on FOS control portfolio SUE strategy)*

	Independent Variables					R-Square	F-Test <sup>2</sup> of Significance of Variables Other Than ( $R_{mt}-R_{ft}$ )
	Intercept	$R_{mt}-R_{ft}$	QP	DEI	UI	UPR	UTS
Sign of coefficient, if risky (as opposed to a hedge)		+	+	-	-	+	-
Coefficient	.04	.04	-.19	-.57	.42	-.08	.03
T-value	(8.63)	(.60)	(-.97)	(-.37)	(.44)	(-.38)	(.03)
Coefficient	.04	-	-.16	-.92	.37	-.01	.06
T-value	(8.70)		(-.84)	(-.66)	(.39)	(-.04)	(1.07)

<sup>1</sup> Dependent variable is the calendar-quarter return on a zero-investment portfolio, where long (short) positions in extreme good news stocks (extreme bad news stocks) are offset by positions in a portfolio of NYSE-AMEX firms in the same size decile. The returns are regressed against the return on the value-weighted NYSE index (in risk premium form) and five factors identified by Chen, Roll, and Ross [1986] as potentially influencing asset prices.

Extreme good (bad) news is defined in terms of standardized unexpected earnings (*SUE*), relative to prior-quarter *SUE* distribution. Firms ranked in the highest (lowest) decile are considered extreme good (bad) news firms.

Independent variables are defined as follows:

$R_{mt} - R_{ft}$  = return on value-weighted NYSE index, less 90-day treasury-bill rate;

QP = quarterly growth rate in industrial production, lagged ahead one period;

DEI = change in expected inflation;

UI = unanticipated inflation;

UPR = unanticipated change in the default risk premium (return on high-yield bonds [under BBB], less return on AAA bonds);

UTS = unanticipated change in the term structure (return on long-term government bonds, less treasury-bill rate).

<sup>2</sup>  $F(5, 43)$  is significant at the .05 level for values in excess of 2.44.

would imply a trivial impact on expected returns, given economically plausible dividend yield effects.

Our conclusion, then, is that the observed postannouncement drift cannot be explained as a risk premium needed to compensate investors for risk factors commonly discussed in the asset-pricing literature. In the following sections, we examine whether some other unidentified risk factor could plausibly explain the drift.

4.2.3. *Consistent profitability of the strategy.* In this section, we examine how frequently a zero-investment *SUE* trading strategy generates a negative return. If a zero-investment strategy yields a positive *mean* return because it is risky, that risk must periodically reveal itself in the form of losses.

Panels A and B of figure 5 present the abnormal returns on the two *SUE* strategies for each calendar quarter from 1974:III through 1986:IV. In panel A the returns are to the FOS control portfolio strategy, where we assume a long (short) position in the firms whose unexpected earnings are ranked in the highest (lowest) quintile.<sup>20</sup> The returns to the continuously balanced *SUE* strategy appear in panel B. In both panels, we began by calculating abnormal returns over 60-trading-day postannouncement windows and then determined how much of the 60-day return was generated within the two calendar quarters spanned by those 60 days.

The interesting feature of figure 5 is the consistency with which the zero-investment portfolios generate positive returns. The returns in panel A are positive in 46 of 50 quarters and in 13 of 13 years. In panel B, the returns are positive in 44 of 50 quarters and in 13 of 13 years. FOS present similar evidence in their figure 2 [1984, p. 594], which shows a positive abnormal return in 31 of 32 quarters.<sup>21</sup>

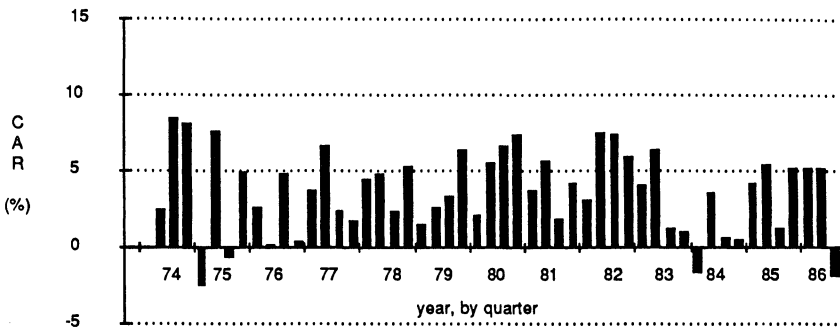
If the returns on a zero-investment portfolio represent compensation for risk, then losses should occur with an expected cost (in terms of utility) that is equal to the expected value of the risk premium. However, for the overall sample, returns of nearly 200% (before compounding) have been generated over the 50 quarters, with negative returns in only 4 or 6 quarters. These negative returns sum to less than 7%.

To better appreciate how surprising the consistency is, consider the behavior of the ex post risk premium for beta. Fama and MacBeth [1973] present returns on zero-investment, unit-beta portfolios for the period 1935–68. That portfolio generated a mean annualized return of about 10%. But among the 134 quarters represented there, returns on this portfolio were negative 39% of the time. In contrast, the mean annualized

<sup>20</sup> Although deciles are used elsewhere when results are presented for the FOS strategy, we use quintiles here to make panel A (based on the FOS strategy) and panel B (based on the continuously balanced *SUE* strategy) more comparable. Results for panel A are similar when deciles are used.

<sup>21</sup> However, FOS do not discuss the implications of this result for distinguishing among alternative explanations for the drift.

Panel A: FOS control portfolio SUE strategy



Panel B: Continuously balanced SUE strategy

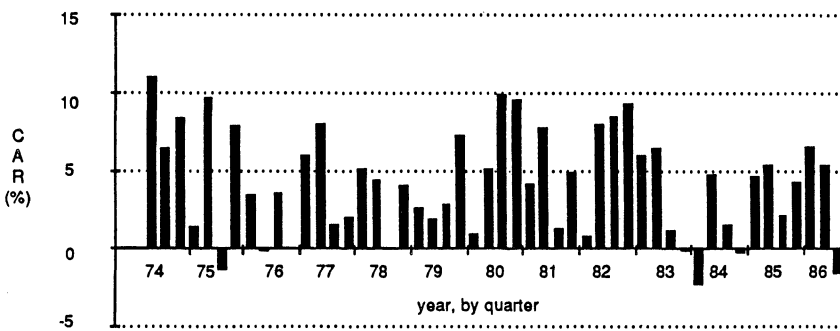


FIG. 5.—Cumulative abnormal returns (CARs) from *SUE* strategies, by calendar quarter. In both panels, long (short) positions are assumed in the highest (lowest) quintiles of standardized unexpected earnings (*SUE*) and held for 60 trading days. CARs are assigned to calendar quarters based on the portion of the 60-day CAR generated within that calendar quarter. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details). In panel A, CARs are the combined abnormal returns from a long position in the highest *SUE* quintile and a short position in the lowest *SUE* quintile. Abnormal returns are the sums over the 60 trading days after the announcement of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. In panel B, continuous balancing requires that each \$1 long position in the highest *SUE* quintile is always offset by a short position in similar-sized stocks (small, medium, or large) in the lowest *SUE* quintile. Balancing in this way sometimes requires waiting after earnings announcements until an offsetting “match” is available. CARs, computed over the 60 trading days after matching, are a combination of the compounded (buy and hold) returns for the long and short positions.

return on the zero-investment portfolio described in figure 5 is higher (18%) and yet is negative only 8% or 12% of the time.

Some readers of prior drafts have questioned whether the consistent profitability depicted in figure 5 could reflect some problem in the benchmark we use to measure abnormal returns. But if our benchmark fails to control for some risk that is priced in the market, then the results

are even more surprising.<sup>22</sup> For example, if we have failed to control for systematic risk and our combined long and short position has a positive beta, the abnormal return on the strategy should be negative when the overall market return is negative. Over the 50-quarter horizon, the equally weighted NYSE index declined 16 times, and yet the abnormal return on the strategy in panel A was positive in 13 of those 16 quarters (11 of 16 quarters for panel B).

In summary, we are able to reconcile our evidence with *CAPM* misspecification (i.e., failure to control fully for risk) only if at least one of the following conditions hold: (1) the infrequency of losses in the 1974–86 period is extremely unusual, relative to what would be observed in a longer time period; (2) the risk premium earned on the *SUE* strategies represents compensation for the risk of infrequent but catastrophic losses, none of which was observed within this 13-year time span; (3) the disutility of the losses we observe is commensurate with the utility of the gains, because the losses occur during periods when a \$1 decline in wealth is 28 times more important than the average \$1 increase in wealth. (Cumulative gains are 28 times larger than cumulative losses.)

We find conditions (1) and (3) implausible and note that there is no evidence to support condition (2).

*4.2.4. Raw returns on bad news firms.* The large estimated negative *abnormal* postannouncement returns for firms with extreme negative unexpected earnings suggests that the *total (raw)* postannouncement returns for those firms could be less than the risk-free rate or even negative. Although such predictably low raw returns on risky assets are not ruled out by most modern capital-asset-pricing models, they are expected only under special conditions that many would find implausible as applied to a broad cross-section of stocks. Essentially, the stocks would have to offer some hedge, the value of which exceeds the cost of any other risk to which the asset is exposed.

Table 4 summarizes the total returns, compounded over various periods, for bad news stocks which ranked in the lowest decile of the unexpected earnings distribution. The bottom panel shows that the total annualized returns on the bad news stocks (averaged over firms of all sizes) were 1.5%, 12.6%, and 10.4% for periods ending 5, 20, and 40

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<sup>22</sup> The results could conceivably be explained by a failure to control for some factor that causes returns to increase (decrease) for good (bad) news firms in *all* periods, regardless of macroeconomic conditions. However, the only asset-pricing models we know of that could possibly include such a factor are the Brennan [1970] “after-tax” *CAPM* (which includes a dividend yield effect) and the Amihud and Mendelson [1986] *CAPM*, which includes a term linked to the bid–ask spread. Earlier (section 4.2.2) we dismissed Brennan’s dividend yield effect as an explanation. The Amihud–Mendelson *CAPM* could explain the result only if an announcement of good news (bad news) caused a long-run increase (decrease) in the proportional bid–ask spread. But one would expect the opposite given that the proportional bid–ask spread varies inversely with price, and that good news (bad news) firms tend to experience price increases (decreases).

**TABLE 4**  
*Total (Raw) Returns on "Bad News" (Lowest SUE decile) Portfolios<sup>1</sup>*

Holding Period (Trading Days, Relative to Announcement)	Small Firms		Medium Firms		Large Firms	
	Raw Return	Cum. Raw Return	Raw Return	Cum. Raw Return	Raw Return	Cum. Raw Return
Preannouncement period (-79, 0)	-1.8%*	-1.8%*	-.4%	-.4%	2.6%*	2.6%*
Postannouncement period						
(1, 5)	-.14	-.14	.00	.00	.23	.23
(6, 20)	.89*	.75*	.85*	.85*	1.19*	1.42*
(21, 40)	1.31*	2.05*	.46	1.31*	.24	1.66*
(41, 60)	2.36*	4.42*	1.87*	3.18*	1.85*	3.51*
(61, 80)	1.32*	5.74*	.78*	3.95*	1.07*	4.59*
Annualized postannouncement raw return						
(1, 5)		-7.0		0.0		11.5
(1, 20)		9.4*		10.6*		17.8*
(1, 40)		12.8*		8.2*		10.2*
(1, 60)		18.4*		13.2*		14.6*
(1, 80)		17.9*		12.3*		14.3*
Comparable annualized raw re- turns for "good news" (highest decile SUE) port- folio						
(1, 5)		32.5%*		41.6%*		35.5%*
(1, 20)		26.6*		33.7*		27.5*
(1, 40)		29.7*		28.0*		22.3*
(1, 60)		32.9*		27.8*		21.4*
(1, 80)		30.5*		26.9*		20.8*
Mean annualized returns across all firm size categories						
		Low SUE		High SUE		
(1, 5)		1.5%		36.5%*		
(1, 20)		12.6*		29.3*		
(1, 40)		10.4*		26.7*		
(1, 60)		15.4*		27.4*		
(1, 80)		14.8*		26.1*		

<sup>1</sup> SUE represents forecast error from a first-order autoregressive earnings expectations model (in seasonal differences) scaled by its estimation-period standard deviation. Firms are assigned to SUE deciles based on the standing of their SUE relative to the prior-quarter SUE distribution.

\* Significantly different from zero, .05 level (two-tailed test).

trading days subsequent to the earnings announcement.<sup>23</sup> Total annualized returns for good news firms were 36.5%, 29.3%, and 26.7% for the same periods. These returns were generated during 1974-86, when the average annualized return on treasury bills one week from maturity was

<sup>23</sup> The standard errors of the mean annualized raw returns over the intervals (1, 5), (1, 20), and (1, 40) are all less than 1%, across all categories in table 4. These standard errors



8.5% and the return on the equally weighted NYSE index was approximately 22% (13% for the value-weighted index).

The total annualized returns for *small* bad news stocks over the 5 days after the earnings announcement were not only less than the average treasury-bill rate, they were actually negative (although not significantly different from zero). The total returns for medium firms over the same 5-day window were zero and remained less than the average T-bill rate over the 40 days subsequent to the announcement. All other total returns are in excess of the average T-bill rate. However, for two months following the announcement, the difference was small. For the overall sample, the 40-trading-day return was only 10.4%, or 1.9% higher than the average T-bill rate.<sup>24</sup> In contrast, the 26.7% postannouncement return for the good news firms exceeded the average T-bill rate by 18.2%.

In order to reconcile this evidence with *CAPM* misspecification, one must believe either (1) that betas on the bad news stocks are near zero (and negative for small and medium stocks shortly after the announcement), or (2) that the value of these stocks as hedges against some unidentified risk causes their cash flows to be discounted at rates less than treasury-bill rates during the 5-day postannouncement period, and at rates nearly that low for two months thereafter. Condition (1) is inconsistent with evidence in table 2, and we find it implausible that condition (2) could apply to as broad a spectrum of stocks as those in the bad news portfolios.

#### 4.3 TESTS OF TRANSACTIONS COSTS AS EXPLANATION FOR DRIFT

Since much of the above evidence is inconsistent with explanations based on incomplete adjustment for risk, we now turn to the possibility that the drift could represent a delayed price response. One possibility is that the drift occurs because transactions costs create sufficient impediments to trading to prevent a complete and immediate response to earnings announcements.

The abnormal returns reported in this paper appear to be within round-trip transactions costs for the small individual investor. When transactions costs are defined to include both bid-ask spreads and commissions, they are about 4% and 2% for small and large stocks,

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were calculated by scaling the standard deviation of raw returns underlying the mean (before annualizing) by the square root of the sample size, and then multiplying by the square root of the factor used to annualize the returns. To the extent the data overlap in calendar time and are cross-sectionally dependent, the standard errors are understated.

<sup>24</sup> A comparison of raw returns to the average treasury-bill rate is imprecise, in that it assumes the event periods are evenly distributed in calendar time. We also calculated the difference between raw returns and contemporaneous returns on treasury bills. For the overall sample, the difference was negative for the first 5 days of the postannouncement period (-7.0%) and positive for the first 40 days (2.1%).

respectively (Stoll and Whaley [1983]).<sup>25</sup> To calculate the cost of the *SUE* strategy, one must double these amounts to reflect the costs of a combined long and short position. Then, taking into account that the *SUE* strategy involves (on average) a 78% turnover in portfolio content each quarter, the implied cost would be about 6% (3%) per quarter for small and large stocks, respectively. These amounts are approximately equal to that 60-day abnormal returns in table 1.

In this section, we consider how the data might behave if transactions costs explain postannouncement drift, and then test for the existence of that behavior.

*4.3.1. Is the drift "constrained" by an upper bound?* Our first test was inspired by Ball [1978, p. 110], who argued that, "...if the 'slow' market reaction is explained in terms of transactions costs (or costs of 'professionals' operating in the market), then *small* deviations from expectations are those which imply market disequilibrium. Large deviations presumably attract more investors and are promptly incorporated in prices because (under this hypothesis) the net gain, after costs, is higher. The consistent interpretation of this hypothesis is that the excess returns persist up to, but not beyond, the level of marginal transactions and information processing costs."

Under Ball's depiction, a postannouncement drift would be observed only when the implied excess returns are small. Alternatively, the drift may be observed for all levels of implied excess returns but would never exceed a threshold (equal to the cost of exploiting the information), regardless of the magnitude of unexpected earnings.<sup>26</sup> That is, regardless of whether the *total* stock price response implied by an earnings announcement is 2%, 5%, or 20%, the price might move immediately to within (say) 2% of the implied level. At that point, incentives to exploit the earnings information would be eliminated for many traders, and the remainder of the response would occur only with some delay. In such a market, the postannouncement drift would increase as unexpected earnings increase, but only to some upper bound; beyond that bound, the drift would remain constant, regardless of the magnitude of unexpected earnings.

Ball [1978, p. 110] notes that existing evidence does not appear consistent with this characterization: "...the evidence... is that extreme-rank earnings and dividend changes are associated with *larger* estimated abnormal returns, contrary to the 'transactions cost' and 'private cost' explanations." However, we consider here whether we (and prior re-

<sup>25</sup> These amounts are based on data from the post-1975 era of negotiated commissions and are calculated by grouping Stoll and Whaley's deciles into three categories to conform to our definitions of small, medium, and large.

<sup>26</sup> Although we initially inferred that Ball's depiction was consistent with the second alternative, he has indicated to us that he intended to imply the first.

searchers) have failed to observe an upper bound because we have not yet examined sufficiently extreme values of unexpected earnings.<sup>27</sup> Our approach is to divide our sample into progressively smaller portfolios, based on rankings of unexpected earnings. That is, we first divide the sample into halves, then thirds, quintiles, deciles, and so on, until finally we divide the sample into 100 portfolios, based on rankings of unexpected earnings. At each of these steps, we calculate the abnormal return from a long position in the portfolio with the highest unexpected earnings, and a short position in the portfolio with the lowest unexpected earnings. Thus, at each step, the values of unexpected earnings in our portfolios become more extreme. If postannouncement drift is caused by a cost that impedes trading, we should observe that, at a point bounded by that cost, the drift should cease to increase, even though unexpected earnings continue to increase.

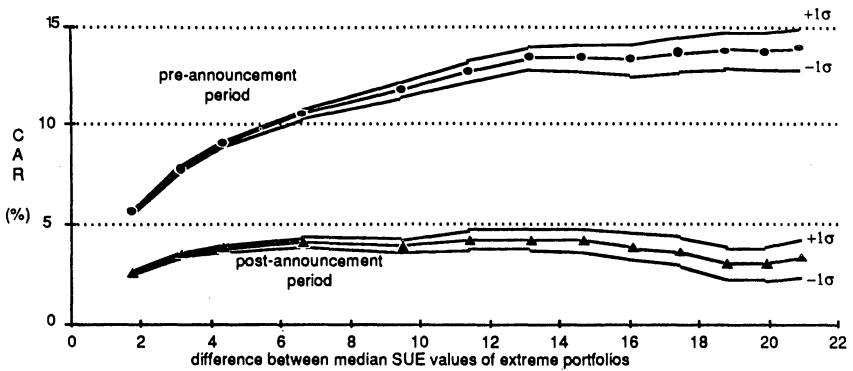
The results are presented in panel A of figure 6. We find that the drift (over 60 days) grows larger, up to the point where the difference between *SUEs* for extreme portfolios is equal to six. (This is the point at which the sample is split into deciles, which is as fine a decomposition as any prior study has used.) Beyond that point, the drift does not increase. Note that the upper bound for the drift is about 4%, or 2% per position. That amount is within the bounds of transactions costs for the average firm (based on Stoll and Whaley [1983]), where such costs include both commissions and the bid-ask spread. Figure 6, panel B shows that the drift is bounded at approximately 5%, 4.3%, and 3% for small, medium, and large firms, respectively. This is consistent with Stoll and Whaley's [1983] evidence that transactions costs vary inversely with firm size; when their sample is segregated into thirds, transactions costs are 3.9%, 2.6%, and 2.0% for small, medium, and large firms. When these amounts are doubled to account for a combined long and short position, they exceed the bounds implied by figure 6, panel B.

One potential alternative explanation for the result is that the more extreme values of unexpected earnings simply reflect estimation error. That is, beyond some upper bound, any additional increases in our measures of unexpected earnings represent nothing more than noise. However, the data indicate that this is not the case. Figure 6, panel A also presents the preannouncement abnormal returns for portfolios with varying levels of unexpected earnings. Note that even though the postannouncement drift reaches a maximum when *SUE* difference equals 6, the preannouncement drift continues to increase to the point where *SUE* difference equals 14. Thus, increases in unexpected earnings (at least to that point) have stock price impacts and are not purely the result of noise.

Note also that the results of this test cast additional doubt on arguments based on *CAPM* misspecification. In order to accommodate these

<sup>27</sup> We are grateful to Jim Noel, who suggested the tests in this section.

Panel A: Overall sample: Pre-announcement and post-announcement abnormal returns.



Panel B: Comparison by firm size: post-announcement abnormal returns.

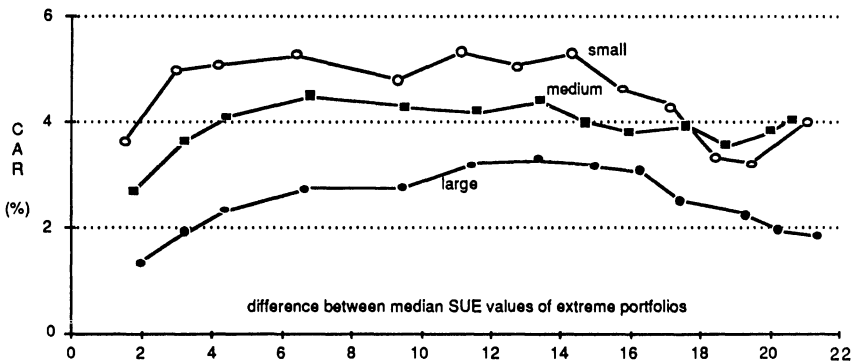


FIG. 6.—Test of an explanation for the drift, based on costs that impede trading. The plot presents the difference in drifts or cumulative abnormal returns (CARs) over 60 days after earnings announcements, between the most positive and most negative *SUE* (standardized unexpected earnings) portfolios, constructed by splitting the sample into 2, 3, 5, 10, 20, . . . , 100 portfolios based on *SUE*. The hypothesis predicts that, if the drift is caused by costs that impede trading, the postannouncement drift should remain less than those costs, regardless of the *SUE* difference between extreme portfolios. Thus, as differences between *SUE*s of extreme portfolios increase (represented by movement toward the right of the graph), the postannouncement CARs should level out, despite increases in the preannouncement CARs. CARs are the sums over 60-trading-day pre- and postannouncement holding periods of the difference between daily returns and returns for NYSE-AMEX firms of the same size decile. *SUE* represents forecast errors from a first-order autoregressive earnings expectation model (in seasonal differences) scaled by its estimation-period standard deviation (see section 3.2 for details). Small, medium, and large firms are in size deciles 1 to 4, 5 to 7, and 8 to 10, respectively, based on January 1 market values of equity for all NYSE and AMEX firms.

results, the misspecification argument would have to introduce a “kink” in the relation between unexpected earnings and risk. That is, unexpected earnings would have to proxy for an omitted risk factor up to some point, but then additional increases in unexpected earnings could no longer be correlated with increases in risk.

4.3.2. *Are abnormal returns for short positions greater than those for long positions?* If the costs of trading do play some role in explaining postannouncement drift, then we might expect the abnormal returns to short positions in bad news firms to exceed those for long positions in good news firms, to compensate for restrictions on short sales.

When we calculate abnormal returns using the FOS approach, our data appear consistent with this hypothesis. The estimated abnormal returns to short positions in bad news firms are larger, and last longer, than the estimated abnormal returns on good news firms. Across all size groups, the abnormal return to the short position over 60 and 180 postannouncement days is 2.3% and 5.5%, respectively, compared to 2.0% and 2.6% for the long position. However, recall that the FOS calculation of abnormal returns involves *summing* daily returns. As indicated in section 3.2.2, summing returns can introduce noise in the calculations which can be eliminated by compounding the returns. While summing and compounding yielded similar results for the *combination* of long positions in good news and short positions in bad news stocks in all of the previous tests, comparisons *between* the returns to the long and short positions are sensitive to the choice between summing and compounding.

Using compounded returns in the FOS size-control portfolio strategy, the differences between postannouncement abnormal returns to long positions in good news stocks and to short positions in bad news stocks are small. The abnormal return to the short position over 60 and 180 postannouncement days is 1.9% and 4.4%, respectively, compared to 2.8% and 5.4% for the long position.

In summary, we have some results which indicate that there is an upper bound on the postannouncement drift, which is consistent with a transactions-cost-based explanation. On the other hand, we find weaker results that restrictions on short sales cause the returns to the short position to exceed the returns to the long position.

Even if certain features of the data are consistent with a transactions-cost-based explanation for the drift, the explanation raises several difficult questions, which we discuss in section 5.

#### 4.4 TESTS OF WHETHER PRICES FAIL TO REFLECT FULL IMPLICATIONS OF CURRENT EARNINGS FOR FUTURE EARNINGS

We now briefly consider one last possibility that could lead to a delayed response to earnings information. Specifically, we consider whether market prices fail to reflect the full implications of current quarterly earnings for future quarterly earnings. Although we initially doubted the viability of this hypothesis, we were motivated to test it based on discussions with a large insurance company that sells information necessary to trade on postannouncement drift.

It is well known that seasonally differenced quarterly earnings tend to be positively correlated from one quarter to the next (Foster [1977] and

Freeman and Tse [1989]). As a result, when earnings in quarter  $t$  are up, relative to the comparable quarter of the prior year, an efficient market would generate a higher expectation for earnings of quarter  $t + 1$  than otherwise. After factoring in the implications of quarter  $t$  earnings, the expectation for quarter  $t + 1$  would be unbiased and the *mean* reaction to the announcement of quarter  $t + 1$  earnings would be zero.

Suppose though that the market fails to recognize the full extent of the serial correlation in seasonally differenced quarterly earnings. That is, the market fails adequately to revise its expectations for quarter  $t + 1$  earnings upon receipt of the news for quarter  $t$ . The full implications of quarter  $t$  earnings might not be assimilated until analysts subsequently revise and publish forecasts or (in the extreme) until earnings for quarter  $t + 1$  are announced. In that extreme case, the market would tend to be “pleasantly surprised” when earnings for quarter  $t + 1$  are up relative to the prior year (and vice versa), even though the increase could have been predicted based on quarter  $t$  earnings.<sup>28</sup>

Table 5 provides results from our test of this possibility. We identify firms in extreme deciles, based on the *SUE* from quarter  $t$ . We then examine the average reaction to the announcement of quarter  $t + 1$  earnings (measured over days  $(-4, 0)$  relative to that announcement). Note that the portfolios held over those five trading days are completely identified on the basis of information available approximately three months earlier; the returns to those portfolios should, on average, reflect no “surprise” under the hypothesis that stock prices fully reflect publicly available information.

Table 5 indicates that one *can* predict the average reaction to quarter  $t + 1$  earnings, based on the *SUE* for quarter  $t$ . When extreme good news arrives in quarter  $t$ , the market tends to be “pleasantly surprised” again in quarter  $t + 1$ , producing average abnormal returns at the second announcement of 1.3%, 0.7%, and 0.3% for small, medium, and large firms, respectively. When extreme bad news arrives in quarter  $t$ , the market tends to be “disappointed” again in quarter  $t + 1$ , with average abnormal returns at the second announcement being -0.8%, -0.7%, and -0.4% for small, medium, and large firms, respectively.

On the basis of our prior tests, one would expect to observe *some* predictable abnormal returns surrounding the next earnings announcement. However, if the drift documented previously were “smooth” over time, abnormal returns as large as those in table 5 would *not* be expected. Since the five trading days examined in table 5 constitute an event period

<sup>28</sup> Some readers have suggested that such behavior is to be expected, because even statistical models that attempt to take the serial correlation in earnings into account generate estimates of unexpected earnings that are themselves serially correlated (see FOS [1984, table 1]). However, note that this is a characteristic of the estimates of unexpected earnings from an imperfect (inefficient) statistical model, not a characteristic of “actual” unexpected earnings in an efficient market. In an efficient market, unexpected earnings would not be serially correlated (by definition).

**TABLE 5**

*Mean Stock Price Reactions to Quarter  $t+1$  Earnings, for Firms Grouped on Quarter  $t$   $SUE$ <sup>1</sup>*

<i>SUE</i> Decile for Quarter $t$	Percentage Abnormal Return in [-4,0] Window Surrounding Earnings Announcement for Quarter $t + 1$ ( $t$ -values in parentheses)		
	Small Firms	Medium Firms	Large Firms
10 (good)	1.32 (7.81)	.68 (5.84)	.31 (3.93)
1 (bad)	-.82 (-5.28)	-.65 (-5.26)	-.37 (-4.01)
Difference ( <i>CAR</i> for long [short] position in <i>SUE</i> 10 [ <i>SUE</i> 1] firm)	2.14	1.33	.68
As fraction of 60-day drift	40%	29%	25%

<sup>1</sup> Firms are grouped according to quarter  $t$   $SUE$ , and abnormal returns are cumulated over the five-trading-day window [-4,0] surrounding the announcement of quarter  $t + 1$  earnings. If market prices fail to reflect the full implications of quarter  $t$  earnings for quarter  $t + 1$  earnings, then the reaction to quarter  $t + 1$  earnings should be predictable, based on quarter  $t$   $SUE$ .

Abnormal returns are differences between daily returns and returns for NYSE firms in the same size decile.  $SUE$  represents forecast error from a first-order autoregressive earnings expectations model (in seasonal differences) scaled by its estimation-period standard deviation.

only 8% as large as the 60-trading-day period used in most of our tests, a smooth drift would cause abnormal returns in table 5 equal to 8% of the total drift observed over the 60-day period. However, the abnormal returns in table 5 are 40%, 29%, and 25% as large as the 60-day drift reported earlier for small, medium, and large firms, respectively. In other words, a disproportionately large fraction of postannouncement drift is concentrated in the few days preceding and including the next quarter’s earnings announcement.

The results are consistent with a market that fails to recognize the full implications of current earnings for future earnings. At the same time, the results shed additional doubt on explanations for the drift based on research design flaws, including a failure to adjust fully for risk. It is difficult to imagine why extreme earnings would lead to risk shifts that tend to occur three months later and are coincident with the announcement of the next quarter’s earnings.

The results in table 5 are related to, but distinct from, those reported by Freeman and Tse (henceforth FT) [1989], who advance a hypothesis for a “rational delayed reaction to earnings news.” As FT explain, the reaction of an efficient market to quarter  $t + 1$  earnings can be conditional on earnings for quarter  $t$ . Given that earnings “innovations” (defined by FT as seasonal differences) are serially correlated, quarter  $t + 1$  innovations should be less surprising if they have the same sign as quarter  $t$

innovations. For example, the reaction (abnormal return) to a quarter  $t + 1$  *positive* innovation that follows a quarter  $t$  positive innovation (say,  $R_{pp}$ ) should be smaller in absolute value than the reaction to a *negative* quarter  $t + 1$  innovation that follows a positive quarter  $t$  innovation (say,  $R_{pn}$ ); that is,  $R_{pp} < -R_{pn}$ .

FT supply evidence consistent with  $R_{pp} < -R_{pn}$ , indicating at least some degree of “rationality” in the market. However, there is a stronger condition implied by market efficiency. Specifically, if the probability of a like-sign innovation is  $\pi$ , then  $\pi(R_{pp}) + (1 - \pi)(R_{pn}) = 0$ ; that is, the weighted average abnormal return for all firms with positive innovations in quarter  $t$  should be zero. If this condition does not hold, one could simply hold *all* firms with a positive innovation in quarter  $t$  and expect to earn positive abnormal returns in quarter  $t + 1$ . Evidence presented throughout this paper (including table 5), in certain of FT’s tests, and in prior research (e.g., FOS [1984]) indicates this stronger condition is violated.

FT also present evidence that at least part of the drift following the announcement of quarter  $t$  earnings can be recharacterized as a response to the predictable portion of quarter  $t + 1$  earnings. (Of course, this raises the question of why the market is responding to something that could have been predicted in a prior quarter.) That evidence is consistent with the results in our table 5 and with earlier evidence documented by Rendleman, Jones, and Latane [1987]. What table 5 demonstrates beyond FT and the prior research is that much of the response to the predictable portion of quarter  $t + 1$  earnings does not occur until the five days surrounding the announcement of those earnings.

## 5. Discussion and Conclusions

Much of the evidence presented here casts doubt on *CAPM* misspecification as an explanation for post-earnings-announcement drift. In section 5.1, we summarize implications of the evidence for various forms of misspecification. Section 5.2 then reviews the plausibility of alternative explanations.

### 5.1 IMPLICATIONS OF THE EVIDENCE FOR CAPM MISSPECIFICATION

*CAPM* misspecification can assume several different forms. They can be divided into (1) risk mismeasurement and (2) other misspecifications. In turn, risk mismeasurement can include (a) misestimation of systematic risk and (b) exclusion of risk factors other than systematic risk.

*5.1.1.a. Risk mismeasurement: misestimation of beta.* Our evidence fails to support the BKW [1988] suggestion that beta shifts might explain a large fraction of post-earnings-announcement drift. The key results are as follows. (1) Estimated beta shifts were only about 8% as large as would be necessary to explain fully the magnitude of the drift (section 4.2.1).



(2) The BKW hypothesis suggests that a strategy based on postanouncement drift (long in good and short in bad news firms) would have a positive beta, thus performing poorly in bear markets. However, the *SUE* strategy yielded consistently positive returns in both bull and bear markets (sections 4.2.1 and 4.2.3).

*5.1.1.b. Risk mismeasurement: exclusion of risk factors other than systematic risk.* Our results are also inconsistent with this potential explanation for post-earnings-announcement drift. (1) We find no evidence that an *SUE* trading strategy is risky along any of the five dimensions identified by Chen, Roll, and Ross [1986] as important factors in asset pricing (section 4.2.2). (2) If the *SUE* strategies are risky on some unidentified dimension, then there is little evidence of that risk surfacing in the form of losses whose cost (in terms of utility) could plausibly be commensurate with the value of the supposed risk premium (section 4.2.3). The consistent profitability of the *SUE* strategies raises the question, "Where's the risk?" (3) According to capital-asset-pricing theory, expected total returns on risky assets can be less than risk-free returns only under special conditions that appear implausible in this context. However, subsequent to earnings announcements, bad news firms had mean *total* returns that were less than T-bill yields during the first week, and only slightly greater than T-bill yields during the first two months (section 4.2.4). (4) The drift is initially increasing in unexpected earnings but appears to reach an upper bound beyond which the drift remains constant as unexpected earnings rise (section 4.3.1). In order to reconcile this result with *CAPM* misspecification, one would have to believe that unexpected earnings proxy for an unidentified risk factor only to some point, with further increases in unexpected earnings being uncorrelated with the unidentified risk. (5) A disproportionate amount of the drift is concentrated around the following quarter's earnings announcement (section 4.4). It is difficult to imagine the reasons risk would tend to shift with a three-month delay, and why the risk shift would be most extreme at a point that coincides with the subsequent earnings announcement.

*5.1.2. Other forms of CAPM misspecification.* *CAPM* misspecification could also involve a failure to allow for market imperfections such as taxes. If the difference between ordinary and capital gains tax rates affects pricing, then a "dividend yield effect" would exist in stock returns. However, as indicated in section 4.2.2, differences in dividend yields between the high and low unexpected earnings firms are so small that they are unlikely to explain any significant fraction of the drift.

## 5.2 DELAYED PRICE RESPONSE AS AN EXPLANATION

Since arguments based on *CAPM* misspecification cannot plausibly be reconciled with our data, we turned to alternative explanations which view the drift as a delayed price response.

*5.2.1. Transactions costs as an explanation.* If transactions costs explain postannouncement drift, then the drift should not exceed transactions cost bounds, even for the most extreme values of unexpected earnings. Section 4.3.1 did indeed indicate that the drift appears to be “constrained” by an upper bound that is approximately equal to round-trip transactions costs for the individual investor. Moreover, the bound varies across firm size in the same way transactions costs do.<sup>29</sup> On the other hand, we did not find strong evidence that abnormal returns to short positions in bad news stocks exceed the abnormal returns to long positions in good news stocks, as would be predicted if restrictions on short sales play a role in causing the drift (section 4.3.2).

Although some of our results in section 4.3.1 may support a transactions-cost-based explanation, this explanation still raises several difficult questions. First, why does trading continue throughout the postannouncement period? If a price response is delayed because transactions costs discourage traders from entering the market, then no trading should occur. Alternatively, if a trade ultimately does occur, it should occur at a price that fully reflects available information. Personally, we are unable to explain why investors are willing to trade even while the price appears not to reflect fully the available earnings information. A related question is, why don’t specialists or other market makers move the price to the “appropriate” level upon the first trade after the earnings announcement?

There are also other questions which undermine the viability of a transactions-cost argument. For example, why is the drift not eliminated by traders who face no commissions and can bypass the specialist’s bid–ask spread (thus facing trivial transactions costs); or why would transaction costs necessarily cause underreaction to new information, as opposed to simply introducing noise in prices? Finally, if transactions costs cause the drift, why is so much of it concentrated around the next quarter’s earnings announcement?

*5.2.2. Failure of market to recognize fully the implications of current earnings for future earnings.* The finding of section 4.4—that much of the drift is concentrated around the next quarter’s earnings announcement—is difficult to explain except as a reflection of market prices that fail to recognize fully the extent of serial correlation in seasonally differenced quarterly earnings. Although the result is surprising, it is consistent with Foster’s [1977] evidence that estimates of unexpected earnings which ignore such serial correlation (i.e., those based on a

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<sup>29</sup> If indeed trading costs (including direct transactions costs and other costs of implementation) do explain post-earnings-announcement drift, then we should observe drifts for other information events as well. It is interesting to note that drifts are observed after a variety of events, including, for example, 13-D filings to announce the acquisition of at least 5% of a firm’s stock (Larcker and Lys [1987]), repurchase tender offers (Lakonishok and Vermalean [1988]), dividend announcements (Charest [1978]), bond rating downgrades (Holthausen and Leftwich [1986]), and earnings forecast revisions by managers (McNichols [1989]) and analysts (Brown, Foster, and Noreen [1985]).

seasonal random walk model) are more highly correlated with stock returns than proxies that do reflect the serial correlation.

Our only result that is not consistent with incomplete updating of earnings expectations is the one from section 4.3.1, which indicated the drift appears to have an upper bound (section 4.3.1). That is, if market prices fail to reflect fully the implications of current earnings for future earnings, then we would expect the drift to be always increasing in the magnitude of the current unexpected earnings rather than having some upper bound.

One possibility that could reconcile the two results is that market prices fail to reflect the full implications of current earnings for future earnings, but once such a discrepancy exceeds a certain threshold, there are sufficient incentives for speculators to trade until it is reduced. But again, this leaves unanswered the question of why some investors are willing to trade at the “wrong” price in the meantime. However, the coexistence of some traders who are either uninformed or unsure about whether the price fully reflects past earnings information, and informed speculators who can exploit the others only at some cost, may be the only explanation that is simultaneously consistent with (1) the rational use of “recent earnings surprise” as a buy/sell signal among several institutions and investment houses, and (2) the persistence of the drift, despite this activity. Whether this or another explanation can resolve the enigma is left for future research.

### 5.3 CONCLUSIONS

In this study we have attempted to discriminate between two alternative explanations for post-earnings-announcement drift: a failure to adjust abnormal returns fully for risk and a delay in the response to earnings reports.

We conclude that much of our evidence cannot plausibly be reconciled with arguments built on risk mismeasurement but is consistent with a delayed price response.

Although these results support a dismissal of an important category of explanations for postannouncement drift, they also raise some difficult unanswered questions. The nagging general question is what kind of equilibrium would support market prices that only partially reflect information as widely disseminated and freely available as earnings. A more specific question (also raised by Freeman and Tse [1989]) is why the market would appear to react with surprise to earnings information that is predictable, based on earnings for the prior quarter. A similar question is suggested by the findings of Ou and Penman [1989a; 1989b], who conclude that market prices fail to reflect detailed financial statement information that is useful in predicting future earnings reversals, and by Dietrich [1984] and Hand [forthcoming], who find reactions to (possibly “cosmetic”) accounting gains that are predictable, based on previously published information.

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