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非預期盈餘反應迴歸模型之確認及衡量之課題

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摘要

本研究探討股票報酬與非預期盈餘關連研究文獻中，未受到應有重視之三項課題：第一，本研究認為，由於盈餘預期無法確知，只能粗略估計，因而提出假說，認為非預期盈餘之絕對數字大小不比其高低估方向(正負號)更能解釋超額報酬；第二，目前之研究通常僅著重於盈餘宣告，忽視其他同一時期之宣告，例如股利，而可能存在遺漏重要自變數的問題；第三，大多數的研究採用之報酬窗期不是過長，就是缺乏明確之事件日期，以致無法掌握宣告之大部分重大價格衝擊。本研究藉盈餘與股利變動方向用以解釋股票報酬之有用性的探究，及含有明確事件日期資料之採用，來探討前述三項課題。本研究共計導出三條迴歸式：相加型迴歸式用以評估超額報酬與非預期盈餘和股利之絕對數字大小間關係；互動型迴歸式用以評估超額報酬與由非預期盈餘及股利定義出的五個類別變數間之關係；第三條迴歸式則用於評估非預期變數之絕對數字大小及正負號，在解釋超額報酬上，是否聯合而言顯著。實證結果發現，在解釋超額報酬方面，非預期盈餘再加上非預期股利，二者之正負號較絕對數字更具解釋力。本文對實證結果之對相關研究的涵義亦詳加討論。

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Specification and Measurement Issues in Unexpected Earnings Response Regression Models

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Abstract

This research addresses three issues that have not received sufficient attention in the vast literature on the relationship between security returns and unexpected earnings. First, it is hypothesized that the magnitude, as opposed to the sign, of unexpected earnings is not necessarily a better explanatory variable of residual returns, since earnings expectations are largely unknown and thus can only be proxied with error. Second, it is observed that extant studies typically focus on earnings announcements exclusively, leading to the possibility of a missing-variable problem by ignoring other contemporaneous announcements such as dividends. Third, most studies either use a return window that is too long or do not have precise event dates, thus failing to capture the most dramatic price impact of the announcements. This study aims to address these issues by exploring

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the usefulness of the signs of earnings and dividend changes in explaining security returns, and by using a data set that has precise event dates. Three regressions are estimated and compared. An additive model evaluates the relationship between residual returns and the magnitudes of unexpected earnings and dividends. An interactive model evaluates the relationship between residual returns and five categorical variables defined by the signs of unexpected earnings and unexpected dividends. Finally, the third model evaluates whether both the magnitudes and the signs of the two unexpected variables are jointly significant in explaining residual returns. The evidence shows that the signs of unexpected earnings, in corroboration with those of unexpected dividends, are more useful in explaining residual returns than the magnitudes of the unexpected variables. The implications of this finding for research in this area are discussed.

1. Introduction

Since the seminal work of Ball and Brown [1968], the empirical relationship between risk-adjusted security returns and unexpected earnings (hereafter returns–earnings relationship) has become one of the most investigated areas in accounting research. In spite of this enormous effort spent on the topic, however, the cumulative knowledge is far from being satisfactory. In a recent review of this literature, for instance, Lev [1989] observes that unexpected earnings explain no more than two to seven percent of the variations in risk-adjusted security returns on the average, notwithstanding the many methodological refinements done to the original Ball and Brown procedures.

Three problems common to this literature beg to be addressed. First and foremost, in determining the "surprise" in earnings, it is not entirely clear how best to filter out the portion of announced earnings that has already been anticipated by the market. To be sure, earnings expectation models exist based on the research of Brown and Rozeff [1979], Foster [1977], Griffin [1977], Watts [1978] and others. Nevertheless, these are proxies at best of investor behavior, so the associated magnitude of unexpected earnings is mostly likely a noisy measure. As a result, it is not clear that the *magnitude* of unexpected earnings is necessarily better correlated with risk-adjusted returns than the *sign* of unexpected earnings. The overall purpose of this research is to investigate this concern.

Second, a large majority of returns–earnings studies have focused exclusively on earnings. The silent assumption must be either (i) earnings announcements are not accompanied by other corporate information releases, or (ii) announcements accompanying earnings releases have no information content. Both assumptions are invalid, however. In the U.S., for instance, earnings announcements are typically made during, or at the conclusion of, the meeting of the firm's board of directors. Consequently, corporate releases other than quarterly earnings frequently are made in the vicinity of earnings announcements. Patell and Wolfson [1982], for instance, report that dividend decisions are frequently announced around the time of earnings releases. In general, it is commonplace to find corporate releases relating to sales, capital expenditures, management change, etc., surrounding earnings announcements.[1] In regard to the second assumption, Hoskin, Hughes, and Ricks [1986] show that announcements that accompany earnings releases have incremental information content, particularly so in the case of contemporaneous dividend announcements. This suggests that research that focuses on earnings announcements exclusively may have suffered from a "missing variable" specification problem. A second purpose of this research, therefore, is to evaluate whether the returns–earnings relationship can be better modeled by controlling for the signs of unexpected dividends.

Third, existing studies in this area tend to either (i) use a long return window, or (ii) otherwise rely on some poorly delineated event dates in a short window analysis. In regard to the first type, Lev [1989] observes that a long return window is likely to result in an overstatement of information content because abnormal returns accumulated over a long period of time can inadvertently pick up the effects of pre-earnings information such as stock repurchases, capital structure changes, stock splits, and stock dividends that are correlated with positive earnings news. Thus, although Easton [1991], Eddy and Seifert [1992], Hoskin et al. [1986], and Kane, Lee, and Marcus [1984] have studied the incremental information content of dividends beyond earnings, their findings could have been tainted by this upward bias discussed in Lev [1989]. In regard to event dates, existing studies mostly rely on the *Wall*

[1] It is not clear why extant research has by and large ignored this fact, as a casual inspection of publications such as the *Wall Street Journal Index* will show that quarterly earnings usually are accompanied by releases regarding dividend and other decisions. One possible explanation is that research such as Watts [1973] has discouraged inquiry in this direction by arguing that the information content of dividends beyond earnings is trivial.

Street Journal Index as the source of data. But as Abdel-khalik [1984] has documented, the reliability of such dates is sometimes questionable. Thus, one is led to wonder the extent to which studies such as Damodaran [1989], Easton [1991], Eddy and Seifert [1992], Kane et al. [1984] have been affected by this inaccurate delineation of the event dates.

Moreover, relevant to both the long- and the short-return window designs is the finding in Patell and Wolfson [1984] that the strongest market reaction to earnings announcements tends to be a 10-15 minute period immediately following the announcement. In a long return window design, the relative impact of the 10-15 minute active market reaction can be heavily diluted. In a short window design, using an inaccurate event date could possibly result in a failure to capture the 10-15 minute market reaction altogether. In view of these two design problems, this research aims to maximize the power of the statistical tests by using a short return window and by delineating the announcement dates precisely using the exact time (hour and minute) of the announcements.

The sample consists of 248 quarterly earnings and dividends announced on Fridays from June 1979 to March 1986, with the exact announcement time extracted from the Dow Jones News Retrieval Service, an on-line data base.[2] For the dependent variable, this research uses a one-day market-risk-adjusted return, based on the Thursday and Friday closing prices. The results lead to the following conclusions. First, it appears that the magnitudes of unexpected earnings and unexpected dividends have significant impacts on abnormal returns, and such impacts are additive. However, when the signs of unexpected earnings and unexpected dividends are added as categorical explanatory variables, the magnitude measures lose explanatory power relative to the categorical variables. Third, removing both magnitude variables from the second regression gives an even better model in the sense that the regression coefficients have meaningful economic interpretations.

The rest of the paper is organized as follows. Section 2 presents the earnings response models tested. Section 3 describes the data and indicates how the variables are estimated. Section 4 discusses the results, and section 5 concludes the paper.

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[2] As Patell and Wolfson [1982, pp. 512] note, the Dow Jones News Retrieval Service is an active competitor to the London-based Reuters Economic Services. According to these authors, most large corporate public relations departments use both services although the Dow Jones system appears to cover the major portion of the U.S. market.

2. Earnings Response Regression Models

This research aims to evaluate whether the magnitude of unexpected earnings is overemphasized in accounting research, with control for unexpected dividends and with precise delineations of the announcement dates. To accomplish this, three regression models are estimated and compared:

Additive Model

The additive model hypothesizes that both the magnitude of unexpected earnings and that of unexpected dividends are correlated with abnormal return, and that the price effects are additive. That is,

$$AR = a_0 + a_1 UE + a_2 UD + \epsilon \tag{1}$$

where AR is one-day abnormal return, UE is unexpected earnings, UD is unexpected dividend, a_i's are coefficients, and ϵ is a disturbance term. If model (1) alone is found to be valid, then the common reliance on the magnitude of earnings as an explanation of variations in security returns should be supported.

Interactive Model

Unlike model (1), the purely interactive model hypothesizes that only the signs of unexpected earnings and unexpected dividends are useful in explaining abnormal returns. That is,

$$AR = b_0 + b_1 K_{-,0} + b_2 K_{-,+} + b_3 K_{+,-} + b_4 K_{+,0} + b_5 K_{+,+} + \omega \tag{2}$$

where all variables are to be defined analogously as those in model (1) except that the K's are categorical variables defined by the signs of unexpected earnings and dividends. For example, $K_{-,0}$ is a dummy variable assuming a value of one if unexpected earnings is negative and unexpected dividends is neutral, and a value of zero otherwise. The other dummy variables are to be interpreted analogously. Notice that the dummy variable $K_{-,-}$ is excluded from model (2) to avoid the problem of perfect multicollinearity.[3] One should

[3] If a qualitative variable has m categories, only m-1 dummy variables can be used in order to avoid the so-called "dummy-variable trap", a situation of perfect multicollinearlity. See Maddala [1977, p. 134] for an elaboration.

therefore interpret the intercept term as representing the case where both unexpected earnings and unexpected dividends are negative. If the intercept term and the dummy variables in model (2) are jointly significant, then the signs of unexpected earnings, coupled with those of unexpected dividends, are useful in explaining the returns–earnings relationship.

Additive and Interactive Model

The third model hypothesizes that both the magnitudes of unexpected earnings and dividends, as well as the stories jointly told by their signs, are useful in explaining abnormal returns. That is,

$$AR = c_0 + c_1 K_{-,0} + c_2 K_{-,+} + c_3 K_{+,-} + c_4 K_{+,0} + c_5 K_{+,+} + c_6 UE + c_7 UD + \xi \quad (3)$$

where all variables are defined analogously as those in models (1) and (2).

3. Data and Estimation of Variables

3.1 Sample Selection

The sample consists of 248 Friday announcements of both earnings and dividends, over the period of June 1979 through March 1986. Initially, a sample of firms that were reported to have made a dividend announcement the previous Friday were identified from the "Dividend News" section of the Monday issues of the *Wall Street Journal.* These firms were then searched for in the "Digest of Earnings Reports" section of the *Journal* to confirm that they also made an earnings announcement. These two steps yielded a preliminary sample of firms that had possibly made both an earnings and a dividend announcement the previous Friday. In the third step, we extracted the original news releases by these firms from the Dow Jones News Retrieval Service. Each Dow Jones news release so extracted ends with a notation of the hour and minute of the corporate release, thus allowing us to select only those announcements that were made prior to the close of stock trading in New York. In all, these steps produced 1,040 pairs of Friday announcements of earnings and dividends, with the exact hour and minute of the events.

This preliminary sample was subsequently reduced to 248 firms after applying the following criteria: (i) The firm must be listed on either the daily CRSP tapes or the daily NASDAQ tapes of the University of Chicago, and there must be at least 180 consecutive return observations prior to the event date. This allows security betas to be estimated. (ii) The firm must not be a regulated utility company because dividend decisions of such firms are often constrained. (iii) Both the earnings and the dividend announcements must be made no later than 3:50 p.m. in New York in order to allow the market at least 10 minutes to react to the announcements prior to the close of trading at 4 p.m.[4] (iv) The dividends announced must not be an initial dividend, in which case unexpected dividend cannot be measured. (v) The absolute value of expected earnings must exceed 20 cents per share. This is a commonly used procedure to prevent moderate news from introducing measurement errors into the test and to avoid infinitely large percentage forecast errors. For examples, see Beaver, Clarke, and Wright [1979] and Elton, Gruber, and Gultekin [1984].

After selecting the announcement sample, we gathered earnings and dividend data from both the Dow Jones News Retrieval Service and the *Wall Street Journal Index*. Where necessary, such data were adjusted for stock dividends and stock splits.

3.2 Estimation of Variables

ARs are measured using the standard market–model methodology (see Watts and Zimmerman [1986, p. 33] for example) using 120 daily returns, from day -180 to day -61, day 0 being the announcement day. UE is measured on the assumption that quarterly earnings evolve as a seasonal random walk, which is commonly found in research of this type, Patell and Wolfson [1982] being an example. That is, $UE = (E_q - E_{q-4})/|E_{q-4}|$, where E_q is the qth quarterly earnings per share. UD is defined as the percentage change in dividends from the previous quarter, which is also a commonly used procedure. Examples include Patell and Wolfson [1982, 1984] and Hoskin et al. [1986]. That is, $UD = (D_q - D_{q-1})/D_{q-1}$, where D_q is the qth quarterly dividend. Moreover, following a typical procedure used in previous studies, including Beaver et al. [1979], Elton et al. [1984], and Kane et al. [1984], we classify dividend changes of less than five percents as neutral news. The dummy variables in both models (2) and (3) are coded using the signs of UE and UD.

[4]Various cut-off times have been tried, in 5-minute increments from 3:30 p.m. to 3:50 p.m. The results based on these various samples are largely the same. The case for the 3:50 p.m. cut-off is reported because it is associated with the largest sample.

4. Results

Models (1), (2), and (3) are estimated via ordinary least squares regression in which outliers in both unexpected earnings and dividends are "pulled in" by truncating the extreme values of the UE and UD variables to the 1.0 and -1.0 range, a 100-percent truncation. The rationale for this technique for minimizing the impact of outliers has been discussed elsewhere, such as Foster [1977], Brown and Rozeff [1978] and Brown, Griffin, Hagerman, and Zmijewski [1987]. Also, we tried 150-percent and 200-percent truncations, but these alternative procedures led to similar overall results and are not reported here.

Additive Model

Table 1 presents the results from the three regressions. On the basis of model (1) alone, UE and UD are jointly and separately significant explanatory variables for residual returns. This inference is based on the F-statistic of 14.34, and on the t-statistics of 4.0 and 3.01, respectively, for UE and UD, which are all significant at the 1% confidence level. The regression coefficients suggest that a 1% increase in UE has a 0.007% positive impact on residual returns, and that a 1% increase in UD has a 0.022% positive impact on residual returns. Thus, the signs of both variables are meaningful. The regression has an adjusted R^2 of 0.097, which is better than the 0.02 to 0.07 average Lev [1989] observes from existing research of this type. It appears, therefore, that adding unexpected dividends as an independent variable in modeling the returns-earnings relationship is a useful procedure. To sum up, results based on model (1) indicate that the magnitude of unexpected earnings has a positive correlation with residual returns although existing research seems to have misspecified the returns-earnings relationship by ignoring the impact of contemporaneously announced dividends.

Interactive Model

Despite the findings for model (1), however, results based on model (2) indicate that the signs alone of UE and UD are better explanatory variables of residual returns. The regression has an F-statistic of 11.21, which is significant at the 1% level. This means that the five dummy variables are jointly significant. These dummy variables are also individually significant, as indicated by the fact that all the t-statistics are significant at no less than

Table 1
Ordinary Least Squares Estimates of Model (1), (2) and (3)
Dependent Variable: AR

Explanatory Variable	Additive Model	Interactive Model	Additive and Interactive Model
Intercept	-0.004	-0.040	-0.035
	(-2.36)**	(-5.82)***	(-4.16)***
$K_{-,0}$		0.029	0.025
		(3.89)***	(2.91)***
$K_{-,+}$		0.028	0.023
		(2.73)***	(1.69)*
$K_{+,-}$		0.038	0.035
		(2.01)**	(1.81)*
$K_{+,0}$		0.045	0.039
		(6.09)***	(4.30)***
$K_{+,+}$		0.046	0.040
		(6.02)***	(3.81)***
UE	0.007		0.003
	(4.00)***		(1.53)
UD	0.022		0.005
	(3.01)***		(0.52)
F-statistic[a]	14.34***		
F-statistic First-Order[b]			1.32
F-statistic Interaction[c]			5.5***
Adjusted R^2	0.097	0.17	0.17

Numbers in parentheses are t-statistics. *, ** and *** denote, respectively, the 10%, 5% and 1% levels of significance.

ARs are one-day risk-adjusted returns based on Thursday and Friday closing prices, with risk adjustment employing the standard market–model methodology using 120 daily returns, from day -180 to day -61, day 0 being the announcement day. $K_{-,0}$ denotes a dummy variable assuming a value of one if unexpected earnings is positive and unexpected dividend is neutral, and a zero value otherwise. UE is defined as $(E_q - E_{q-4})/|E_{q-4}|$, where E_q and E_{q-4} are, respectively, announced earnings per share of quarter q and of four quarters earlier. UD is defined as $(D_q - D_{q-1})/D_{q-1}$, where D_q and D_{q-1} are, respectively, announced dividend per share and previous quarter's dividend per share.

[a] The degrees of freedom are (2, 246) for model (1) and (5, 243) for model (2). Related critical values at the 1% confidence level are, respectively, 4.61 and 3.01.

[b] The degrees of freedom are (2, 240). A related critical value at the 5% confidence level is 3.00.

[c] The degrees of freedom are (5, 240). A related critical value at the 1% confidence level is 3.02.

the 5% level. The regression has an adjusted R^2 of 0.17, which is nearly twice that for model (1). Based on Lev's [1989] argument that R^2 is an appropriate measure of information content, one can conclude that the traditional earnings response model, which hypothesizes a positive correlation between the magnitude of unexpected earnings alone and residual returns, seems to suffer from serious specification and measurement problems.

Additionally, the estimated coefficients of model (2) also tell a consistent story. As noted in the previous section, the intercept term in model (2) represents the case where UE and UD are both negative. Thus, one would expect the intercept term not only to be negative, but also to have the least value when compared with the other estimated coefficients. This is in fact so, as the intercept term is -0.04, which ranks lower than any other estimated coefficients in the column of Table 1 for model (2). On the contrary, since $K_{+,+}$ captures the cases where both UE and UD are positive, one would expect its coefficient to be positive and to rank highest among the estimated coefficients. This is indeed so, as indicated by an estimated coefficient of 0.046, which is the largest coefficient in the column. This coefficient indicates that, when both UE and UD are positive, one would expect a 0.006% (given by the sum of the coefficient, 0.046, and the intercept term, -0.040) increase in residual returns on the average. Similarly, because $K_{+,0}$ has a coefficient of 0.045, a positive UE coupled with a neutral UD is found to have a 0.005% positive impact on residual returns. However, the remaining dummy variables, $K_{-,0}$, $K_{-,+}$, and $K_{+,-}$, all contribute negatively to residual returns, as none of them is larger than the absolute value of the intercept term. The economic interpretations of these regression coefficients are summarized in Table 2.

Two generalizations can be made based on the second column in Table 2. First, when either UE or UD is negative, which is represented by the intercept and the variables $K_{-,0}$, $K_{-,+}$, and $K_{+,-}$, the associated residual return is negative. This supports the belief that investors are careful about possible manipulations of earnings- and dividend-trends by management. Consequently, they would evaluate the two signals in relation to each other. Moreover, since the intercept stands for the $K_{-,-}$ variable, it has the most negative impact on returns. Second, when UE is positive and UD is non-negative, as represented by $K_{+,0}$ and $K_{+,+}$ variables, the associated residual return is positive. In addition, the price impact of $K_{+,+}$ dominates that of $K_{+,0}$ because the former designates better news than the latter. In

Table 2
Economic Interpretation of Model (1), (2) and (3)

	Impact on AR		
Explanatory Variable	(1) Additive Model	(2) Interactive Model	(3) Additive and Interactive Model
Negative UE, Negative UD		-.040%	-.035%
Negative UE, Neutral UD		-.011%	-.010%
Negative UE, Positive UD		-.012%	-.012%
Positive UE, Negative UD		-.002%	0.000%
Positive UE, Neutral UD		0.005%	0.004%
Positive UE, positive UD		0.006%	0.005%
1% increase in earnings	0.007%		0.003%
1% increase in dividends	0.022%		0.005%

short, as estimated, the interactive model tells a consistent story about the usefulness of the signs of unexpected earnings in explaining residual returns.

Additive and Interactive Model

To shed further light on the relative usefulness of the magnitude variables and the indicator variables in explaining returns, model (3) is estimated. Notice that there is no improvement in the adjusted R^2, which stands at 0.17 as before. The first-order F-statistic is 1.32, which is statistically insignificant.[5] Since the first-order F-statistic tests the joint significance of the UE and UD variables in the regression, the results indicate that the two magnitude variables do not add much to the regression. This is also in keeping with the sizes of the t-statistics of the two variables. On the contrary, the interaction

[5]This F-statistic was computed as the sums of squared errors from constrained and unconstrained regressions. Specifically,

$$F = \frac{(SSE_{Restricied} - SSE_{Unrestricted})/R}{SSE_{Unrestricted}/(N-J)}$$

where $SSE_{Restricted}$ and $SSE_{Unrestricted}$ are the sums of squared errors in the restricted and unrestricted models, respectively, R is the number of restrictions, N is the number of observations, and J is the number of regressors in the unconstrained regression.

F-statistics is 5.50, which is significant at the 1% level. This suggests that the dummy variables are jointly significant in model (3). Moreover, the intercept term and the five coefficients of the dummy variables are comparable to those of model (2), in terms of their signs and relative values. Thus, one could give these six coefficients the same economic interpretation as that associated with model (2), which is fairly evident by comparing the last two columns in Table 2. In sum, model (3) strengthens the evidence based on model (2) that the signs of UE and UD are more useful in explaining residual returns than the magnitudes of the two variables, thus supporting the basic hypothesis of this paper.

5. Summary and Conclusion

Empirical modeling of risk-adjusted security returns as a linear function of unexpected earnings has been one of the most active areas of accounting research in the past 20 years. Unfortunately, as recently reviewed by Lev [1989], the cumulative knowledge provided by this body of research does not seem to justify the vast amount of energy that has been devoted to it. As indicated by the values of the adjusted R^2s from extant studies, unexpected earnings seem to explain no more than 7% of the variations in residual returns on the average. This study was motivated by three observations characteristic of this body of research.

First, researchers rely too much on the hypothesis that the size of unexpected earnings is related to the *size* of price reaction. Although this hypothesis seems reasonable, earnings expectations can only be measured with error. Thus, it is not clear that the size of unexpected earnings is necessarily more useful in explaining residual returns than the sign of unexpected earnings. The basic motivation of this research is to evaluate whether this concern is founded.

Second, with a few exceptions, extant studies typically focus on earnings exclusively, contrary to the fact that earnings announcements are frequently accompanied by other informative corporate releases, such as sales, capital expenditures, personnel changes, and so on. In light of previous findings that dividend announcements that accompany earnings announcements tend to have incremental information content, this research evaluates whether the returns–earnings relationship can be strengthened by including unexpected dividends as an intervening independent variable.

Third, extant studies also tend to suffer from measurement biases arising from poorly delineated announcement dates. Because researchers are unsure of the precise announcement dates, a long return window is often used to bracket the announcement effect. On the basis of the results in Patell and Wolfson [1984], however, a long window design tends to allow the announcement's impact to be diluted by unrelated events. Consistent with this, Lev [1989] observes that a long return window is also likely to pick up the price effects due to pre-earnings announcements regarding decisions such as stock splits, stock repurchases, capital structure changes, and the like. In short, a long return window design will likely reduce the power of the test, which is in keeping with a low adjusted R^2. In light of this problem, this research uses announcement dates that are defined by the exact hour and minute of the announcements, thus maximizing the impact of the announcement on the one-day return window.

The results show that the basic hypothesis of the research has merit. Namely, although unexpected earnings and unexpected dividends appear to be significant explanatory variables in the returns–earnings relationship, such explanatory power is nearly doubled if one merely uses the signs of the two variables. In a mixed model where both the magnitudes and the signs are used as independent variables, the magnitude variables emerge as insignificant. In regard to the secondary hypothesis, the results show that, although the sign of unexpected earnings is an important determinant of residual returns, so is the sign of unexpected dividends. In fact, when at least one of them is negative, the associated price impact is negative. On the other hand, when unexpected earnings is positive and when unexpected dividends is no worse than neutral, the associated price impact is positive. Thus, not only do contemporaneous dividend announcements have incremental information content, such information content is also multiplicative rather than additive.

Actually, some of these results have been established previously, by authors such as Patell and Wolfson [1982, 1984], Kane et al. [1984], Eddy and Seifert [1992], and Hoskin et al. [1986]. Patell and Wolfson [1982, 1984] and Hoskin et al. [1986], however, did not consider the multiplicative effect of the earnings and dividend information, a central concern here. Like the present study, Kane et al. [1984] and Eddy and Seifert [1992] considered the interactive effect. But Kane et al. used a long return window, in contrast to the one-day return window used here, and Eddy and Seifert did not use precisely announcement dates, a problem this study has overcome by noting the exact time of each announcement. Although the qualitative conclusions of this study are largely the same as those found by these previous authors, overcoming some of the methodological and data problems gives an added degree of confidence in the results, which is the minimum contribution of this study.

This discussion would be incomplete, however, without pointing out some of the limitations of this research. Very clearly, the research has ignored all other contemporaneous announcements except dividends. Although Hoskin et al. [1986] show that dividends are by far the only dominant contemporaneous announcement, other corporate announcements also have a detectable, though very light, impact on prices. Thus, the missing-variable problem this research aims to address is not completely resolved. In addition, the study uses very naive expectation models for both earnings and dividends. These models possibly have introduced noise in the regressions and reduced the power of the test. Moreover, the one-day abnormal return is based on Thursday closing to Friday closing prices. Ideally, it should be based on Friday opening to Friday closing prices in order to capture the announcement effects effectively, but opening prices are not readily available. This data restriction is also likely to have injected noise in the estimated models.

In spite of these limitations, the findings here have a number of implications for future research in this area. First, there seems to be too much effort spent on modeling investors' expectation of earnings. It is not likely that more elaborate time-series models of earnings expectation will result in substantially higher correlations between the size of unexpected earnings and residual returns. This observation is based on the finding that our interactive model is able to produce an adjusted R^2 that is nearly twice as large as that found in the literature, which includes studies that use complicated time-series models such as Box-Jenkins to proxy earnings expectation by investors. As a contribution to this literature, therefore, research on the time-series analysis of earnings has reached a point of diminishing return. Second, usually driven by the availability of earnings data in computer readable format, researchers have inadvertently ignored contemporaneous announcements that could be important intervening variables in modeling the returns–earnings relationship. Hoskin et al. [1986] have produced evidence to support such a view, and this research corroborates their findings by showing the crucial role of dividend information when announced in the neighborhood of earnings releases. Further work in modeling the multiplicative impact of earnings and other contemporaneous announcements seems to be a fruitful endeavor. Finally, when delineating announcement dates, we found that quite a few announcements were made after the stock market had closed. Clearly, to the extent that the price impact is most dramatic *after* the announcement, then announcements made after the close of trading should have a more pronounced effect on the following day. But popularly used data bases, such as the *Wall Street Journal Index* and Compustat, often fail to differentiate between announcements made prior to and those made after the close of trading. We believe that future research on announcement effects can benefit from a more precise identification of the announcement dates.

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