NBER WORKING PAPER SERIES

EARNINGS AND DIVIDEND ANNOUNCEMENTS: IS THERE A CORROBORATION EFFECT?

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Working Paper No. 1248

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
December 1983

The research reported here is part of the NBER's research program in Financial Markets and Monetary Economics. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

NBER Working Paper #1248
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ABSTRACT

We examine abnormal stock returns surrounding contemporaneous earnings and dividend announcements in order to determine whether investors evaluate the two announcements in relation to each other. We find that there is a statistically significant interaction effect. The abnormal return corresponding to any earnings or dividend announcement depends upon the value of the other announcement. This evidence suggests the existence of a corroborative relationship between the two announcements. Investors give more credence to unanticipated dividend increases or decreases when earnings are also above or below expectations, and vice versa.

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1. INTRODUCTION

It seems fair to say that there is today a wide consensus that either favorable earnings or dividend announcements can, by themselves, induce positive abnormal stock returns. The effect of earnings announcements on stock price changes has been documented by Ball and Brown(1968), Foster (1977), Brown(1978), Watts(1978), and Rendleman, Jones and Latane (1982). The dividend announcement effect was first highlighted by Pettit(1972, 1976). Although Watts(1973, 1976) took issue with some of Pettit's methodology, recent studies by Charest(1980) and Aharony and Swary(1980), which are immune to Watts's reservations, strongly confirm the existence of an information content of dividend announcements. The Aharony and Swary study in particular carefully controls for earnings announcements when measuring the effect of dividends. It uses daily data and measures abnormal returns in periods surrounding dividend announcements only when that period does not also contain an earnings announcement. This procedure avoids the possible confounding of the information conveyed by the two announcements. Finally, Miller and Scholes(1982), in a study focused primarily on dividends and taxes, find significant evidence of a dividend announcement effect.

These studies have for the most part attempted to measure the separate effects of either dividends or earnings. In general, the effect of the other announcement has been treated as a statistical nuisance which muddies the waters and introduces methodological complications. Consequently, these studies necessarily leave unanswered the question of whether investors evaluate dividend and earnings announcements in relation to each other. Earnings figures can be manipulated by clever accounting practices, and so may be interpreted with skepticism by the investment community (Kaplan and Roll, 1972). Similarly, dividend announcements are only a crude way to convey information to capital markets.

While both earnings and dividend data have been shown to influence stock performance, one would expect that, in view of the noise associated with either announcement, the capital market would be interested in the consistency of the stories told by earnings and dividend announcements. This might lead to a corroboration effect on stock prices. Empirical evidence of such an interaction effect would be consistent with the hypothesis that the announcements convey useful, but imperfect information.

Unfortunately, by isolating the separate effects of dividends and earnings announcements, the statistical procedures utilized in previous studies have precluded the measurement of a corroboration effect. This effect is the focus of this study. We select firms for which dividends and earnings announcements are separated by less than 10 days. The abnormal return surrounding this "joint announcement" is measured and the separate as well as interactive effects of the dividend and earnings announcements are estimated.

Our empirical results, presented below in Section 4, clearly support the hypothesis of an interaction effect between dividend and earnings announcements. Although regressions of cumulative abnormal stock returns on unanticipated dividends and earnings yield highly significant coefficients on each variable, once terms that capture the interaction between the announcements are added to the regression, the interaction terms are at least as statistically significant as the level effects. These results indicate that the effects of earnings and dividend innovations depend upon the value of the other variable. Each announcement is evaluated with respect to the information contained in the other.

2. DATA AND SAMPLE SELECTION

Our sample consists of 352 observations of quarterly earnings and dividend announcements made during the sample period from the 4th quarter of 1979 to the 2nd quarter of 1981. The selection criteria of these firm-cases are as follows.

1. Firms are listed in the University of Chicago CRSP tapes and also in the Standard and Poor's Qurateriy COMPUSTAT Tapes for the 1973 - 1981 period.
2. Firm's main business line is in manufacturing sectors(SIC codes from 2000 to 3999)

3. Earnings and dividend announcements of these firms were reported in the Wall Street Journal during the sample period.

4. The two announcements occurred within 10 days of each other.

5. Firm's fiscal year ends in March, June, September, or December.

Nonmanufacturing industries were excluded from the sample because they tend to contain many regulated firms whose dividend decisions might be constrained. In order to obtain a sample which was roughly balanced with regard to the composition of positive, zero, and negative earnings and dividend surprises, we utilized the following procedures: First, all firms satisfying requirements 1 - 5 above were sampled from the fourth quarter of 1979 and the second quarter of 1981. This resulted in a sample of 256 observations, which was dominated by cases with zero change in quarterly dividends. (188 of the 256 observations had zero dividend change.) We next scanned the COMPUSTAT tape for all fiscal quarters between 1980:1 and 1981:1 to identify all eligible firms which had a dividend increase or decrease of at least five cents per share. (Firms with extra dividends were excluded from the sample.) This procedure resulted in an additional 96 observations, although only 22 of these were dividend decreases. The final composition of the sample with respect to the sign of dividend and earnings surprises is presented in Table 1.

TABLE 1

Classification of Data

		Earnings Surprise		
		positive	negative	total
Dividend Surprise	positive	78	61	139
	zero	85	103	188
	negative	4	21	25
	total	185	167	352

Notes: Definitions of expected dividend and earnings are given in equations (1) and (2), respectively.

The selection of announcements which are closely timed improves the chances of statistically being able to discern abnormal returns. To detect a corroboration effect, we need to measure abnormal returns over a period encompassing both announcements. If those announcements were widely separated in time, then the abnormal return would need to be calculated over a long intermediate period, during which no relevant event would occur. The extra noise introduced by returns during that period would make it difficult to identify the effects of announcement per se.

Daily stock returns for the 352 observations were available from the CRSP tapes. Dividends per share and primary earnings per share excluding extraordinary items and discontinued operations were obtained from the COMPUSTAT tapes and both earnings and dividend figures were adjusted for stock dividends or stock splits.

3. METHODOLOGY

In order to measure unanticipated dividends and earnings, we need models of expectation formation. Rather than building our own models of such expectations, we rely on models whose validity already have been established elsewhere. The validity of an expectational model will be considered to be confirmed if an earlier study has demonstrated a link between unanticipated dividend or earnings derived from that model and subsequent abnormal stock price performance.

3.1 DIVIDEND EXPECTATION MODEL

Aharony and Swary(1980) demonstrate that a simple dividend forecasting model could successfully predict abnormal stock performance. The model forecasts no change in dividends from one quarter to the next:

$$D^*_q = D_{q-1} \qquad (1)$$

where D_q equals the ordinary dividend per share in the q th quarter and the asterisk denotes an expectation operator[1]. The model is consistent with the hypothesis that managers are reluctant to change dividends in either direction unless they believe the prospects of the firm have significantly

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1. Such a model would probably fare poorly with extra dividends, which are explicitly paid on a one-time-only basis.

improved or deteriorated. Laub(1970) found that firms changed regular dividends in only 25 percent of sampled quarters. This infrequency of dividend change suggests that the simple model might capture expectations to a first approximation.

Aharony and Swary report that this model was as successful as the more sophisticated one of Fama and Babiak(1968) in predicting abnormal performance. The model is ultimately validated by the strong evidence that stock performance was above normal following positive dividend innovations and below normal for negative innovations. Our measure of unanticipated dividends, denoted by D^u, is therefore computed as the percentage change in dividends from the previous quarter:

$$D_q^u = D_q/D_q^* - 1 = D_q/D_{q-1} - 1$$

3.2 EARNINGS EXPECTATION MODEL

The time series properties of quarterly earnings data have been extensively studied. Benston and Watts(1978) examine several Box-Jenkins(1970) models and find that a specification used by Foster(1977) has the best predictive power and that the forecast errors of the Foster model are most closely related to abnormal stock market returns. Watts (1978) corroborates the ability of forecast errors from the Foster model to predict abnormal stock returns. Therefore we will use this model to generate earnings expectations:

$$E_q^* = E_{q-4} + a + b(E_{q-1} - E_{q-5}) \qquad (2)$$

where subscripts q denote quarters. The earnings model allows for seasonal dependence in earnings, for trend growth (via a) and for business cycle effects (via $E_{q-1} - E_{q-5}$). We fit equation (2) separately for each firm in the sample to generate a one period ahead earnings forecast for each firm and took as our measure of unanticipated earnings, E^u, the percentage error in the earnings forecast:

$$E_q^u = E_q / E_q^* - 1$$

3.3 MEASUREMENT OF ABNORMAL STOCK PRICE PERFORMANCE

Abnormal returns are calculated over a period beginning 10 days prior to the first announcement of dividends or earnings and ending 10 days subsequent to the second announcement. The abnormal returns are calculated using the CAPM:

$$AR_{jt} = R_{jt} - \{R_{ft} + B_j(R_{mt} - R_{ft})\}$$

where

AR_{jt} = the abnormal return in day t for firm j,

R_{jt} = total return in day t for firm j,

R_{mt} = market return in day t,

R_{ft} = Treasury bill rate in day t,

B_j = beta for stock of firm j.

The beta is computed from a market model regression using one year of weekly data prior to the first announcement. We use the CAPM to measure abnormal returns rather than the market model, because the intercept of the market model is an ex post result which cannot be taken as a predictor for future periods. A firm with above expected returns in one period should not necessarily be expected to generate superior returns in following periods. Use of the ex post intercept would impose this expectation on returns for future periods.

For each firm in the sample, indexed by j, cumulative abnormal returns (CAR) are calculated as

$$CAR_j = \sum_{t=T_{1j}-10}^{T_{2j}+10} AR_{jt} \quad (3)$$

where T_{1j} is the date of the first announcement and T_{2j} is the date of the latter announcement for firm j.[2]

In theory, The CAR over the joint announcement period should not depend on the announcement order. The new information released to the market after both announcements are

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2. Some authors have found a tendency for abnormal returns to persist for long periods after the earnings announcement. However, even in these studies, the bulk of the CAR occurs within a few days surrounding the announcement. For example, in Rendleman, Jones, and Latane(1982) more than two thirds of the CAR typically appeared within the 20 days surrounding the earnings announcement. Aharony and Swary(1980), and Divecha and Morse(1983) report that the effect of dividend announcement is generally completely impounded into stock prices within 20 day period surrounding the announcement.

made is identical, regardless of their order. Therefore the total abnormal return should be identical over the period containing both announcements. For example, consider a large positive earnings innovation followed by a small dividend innovation. The first announcement would likely generate a large return, while the second could conceivably generate a negative abnormal return because conditional on the first announcement the dividend innovation is disappointing. If the announcements were reversed, the dividend innovation would generate a small positive return and the large earnings innovation would generate a small positive abnormal return because conditional on the earlier (small) dividend innovation, earnings are above expectation. The total effect of the two announcements in either order should be identical, since after both announcements are released, the new information available to the market is identical. We test this hypothesis below, and find that the ordering of the announcements seems irrelevant to the CAR over the announcement period. The appendix provides a more rigorous demonstration that announcement order should not affect our empirical results.

3.4 SPECIFICATION

Rendleman, Jones, and Latane(1982) argue that it is appropriate to standardize unexpected earnings by the standard error of forecasts. This argument is appealing if investors react less strongly to earnings or dividend innovations when the typical variability of such innovations is large. Even if large innovations are observed, these might be discounted if the standard errors of the forecasts are also large. This procedure thus rests on the statistical inference problem facing market participants.

One potential weakness of this approach is that the standardization disturbs the interpretation of innovations in terms of economic magnitudes. A small earnings innovation should not cause a large change in stock price, even if it is statistically significant. Rather than choose one or the other of these specifications, we present results below using standardized and nonstandardized values for E^u, D^u, and CAR.

To standardize the earnings and dividend series, we calculated the time series of D^u_q and E^u_q using one quarter ahead forecast errors over the period 1973:3 to two quarters prior to the announcement quarter. We then calculated the standard deviation of the forecast errors and created the standardized variables,

$$ES^u = E^u/s_E$$

$$DS^u = D^u/s_D$$

where s_E and s_D are the standard deviations of earnings and dividend forecast errors, respectively.

To standardize CAR we first calculated s_j (where j denotes firms) as the standard deviation of the daily residual obtained by applying the CAPM to the 90 tradings days of data which end 30 trading days before the first announcement. We then formed a standardized cumulative abnormal return ($CARS_j$) as

$$CARS_j = CAR_j/\{s_j(T_{2j} - T_{1j} + 21)^{1/2}\}$$

where the $(T_{2j} - T_{1j} + 21)$ term equals the number of days starting from 10 days before the first announcement and ending 10 days after the second announcement, i.e., the days over which the CAR is calculated.

We test our hypothesis regarding the importance of interactions between earnings and dividend announcements using two set of regressions. The first set is in the spirit of Pettit(1972) who combines stocks into positive and negative earnings surprise groups and then compares the abnormal stock performances for each sub-class of dividend surprises within each earnings group. This is a nonparametric test in the sense that only the signs of the announcement surprises are used in forming the portfolios. His procedure is roughly equivalent to regressing abnormal returns on dummy variables which take values of zero or one depending on the signs of the forecast errors.

Our first set of regressions takes the form,

$$CAR = b_0 + b_1 D^u + d_2 E^u + b_3 D(-0)$$

$$+ b_4 D(-+) + b_5 D(+-) + b_6 D(+0) + b_7 D(++) \quad (4)$$

where D(+-) is a dummy variable which takes value 1 if the earnings innovation is positive and dividend innovation is negative and 0 otherwise, and where the other dummy variables are defined analogously. Since the D(--) variable must be excluded for reasons of collinearity of the six possible dummies with the intercept, the base case has the interpretation of a negative innovation in both earnings and dividends and the intercept is thus expected to be negative if interaction effects are relevant.

Equation (4) is equivalent to an analysis of variance with two covariates, D^u and E^u. It thus implicitly has a grouping procedure at its foundation and so is similiar to the approach in Pettit. Under the hypothesis that interactions are unimportant, the dummy variables should be jointly insignificant. The intercept b_0 would be zero, and the slope coefficients, b_1 and b_2 should capture the entire effect of dividend and earnings announcements. The effects of the two announcements would then simply be additive.

Conversely, if announcements are corroborative, then the grouping procedure represented by the dummy variables will be important, and the coefficients of the dummies will be significant. In this case, the coefficients b_1 and b_2 still might be positive since the dummies cannot capture the magnitude of any announcements, but their significance levels should be lowered.

Our second specification is more parametric in nature. We first create interaction terms of the form,

$$INT(-+) = (|D^u \times E^u|^{1/2} + 1.0) \times D(-+)$$

where an analogous interaction term is created for each of the six possible combinations of earnings(+ or -) and dividends(+, 0, or -).

The motivation for this form of interaction terms is as follows: the absolute value of the product of D^u and E^u gives the magnitude of the interaction. Large values correspond to strongly corroborative or strongly contradictory signals, depending upon the agreement of the signs of the two surprises. The square root operation is performed to maintain dimensional consistency. That operation gives the interaction term a unit of percent error which is the unit of the other right hand side variables. The value 1.0 is added to the term $|D^u \times E^u|$ because of the problems which would arise when $D^u = 0$. In that case, the interaction term for $D^u = 0$ and any earnings level would be identically zero and a slope coefficient could not be estimated. The addition of 1.0 to the term causes the interaction variable for these cases to be a simple dummy variable which takes a value of 1.0 in the relevant instance and zero otherwise. Thus the interaction term is a quantitative variable for $D^u \neq 0$, and a simple dummy variable otherwise. Finally, multiplication by the dummy variables D(-+), etc., is required to distinguish among the possible combinations of zero, positive, and negative innovations, so as to capture the effect of sign agreements or disagreements.

To summarize, the second specification takes the form,

$$\begin{aligned} CAR = b_0 + b_1E^u + b_2D^u \\ + b_3INT(--) + b_4INT(-0) + b_5INT(-+) \\ + b_6INT(+-) + b_7INT(+0) + b_8INT(++) \end{aligned} \tag{5}$$

Notice that in this specification all six possible combinations of interaction terms can be included since the interaction terms are no longer collinear with the constant term.

We will present estimates of equations (4) and (5) for four specifications corresponding to the possible permutations of standardization of the dependent and independent variables. One potential problem relating to those specifications with non-standardized dependent variables is the possibility of heteroskedasticity. This might arise since the CAR for each observation differs according to the time interval between announcements and the standard deviation of daily residuals, s_j. We tested our specifications for heteroskedasticity using the procedure suggested by White (1980). These specifications showed virtually no evidence of heteroskedasticity; the chi-square statistics obtained in all cases were less than one-half the critical value corresponding to a 5 percent confidence level. We checked further for heteroskedasticity by performing weighted least squares regressions with weights equal to the reciprocal of either $(T_{2j} - T_{1j} + 21)^{1/2}$ or $s_j(T_{2j} - T_{1j} + 21)^{1/2}$. The residuals from these WLS regressions were then subjected to the White test; the results uniformly indicated that the unweighted residuals were closer to being homoskedastic. In no cases were the coefficient values significantly affected by the weighting scheme. For these reasons, we present results only for the simple OLS regressions. Finally, we also experimented with specifications which included the squared values of E^u and D^u in the list of independent variables. The inclusion of these varibles seemed to have little effect on the coefficients of the other variables. The heteroskedasticity tests for these specifications also were similar to those for the regressions without the square terms. In light of the similiarity of these results with those presented above, in the interest of brevity, we do not present the results for the expanded specifications.

4. EMPIRICAL RESULTS

4.1 CORROBORATIVE EFFECTS

Table 2 presents regressions in the spirit of traditional studies, which ignores possible interactions between earnings and dividend announcements. The four columns of the table correspond to different combinations of the standardization of the right hand side and left hand side variables. The table confirms that our sample produces results similar to those reported in the literature. The coefficients of both the earnings and dividend announcements are uniformly positive and significant at better than the one percent level, regardless of the standardization of the regression variables.

These results suggest that earnings or dividend surprises can, by themselves, induce abnormal stock returns. In column 1 of Table 2, for which neither CAR nor innovations are standardized, a 1 percent surprise in earnings or dividends leads to a 0.034 or 0.07 percent abnormal return, respectively. The other regressions do not have simple economic interpretations due to the effect of standardization, but the qualitative properties of the regressions are similar.

Table 3 presents estimates of equation (4), which includes E^u, D^u and qualitative dummy variables to capture interaction effects. The D(- -) dummy (negative surprises in earnings and dividends) is suppressed so that the base case

TABLE 2

Regression Results without Interaction Terms

dependent variable \ independt. variables	CAR (not standardized) E^u, D^u not std.	std.	CARS (CAR standardized) E^u, D^u not std.	std.
Constant	-.005 (1.12)	-.011 (2.31**)	-.015 (.26)	-.088 (1.44)
Earnings Surprise	.034 (4.51**)	.016 (4.40**)	.435 (4.34**)	.233 (4.81**)
Dividend Surprise	.070 (4.16**)	.015 (4.87**)	.709 (3.18**)	.177 (4.30**)
R^2 (adjusted)	.124	.135	.096	.127

Notes: 1. t-statistics in parentheses
2. *(**) denotes coefficients significantly different from zero at 5%(1%) level.
3. 'std.' represents 'standardized'.

(represented by the intercept) has the interpretation of a bad news scenario: $E^u < 0$, $D^u < 0$. The coeffcients of the dummy variables thus represent the incremental return over the (- -) case resulting from placement in another group. These coefficients are all positive and generally highly significant, regardless of standardization. For the most part the magnitudes of the coefficients increase as one moves down the table from D(- 0) to D(+ +), which reflects the increasing "good-news nature" of the announcements. The only exception to this rule surrounds the transition from

TABLE 3

Regression Results with Interaction Dummies

dependent variable \ independt. variables	CAR (not standardized) E^u, D^u not std.	CAR (not standardized) E^u, D^u std.	CARS (CAR standardized) E^u, D^u not std.	CARS (CAR standardized) E^u, D^u std.
Constant	-.083 (3.47**)	-.081 (3.41**)	-.958 (3.06**)	-.779 (2.50**)
Earnings Surprise	.015 (1.55)	.009 (1.89)	.213 (1.64)	.173 (2.68**)
Dividend Surprise	.029 (1.24)	.008 (1.35)	.150 (.50)	.097 (1.24)
D(- 0)	.068 (2.84**)	.069 (2.80**)	.828 (1.64)	.703 (2.20*)
D(- +)	.079 (2.84**)	.072 (2.28**)	.969 (2.65**)	.725 (1.71)
D(+ -)	.057 (1.22)	.054 (1.18)	.772 (1.25)	.623 (1.03)
D(+ 0)	.092 (3.38**)	.089 (3.32**)	1.044 (2.93**)	.811 (2.33*)
D(+ +)	.103 (3.48**)	.089 (2.59**)	1.320 (3.41**)	.911 (2.03*)
F-stat. 1st order	2.08	2.79	.61	4.49*
F-stat. interact.	2.65*	2.37*	2.46*	1.21
R^2 (adjusted)	.144	.147	.115	.130

Notes: 1. t-statistics in parentheses
2. *(**) denotes coefficient significantly different from zero at 5%(1%) level.
3. D(-+) denotes a dummy with value 1 if $E^u<0$ and $D^u>0$. The other dummies are defined analogously.

(- +) to (+ -), which is the only pair of events which cannot be naturally ordered. The coefficients of the (+ 0) and (+ +) dummies all exceed the intercept, which reflects the unambiguous good news of those scenarios, while the coefficient of the (- 0) dummy is of less magnitude than the intercept. The coefficients of the (+ -) and (- +) dummies are, in 7 out of 8 cases, of lower magnitude than the intercept, which indicates that a negative surprise in either dividends or earnings seems to be sufficient to induce negative stock performance.

The coefficients on the magnitudes of E^u and D^u are still positive, as one would expect, However, when the dummies are included, the size of the coefficents falls by a factor of approximately 2 relative to Table 2, and the coefficients generally lose statistical significance. This pattern is consistent with the hypothesis that the earnings and dividend announcements are interpreted jointly so that the interaction dummies are the key explanatory variables.

The acid test of the corroboration hypothesis is given by the F-statistics reported for each regression in Table 3. The first order F-statistic tests the joint significance of D^u and E^u taken together. The interaction F-statistic tests the joint significance of the right hand side dummy variables. All the F-statistics are computed using sums of squared residuals from constrained and unconstrained regressions. The degrees of freedom for the first order statistics are (2,344) and for the interaction statistics (5,344); the corresponding critical values for a 5 percent confidence level are 3.02 and 2.24. A significant value for the interaction F-statistics is consistent with the corroboration hypothesis.

The F-statistics presented in Table 3 are generally supportive of the corroboration hypothesis. The interaction dummy variables are jointly significant at a 5 percent level in three of the four specifications. In contrast, the earnings and dividend surprise variables are jointly significant only in the fourth specification. The interaction terms seem to be better able to explain abnormal stock performance than the levels of E^u and D^u. This evidence suggests that the two announcements are not evaluated in isolation.

Table 4 presents regressions based on quantitative interaction terms. Although the results of these regressions are not as strong as in Table 3, they also tend to support the corroboration hypothesis.

The F-statistics for the significance of the interaction term is significant in two of four cases, while that for the first order effects of the announcements is never significant. The lower significance level may be due to misspecification of the exact functional form for the interaction terms, or may be due to increased collinearity between the interaction and first order effects when both are specified quantitatively.

TABLE 4

Regression Results with Quantitative Interactions

dependent variable / indep. variables	CAR not std.	CARS std.	CAR not std.	CARS std.
	E^u	D^u (not standardized)	E^u	D^u (standardized)
Constant	.049 (1.09)	.250 (.42)	-.012 (.64)	-.316 (1.24)
Earnings Surprise	.010 (1.00)	.145 (1.07)	.007 (1.27)	.147 (1.95*)
Dividend Surprise	.013 (.49)	-.031 (.09)	-.001 (.09)	.018 (.20)
INT(- -)	-.086 (3.17**)	-.809 (2.25*)	-.032 (2.57*)	-.231 (1.40)
INT(- 0)	-.065 (1.43)	-.400 (.66)	-.002 (.07)	.222 (.79)
INT(- +)	-.046 (1.10)	-.211 (.38)	.009 (.78)	.197 (1.29)
INT(+ -)	-.065 (1.72)	-.404 (.81)	-.028 (1.55)	-.109 (.46)
INT(+ 0)	-.039 (.83)	-.137 (.22)	.022 (.99)	.368 (1.29)
INT(+ +)	-.018 (.47)	.167 (.32)	.019 (1.84)	.305 (2.23*)
F-stat. 1st order	.60	.49	.83	1.90
F-stat. interact.	1.18	2.61*	2.67*	1.79
R^2 (adjusted)	.159	.121	.155	.135

Notes: 1. t-statistics in parentheses.
2. *(**) denotes significantly different from zero at 5%(1%) level.
3. INT(-+) denotes the interaction term when $E^u<0$ and $D^u>0$. Other interaction terms are defined analogously.

The quantitative properties of the Table 4 regressions are similar to those of Table 3. The coefficients of the earnings and dividend surprise variables are insignificant in the presence of the interaction terms. In fact, in columns 2 and 3, the dividend surprise coefficients are negative, although the t-statistics are virtually zero. The coefficients of the interaction terms increase as the announcements become more favorable.

The major problem with this specification appears in panel 1 of Table 4, in which the coefficients of all the interaction terms are negative. Although the coefficients bear the expected relative relations to each other in the sense that their algebraic valus increase for better-news scenarios, the coefficients of the (+ 0) and (+ +) terms clearly should be positive. When we reran the regression constraining the intercept to be zero (which imposes zero predicted CAR for zero surprises in both announcements) the problem was "cured." The constrained regression result was:

$$CAR = .010E^{u} + .006D^{u} - .061INT(--) - .016INT(-0) - .002INT(-+) - .037INT(+-) + .011INT(+0) + .023INT(++)$$

$$R^2(\text{adjusted}) = .157, \quad F = 9.17^{**}, \quad \text{sample} = 352$$

The coefficients on the six interaction terms ranged from -0.061 on the (- -) term to +0.023 on the (+ +) term; both of these coefficients were significant at the 5 percent level and the intermediate coefficients bore the expected relationships to each other. However, the results of the unconstrained regressions remain puzzling.

4.2 DOES THE ANNOUNCEMENT ORDER MATTER?

We suggested that the order of two announcements should not matter. The CAR measured is the total effect on stock prices of the new information contained in the two announcements. The order of the two announcements should matter only if the announcement order per se contains information.

To test this proposition we ran an extended set of regressions with terms designed to capture any ordering effect. We first define the terms,

$$\text{ELEAD} = \begin{cases} 1 & \text{if} \quad t_D > t_E \\ 0 & \text{otherwise} \end{cases}$$

$$\text{ELAG} = \begin{cases} 1 & \text{if} \quad t_E > t_D \\ 0 & \text{otherwise} \end{cases}$$

where t_E and t_D are the dates of the earnings and dividend announcements and where analogous terms are defined for the dividend terms DLEAD and DLAG. Both LEAD and LAG dummies could be included in the regression because announcement dates were identical for 116 observations.

The coefficient on E^u x ELEAD in Table 5 therefore indicates the *increase* in the first order effect of the earnings surprise due to its revelation prior to dividends. Table 5 presents estimates of this effect for three specifications: first order effects alone, first order plus interaction dummy terms, and first order plus quantitative dummy terms.

The regression variables in Table 5 are all non-standardized. Results using standardized variables were similar and are not reported. The results in Table 5 are provocative in that the coefficients of the ELEAD and DLEAD variables are positive, while the LAG variables are negative. However, the t-statistics are all extremely small, centering around a magnitude of roughly one half. There is no convincing evidence that the order of the two announcements significantly influence their effects on stock returns.

TABLE 5

Effects of Announcement Order

independt. variables	CAR	CAR	independt variables	CAR
Constant	-.005 (1.08)	-.082 (3.38**)	Constant	.160 (1.91)
E^u	.034 (2.47**)	.011 (.74)	E^u	.010 (.62)
D^u	.072 (2.93**)	.037 (1.25)	D^u	.020 (.66)
E^u x ELEAD	.006 (.35)	.010 (.55)	E^u x ELEAD	.007 (.42)
E^u x ELAG	-.015 (.62)	-.008 (.32)	E^u x ELAG	-.011 (.48)
D^u x DLEAD	.033 (.49)	.009 (.13)	D^u x DLEAD	-.007 (.20)
D^u x DLAG	-.010 (.29)	-.016 (.45)	D^u x DLAG	-.020 (.30)
D(- -)		- -	INT(- -)	-.201 (2.99**)
D(- 0)		.067 (2.74**)	INT(- 0)	-.175 (2.09*)
D(- +)		.078 (2.74**)	INT(- +)	.159 (1.92)
D(+ -)		.066 (1.34)	INT(+ -)	-.168 (2.14*)
D(+ 0)		.091 (3.33**)	INT(+ 0)	.149 (1.78)
D(+ +)		.102 (3.39**)	INT(+ +)	-.131 (1.60)

Notes: 1. t-statistics in parentheses.
2. *(**) denotes significantly different from zero at 5%(1%) level.
3. Dummy and INT variables are defined in Tables 3 and 4.

5. SUMMARY AND CONCLUSION

We have examined the corroborative relationship between earnings and dividend announcements. We first demonstrated that our sample is similiar to those of earlier researchers, who found that unexpected dividend and earnings announcements appear in and of themselves to be able to induce abnormal stock returns. However, once a more general specification which allows for interaction effects between the two announcements was estimated, empirical results indicated that the announcements are indeed interpreted in relationship to each other. This interaction or corroborative effect was generally statistically significant. Finally, we tested for any potential effect of the order of the two announcements, and as expected, found that the order of the announcements did not significantly affect the total magnitudes of abnormal returns.

APPENDIX

In this appendix we examine the effect of announcement order on regression results. For expositional simplicity, we will consider regressions with only two right hand side variables:

$$CAR = b_0 E^u + b_1 D^u$$

Although we ignore announcement order in the text, in practice, the market's expectation of the second announcement is derived <u>conditional</u> on the first announcement. The issues are (1) whether the total return over the joint announcement period will be affected by announcement order and (2) how to interpret our regression coefficients in light of the conditional expectation formed for the second announcement.

Denote by D^{uu} the unanticipated dividend conditional on already knowing E^u; similarly E^{uu} would be the earnings surprise conditional on knowing D^u. To place the model in a regression framework, suppose that E^u and D^u are joint normally distributed, so that

$$E^u = kD^u + e$$

where k is a constant, e is a zero mean normally distributed error term, and by definition of expectations, the expected earnings and dividend surprises are zero. The expected value of E^u given D^u is simply kD^u so that

$$E^{uu} = e = E^u - kD^u$$

and analogously, if earnings are announced first,

$$D^{uu} = D^{u} - cE^{u} \ ; \qquad c = 1/k$$

By the definition of conditional expectations, D^{uu} must be orthogonal to E^{u} and E^{uu} must be orthogonal to D^{u}.

Now consider three regression specifications:

1. $CAR = a_1E^{u} + a_2D^{uu}$; if earnings announced first.
2. $CAR = b_1E^{uu} + b_2D^{u}$; if dividend announced first.
3. $CAR = d_1E^{u} + d_2D^{u}$; ignore announcement order.

The first two specifications could in principle be estimated given a series of surprises and conditional surprises. The third equation corresponds to the regressions performed in this paper.

Because of the orthogonality of E^{u} to D^{uu} and E^{uu} to D^{u}, the coefficient estimates of (a_1, a_2) and (b_1, b_2) will be identical to those which would be obtained if CAR were regressed against each of the right hand side variables in specifications 1 and 2 individually. Therefore, using Theil's (1971) misspecification theorem for omitted variables, we can compare regression specifications 2 and 3 to obtain

$$b_2 = d_2 + kb_1 \tag{A1}$$

$$b_1 = d_1 \tag{A2}$$

and compare specifications 1 and 3 to obtain

$$a_1 = d_1 + ca_2 \tag{A3}$$

$$a_2 = d_2 \tag{A4}$$

Equation (A1) - (A4) are arithmetic identities which must hold among the various OLS coefficient estimates. Rearranging, we obtain

$$a_2 = b_2 - kb_1 \tag{A5}$$

$$b_1 = a_1 - ca_2 \tag{A6}$$

Now suppose that if earnings are announced first, specification 1 is appropriate, but that we perform regression specification 3. Then,

$$\begin{aligned} CAR &= a_1 E^u + a_2 D^{uu} \\ &= a_1 E^u + a_2(D^u - cE^u) \\ &= (a_1 - ca_2)E^u + a_2 D^u \\ &= b_1 E^u + a_2 D^u \end{aligned}$$

Thus, in our regressions using specification 3, we will obtain coefficient estimates

$$d_1 = b_1$$

$$d_2 = a_2.$$

Analogously, suppose earnings announcements lag dividend announcements. Then the appropriate model is

$$\begin{aligned} CAR &= b_1 E^{uu} + b_2 D^u \\ &= b_1(E^u - kD^u) + b_2 D^u \\ &= b_1 E^u + (b_2 - kb_1)D^u \end{aligned}$$

$$= b_1 E^u + a_2 D^u$$

Again, our regression estimates will be

$$d_1 = b_1$$

$$d_2 = a_2$$

In either case. the regression coefficients from the third specification equal the coefficients on the <u>conditional</u> surprise terms from specifications 1 and 2. This result is consistent with the interpretation of regression coefficients as partial derivatives. The coefficient on D^u in specification 3 has the interpretation as the incremental effect of a dividend surprise given the level of the earnings surprise. In specification 1, the dividend variable is already defined as the dividend surprise given the level of E^u. It is not surprising that the coefficients are arithmetically identical.

This analysis highlights the irrelevance of announcement order. Our regression coefficients capture incremental results of one announcement for a given value of the other. As long as order per se contains no information, the marginal effect of either announcement will be identical given the value of the other announcement.

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