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THE RECENCY EFFECT OF ACCOUNTING INFORMATION*

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This study tests the joint effects of dividend and earnings information. A study of joint effects is justified for the following reasons. First, *dividends and earnings are considered two of the most important signaling devices (Aharony and Swary 1980) that investors use in evaluating stock prices.* Second, *dividends and earnings are 'garbled' information (Ohlson 1989). Dividends and earnings may contain corroborating or disconfirming news.* Third, *investors may behave with memory, revising beliefs in complex ways in evaluating a sequence of information. Prior dividend studies that controlling for earnings announcement effects do not address these possibilities.*

Using Hogarth and Einhorn's (1992) belief-adjustment theory, this study models the behavior of investor reactions to joint dividend and earnings surprises. The theory predicts that order and timing of dividend and earnings surprises have different effects on stock returns. When dividend and earnings surprises have opposite signs (mixed evidence), the theory predicts that later surprises have a larger impact on stock returns than do earlier surprises (the recency effect hypothesis).

The evidence for the recency effect hypotheses is relatively strong. In three out of four cases of mixed evidence (positive earnings, negative earnings and positive dividend surprises), the recency effect hypotheses are supported.

Keywords: behavioral accounting; behavioral finance; behavioral market research; belief adjustment theory; Hogarth and Einhorn; large firm bias; the recency effect; sequence of information; survivorship bias

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Introduction

Financial accounting research is commonly concerned with how individual investors use information in a market setting (Dyckman and Morse 1986). How individual investors use dividend and earnings information jointly is the issue addressed in this study. Dividend and earnings information are chosen because not only are they individually important accounting information but they also possess characteristics that can alter beliefs. The order of dividend and earnings information varies. Some companies announce dividend information first and then followed by earnings information. Other companies make the earnings announcement first followed by dividend information. The question thus arises as to whether the presentations of order of dividend and earnings information can alter investors' beliefs differently.

This study addresses the issue of how investors change their belief of stock prices on receiving a sequence of two accounting information. Dividend and earnings are used as accounting information in this study because the two are the most important signaling devices (e.g., Aharony and Swary 1980; Woolridge 1982; Asquith and Mullins 1983; Venkatesh and Chiang 1986; Healy and Palepu 1988; and Mande 1994) that investors use in evaluating stock prices. Second, dividend and earnings are 'garbled' information (Ohlson 1989) that they may contain corroborating or disconfirming news.

The objective of this study is to incorporate behavioral theory (belief adjustment theory) to test the recency effect of a sequence of dividend and earnings information. Using Hogarth and Einhorn's (1992) belief-adjustment theory, this study models the behavior of investor reactions to joint dividend and earnings information. The theory predicts that order of dividend and earning information has different effects on stock returns. When dividend and earnings information have the opposite signs, it predicts that later information or recent information has a larger impact on stock returns than does earlier information (the recency effect hypothesis). Order in this study is defined as the sequence of the information whether dividend information precedes or follows earnings information and whether bad news precedes or follows good news.

This study is important for the following reasons. *First*, it contributes to the literature by incorporating a behavioral theory to model investors' reactions to accounting information. The incorporation of behavioral theory is consistent with Bernard's (1989) suggestion that research should adopt new ways to think about markets. He supports the idea of linking cognitive psychology with stock price behavior.

Second, belief-adjustment theory provides an additional explanation to the signaling theory used in prior studies. Signaling theory, which explains why firms pay dividends (i.e., to signal the future prospect of the firm), focuses on managers' behavior. On the contrary, belief adjustment theory focuses on investors' behavior about how they adjust their beliefs to new evidence.

Third, this study responds to the AICPA's Special Committee on Financial Reporting (1994) that calls for research on how users of financial statements make decisions. The application of belief-adjustment theory in a market setting may improve our understanding of how investors use different sequences of company information.

Fourth, the results of this study may have important implications for firms' announcement policies because different announcement patterns may have different impacts on stock returns.

Fifth, this study is carried out using secondary data from direct testing in the real market phenomenon to test the behavior of the investors. Usually, testing the individual behavior is conducted in laboratory experiment in which some aspects can be controlled. Using direct market testing such as one used in this study is rare. However, this method has some disadvantages as well as some advantages. The disadvantages are many confounding effects are difficult to be controlled and the level of analysis is in aggregate market level, whereas the behavior testing should be in individual level. Confounding effects are overcame with the inclusion of variables that are believed to reduce those effects. The level of analysis problem is argued as follows. Camerer (1992) gave four reasons why aggregation does not preclude markets from reflecting the majority of rational individuals. The reasons are: (1) individual errors are random, so that errors cancel out; (2) active traders who dominate markets are rational, (3) traders who make errors learn from other traders; and (4) traders who make errors but do not learn are selected out. The advantage is that this method really deals with the real data resulted from real behavior phenomenon of investors, while study in the laboratory testing is only a simulation of the real phenomenon.

The findings of this study are as follows. The theory predicts that when dividend and earnings information have opposite signs (good news followed by bad news or bad news followed by good news), later information has a larger impact on stock returns than does earlier information. This hypothesis is called recency effect hypothesis. The hypothesis is supported for positive dividend surprises, negative earnings surprises and positive earnings surprises. It is not supported for negative dividend surprises.

Theory, Literature Review and Hypothesis Development

The Belief-adjustment Theory

Beliefs are the critical component in the decision making process (Beaver 1989). The level of beliefs determines decision making behavior. The role of information is to alter beliefs. Therefore, decision making behavior is altered when newly arrived information changes beliefs. Beaver (1989), using this argument, also stated that the role of accounting information is to alter the beliefs of investors. Investor beliefs are unobservable. Stock prices can be viewed as arising from an equilibrium process of investors' beliefs (Bamber 1987; Lev 1988; Beaver 1989; Kim and Verrecchia 1991; and Bamber and Cheon 1995).[1]

The belief-adjustment theory potentially provides models of how a sequence of information can revise individuals' beliefs. Therefore, application of the theory may expand our understanding of how two different pieces of accounting information considered by investors may affect their beliefs. In accounting settings, the theory has been applied in auditing (for example, Ashton and Ashton 1988, 1990; and McMillan and White 1993), in manage-

[1] There is a conceptual difference between stock price and trading volume. While price changes reflect changes in the aggregate market's average *beliefs*; in contrast, trading volume is the sum of all individual investors' *actions* (Bamber and Cheon 1995).

ment accounting (Dillard et al. 1991) and in taxation (Pei et al. 1990), but not in financial market studies.

Hogarth and Einhorn's (1992) belief-adjustment theory is based on the assumption that people process information sequentially and have limited memory capacity. The belief-adjustment model can be formulated as follows.

$$B_k = B_{k-1} + w_k.E_k(d) \text{ .... } (1)$$

where

B_k = current belief about stock price after evaluating k pieces of dividend and, or earnings evidence,

B_{k-1} = anchor or prior belief about stock price,

w_k = the adjustment weight for the k^{th} piece of dividend or earnings evidence,

$E_k(d)$ = magnitude of the k^{th} piece of dividend or earnings evidence,

d = the direction of the evidence, whether it is negative or positive evidence.

Evidence or a surprise is defined as a change in value of dividends or earnings from prior to current quarters. The value of the adjustment weight, w_k, depends on the direction of the evidence. Hogarth and Einhorn (1992) argued that for negative evidence, $E_k(-)$, the adjustment weight (w_k) is specified as proportional to the anchor (B_{k-1}):

$$w_k = \alpha.B_{k-1} \quad \text{for} \quad 0 \leq \alpha < 1 \text{ .... } (2a)$$

For positive evidence, w_k is inversely proportional to the anchor or in other words, the same positive evidence increases more for small anchors than it does for large anchors (Hogarth and Einhorn 1992):

$$w_k = \beta.(1-B_{k-1}) \quad \text{for} \quad 0 \leq \beta < 1 \text{ .... } (2b)$$

The adjustment weight is also affected by one's sensitivity toward negative or positive evidence, α and β, respectively. Values of $\alpha=1$ and $\beta=1$ indicate high sensitivity to negative and positive evidence, respectively. Similarly, $\alpha=0$ and $\beta=0$ indicate no sensitivity to negative and positive evidence, respectively.

Substituting equation (2a) and (2b) into equation (1) yields:

$$B_k = B_{k-1} + \alpha.B_{k-1}.E_k(-), \text{ and......... } (3a)$$

$$B_k = B_{k-1} + \beta.(1-B_{k-1}).E_k(+) \text{ .... } (3b)$$

Equation (3a) refers to a belief-adjustment model for negative evidence and equation (3b) refers to a belief-adjustment model for positive evidence.

The observed phenomena studied in this study are consistent with the properties of the belief-adjustment theory. The properties of the theory and the phenomena observed are as follows.

1. ***Sequential Process.*** Hogarth and Einhorn (1992) argue that belief updating is in fact a common human activity. In everyday life, information is received one piece at a time and is integrated in a sequential process (Anderson 1981). Sequential processing is the underlying assumption of belief-adjustment theory. This assumption is also consistent with the manner in which investors evaluate dividend and earnings surprises sequentially, since such surprises are also received at different points in time.
2. ***Task Variables.*** The theory considers three different task variables: complexity of the task, length of series of evidence and response mode.

a. Complexity of the task is a decreasing function of familiarity with the task. Evaluating dividend and earnings surprises as negative evidence (decreasing value from prior information) or positive evidence (increasing value from prior information) is not considered a complex task, since investors merely calculate the difference between prior and current information values. Therefore, the task to evaluate dividend and earnings surprises as negative or positive evidence according to the theory is considered a simple task.
b. Length of series of evidence refers to the number of pieces of evidence to be evaluated. Tasks that evaluate between 2 to 12 pieces of evidence are considered "short" tasks, while tasks that consider over 17 pieces of evidence are classified as "long" tasks. Only two pieces of evidence are considered in this study: dividend and earnings surprises. Therefore, the task is viewed as a short series task.
c. Response mode refers to the procedures by which evidence is evaluated. Two response modes are introduced by belief-adjustment theory: Step-by-Step (SbS) and End-of-Sequence (EoS) response modes. In the SbS response mode, evidence is evaluated one piece at a time in a given sequence. In the EoS response mode, all pieces of evidence are evaluated at once. This study investigates both response modes. A task to evaluate dividend and earnings surprises is considered as an SbS task if their announcements are separated by three or more days. However, a task to evaluate dividend and earnings surprises which occur simultaneously on the same day is viewed as an EoS task.

To summarize, the task observed in this study can be classified according to the theory as simple, short series, and SbS task for dividend and earnings surprises that are announced separately by three or more days. This study does not use EoS task, because it does not deal with dividend and earnings surprises which occur simultaneously on the same day.[2]

Literature Review and Hypothesis Development

For mixed evidence, the belief adjustment theory classifies two possible order effects: primacy and recency effects. The primacy effect occurs when earlier evidence is considered more important than later evidence. The primacy effect is also known as the attention decrement effect: the last evidence receives less attention than earlier evidence. On the other hand, the recency effect occurs when recent evidence is considered more important than the earlier evidence. The prediction of primacy or recency effect depends on the properties of task variables. A primacy effect is predicted for the End-of-Sequence (EoS) response mode together with short and simple series of evidence. For the Step-by-Step (SbS) response mode with short and simple series of evidence, a recency effect is predicted (Hogarth and Einhorn 1992). This study tests the recency effect for the SbS response mode (sequential announcements).

Eddy and Seifert (1992) investigate the effects of dividend and earnings surprises. They use a sample of 1,111 firms from 1983 to 1985. The naive dividend

[2] A study that test the dilution effect uses both samples. It uses SbS sample for firms with surprises announced separately by days and EoS sample for firms with surprises which occur simultaneously on the same day. The dilution effect occurs if the two samples behave similarly.

expectation model and the Value Line analyst's earnings forecast model are used. They find that dividend and earnings surprise effects are not substitutes for each other. Their study suggests that the order of information signs, positive information follows or precedes negative information, had different effects on stock prices. However, this study does not examine whether the order of surprises itself has an impact on stock prices. Specifically, they do not test the recency effect (later information is more important than earlier one).

De Bondt and Thaler (1985) form loser and winner portfolios based on the rankings of 36 months excess returns. After another 36 months following portfolio formation, the losing stocks outperform the winning stocks. They explain this finding as a recency effect; that is, in revising their beliefs, individuals overweigh recent information and underweigh prior data which point to the fact that the outperformed securities are once losing stocks. They also argue that security analysts and economic forecasters display this behavior. Arrow (1982) also suggests that the excessive reaction to current information characterizes the securities markets.

Kane et al. (1984), and Chang and Chen (1991) find that dividend and earnings surprises that were announced separately by less than ten days had interaction effects. The information content of the second announcement was influenced by the first. Even though they do not test the recency effect, their findings suggest that information content of dividends and earnings depends on the order of the announcements.

A recency effect is found in Hogarth and Einhorn's (1992) experiments. Twenty-four subjects in one experiment are given two pieces of mixed positive and negative evidence. Order of evidence is arranged according to a within subjects design. They find that the later evidence is interpreted more important than the earlier evidence by their experimental subjects. Their results support the recency effect hypothesis. Furthermore, in an additional experiment which used 60 subjects and involvs four pieces of evidence, Hogarth and Einhorn again find support for the recency effect.

A recency effect is also found in the Ashton and Ashton (1988) experiment involving professional auditors. When auditors are presented with mixed evidence, they find that auditors beliefs are highly sensitive to the most recent evidence. The prediction of the theory leads to the following alternative hypotheses:

H_1= *The dividend response coefficient of a negative dividend information is greater when the negative dividend information follows a positive earnings information than when it precedes a positive earnings information.*

H_2= *The dividend response coefficient of a positive dividend information is greater when the positive dividend information follows a negative earnings information than when it precedes a negative earnings information.*

H_3= *The earnings response coefficient of a negative earnings information is greater when the negative earnings information follows a positive dividend information than when it precedes a positive dividend information.*

H_4= *The earnings response coefficient of a positive earnings information is greater when the positive earnings information follows a negative dividend information than when it precedes a negative dividend information.*

These hypotheses test the effect of recent information relative to earlier information. The hypotheses are tested by comparing the slopes of stock price changes (dividend and earnings response coefficients) for earlier surprises and later (recent) surprises. The slope for the later surprises must be steeper (greater response coefficient) than that for the earlier surprises for the recency effect to occur.

Hypothesis H2 tests the recency effect for each piece of evidence. Since the recency effect involves two pieces of mixed evidence in sequence, their order should be considered together. Consider when the first evidence is negative evidence. Using equation (3a):

$$B_k = B_{k-1} + \alpha.B_{k-1}.E_k(-), \text{ ....(3a)}$$

the impact of the negative evidence on a new belief is:

$$B^-_1 = B_0 + \alpha.B_0.E_1(-)$$

The superscript (-) in B_p^- is added to show a belief after receiving negative evidence, $E_i(-)$. For mixed evidence, if the first evidence is negative, the second evidence is positive and using equation (3b):

$$B_k = B_{k-1} + \beta.(1-B_{k-1}).Ek(+) \text{ ....(3b)}$$

and the final belief becomes:

$$\begin{aligned} B^{-,+}_2 &= B^-_1 + \beta.(1-B^-_1).E_2(+) \\ &= B_0 + \alpha.B_0.E_1(-) + \\ &\quad \beta.\{1-[B_0 + \alpha.B_0.E_1(-)]\}.E_2(+) \\ &\text{ ....(4a)} \end{aligned}$$

The superscripts (-,+) in $B_p^{-,+}$ are added to show a belief after receiving negative evidence (-) followed by positive (+) evidence. The change in belief after receiving two pieces of evidence (negative evidence followed by positive evidence) is:

$$\begin{aligned} B^{-,+}_2 - B_0 &= \alpha.B_0.E_1(-) + \beta.\{1 - [B_0 + \\ &\quad \alpha.B_0.E_1(-)]\}.E_2(+) \text{.........(4b)} \end{aligned}$$

If the first evidence is positive:

$$B^+_1 = B_0 + \beta.(1 - B_0).E_1(+)$$

When it is followed by negative second evidence, the final belief becomes:

$$\begin{aligned} B^{+,-}_2 &= B^+_1 + \alpha.B^+_1.E_2(-) \\ &= B_0 + \beta.(1 - B_0).E_1(+) + \\ &\quad \alpha.[B_0 + \beta.(1 - B_0).E_1(+)].E_2(-) \\ &\text{ .... (5a)} \end{aligned}$$

and the change in belief after receiving two pieces of evidence (positive evidence followed by negative evidence) is:

$$\begin{aligned} B^{+,-}_2 - B_0 &= \beta.(1 - B_0).E_1(+) + \alpha.[B_0 + \\ &\quad \beta.(1 - B_0).E_1(+)].E_2(-) \\ &\text{ ....(5b)} \end{aligned}$$

Equation (4a) and (4b) show a new belief and the change in belief, respectively, after receiving negative evidence followed by positive evidence, and equation (5a) and (5b) shows a new belief and the change in belief, respectively, after receiving positive evidence followed by negative evidence. Since later evidence is judged more important than earlier evidence, later positive evidence in equation (4a) is judged to be more important than earlier positive evidence in equation (5a). Therefore, equation (4a) results in higher belief than does equation (5a). The converse is true that equation (5a) results in lower belief than equation (4a) because negative evidence is presented later in equation (5a) rather than presented earlier in equation (4a). Therefore, if the recency effect occurs, the value of $B_2^{-,+}$ is greater than the value of $B_2^{+,-}$ or the difference between them is positive as follows:

$$
\begin{aligned}
B^{-,+}_2 - B^{+,-}_2 = {} & B_0 + \alpha.B_0E_1(-) + \\
& \beta.[(1 - B_0) + \\
& \alpha.B_0.E_1(-)].E_2(+) - B_0 - \\
& \beta.(1 - B_0).E_1(+) - \alpha.[B_0 + \\
& \beta.(1 - B_0).E_1(+)].E_2(-) \\
= {} & \alpha.B_0.E_1(-) + \beta.(1 - B_0 - \\
& \alpha.B_0.E_1(-).E_2(+) - \\
& \beta.(1 - B_0).E_1(+) - \\
& \alpha.B_0.E_2(-) - \alpha.\beta.(1 - \\
& B_0).E_1(+).E_2(-) \\
= {} & \alpha.B_0.E_1(-) + \\
& \beta.(1 - B_0).E_2(+) - \\
& \beta.\alpha.B_0.E_1(-).E_2(+) - \\
& \beta.(1 - B_0).E_1(+) - \\
& \alpha.B_0.E_2(-) - \\
& \alpha.\beta.E_1(+).E_2(-) + \\
& \alpha.\beta.B_0.E_1(+).E_2(-) \\
= {} & -\alpha.\beta.E_1(+).E_2(-) > 0 \qquad \text{..................................(6)}
\end{aligned}
$$

The net belief is positive because the negative sign in equation (6) is multiplied with the negative value of $E_2(-)$.

Since the recency effect involves two information in sequence, the order of dividend and earnings information should be considered together in the sense that if one is to be announced later, another must be announced earlier. Also, if the recency effect occurs and announcement policy is driven by the opportunity to choose strategy that is value maximizing, firms will prefer to announce positive news later than announce it earlier. The following alternative hypotheses posit that the sequence of a positive surprise that follows negative surprise yields a greater belief than the sequence of a negative surprise that follows a positive surprise.

H_5= *The combined response coefficients of a positive earnings surprise announced later and a negative dividend surprise announced earlier is greater than the combined response coefficients of a negative dividend surprise announced later and a positive earnings surprise announced earlier.*

H_6= *The combined response coefficients of a positive dividend surprise announced later and a negative earnings surprise announced earlier is greater than the combined response coefficients of a negative earnings surprise announced later and a positive dividend surprise announced earlier.*

Research Method

Sample Selection

Data for this study are collected from quarterly Compustat and Center for Research in Security Prices (CRSP) tapes from 1979-1993.[3] This study uses initiating dividend change as the dividend infor-

[3] Each Compustat quarterly-data tape contains 12 years of observations. The current tapes subscribed by Temple University are 1993 Compustat tapes (1982 - 1993). The oldest ones the University subscribes to are 1990 Compustat tapes (1979 - 1990). Combining both tapes increases the population for three years (12 quarters) from 1979 - 1981. Compustat is copyrighted by Standard & Poor's Compustat Services, Inc. and CRSP is copyrighted by the University of Chicago.

mation, because initiating dividend change has been proved to convey more information than that of just dividend change (Aharony and Swary 1980 and Asquith and Mullins 1983). This study restricts the sample that only contains firms initiating dividend changes after maintaining constant payouts for at least five quarters in a row. There are two reasons for this restriction. *First*, some firms have a consistent payout pattern, that is they pay constant dividends for the first three quarters and increase the payouts for the fourth quarter. They employ this pattern from year to year. In this case, the increase of dividends in the fourth quarter is probably already expected by the market. Restriction to a five-quarter constant payout will exclude these firms. *Second*, this study, like other studies, uses a naive dividend random-walk expectation model. The justification of this model is based on the assumption that firms are reluctant to change their dividend policy unless they expect changes in the future prospects of the firms. When firms initiate a change in their dividend policy, the change will be unexpected by the markets (Asquith and Mullins 1983). Consistent with this assumption, five quarters of constant dividends is required. Five quarters are considered long enough for the market to learn that firms did not change their dividend policy. Therefore, initial dividend changes after five consecutive quarters of constant payouts reduce the possibility that the changes were expected.

Three Compustat tapes are used. *The first tape* is the Primary-Supplementary-Tertiary (PST) Industrial tape. It contains companies traded on NYSE and other major exchanges. *The second tape* is the Full Coverage tape. It contains companies listed on NASDAQ, regional exchanges and owned subsidiaries trading preferred stock. *The second tape* is included in the sample to avoid the large firm bias. *The third tape* is the Industrial Research tape. It contains companies that once were in the PST and Full Coverage tapes but have been deleted due to bankruptcy, acquisition or merger, leveraged buyout, or going private. The third tape is included in the sample to avoid the survivorship bias.

Following Aharony and Swary (1980), this study examines only those quarterly dividend and earnings surprises conveyed to the public in the same quarter. Announcement dates for the corresponding earnings per share are collected from Compustat tapes. Dividend announcement dates are collected from CRSP tapes. To ensure that the CRSP dividend announcement dates were the dates of the announcements for the cash dividends per share taken from Compustat tapes, the amounts of the cash dividends per share and the initiating dividend changes in CRSP tapes were again cross-checked.

Dividend announcement dates are used instead of ex-dividend dates because the former are associated with information effects while the latter are associated with tax-effects (Litzenberger and Ramaswamy 1982). When dividends and earnings announcements have three or more days interval, they are considered as sequential announcements. A total of 2,413 pairs of announcements are collected for sequential announcements. Table 1 shows the sample selection.

The sample is partitioned into 8 cases, according to the pattern of the surprises, whether dividend surprises follow or precede earnings surprises and whether the surprises are negative or positive. Table 2 shows the number of pair-observations for each pattern in the sample.

Table 1. Sample Selection Process

Description	Sequential Announcements	
	Firm-quarter	Number of firms
Pairs of announcements dates collected	2528	1072
Pairs are dropped due to:		
- non-recurring or unspecified frequency of cash dividend	(2)	(2)
- Dividend reinvestment plans	(95)	(52)
- Extra or special dividends	(2)	(2)
- Foreign currency cash dividend converted to U.S. dollars	(1)	(1)
- Cash dividend paid for liquidation or reorganizations	(3)	(3)
- Stock splits	(11)	(11)
- Stock Dividend	(1)	(1)
Final Pairs	2413	1000

Notes:

These observations include 16 late announcers in which firms announced their earnings in the fourth quarter at least one week late compared to their announcement date in year *t-1*. Investors' beliefs may be affected if they perceived that the late announcement was due to an auditing problem. Sensitivity analysis was conducted to test for any significant differences between late announcers and timely announcers. The results remain the same.

Table 2. Number of Pair Sequential Announcements

Case	Pattern	Interval Between Announcements (Days)					
		3-10	11-20	21-30	31-60	61-90	Total
1	DE(-,-)	13	11	15	13	3	55
2	DE(+,+)	113	95	153	176	14	551
3	ED(-,-)	21	21	11	6	0	59
4	ED(+,+)	218	171	96	48	3	536
5	DE(-,+)	17	11	14	22	1	65
6	DE(+,-)	112	104	113	186	24	539
7	ED(-,+)	252	126	106	70	4	558
8	ED(+,-)	22	12	6	10	0	50
Total:		768	551	514	531	49	2413

Notes:

D = dividend surprises (ΔDPS); E = earnings surprises (ΔEPS); - = negative evidence (ΔDPS < 0 or ΔEPS < 0); + = positive evidence (ΔDPS > 0 or ΔDPS >0);

- Cases 1,2,5,6 are for dividend surprises that precede earnings surprises;
- Cases 3,4,7,8 are for dividend surprises that follow earnings surprises.

Empirical Models

The basic empirical model is derived from the belief-adjustment model in equation (1). Recall that the belief-adjustment model is $B_k = B_{k-1} + w_k.E_k(d)$. Since investor beliefs are unobservable, stock prices are frequently used as a proxy for investor beliefs (Bamber 1987; Lev 1988; Beaver 1989; Kim and Verrecchia 1991; and Bamber and Cheon 1995). Therefore, current and prior prices, P_k and P_{k-1}, are used as proxies for current and prior beliefs, B_k and B_{k-1}. The change in stock prices reflect the change in investors' belief. Also, since evidence, $E_k(d)$, is defined as a change in value of current and prior information, dividend and earnings surprises (ΔDPS and ΔEPS) are considered as pieces of evidence that might change the belief about stock prices. This association can be represented by the following basic model:

$$MRR_i = \delta_0 + \delta_1 \Delta DPS_i \text{ (or } \Delta EPS_i) + \delta_2 MIMR_i + \varepsilon \quad \text{.................(7)}$$

where MRR_i the mean relative price change for firm i^{th}, and is explained in detailed in the next paragraph. $MIMR_i$ is the mean index of market returns and is explained below. This model is similar to the return models used by Ahmed (1994) and Kallapur (1994).

The MRR_i for each firm is calculated as the mean of relative price changes (raw returns) at the announcement day (t = 0), one day before (t=-1) and one day after the announcement day (t = +1) as follows:[4]

$$MRR_i = \frac{1}{3}\sum_{t=-1}^{1}\frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} = \frac{1}{3}\cdot\left(\frac{P_{i,-1} - P_{i,-2}}{P_{i,-2}} + \frac{P_{i,0} - P_{i,-1}}{P_{i,-1}} + \frac{P_{i,1} - P_{i,0}}{P_{i,0}}\right) \quad \text{..(8)}$$

where $P_{i,t}$ and $P_{i,t-1}$ are stock prices at the announcement date and one day before the announcement date, respectively, for each firm.[5,6] Using a three day window is consistent with Eddy and Seifert (1992) and Leftwich and Zmijewski (1994). The reason for including day -1 is because of possible information leakage. Day +1 is included due to differences between the date of the potential market reaction and the announcement date reported by Compustat or CRSP. If the source of the announcement date is the newspaper, the potential market reaction date is the same day (day 0) as the newspaper date because investors received the news early in the morning before the market opens. However, even though the newspaper date is day 0, it is possible that the announcement is disseminated on day -1 electronically and prior to the close of the market. Therefore, if the source of the announcement date is news wire, the potential market reaction date is one day after the news wire date (day +1) since the announcement could be made after the market closed (Leftwich and Zmijewski 1994). CRSP and Compustat tapes use either the Dow Jones News retrieval (electronic), or the

[4] This measurement differs from Kane et al.'s (1984). Kane et al. calculate CAR as the accumulation of abnormal returns started 10 days before the first announcement and ended 10 days after the second announcement. But long intervals between the two announcements create noise in the measurement. To avoid this noise, days between two announcements are not used in the return calculation; rather, returns are calculated separately for each surprise.

[5] For convenience, subscript *i* which indicates the i^{th} firm is dropped from further notation.

[6] For short accumulation period, the arithmetic mean and the geometric mean yield virtually identical results in calculating MRR (three-day mean raw return).

Wall Street Journal (newspaper), as sources for earnings announcement dates and dividend declaration dates. They do not distinguish nor report the sources of the announcements date (Leftwich and Zmijewski 1994).

A sample of 30 pairs of earnings and dividend announcement dates from Compustat and CRSP taken randomly were compared with those in the Wall Street Journal Index. All of the earnings announcement dates are the same for Compustat and the Wall Street Journal Index, indicating that Compustat uses the newspaper as its source. All of the *CRSP* dividend announcement dates are one day before those reported in the Wall Street Journal Index, indicating that *CRSP* uses the newswire as its source. This suggests that for research using *CRSP* dividend declaration dates, day +1 should be included in the examination window since it is the day that investors receive the announcements from the Wall Street Journal.

Naive dividend and earnings expectation models are used to determine *ΔDPS* and *ΔEPS*.[7] ΔDPS (ΔEPS) is calculated as the quarterly change in dividends (earnings) deflated by the last quarter stock price since it can reduce cross-section dependency bias (Christie 1987).

MIMR is the mean of the CRSP value-weighted index of market returns at the announcement date, one day before and one day after. The purpose of using MIMR is to control for market factors that affect stock returns, such as interest rates or market risk premia (Kallapur 1994). Further, Kallapur uses the market returns index to transform the raw returns in the dependent variable into market- and risk-adjusted returns. *MIMR* is calculated consistently with *MRR*'s calculation.

To test the order effects of dividend surprises on stock returns, MRR^D is used as the dependent variable. MRR^D represents the mean of the raw returns in the three day period before, at, and after the dividend announcement date. Adding interaction dummies with the surprise variable (ΔDPS):

$$\begin{aligned} MRR^D = {} & \xi_0 + \xi_1\, MIMR^D + \\ & \xi_2\, DE(-,-).\Delta DPS + \\ & \xi_3\, DE(+,+).\Delta DPS + \\ & \xi_4\, ED(-,-).\Delta DPS + \\ & \xi_5\, ED(+,+).\Delta DPS + \\ & \xi_6\, DE(-,+).\Delta DPS + \\ & \xi_7\, DE(+,-).\Delta DPS + \\ & \xi_8\, ED(-,+).\Delta DPS + \\ & \xi_9\, ED(+,-).\Delta DPS + \varepsilon \text{.......(9)} \end{aligned}$$

The notation of the dummies indicates the order of the evidence. For example, *DE*(-,+) takes the value of 1 for a case when a negative surprise in dividends precedes a positive surprise in earnings, and 0 for the other cases. Sequences of same signs, that are *DE*(-,-), *DE*(+,+), *ED*(-,-) and *ED*(-,-) are included in the model as control variables.

[7] Using the random walk process means that ΔDPS (ΔEPS) measures unexpected surprises. But unexpected dividends and earnings as proxies for unobservable market expectations are subject to measurement errors, which lead to regression coefficients that are downward biased. The leading return period procedure can be used to reduce the measurement errors (Brown 1987; Youn-Cho and Jung 1991). Hence, the one quarter stock return as the leading return period is added to the regression model for sensitivity analysis. The one quarter stock return (RETQ) is measured as $(P_q - P_{q-1} + DIV_q) / P_{q-1}$, where DIV_q is the cash dividend per share, P_q and P_{q-1} are the current and prior quarter stock returns. The results using this procedure are qualitatively similar in this research.

Similarly, MRR^E measures the raw return surprise following an earnings announcement. MRR^E is the mean of the raw returns over the three day period ending on day +1 after the earnings announcement date. Adding interaction dummies with the surprise variable (DEPS), the model becomes:

$$
\begin{aligned}
MRR^E = \phi_0 + \phi_1\ & MIMR^E + \\
\phi_2\ & DE(-,-).\Delta EPS + \\
\phi_3\ & DE(+,+).\Delta EPS + \\
\phi_4\ & ED(-,-).\Delta EPS + \\
\phi_5\ & ED(+,+).\Delta EPS + \\
\phi_6\ & DE(-,+).\Delta EPS + \\
\phi_7\ & DE(+,-).\Delta EPS + \\
\phi_8\ & ED(-,+).\Delta EPS + \\
\phi_9\ & ED(+,-).\Delta EPS + \varepsilon ......(10)
\end{aligned}
$$

Results

Characteristics of the Sample

Table 3 describes the characteristics of the sample by the pattern of surprises. Panel A reports the characteristics of dividends per share paid by firms in the sample. For all cases (1 through 8), the mean dividends per share is $0.2805. The minimum dividends per share is $0.0050 while the maximum is $1.7700. On average, firms that cut their dividend payments paid lower dividends per share ($0.1520, $0.1433, $0.1712 and $0.1757, respectively for cases *DE*(-,-), *ED*(-,-), *DE*(-,+) and *ED*(+,-) than firms that increased their dividend payments ($0.2651, $0.3461, $0.2852 and $0.3188 for cases *DE*(+,+), *ED*(+,+), *DE*(+,-) and *ED*(-,+).

Panel B describes the characteristics of changes in dividends per share deflated by prior quarter stock price (ΔDPS). For the sequential announcement cases (1 through 8), the mean dividend surprises is $0.0002. The minimum dividend surprise is -$0.0273 while the maximum is $0.0116. For the simultaneous announcement cases (9 and 10), the mean dividend surprises is -$0.0001. The minimum dividend surprise is -$0.0334 while the maximum is $0.0050. On average, firms cut dividend payments (-$0.0051, -$0.0062, -$0.0041 and -$0.0056 for cases *DE*(-,-), *ED*(-,-), *DE*(-,+) and *ED*(+,-), respectively, more than when they increased them ($0.0008, $0.0009, $0.0008 and $0.0009 for cases *DE*(+,+), *ED*(+,+), *DE*(+,-) and *ED*(-,+), respectively. Since the magnitudes of the dividend changes differ across surprise signs, this suggests that joint effect studies should not only examine the signs of the surprises but should also examine the magnitude of the surprises.

Panel C shows the characteristics of earnings per share earned by firms in the sample. For the sequential announcement cases (1 through 8), the mean earnings per share is $0.6405. The minimum earnings per share is -$4.9700 while the maximum is $3.8200.

Panel D delineates the characteristics of change in primary earnings per share deflated by prior quarter stock price (ΔEPS). For the sequential announcement cases (1 through 8), the mean earnings surprises is -$0.0008. The minimum earnings surprise for sequential cases is -$0.3573 while the maximum is $0.6250.

The characteristics of total assets are shown in Panel E. For sequential sample, firms that experience earnings decreases and dividend decreases in cases *DE*(-,-) and *ED*(-,-) are the two smallest firms with their means total assets of $2,987.83 million and $ 1,967.43 million, respectively. Since firm size differs across cases, it suggests that size can be a moderating variable and should be taken into consideration. However, including firm size

Table 3. Descriptive Statistics

Panel A. Dividend Per Share in Dollars (DIV)

Case	Pattern	Mean	SD	p-value*	Max	Q3	Median	Q1	Min
1	DE(-,-)	0.1520	0.1437	0.0000	0.8500	0.2000	0.1000	0.0500	0.0100
2	DE(+,+)	0.2651	0.1897	0.0000	1.2100	0.3700	0.2300	0.1100	0.0050
3	ED(-,-)	0.1433	0.1181	0.0000	0.5700	0.2000	0.1240	0.0500	0.0200
4	ED(+,+)	0.3461	0.2300	0.0000	1.7700	0.4800	0.3000	0.1600	0.0200
5	DE(-,+)	0.1712	0.1295	0.0000	0.5400	0.2500	0.1500	0.0570	0.0060
6	DE(+,-)	0.2852	0.2107	0.0000	1.3755	0.4000	0.2350	0.1100	0.0120
7	ED(-,+)	0.3188	0.2149	0.0000	1.1600	0.4500	0.2700	0.1400	0.0220
8	ED(+,-)	0.1757	0.1416	0.0000	0.6200	0.2755	0.1375	0.0600	0.0100
1-8		0.2805	0.2070	0.0000	1.7700	0.4000	0.2400	0.1200	0.0050

*p-values are based on one-tail tests.

Panel B. Change in Dividend Per Share Deflated by Prior Quarter Stock Price (ΔDPS)

Case	Pattern	Mean	SD	p-value*	Max	Q3	Median	Q1	Min
1	DE(-,-)	-0.0051	0.0053	0.0000	0.0000	-0.0000	-0.0039	-0.0083	-0.0210
2	DE(+,+)	0.0008	0.0006	0.0000	0.0066	0.0010	0.0006	0.0003	0.0000
3	ED(-,-)	-0.0062	0.0066	0.0000	0.0000	-0.0001	-0.0040	-0.0088	-0.0273
4	ED(+,+)	0.0009	0.0007	0.0000	0.0116	0.0012	0.0008	0.0005	0.0000
5	DE(-,+)	-0.0041	0.0046	0.0000	0.0000	0.0000	-0.0028	-0.0068	-0.0133
6	DE(+,-)	0.0008	0.0005	0.0000	0.0038	0.0011	0.0007	0.0004	0.0000
7	ED(-,+)	0.0009	0.0007	0.0000	0.0068	0.0012	0.0007	0.0004	0.0000
8	ED(+,-)	-0.0056	0.0049	0.0000	0.0000	-0.0000	-0.0050	-0.0086	-0.0196
1-8		0.0002	0.0025	0.0000	0.0116	0.0010	0.0006	0.0003	-0.0273

*p-values are based on two-tail tests.

Panel C. Primary Earnings Per Share in Dollars (EPS)

Case	Pattern	Mean	SD	p-value*	Max	Q3	Median	Q1	Min
1	DE(-,-)	-0.0542	0.7249	0.5746	1.5000	0.3600	0.1000	-0.2800	-2.4600
2	DE(+,+)	0.8093	0.5205	0.0000	3.5400	1.0800	0.6900	0.4400	-0.1100
3	ED(-,-)	-0.2801	1.2893	0.1162	1.1900	0.3000	0.0700	-0.2500	-4.9700
4	ED(+,+)	0.9060	0.6110	0.0000	3.8600	1.1400	0.7800	0.4900	-0.8100
5	DE(-,+)	0.4684	0.6120	0.0000	2.8600	0.6100	0.3600	0.1800	-0.5700
6	DE(+,-)	0.5630	0.5980	0.0000	2.7900	0.8100	0.5100	0.2600	-4.5700
7	ED(-,+)	0.5329	0.5944	0.0000	3.1600	0.7600	0.4500	0.2600	-2.3000
8	ED(+,-)	0.1868	0.5869	0.0119	2.0800	0.4000	0.2150	0.0200	-1.5600
1-8		0.6405	0.6488	0.0000	3.8200	0.9100	0.5600	0.3100	-4.9700

*p-values are based on two-tail tests.

are significantly different from zero. The differences of MRR^D between cases are tested using t-test and Wilcoxon test in Panel A of Table 4.[8]

Panel G of Table 3 shows the characteristics of three-day means of raw returns at earnings announcement dates (MRR^E) as defined in equation (14). The mean raw return for the sequential announcement cases (1 through 8) is 0.0004. Cases *DE*(-,-), *ED*(-,-), DE(+,-) and *ED*(-,+) have negative means due to negative earnings surprises. Cases *DE*(+,+), *ED*(+,+), *DE* (-,+) and *ED*(+,-) have positive means due to positive earnings surprises. The differences of MRR^E between cases are tested using the t-test and the Wilcoxon test in Panel B of Table 4.

Panel H of Table 3 reports the characteristics of means of the total raw returns at dividend and earnings announcement dates (MRR^T). The mean total raw return for the sequential announcements cases (1 through 8) is 0.0004 which is significantly different from zero (p-value is 0.0357). For consistent evidence cases *DE*(-,-), *DE*(+,+), *ED*(-,-) and *ED*(+,+), each case has a correct sign. Cases *DE*(-,-) and *ED*(-,-) have negative means due to negative dividend and earnings surprises. Cases *DE*(+,+) and *ED*(+,+) have positive means due to positive dividend and earnings surprises. For each case in mixed evidence cases, the sign of the mean follows the sign of the surprise announced later. This indicates that later surprises dominant earlier surprises. The differences of MRR^T between cases are tested using the t-test and the Wilcoxon test in Panel C of Table 4.

Diagnostics

The hypotheses are tested using ordinary least squares regressions. Diagnostics are conducted to ensure that the multicollinearity and heteroskedasticity problems do not bias the results.

The correlations between $MIMR^D$ and ΔDPS and between $MIMR^E$ and ΔEPS are 0.02341 and -0.03161, respectively (see Panel A of Table 5). Correlations between ΔDPS and ΔEPS is -0.12175 (see Panel A of Table 5). All of the correlations are relatively small which suggests that multicollinearity is not a serious problem. The highest condition number is 10.64415. It is below 20, the critical value of potential multicollinearity problem (Greene 1993). Again, this suggests that multicollinearity is not a serious problem in this study.

The use of deflators is one of the methods to correct heteroskedasticity problem. This study uses prior quarter stock prices as the deflator (Christie 1987). The remaining heteroskedasticity is overcome using White's (1980) correction for heteroskedasticity. In Table 6 and 7, two t-statistics are presented for each regression coefficient. The *first line* reports unadjusted t-statistics, and the *second line* reports White's adjusted t-statistics.

[8] The t-test is a parametric test while the Wilcoxon test is nonparametric. The parametric test uses the normality assumption of the population. Instead, the nonparametric test can be used without the need for any assumptions regarding population parameters (Lapin 1984). Therefore, the Wilcoxon test is used here as a complement to the t-test. The two statistics are expected to provide similar significant levels. The two statistics may provide inconsistent signs since they use different procedures. The t-test uses the arithmetic mean as the basis of comparison, while the Wilcoxon test uses sum of ranks of the observation. Because this study compares the differences in two arithmetic means, it relies on the sign of the t-statistics and the significant levels of both tests.

Table 4. Wilcoxon Test and *t*-test for Comparing Differences in Means of the Raw Return

Panel A. Three-day Mean Raw Return at Dividend Announcement Date (MRR^D)

	DE(-,-)	DE(+,+)	ED(-,-)	ED(+,+)	DE(-,+)	DE(+,-)	ED(-,+)	ED(+,-)
DE(-,-)		1.0412 (0.3017)u	-0.9869 (0.3270)u	1.2725 (0.2037)e	-0.2515 (0.8020)u	1.0733 (0.2835)e	1.5048 (0.1361)u	-1.6265 (0.1078)u
DE(+,+)	-.939329 (0.3476)		-1.5422 (0.1288)u	0.6361 (0.5248)u	-1.0175 (0.3136)u	0.0045 (0.9965)u	1.0615 (0.2887)u	-2.0919 (0.0403)u
ED(-,-)	-.041300 (0.9671)	-.903376 (0.3663)		1.6547 (0.1037)u	0.7385 (0.4622)u	1.5407 (0.1291)u	1.7743 (0.0813)u	-0.6770 (0.4997)u
ED(+,+)	-1.45577 (0.1455)	-1.24534 (0.2130)	-1.40953 (0.1587)		-1.1883 (0.2399)u	-0.6048 (0.5454)e	0.5664 (0.5713)u	-2.1815 (0.0327)u
DE(-,+)	0.00001 (0.9999)	-.828104 (0.4076)	0.055302 (0.9559)	-1.31067 (0.1900)		1.0152 (0.3146)u	1.2533 (0.2106)e	-1.3911 (0.1674)u
DE(+,-)	-1.02554 (0.3051)	-.136286 (0.8916)	-1.00925 (0.3129)	-1.07198 (0.2837)	-.908765 (0.3635)		1.0330 (0.3019)u	-2.0906 (0.0404)u
ED(-,+)	-1.73345 (0.0830)	-1.97061 (0.0488)	-1.63720 (0.1016)	0.801464 (0.4229)	-1.52858 (0.1264)	1.80763 (0.0707)		-2.2766 (0.0259)u
ED(+,-)	1.43289 (0.1519)	-3.09251 (0.0020)	1.29267 (0.1961)	-3.62706 (0.0003)	1.25724 (0.2087)	-3.05972 (0.0022)	-3.85179 (0.0001)	

Panel B. Three-day Mean Raw Return at Earnings Announcement Date (MRR^E)

	DE(-,-)	DE(+,+)	ED(-,-)	ED(+,+)	DE(-,+)	DE(+,-)	ED(-,+)	ED(+,-)
DE(-,-)		0.8466 (0.4004)u	-0.3306 (0.7416)e	0.7498 (0.4563)u	3.7082 (0.0004)u	-0.7740 (0.4392)e	-0.4764 (0.6354)u	1.4449 (0.1514)u
DE(+,+)	-.728893 (0.4661)		1.3878 (0.1093)e	3.9921 (0.7380)u	-0.3304 (0.0006)u	-0.0685 (0.0001)u	1.9973 (0.0001)e	3.7118 (0.2118)e
ED(-,-)	-1.16525 (0.2439)	-2.38707 (0.0170)		-4.2641 (0.1704)u	-4.0080 (0.0002)u	1.3437 (0.7412)e	-4.3872 (0.9454)e	-4.2770 (0.0481)e
ED(+,+)	-.641808 (0.5210)	0.211098 (0.8328)	-2.43374 (0.0149)		-3.0814 (0.0005)u	0.7189 (0.0001)u	2.8376 (0.0001)u	-1.6037 (0.1831)u
DE(-,+)	3.11572 (0.0018)	3.59578 (0.0003)	3.90689 (0.0001)	3.63085 (0.0003)		-0.3346 (0.0001)u	3.6569 (0.0001)u	-4.2782 (0.0031)u
DE(+,-)	0.576125 (0.5645)	3.38693 (0.0007)	-1.04434 (0.2963)	-3.36915 (0.0008)	4.49039 (0.0001)		0.7189 (0.4723)u	1.2501 (0.0047)e
ED(-,+)	0.775392 (0.4381)	3.73537 (0.0002)	-.960890 (0.3366)	-3.79676 (0.0001)	4.56836 (0.0001)	-.338598 (0.7349)		3.0868 (0.0021)e
ED(+,-)	-1.07526 (0.2823)	0.80757 (0.4193)	-2.42135 (0.0155)	0.869333 (0.3847)	2.41400 (0.0158)	2.34935 (0.0188)	2.50267 (0.0123)	

Table 3. **(Continued)**

Panel D. Change in Primary Earnings Per Share Deflated by Prior Quarter Stock Price (DEPS)

Case	Pattern	Mean	SD	p-value*	Max	Q3	Median	Q1	Min
1	DE(-,-)	-0.0191	0.0246	0.0000	0.0000	-0.0026	-0.0092	-0.0231	-0.1047
2	DE(+,+)	0.0088	0.0135	0.0000	0.1006	0.0098	0.0041	0.0015	0.0002
3	ED(-,-)	-0.0344	0.0639	0.0002	0.0000	-0.0050	-0.0131	-0.0235	-0.3573
4	ED(+,+)	0.0112	0.0163	0.0000	0.1513	0.0138	0.0048	0.0016	0.0000
5	DE(-,+)	0.0403	0.0983	0.0055	0.6250	0.0315	0.0094	0.0044	0.0007
6	DE(+,-)	-0.0110	0.0178	0.0000	0.0000	-0.0016	-0.0050	-0.0117	-0.1560
7	ED(-,+)	-0.0153	0.0290	0.0000	0.0000	-0.0019	-0.0061	-0.0158	-0.3483
8	ED(+,-)	0.0389	0.0582	0.0000	0.2990	0.0562	0.0161	0.0033	0.0001
1-8		-0.0008	0.0308	0.1934	0.6250	0.0045	0.0000	-0.0054	-0.3573

*p-values are based on two-tail tests.

Panel E. Total Assets in Millions of Dollars (TASSET)

Case	Pattern	Mean	SD	p-value*	Max	Q3	Median	Q1	Min
1	DE(-,-)	2987.83	4398.34	0.0000	20452.00	4581.96	707.39	314.06	9.17
2	DE(+,+)	5078.76	12468.80	0.0000	130631.00	4427.69	1280.90	322.13	0.01
3	ED(-,-)	1967.43	4469.22	0.0020	23894.00	1058.71	225.52	90.17	15.94
4	ED(+,+)	4443.11	11408.43	0.0000	128821.00	3502.28	1038.25	294.48	0.00
5	DE(-,+)	5426.88	16805.10	0.0267	85713.00	2134.84	1085.93	290.09	14.94
6	DE(+,-)	4489.27	13841.26	0.0000	184198.00	3393.51	1141.98	356.14	9.45
7	ED(-,+)	4544.73	11920.83	0.0000	130193.00	2356.29	777.28	245.94	5.23
8	ED(+,-)	6246.90	22446.74	0.0271	166630.00	1418.27	278.48	142.26	28.50
1-8		4693.39	12883.38	0.0000	184198.00	3353.74	959.29	277.23	0.00

*p-values are based on one-tail tests.

Panel F. Three-day Mean Raw Return at Dividend Announcement Date (MRR^D)

Case	Pattern	Mean	SD	p-value*	Max	Q3	Median	Q1	Min
1	DE(-,-)	-0.0011	0.0121	0.4771	0.0274	0.0061	0.0000	-0.0073	-0.0336
2	DE(+,+)	0.0005	0.0103	0.1870	0.0366	0.0060	0.0000	-0.0053	-0.0527
3	ED(-,-)	-0.0050	0.0268	0.1693	0.0229	0.0067	-0.0006	-0.0073	-0.1701
4	ED(+,+)	0.0010	0.0122	0.0447	0.0490	0.0059	0.0002	-0.0040	-0.1692
5	DE(-,+)	-0.0018	0.0167	0.4342	0.0511	0.0058	0.0000	-0.0076	-0.0470
6	DE(+,-)	0.0005	0.0116	0.2265	0.0508	0.0058	0.0000	-0.0048	-0.0495
7	ED(-,+)	0.0021	0.0123	0.0000	0.1136	0.0072	0.0012	-0.0043	-0.0583
8	ED(+,-)	-0.0090	0.0372	0.0526	0.0351	0.0028	-0.0031	-0.0113	-0.2247
1-8		0.0004	0.0138	0.0849	0.1136	0.0060	0.0000	-.00510	-0.2247

*p-values are based on two-tail tests.

Table 3. ***(Continued)***

Panel G. Three-day Mean Raw Return at Earnings Announcement Date (MRR^E)

Case	Pattern	Mean	SD	p-value*	Max	Q3	Median	Q1	Min
1	DE(-,-)	-0.0003	0.0206	0.8985	0.0739	0.0105	0.0003	-0.0103	-0.0671
2	DE(+,+)	0.0020	0.0154	0.0023	0.0691	0.0092	0.0010	-0.0059	-0.0660
3	ED(-,-)	-0.0015	0.0168	0.5061	0.0695	0.0060	-0.0034	-0.0123	-0.0381
4	ED(+,+)	0.0017	0.0135	0.0018	0.0604	0.0078	0.0010	-0.0051	-0.0518
5	DE(-,+)	0.0239	0.0421	0.0002	0.1300	0.0383	0.0098	-0.0028	-0.0767
6	DE(+,-)	-0.0024	0.0192	0.0026	0.0465	0.0064	0.0000	-0.0082	-0.1308
7	ED(-,+)	-0.0016	0.0155	0.01437	0.0609	0.0056	0.0001	-0.0079	-0.0986
8	ED(+,-)	0.0045	0.0164	0.0277	0.0732	0.0112	0.0012	-0.0039	-0.0322
1-8		0.0004	0.0177	0.1736	0.1300	0.0077	0.0000	-0.0066	-0.1308

*p-values are based on two-tail tests.

Panel H. Mean Total Raw Return at Dividend and Earnings Announcement Dates (MRR^T)

Case	Pattern	Mean	SD	p-value*	Max	Q3	Median	Q1	Min
1	DE(-,-)	-0.0007	0.0112	0.6158	0.0201	0.0065	0.0012	-0.0075	-0.0388
2	DE(+,+)	0.0013	0.0096	0.0017	0.0489	0.0058	0.0011	-0.0038	-0.0498
3	ED(-,-)	-0.0033	0.0144	0.0982	0.0378	0.0022	-0.0017	-0.0078	-0.0694
4	ED(+,+)	0.0013	0.0090	0.0002	0.0396	0.0058	0.0010	-0.0029	-0.0799
5	DE(-,+)	0.0110	0.0229	0.0013	0.0778	0.0167	0.0055	-0.0038	-0.0407
6	DE(+,-)	-0.0009	0.0118	0.0648	0.0317	0.0046	0.0000	-0.0053	-0.0848
7	ED(-,+)	0.0002	0.0102	0.5790	0.0605	0.0052	0.0001	-0.0044	-0.0447
8	ED(+,-)	-0.0022	0.0204	0.3751	0.0359	0.0055	-0.0000	-0.0059	-0.1069
1-8		0.0004	0.0114	0.0357	0.0778	0.0055	0.0004	-0.0043	-0.1069

*p-values are based on two-tail tests.

which is defined as total assets (TASSETS), TASSET per share or log of TASSET quantitatively does not change the results of the regressions.

Panel F shows the characteristics of three-day means of the raw returns at dividend announcement dates (MRR^D) as defined in equation (14). The mean raw return for the sequential announcement cases (1 through 8) is 0.0004 which is significantly different from zero (p-value is 0.0849). Cases *DE*(-,-), *ED*(-,-), *DE*(-,+) and *ED*(+,-) have negative means of raw return due to negative dividend surprises. Cases *DE*(+,+), *ED*(+,+), *DE*(+,-) and *ED*(-,+) have positive means due to positive dividend surprises. Even though for all cases (1 through 8) the mean is significantly different from zero, some of the cases [DE(-,-), DE(+,+), ED(-,-), DE(-,+) and DE(+,-)] have individual means that are insignificantly different from zero. This suggests that studies that claim to find dividend signals cannot generalize their finding to all cases. For example, this study documents a positive mean raw return (0.04%) when results are pooled over all cases of dividend surprises. But, only dividend surprises in cases *ED*(+,+), *ED*(-,+) and *ED*(+,-) produce means that

Table 4. ***(Continued)***

Panel C. Mean Total Raw Return at Dividend and Earnings Announcement Dates (MRR^T)

	DE(-,-)	DE(+,+)	ED(-,-)	ED(+,+)	DE(-,+)	DE(+,-)	ED(-,+)	ED(+,-)
DE(-,-)		1.5008 (0.1339)e	-1.0388 (0.3014)u	1.3876 (0.1701)u	3.3061 (0.0015)u	-0.1038 (0.9174)e	0.6906 (0.4901)e	-0.5124 (0.6095)u
DE(+,+)	-0.82969 (0.4067)		-2.2967 (0.0253)u	0.1231 (0.9020)u	2.9781 (0.0044)u	-3.4346 (0.0006)u	-1.7211 (0.0855)e	-1.3935 (0.1680)u
ED(-,-)	-1.31274 (0.1893)	-2.87432 (0.0040)		2.3411 (0.0228)u	3.7844 (0.0003)u	1.1780 (0.2434)u	1.7638 (0.0830)u	0.3330 (0.7397)u
ED(+,+)	-1.00234 (0.3162)	-0.44090 (0.6593)	-3.10377 (0.0019)		2.9621 (0.0047)u	-3.6999 (0.0002)u	-1.6925 (0.0908)u	-1.4243 (0.1590)u
DE(-,+)	2.61932 (0.0088)	2.64604 (0.0081)	3.45794 (0.0005)	2.45394 (0.0141)		-3.6463 (0.0006)u	-3.2993 (0.0018)u	-3.2904 (0.0013)e
DE(+,-)	0.226622 (0.8207)	2.73307 (0.0063)	-1.74845 (0.0804)	-3.29581 (0.0010)	3.44599 (0.0006)		1.7282 (0.0842)e	-0.5172 (0.6066)u
ED(-,+)	-0.1140 (0.9092)	1.7987 (0.0721)	-2.1398 (0.0324)	-1.9792 (0.0478)	3.13134 (0.0017)	0.82454 (0.4096)		-1.6624 (0.0970)u
ED(+,-)	0.195268 (0.8452)	-1.31323 (0.1891)	-1.14469 (0.2523)	-1.53315 (0.1252)	2.74009 (0.0061)	-.146591 (0.8835)	-.530900 (0.5955)	

Notes:

- the upper-right portion contains t statistics;
- the lower-right portion contains Wilcoxon statistics.
- the first line is the test statistic;
- the second line is the p-value;
- all p-values are based on the two-tail test;
- u = Means under comparison have unequal variances at the 10 percent level.
- e = Means under comparison have equal variances at the 10 percent level.

Table 5. Correlation Matrixes

	MRR^D	MRR^E	DDPS	DEPS	MIMR^D
MRR^E	0.03239 (0.1121)				
ΔDPS	0.03151 (0.1223)	-0.06037 (0.0030)			
ΔEPS	-0.00630 (0.7576)	0.08690 (0.0001)	-0.12175 (0.0001)		
MIMR^D	0.29644 (0.0001)	0.07176 (0.0004)	0.02341 (0.2510)	-0.00407 (0.8419)	
MIMR^E	0.02178 (0.2854)	0.25628 (0.0001)	-0.01016 (0.6184)	-0.03161 (0.1210)	0.14787 (0.0001)

Definition:

MRR^D = mean of the raw returns in the three day period at, before, and after the dividend announcement day.

MRR^E = mean of the raw returns in the three day period at, before, and after the earnings announcement day.

MIMR^D = mean of the CRSP value-weighted market returns in the three day period at, before, and after the dividend announcement day.

MIMR^E = mean of the CRSP value-weighted market returns in the three day period at, before, and after the earnings announcement day.

Table 6. Regression Results for Dividend Announcements

Variable (Coefficient)	Model 1	Model 2$^{a)}$	Model 3
INTERCEPT (ξ_0)	-0.001228 (-3.427)*** (-2.916)***	-0.001713 (-3.603)*** (-2.784)***	-0.001693 (-3.571)*** (-2.763)***
ΔDPS	1.188944 (3.835)*** (3.528)***	-	-
MIMR^D (ξ_1)	0.978952 (15.115)*** (13.946)***	0.976303 (15.047)*** (13.857)	0.987755 (15.243)*** (14.027)***
DE(-,-)+ΔDPS (ξ_2)		-0.024439 (-0.026) (-0.033)	-0.017462 (-0.019) (-0.024)
DE(+,+)+ΔDPS (ξ_3)		1.249691 (1.858)** (2.043)**	1.219990 (1.823)** (2.000)**
ED(-,-)+ΔDPS (ξ_4)		0.206858 (0.202) (0.127)	-1.367138 (-1.227) (-2.262)**

Table 6. ***(Continued)***

Variable (Coefficient)	Model 1	Model 2[a]	Model 3
ED(+,+) + ΔDPS (ξ_5)		1.878058 (2.847)*** (2.808)***	1.850176 (2.816)*** (2.770)***
DE(-,+) + ΔDPS (ξ_6)		0.968570 (0.743) (0.796)	0.979202 (0.756) (0.804)
DE(+,-) + ΔDPS (ξ_7)		1.469978 (2.148)** (2.024)**	1.209144 (1.758)** (1.806)**
ED(-,+) + ΔDPS (ξ_8)		2.255080 (3.549)*** (3.291)***	2.236888 (3.533)*** (3.269)***
ED(+,-) + ΔDPS (ξ_9)		1.085030 (1.160) (1.467)*	1.090622 (1.172) (1.476)*
Condition #	2.17109	3.19180	3.18886
F-Value	121.810***	27.671***	28.275***
SSE	0.39883	0.39786	0.39057
R^2	0.0957	0.0979	0.1004
adj-R^2	0.0949	0.0944	0.0969
t-test:			
$\xi_9 > \xi_6$		0.082	0.079
$\xi_8 > \xi_7$		1.241*	1.541*

Models:

$$MRR^D = \xi_0 + \xi_1 MIMR^D + \xi_2 DE(-,-).\Delta DPS + \xi_3 DE(+,+).\Delta DPS + \xi_4 ED(-,-).\Delta DPS + \xi_5 ED(+,+).\Delta DPS + \xi_6 DE(-,+).\Delta DPS + \xi_7 DE(+,-).\Delta DPS + \xi_8 ED(-,+).\Delta DPS + \xi_9 ED(+,-).\Delta DPS + \varepsilon \quad (9)$$

1 = basic model as shown in equation (7).
2 = main interaction model as shown in equation (9).
3 = sensitivity analysis from model 2 where sixteen observations are deleted due to late announcers in the fourth quarter. Investors beliefs may be affected if they perceived that the late announcements are due to an auditing problem.

Notes:

- *t*-values in the parentheses. The first *t*-values are unadjusted *t*-statistics. The second *t*-values are White's adjusted *t*-statistics.
- All condition numbers are less than 20 indicating multicollinearity is not a problem.
- Outliers are deleted by winsorizing based on two standard-deviations for dividend surprises and ± $5 of EPS.
- The descriptive statistics suggest that firm size, which is defined as firm total assets (TASSET), is different across cases. Including size variable (TASSET, TASSET per share or log of TASSET) does not change the results.

[a] Adding the RETQ variable defined as one quarter return $(P_q - P_{q-1} + DIV_q)/P_{q-1}$ into the regression to reduce the measurement error of the market expectation does not change the regression results. The coefficient of RETQ itself is insignificant.

* = significant at the 10 percent level; ** = significant at the 5 percent level; *** = significant at the 1 percent level.

Table 7. **Regression Results for Earnings Announcements**

Variable (Coefficient)	Model 1	Model 2[a)]	Model 3
INTERCEPT (ϕ_0)	-0.000014 (-0.043) (-0.042)	-0.000466 (-1.072) (-1.080)	-0.000438 (-1.003) (-1.012)
ΔEPS	0.138433 (6.245)*** (5.197)***	-	-
MIMR[F] (ϕ_1)	0.812513 (13.643)*** (6.675)***	0.810247 (13.769)*** (6.632)***	0.809434 (13.713)*** (6.614)***
DE(-,-) + ΔEPS (ϕ_2)		-0.049623 (-0.426) (-0.639)	-0.048737 (-0.417) (-0.628)
DE(+,+) + ΔEPS (ϕ_3)		0.141740 (2.518)*** (3.104)***	0.140304 (2.486)*** (3.071)***
ED(-,-) + ΔEPS (ϕ_4)		0.099044 (0.769) (0.591)	0.138597 (1.027) (0.794)
ED(+,+) + ΔEPS (ϕ_5)		0.121219 (2.413)*** (2.412)***	0.120295 (2.389)*** (2.394)***
DE(-,+) + ΔEPS (ϕ_6)		1.155236 (8.997)*** (4.344)***	1.154355 (8.976)*** (4.341)***
DE(+,-) + ΔEPS (ϕ_7)		0.149455 (2.976)*** (1.981)**	0.148863 (2.957)*** (1.971)**
ED(-,+) + ΔEPS (ϕ_8)		0.048497 (1.022) (1.323)*	0.048746 (1.026) (1.329)*
ED(+,-) + ΔEPS (ϕ_9)		0.138294 (1.465)* (2.207)**	0.137611 (1.456)* (2.195)**
Condition #	1.09064	2.09727	2.09776
F-Model	110.905***	32.973***	32.778***
SSE	0.58011	0.56262	0.56054

Table 7. ***(Continued)***

Variable (Coefficient)	Model 1	Model 2[a)]	Model 3
R^2	0.0909	0.1183	0.1184
adj-R^2	0.0901	0.1147	0.1148
t-test:			
$\phi_7 > \phi_8$		(1.271)*	(1.259)*
$\phi_6 > \phi_9$		(3.731)***	(3.729)***

Models:

$$MRR^E = \phi_0 + \phi_1 MIMR^E + \phi_2 DE(-,-).\Delta EPS + \phi_3 DE(+,+).\Delta EPS + \phi_4 ED(-,-).\Delta EPS + \phi_5 ED(+,+).\Delta EPS + \phi_6 DE(-,+).\Delta EPS + \phi_7 DE(+,-).\Delta EPS + \phi_8 ED(-,+).\Delta EPS + \phi_9 ED(+,-).\Delta EPS + \varepsilon \quad (10)$$

1 = basic model as shown in equation (7).

2 = main interaction model as shown in equation (10).

3 = sensitivity analysis from model 2 where sixteen observations are deleted due to late announcers in the fourth quarter. Investors beliefs may be affected if they perceived that the late announcements are due to an auditing problem.

Notes:

- *t*-values in the parentheses. The first *t*-values are unadjusted *t*-statistics. The second *t*-values are White's adjusted *t*-statistics.
- All condition numbers are less than 20 indicating multicollinearity is not a problem.
- Outliers are deleted by winsorizing based on two standard-deviations for earnings surprises and ± $5 of EPS.
- The descriptive statistics suggest that firm size, which is defined as firm total assets (TASSET), is different across cases. Including size variable (TASSET, TASSET per share or log of TASSET) does not change the results.

[a)] Adding the RETQ variable defined as one quarter return $(P_q - P_{q-1} + DIV_q)/P_{q-1}$ into the regression to reduce the measurement error of the market expectation does not change the regression results. The coefficient of RETQ is insignificant.

*= significant at the 10 percent level; ** = significant at the 5 percent level;
*** = significant at the 1 percent level.

Hypothesis Testing

Table 6 provides regression results for dividend surprise effects. Five different models are presented. Model 1 is the basic model (equation 7) used to replicate the results of dividend signaling study. Model 2 is the main interaction model (equation 9). Model 3 is a sensitivity analysis of model 2. Investors beliefs may be affected if they perceived that the late announcements are due to auditing problems. To eliminate this effect, observations that contain late announcers in the fourth quarter are deleted in Model 3.

Table 7 provides regression results for earnings surprise effects. Five different models are also presented. Model 1 is the basic model (equation 7) used to replicate the results of information content in earnings as reported by prior studies. Model 2 is the main interaction model (equation

10). Model 3 is a sensitivity analysis of model 2 which is the same with that in Table 6.

The Information Content Hypotheses

Model 1 in Table 6 provides confirmation of the information content in dividends as reported by previous studies. The dividend response coefficient (DRC) is 1.188944 which is significant at the 1 percent level for a one-tailed test. Similarly, Model 1 in Table 7 reports the result of the information content in earnings. The earnings response coefficient (ERC) is 0.138433 which is significant at the 1 percent level for a one-tailed test.[9] This result is consistent with the ERC findings in prior studies.

The Recency Effect Hypothesis

Hypothesis H_1 examines the effect of negative dividend surprises (DDPS<0) announced later [case *ED*(+,-)] versus those announced earlier [case *DE*(-,+)] on MRR^D. The means of MRR^D for *ED*(+,-) (case number 8) and *DE*(-,+) (case number 5) are -0.0090 and -0.0018, respectively, as reported in Panel F of Table 3. Panel A of Table 4 reports the *t*-statistic and Wilcoxon statistic to compare the difference between these two means. The *t*-statistic is -1.3911 which is significant (p-value is 0.0837 for a one-tailed test). The Wilcoxon statistic is marginally significant (p-value is 0.1043 for a one-tailed test). This means that negative dividend surprises that follow good news in earnings yield more negative MRR^D than when they precede the same good news. These results provide preliminary support for H_1. However, these univariate tests only consider the order of the announcements. They do not consider the magnitude effect of dividend surprises on the MRR^D. The regression coefficients, on the other hand, explain the effect of ΔDPS magnitude on stock returns. The hypothesis is supported if ξ_9 [coefficient for *ED*(+,-)] and ξ_6 [coefficient for *DE*(-,+)] are not significantly negative and if the value of ξ_9 is significantly larger than that of ξ_6. The *t*-statistic test of ξ_9 (1.08503, significant at the 10 percent level for a one-tailed test) > ξ_6 (0.96857, insignificant) is 0.082 (Table 6, Model 2). It is statistically insignificant for a one-tailed test. Therefore, H_1 is not supported.

A possible alternative explanation to the finding of an insignificant recency effect is late releases of earnings information in the fourth quarter. If investors perceived that the late earnings announcement was due to an auditing problem, their beliefs regarding the earnings and dividend evidence may be affected. This could cause an unusually lower response to the surprises; hence, weakening the significance of the recency effect. To account for this effect, a sensitivity analysis was conducted by deleting 16 observations of late announcers (Model 3). The results remain the same. This procedure was also used for hypotheses H_2, H_3 and H_4. Again, the results do not change.

Hypothesis H_2 examines the effect of positive dividend surprises (ΔDPS>0) announced later [case 7, ED(-,+)] versus those announced earlier [case 6, DE(+,-)] on MRR^D. The means of MRR^D for *ED*(-,+) and *DE*(+,-) are 0.0021 and 0.0005, respectively, as reported in Panel F of Table 3. The *t*-statistic for this comparison is 1.033 which is insignificant for a one-

[9] Since the direction of the test is known (i.e., the coefficient of the earnings response coefficient is expected to be positive), the statistical test was performed based on a one-tailed test.

tailed test (Panel A of Table 4). The Wilcoxon statistic is significant at the 5 percent level. Considering the magnitude of the dividend surprises, the hypothesis is supported if coefficients ξ_8 and ξ_7 are not significantly negative and if $\xi_8 > \xi_7$. Table 6, Model 2 reports that ξ_8 is 2.25508 (significant at the 1 percent level for a one-tailed test) and ξ_7 is 1.469978 (significant at the 5 percent level for a one-tailed test). The *t*-statistic test of $\xi_8 > \xi_7$ is 1.241 (Table 6, Model 2) which is significant at the 10 percent level for a one-tailed test. Therefore, H_2 is supported.

Hypothesis H_3 examines the effect of negative earnings surprises (ΔEPS<0) announced later [case 6, *DE*(+,-)] versus those announced earlier [case 7, ED(-,+)] on MRR^E. The means of MRR^E for *DE* (+,-) and *ED*(-,+) are -0.0024 and -0.0016, respectively, as reported in Panel G of Table 3. MRR^E for *DE*(+,-) is not statistically negatively larger than that of *ED*(-,+). The *t*-statistic for this comparison is 0.7189 which is insignificant (Panel B of Table 4). Considering the magnitude of the earnings surprises, the hypothesis is supported if coefficients ϕ_7 and ϕ_8 are not significantly negative and if $\phi_7 > \phi_8$. Table 7, Model 2 reports that ϕ_7 is -0.149455 (significant at the 5 percent level for a one-tailed test) and ϕ_8 is 0.048497 (significant at the 10 percent level for a one-tailed test). The *t*-statistic test of $\phi_7 > \phi_8$ is 1.271 which is significant at the 10 percent level for a one-tailed test. Therefore, H_3 is supported.

Hypothesis H_4 examines the effect of positive earnings surprises (ΔEPS>0) announced later [case 5, *DE*(-,+)] versus those announced earlier [case 8, *ED*(+,-)] on MRR^E. The means of MRR^E for *DE*(-,+) and *ED*(+,-) are 0.0239 and 0.0045, respectively (Panel G of Table 3). MRR^E for *DE*(-,+) is statistically larger than that of *ED*(+,-). The *t*-statistic for this comparison is 4.2782 (Panel B of Table 4). Both the *t*-statistic and the Wilcoxon statistic are significant at the 1 percent level for a one-tailed test. Considering the magnitude of the earnings surprises, the hypothesis is supported if coefficients ϕ_6 and ϕ_9 are not significantly negative and if $\phi_6 > \phi_9$. Table 7, Model 2 reports that ϕ_6 is 1.155236 (significant at the 1 percent level for a one-tailed test) and ϕ_9 is 0.138294 (significant at the 5 percent level for a one-tailed test). The *t*-statistic test of $\phi_6 > f_9$ is 3.731 which is significant at the 1 percent level for a one-tailed test. Therefore, H_4 is supported.

Hypothesis H_5 examines the combined recency effects for dividend and earnings surprises considered together. The hypothesis is tested using the sequential announcement sample. Hypothesis H_5 is tested by comparing the combined recency effects for case *DE*(-,+) with case *ED*(+,-). The total mean raw returns (MRR^T, three-day raw returns for dividend surprises and three-day raw returns for earnings surprises) for cases *DE*(-,+) and *ED*(+,-) are 0.0110 and -0.0022, respectively (Table 3, Panel H, cases 5 and 8). The difference between these two values is 0.0132 which represents the net belief of the recency effect as indicated in equation (6). The *t*-statistic for the difference between the two means is 3.2904 (Panel C of Table 4) which is significant at the 1 percent level for a one-tailed test. The Wilcoxon test is also significant at the 1 percent level for a one-tailed test. These results provide preliminary support for H_5.

Considering the magnitude of the surprises, the regression coefficients explain the responsiveness of returns to surprises. Coefficients ξ_6 (0.968570, Model 2 in Table 6) and ϕ_6 (1.155236, Model 2 in Table 7) indicate the effects of negative dividend surprises announced earlier and positive earnings surprises announced later, respectively. The net effect of these two surprises is (ϕ_6 - ξ_6). Coefficients ϕ_9 (0.138294, Model 2 in Table 7) and ξ_9 (1.085030, Model 2 in Table 6) indicate the effects of positive earnings surprises announced earlier and negative dividend surprises announced later, respectively. The net effect of these two surprises is (ϕ_9 - ξ_9). To obtain the combined recency effect, the net effect of negative dividend surprises announced earlier and positive earnings surprises announced later (ϕ_6 - ξ_6) must be compared to the net effect of positive earnings surprises announced earlier and negative dividend surprises announced later (ϕ_9 - ξ_9). The combined recency effect is supported if (ϕ_6 - ξ_6) is significantly larger than (ϕ_9-ξ_9). The value of (ϕ_6-ξ_6) is 0.186667 and the value of (ϕ_9 - ξ_9) is -0.942006. The *t*-statistic that the value of (ϕ_6-ξ_6) is larger than the value of (ϕ_9-ξ_9) is 0.711.[10] The combined recency effect is insignificant. Therefore H_5 is not supported.

Hypothesis H_6 is tested by comparing the combined recency effects for case *ED*(-,+) with case *DE*(+,-). The MRR^T for cases *ED*(-,+) and *DE*(+,-) are 0.0002 and -0.0009, respectively (Table 3, Panel H). The difference between these two values is 0.0011 which represents the net belief of the recency effect as indicated in equation (6). The *t*-statistic for the difference between the two means is 1.7282 which is significant at the 5 percent level for a one-tailed test (Panel C of Table 3). The Wilcoxon test is insignificant (Panel C of Table 3). Coefficients ϕ_8 (0.048497, Model 2 in Table 6) and ξ_8 (2.255080, Model 2 in Table 6) indicate the effects of negative earnings surprises announced earlier and positive dividend surprises announced later, respectively. The net effect of these two surprises is (ξ_8 - ϕ_8). Coefficients ξ_7 (1.469978, Model 2 in Table 6) and ϕ_7 (0.149455, Model 2 in Table 7) indicate the effects of positive dividend surprises announced earlier and negative earnings surprises announced later, respectively. The net effect of these two surprises is (ξ_7 - ϕ_7). The combined recency effect is supported if (ξ_8-ϕ_8) is significantly larger than (ξ_7-ϕ_7). The value of (ξ_8 - ϕ_8) is 2.206583 and the value of (ξ_7-ϕ_7) is 1.320523. The *t*-statistic that the value of (ξ_8-ϕ_8) is larger than the value of (ξ_7-ϕ_7) is 1.311.[11] Since the *t*-statistic is significant at the 10 percent level for a one-tailed test, H_6 is supported.

[10] The expression (ϕ_6 - ξ_6) > (ϕ_9 - ξ_9) can be rewritten as (ϕ_6 - ϕ_9) > (ξ_6 - ξ_9). Model 2 in Table 8 shows that (ϕ_6 - ϕ_9) is 1.016942 = 1.155236 - 0.138294 (t-statistic is 3.731) and Model 2 in Table 7 shows that the value of (ξ_6 - ξ_9) is -0.116460=0.968570-1.08503 (*t*-statistic is 0.082). Using these values and the formula as follows:

$$t=\frac{\hat{\beta}_k^{(1)}-\hat{\beta}_k^{(2)}}{\sqrt{\frac{SSE^{(1)}+SSE^{(2)}}{df^{(1)}+df^{(2)}}\cdot\left[\frac{(\hat{\beta}_k^{(1)})^2.(df^{(1)})}{(t^{(1)})^2.(SSE^{(1)})}+\frac{(\hat{\beta}_k^{(2)})^2.(df^{(2)})}{(t^{(2)})^2.(SSE^{(2)})}\right]}}$$

the *t*-statistic to test (ϕ_6 - ϕ_9) > (ξ_9 - ξ_6) is 0.711.

[11] The expression (ξ_8 - ϕ_8) > (ξ_7 - ϕ_7) can be rewritten as (ξ_8 - ξ_7) > (ϕ_8 - ϕ_7). Model 2 in Table 7 shows that the value of (ξ_8 - ξ_7) is 0.7851 (=2.255080 - 1.469978) (t-statistic is 1.241) and Model 2 in Table 8 shows that (ϕ_8 - ϕ_7) is -0.1446053 (=0.048497 - 0.149455) (t-statistic is 1.271). The t-statistic to test (ξ_8 - ξ_7) > (ϕ_8 - ϕ_7) is 1.311.

Table 8. **Summary of Hypothesis Testing**

Hypothesis	Direction of the evidence	Magnitude of the evidence	Order of the evidence	Test of Hypothesis	Result
			Recency Effect Hypotheses:		
H_1	Negative	ΔDPS	ED(+,-) vs DE(-,+)	$\xi_9 > \xi_6$	Not Supported
H_2	Positive	ΔDPS	ED(-,+) vs DE(+,-)	$\xi_8 > \xi_7$	Supported
H_3	Negative	ΔEPS	DE(+,-) vs ED(-,+)	$\phi_7 > \phi_8$	Supported
H_4	Positive	ΔEPS	DE(-,+) vs ED(+,-)	$\phi_6 > \phi_9$	Supported
			Combined Recency Effect Hypotheses:		
H_5	Positive & negative	ΔDPS & ΔEPS	DE(-,+) vs ED(+,-)	$(\phi_6 - \xi_6) > (\phi_9 - \xi_9)$	Not Supported
H_6	Positive & negative	ΔDPS & ΔEPS	ED(-,+) vs DE(+,-)	$(\xi_8 - \phi_8) > (\xi_7 - \phi_7)$	Supported

Models:

$$MRR^D = \xi_0 + \xi_1 MIMR^D + \xi_2 DE(-,-).\Delta DPS + \xi_3 DE(+,+).\Delta DPS + \xi_4 ED(-,-).\Delta DPS + \xi_5 ED(+,+).\Delta DPS + \xi_6 DE(-,+).\Delta DPS + \xi_7 DE(+,-).\Delta DPS + \xi_8 ED(-,+).\Delta DPS + \xi_9 ED(+,-).\Delta DPS + \varepsilon \quad (9)$$

$$MRR^E = \phi_0 + \phi_1 MIMR^E + \phi_2 DE(-,-).\Delta EPS + \phi_3 DE(+,+).\Delta EPS + \phi_4 ED(-,-).\Delta EPS + \phi_5 ED(+,+).\Delta EPS + \phi_6 DE(-,+).\Delta EPS + \phi_7 DE(+,-).\Delta EPS + \phi_8 ED(-,+).\Delta EPS + \phi_9 ED(+,-).\Delta EPS + \varepsilon \quad (10)$$

Summary, Discussion and Limitations

Summary and Discussion

Table 8 summarizes the hypotheses and the findings.

Three of the four recency effect hypotheses are supported. Only the recency effect hypothesis for the negative dividend surprises is not supported. It can be concluded that order of negative dividend surprises is not important. The effect of negative dividend surprises whether announced later or earlier, given that earnings surprises are positive, on stock returns is insignificant. Small sample sizes for negative dividend cases may also contribute to the failure to find significance for the hypothesis.

The recency effect hypothesis for the positive dividend surprises is supported. Therefore, it can be concluded that the order of positive dividend surprises is important. This indicates that when earnings surprises are negative, positive dividend surprises announced later are more important than when announced earlier. The recency effect hypotheses are also supported for negative and positive earnings surprises. Therefore, earnings surprises, whether negative or positive, are more important if announced later than if announced earlier. These findings are consistent with recency effects that are found in the Ashton and Ashton (1988) and Hogarth and Einhorn (1992) experiments.

The recency effects directly test whether a later announcement has a greater effect on share prices than does an earlier announcement. To complete the analysis of ordered announcement effects for mixed evidence, the combined effects for the first and second announcements should also be analyzed. Hence, the following announcement series were compared: *ED*(-,+) versus *DE*(+,-) and *DE*(-,+) versus *ED*(+,-). The results indicate that the combined earnings and dividend effects in the *ED*(-,+) sequence has a significantly greater positive impact on stock returns than does the *DE*(+,-) sequence. On the other hand, the combined earnings and dividend effects on stock returns in the *DE*(-,+) sequence is not significantly different from that in the *ED*(+,-) sequence.

These findings have important implications for announcement policy as follows. Shareholder value can be increased by positive dividend announcements preceding rather than following negative earnings surprises. On the contrary, if firms experience unexpected increases in earnings and want to cut their dividends, the announcement of the dividend cut can be made either before or after the earnings announcement without major differences in share prices.

How do investors react differently to the sequence of accounting information? This study finds that presentation of evidence, which is presented in mixed type (good news/bad news or bad news/good news), will effect stock returns differently. In mixed evidence, investors react more to later surprises than to earlier surprises (recency effect).

Limitations

Some possible limitations are noted in this research. *First*, this study only considers a series of two announcements. Investors may have longer horizons and look at series that are longer than two announcements. Also, since dividend and earnings announcements are continuous events, one event announced later can be an event announced earlier in the next period for long series. For example, in quarter one, a firm announced a positive dividend change followed by a negative earnings change and a similar order of announcements was also made in quarter two. When considering the order of announcements constrained in quarter one only, case *DE*(+,-) is obtained. But, when announcements are considered continuous within and across quarters, cases *DE*(+,-), ED(-,+) and *DE*(+,-) are obtained for quarter one, across quarters and quarter two, respectively. Note that the order of evidence can change across quarters where a negative earnings change announced later in quarter one became a negative earnings change announced earlier cross-quarterly. Future studies should consider this limitation.

The limitation noted above becomes obvious when the interval between the two announcements is long. Take again an example that in the beginning of quarter one a firm announced a positive dividend change followed by a negative earnings change separated by 60 days interval. In the beginning of quarter two, it also announced a positive dividend change. Considering that a quarter contains 90 days, the negative earnings change announcement in quarter one is closer to the positive dividend change announced in quarter two rather than that in quarter one. Therefore, the announcement pair examined should be *ED*(-,+) rather than *DE*(-,+). Considering this problem, a sensitivity analysis was conducted by deleting all observations that have intervals between the dividend and earnings announcements of more than 30 days. Qualitatively, the results do not change.

Second, in pair announcements design, the signs of the second surprises, in fact, were not yet known by investors when they evaluated the first surprises. But, the signs of first surprises were always known when the second surprises were evaluated. Since this study uses ex-post data, signs of the second surprises can be identified. Signs of the second surprises are unknown because the second announcement occurred after the first announcement. Therefore, classification of surprises based on signs of first and second surprises is a limitation to studies that examine joint effects between dividend and earnings surprises. An example is a case when testing the recency effect hypothesis for negative dividend surprises. This hypothesis is tested by comparing the dividend response coefficients between dividend surprises announced later in case *ED*(+,-) and that announced earlier in case *DE*(-,+). For negative dividend surprises announced later, signs of earnings surprises announced earlier can be determined, hence case *ED*(+,-) can be formed. For negative dividend surprises announced earlier, signs of earnings surprises announced later were unknown, hence case *DE*(-,+) is based on ex-post signs. To address this problem, a sensitivity analysis was conducted by forming cases without the second signs, e.g. case DE(-,X) instead of *DE*(-,+) or *DE*(-,-), where X indicates the second signs were ignored. Qualitatively, the results remain the same.

Third, the Hogarth and Einhorn's (1992) belief-adjustment theory is developed and tested using laboratory experiments. In laboratory experiments, initial anchor values may be manipulated by giving subjects the same values to avoid the bias of different initial anchors when examining the effects of consistent evidence on an individual's belief. In a market study, where initial anchors cannot be manipulated, such biases may occur and are considered as a limitation of the study.

Fourth, Asquith and Mullins (1983) justify the use of the naive dividend random-walk expectation model. They argued that the naive model accurately reflects investors' expectations when it is used for initial dividends because initial dividends are more likely to be unexpected. To identify unexpected dividend changes, they collected firms that paid no dividends for at least 10 years. Other studies that followed their suggestion are Healy and Palepu (1988) and Born et al. (1988). Following them, this study uses five quarters of constant dividend payouts as a restriction for the firms to be included in the sample. Initial dividend changes after five quarters of constant payouts are believed to be strongly unexpected. A constant dividend policy is common for some firms. Unlike dividends per share which are determined by management discretion, a constant EPS from quarter to quarter is rarely found because the level of EPS is determined by exogenous factors. Therefore, in this study, a requirement for constant earnings changes to capture accurately unexpected earnings changes cannot be employed. This creates a measurement bias. Investors have a stronger expectation that dividends will not change as compared to earnings. Since this bias cannot be eliminated merely by research design, it should be considered as another limitation of this study.

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