STOCK PRICE DISCOVERY IN EARNINGS SEASON

Qi Sun, California State University San Marcos

ABSTRACT

This study investigates whether the timing of earnings announcement in earnings season affects stock price discovery process. This paper documents that market reaction is more favorable for earnings announcements made at the beginning of earnings season ("timing effect"). Price reaction on earnings announcement dates and post-announcement price drift are significantly stronger for positive earnings surprises released at the beginning of earnings season. Negative earnings surprises announced at the end of earnings season have the most pronounced post-announcement price decline. The timing effect associated with positive earnings surprises is consistent with industry information transfer theory. The timing effect associated with negative earnings surprise is mainly driven by market penalty on companies' strategic delay of bad news announcements.

INTRODUCTION

To assist market efficiency, the Securities and Exchange Commission (SEC) requires publically traded companies to file their earnings reports in a timely manner. Form 10-K annual reports (Form 10-Q quarterly reports) are required to be filed within 90 (45) days after fiscal year (quarter) end. As a result, earnings announcements are clustered in time. The time window in which the majority of corporate earnings are released to the public is generally referred as "earnings season". Prior research on earnings announcements has shown that the timing of a company's earnings announcement is highly predictable (e.g. Begley and Fischer (1998)). Therefore, if a company reports earnings on time, its stock price discovery process should be independent of when the earnings announcement is made in earnings season. However, a company's stock price discovery process could be complicated by earnings season. On the one hand, clustered earnings announcements and massive media coverage of news events enrich investors' information set, which promotes stock price discovery. On the other hand, competing news events complicate investors' searching, processing, and interpretation of earnings news.

If investors are overwhelmed or distracted, stock price may not fully adjust to reflect the value implication of a company's released earnings news. Using a sample of quarterly earnings announcements released between years 1985 and 2003, this study documents that the timing of earnings announcement affects stock price discovery process (referred as "timing effect" thereafter). Specifically, market reaction is more favorable to earnings news announced at the beginning of earnings reason compared with those announced at the end of earnings season. Stocks with extreme positive earnings surprise released at the beginning of earnings season on average gain 3.1% over a three-day window around the earnings announcement date, and 2.9% in the following sixty trading days. The total price increase of 6% exceeds the total price increase of 2.8% for companies in the same earnings surprise quintile but report at the end of earnings season. Both immediate price reaction and post-announcement price drift (1.9% and 0.9% respectively) are significantly smaller for late-in-season earnings announcements. Stocks with extreme negative earnings surprise reported in early earnings season experience smaller price decline. The average total price drop is -3.5% (-2.4% on earnings announcement date and -1.1% in the following sixty trading days), significantly smaller than the

-6.5% (-2.4% on earnings announcement date and -4.1% in the following sixty trading days) for companies in the same earnings surprise quintile but report in late earnings season.

Two possible explanations are explored for the documented timing effect: industry earnings information transfer and a firm's strategic timing of news announcements. The timing effect associated with extreme positive earnings surprise can be attributed to industry earnings news transfer. The price reaction to late-in-earnings-season announcements is significantly positively correlated with the industry earnings news announced at the beginning of earnings season. The weaker price reaction associated with late-in-earnings-season announcements is mainly driven by the significant pre-announcement price increase.

The timing effect associated with extreme negative earnings surprise is mainly driven by market penalty on a firm's strategic delay of bad news announcement. An examination of the reporting pattern of individual firms shows the proportion of delayed bad news announcements increases from 7.6% in early earnings season to 37.2% toward the end of earnings season. The timing effect is the most pronounced among delayed bad news announcements: both price reaction (-3.0%) and price drift (-5.2%) are significantly more negative than those associated with on-time announcements. In addition, market appears to be forgiving if companies announce bad news earlier than expected, regardless whether the bad news is reported in early or late earnings season. Stocks of these earlier-than-expected bad news announcers do not significantly underperform their size-B/M matching portfolios in the following sixty trading days.

This study contributes to the literature with evidence of how news is incorporated into stock price in a unique setting, i.e. during a predictable time period with intensive mandatory earnings news announcements. It is yet unclear in the literature how a cluster of mandatory news announcements of the same nature affects stock price discovery process, and whether the value implication of the timing of such mandatory news announcement reflects management's opportunism or desire for better information dissemination. Evidence in this study suggests that stock price discovery process is distorted in earnings season. The reward to good news announced at the beginning of earnings season and penalty on bad news released toward the end of earnings season suggest that the timing of earnings announcement has a strong effect on investors' perceptions of the information content of reported earnings. As a result, price discovery is complicated by investors' rational information extrapolation, which promotes market efficiency, and investors' representativeness bias, which distorts price discovery. The remainder of the paper proceeds as follows. Section II reviews related literature on market response to corporate news announcements. Section III describes data measurements. Section IV discusses empirical results. The last section concludes.

RELEVANT LITERATURE REVIEW

If the timing of a company's mandatory earnings announcement is highly predictable, stock price reaction to such a mandatory news announcement should be solely determined by the value implication of earnings news. However, existing studies suggest that the timing of earnings announcement in earnings season may have value implication as well. The value implication of the timing of earnings announcement in earnings season is associated with the facts that corporate earnings announcements are clustered in time, and a firm's earnings news conveys information not only relevant to the announcing firm but also to firms that are linked to the announcing firm in product markets. Studies (e.g. Foster (1981), Han and Wild (1990), Hou (2007)) have shown that a firm's stock price reacts to earnings announcements made by competing firms in the same industry. The intra-industry diffusion of earnings news is due to the fact that firms in the same industry have similar cash flow characteristics. Firms in the same industry react similarly to changes in regulations and shift in supply and demand conditions. Firms' growth opportunities and the corresponding investment and financing decisions are closely related to the industry's expansion and contraction. These commonalities suggest that a firm's earnings news not only discloses the impact of firm specific policies, but also reflects the impact of common industry externalities.

The clustered earnings announcements in earnings season create a unique environment for information transfer. In earnings season, intensive corporate earnings news release not only broadens information transfer channels, but also stimulates market participants' information searching activities. At the beginning of earnings season, investors hold their trading interests to wait for massive earnings news to set a distinctive tone to trade in equity market. As more earnings news hits the market, investors' trading interests grow, which promotes information dissemination. As investors and financial analysts extrapolate from the released earnings news to update their understanding of macroeconomic condition, and industry challenges and opportunities, there is smaller likelihood that a yet-to-be-released earnings announcement surprises the market. Alternatively, the value implication of the timing of earnings announcement in earning season could be attributed to companies' strategic timing of corporate news announcements to optimize post-announcement stock price. Prior research suggests that companies strategically choose the time of the day (e.g. Patell and Wolfson (1982), Francis, Pagach and Stephan (1992), Gennotte and Trueman (1996)), the day of the week (e.g. Damodaran (1989), DellaVigna and Pollet (2009)) to make news announcements, or intentionally accelerate or delay news announcements (e.g. Givoly and Palmon (1982), Chambers and Penman (1984), Kross and Schroeder (1984), Begley and Fischer (1998), Bagnoli et al. (2002), Graham et al. (2005), Cohen et al. (2007a), Kothari et al. (2009))). Evidence of strategic timing of news disclosure includes negative earnings news is announced more often outside trading hours than during trading hours, companies tend to release bad news on Friday, and earnings report delay is negatively related to the magnitude of earnings news ("good news early, bad news late").

The strategic timing of corporate news announcements has been argued as driven by managers' opportunism. For example, managers opportunistically hold bad news until the market closes or when investors are more distracted from job-related tasks, e.g. on Friday, to minimize negative market reaction. Managers may accelerate the release of good news before competing firms weigh in with strong earnings performance that will downplay the value implication of the announcing firm's good news. Managers may also accelerate bad news announcement to minimize litigation and reputation risks, or when they sense a "best possible light" to position the bad news. The strategic timing of news announcements could also be driven by managers' attempt to be informative. For example, managers may accelerate the release of good or bad news to provide investors with more timely information, or build the company's reputation for transparent reporting. Similarly, the withholding of bad news may reflect managers' desire for better information dissemination, giving less informed investors more time to digest complex information so that they can fairly assess the value implication of bad news.

In summary, information transfer literature implies that stock price discovery process will be distorted in earnings season, with weaker market reaction to earnings news as earnings season extends. Strategic timing literature suggests that market reaction to late-in-earnings-season announcements is less favorable. Because investors' ex ante expectation is that it takes managers more time to prepare for the release of manipulated or bad earnings news. Managers may use the extra time to resolve disagreement with auditors, prepare for analysts' questioning, come out a recovery plan to offset the negative impact of bad earnings news, or explore complicated accounting practices that may reverse the poor earnings result.

DATA AND METHODOLOGY

The value implication of the timing of earnings announcement in earnings season is studied with a sample of quarterly earnings announcements made between calendar years 1985 and 2003 by companies listed on the New York Stock Exchange (NYSE), American Stock Exchange (AMEX), and National Association of Securities Dealers Automated Quotation system (NASDAQ). Real estate investment trusts (REITs), American Depository Receipts (ADRs), and closed-end mutual funds are excluded. To mitigate microstructure effect, stocks priced below $5 per share are also excluded. To ensure that fiscal quarters are aligned, the research sample is restricted to firms with March, June, September and December fiscal quarter end. Earnings season is identified with Compustat quarterly earnings announcement date. Following Della

Vigna and Pollet (2009), when the earnings announcement date is also available at the Institutional Brokerage Estimate System (I/B/E/S) but different from the Compustat date, the earlier date is used. While the accuracy of earnings announcement date is likely to be higher when it is available at both I/B/E/S and Compustat, Compustat earnings announcement dates are used for the identification of earnings season because I/B/E/S shows a coverage bias toward large firms. The magnitude of earnings news is estimated by earnings surprise, defined as the difference between the I/B/E/S reported Earnings-Per-Share (EPS) and I/B/E/S consensus EPS forecast, which is the median of the most recent forecasts from individual analysts. The difference is normalized by the stock price at the end of the reported fiscal quarter. To exclude stale forecasts, only the one- or two-quarter ahead forecasts issued or reviewed in the last sixty calendar days before the earnings announcement are included. If an analyst issues multiple forecasts during that period, the most recent forecast by this individual will be used.

Both the reported EPS and the consensus EPS forecast are from the I/B/E/S raw unadjusted earnings dataset. The commonly used standard I/B/E/S dataset reports the actual and forecasted EPS that are adjusted for stock splits (i.e. EPS is based on the number of shares outstanding as of today along with a split factor). The estimated and actual EPS are rounded to the nearest cent after making retroactive and cumulative stock split adjustments, which makes the comparison of actual and estimated EPS problematic for firms that have executed stock splits. A disproportionate number of firms will be categorized as "exactly met " analysts' expectations if standard I/B/E/S data file were used, while in fact they have missed or exceeded analysts' expectations. Stock price discovery process is evaluated by market reaction to earnings surprise, which includes immediate price reaction (CAR) to earnings surprise and post-announcement price drift (PEAD) over a window of sixty trading days. To calculate CAR and PEAD, each stock is matched with 1 of 25 size and book-to-market (B/M) portfolios at the end of June. Size is measured by the market capitalization at the end of June. B/M is measured as the ratio of the book value of equity at the end of last fiscal year-end in the prior calendar year to the market value of the equity at the end of December of the prior calendar year. Daily individual stock returns and company financials are from CRSP/Compustat merged database. Daily returns of the 25 size-B/M portfolios are from professor Kenneth French's web site. CAR is calculated as the sum of daily abnormal returns over a window of three trading days [-1, 1], where $t=0$ is the earnings announcement date. PEAD is calculated as the difference between the buy-and-hold return of the announcing firm and that of a size-B/M matching portfolio over a window of [2, 61] in trading days,

$$CAR_{i,q} = \sum_{t=-1}^{t=1}(r_{i,t} - r_{p,t}) \tag{1}$$

$$PEAD_{i,q} = \prod_{t=2}^{t=61}(1 + r_{i,t}) - \prod_{t=2}^{t=61}(1 + r_{p,t}) \tag{2}$$

where $r_{i,t}$ is the daily return of stock i and $r_{p,t}$ is the daily return of its matching size-B/M portfolio on trading day t, where $t=0$ is the announcement date of quarter q's earnings. PEAD is calculated over sixty trading days because Bernard and Thomas (1989) report that most of the drift occurs during the first sixty trading days after the announcement. For a small number of earnings announcements, next quarter's earnings announcement date falls into the sixty-trading-days window. In this case, a stock's raw return is replaced by its matching size-B/M portfolio's raw return for the remaining sixty-days window for PEAD calculation.

RESULTS AND DISCUSSIONS

The Timing of Quarterly Earnings Announcements

The SEC explicitly requires that quarterly earnings reports to be filed within 45 days after the fiscal quarter ends. As a result, quarterly earnings announcements are clustered in time, forming the so called "earnings season"- the time period in which a majority of corporate earnings are released to public. Table 1 reports

the descriptive statistics of the number of calendar days between earnings announcement date and fiscal quarter end based on a sample of 420,900 observations of Compustat quarterly earnings announcements made between calendar years of 1985 and 2003. As shown in Table 1, in accordance with SEC's requirements, 90% of companies release their quarterly earnings results within 45 calendar days after fiscal quarter end. Earnings season kicks off approximately two weeks after fiscal quarter end, as only 5% of earnings announcements are released in the first 15 calendar days after fiscal quarter end. Earnings season lasts about one month with 90% of earnings announcements are made during earnings season, which starts from the 16th calendar day after fiscal quarter end.

Table 1: Descriptive Statistics of The Number of Calendar Days Between Earnings Announcement Date and Fiscal Quarter End

Fiscal Quarter	Mean	Median	P5	P10	P20	P25	P30	P40	P60	P70	P75	P80	P90	P95
1	32	29	15	18	21	23	24	27	33	37	38	40	45	47
2	32	30	16	18	21	23	24	27	33	37	38	40	45	47
3	31	29	15	17	21	22	24	26	33	36	38	40	45	46
Average	32	29	15	18	21	23	24	27	33	36	38	40	45	47

This table shows the percentile descriptive statistics of the number of calendar days between earnings announcement date and fiscal quarter end.

Based on the percentile descriptive statistics in Table 1 and frequency distribution of reporting lag (untabulated for brevity), the timing of a quarterly earnings announcement is defined as "at the beginning of earnings season (BGN)" if it is made between the 16th and 25th calendar days after fiscal quarter end, " in the middle of earnings season (MID)" if it is made between the 26th and 35th calendar days after fiscal quarter end, or "at the end of earnings season (END)" if it is made between the 36th and 47th calendar days after fiscal quarter end. If an earning announcement is made in the first 15 calendar days or beyond calendar day 47 after fiscal quarter end, its timing is labeled as "Before" and "After" respectively. Table 2 presents the percentage of total quarterly earnings announcements, and percentage of announcements of extreme earnings news released before, during, and after earnings season, based on a sample of Compustat quarterly earnings released between calendar years 1995 and 2003. Extreme earnings news is identified based on quarterly sorting of reported earnings surprises into quintiles. Extreme good and bad earnings news refers to earnings surprises ranked in the top and bottom quintiles.

Table 2: Percentage of Earnings Announcements Made Before, During, and after Earnings Season

Timing of Announcement	Time Interval	% of Total Announcements (N=420,900)	% of Extreme Bad Earnings News (N=35,846)	% of Extreme Good Earnings News (N=36,137)
Before	D1-D15	5%	5%	7%
BGN	D16-D25	30%	28%	40%
MID	D26-D35	30%	27%	28%
END	D36-D47	30%	21%	15%
After	D48 ~	5%	19%	10%

This table reports the percentage of quarterly earnings announcements made before, during, and after earnings. An announcement is labeled as "Before" if it is released between calendar days 1 and 15 after fiscal quarter end (D1-D15), "BGN" if between calendar days 16 and 25 (D16-D25), "MID" if between calendar days 26 and 35 (D26-D35), "END" if between calendar days 36 and 47 (D36-D47), and "after" if beyond calendar day 47 after fiscal quarter end. The last two columns report the distribution of extreme news announcements. Extreme news is defined based on quarterly quintile ranking of earnings surprises for companies with fiscal quarter ends in March, June, September, or December.

As shown in the column "% of Total Announcements", with the above partition of earnings season, 90% of quarterly earnings announcements are announced during earnings season, 5% are announced before

earning season starts, and 5% are announced after earnings season ends. Quarterly earnings announcements spread evenly in earnings season with approximately 30% announcements made at the beginning, in the middle, and at the end of earnings season. Such a partition of earning season is not affected by whether company has a calendar fiscal quarter end, or a December fiscal quarter end (results untabulated for brevity). The timing of extreme earnings news announcement is determined by whether the news is good or bad. Extreme good earnings news tends to be released in early earnings season: 40% of extreme good news is released over the first 10 calendar days of earnings season while only 15% is announced at the end of earnings season. While extreme bad news announcements spread evenly in earnings season, 19% of extreme bad news is reported after earnings season ends.

The Timing Effect

To examine the effect of the timing of earnings announcement on stock price discovery process, a univariate analysis is performed. At the end of each calendar quarter, earnings surprises announced in the quarter are sorted into quintiles. For each earnings surprise quintile, the mean price reaction and post-announcement price drift, as defined in equation (1) and (2), are calculated based on the timing of news announcement. For extreme good and bad earnings news, the mean price reaction and price drift, and the difference in price reaction and price drift between announcements made at the beginning versus at end of earnings season are reported in Table 3.

Table 3: Price Reaction and Post-Announcement Price Drift For Extreme Earnings Surprise Quintiles by Timing of Earnings Announcement

Panel A: Extreme Negative Earnings Surprise Quintile						
	Earnings Season					
	Before	BGN	MID	END	After	BGN-END
Price Reaction	-1.76*	-2.44**	-2.51**	-2.38**	-1.87**	-0.06
Price Drift	0.39	-1.11	-2.58*	-4.12**	-2.18*	3.01**
Panel B: Extreme Positive Earnings Surprise Quintile						
	Earnings Season					
	Before	BGN	MID	END	After	BGN-END
Price Reaction	3.99*	3.10**	2.66**	1.93**	1.91*	1.17*
Price Drift	4.13*	2.90**	1.65*	0.94	1.34	1.96*

*This table reports the mean price reaction and price drift of extreme earnings surprise quintiles grouped by the timing of earnings announcements. The timing of earnings announcement is labeled "BGN" ("END") if the announcement is made in the first (last) 10 calendar days of earnings season, and "MID" otherwise. An earnings announcement made in the first 15 calendar days (beyond calendar day 47) after fiscal quarter end is labeled "Before" ("After"). Extreme earnings surprises are those ranked top and bottom 20 percent in quarterly quintile sorting. The p-values are calculated using standard errors adjusted for heteroskedasticity and clustering by date. Notation *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.*

Evidence in Table 3 shows market reaction is more favorable for earnings announcements made at the beginning of earnings season ("timing effect"). For extreme positive earnings surprise quintile, price reaction and post-announcement drift are stronger if the announcement is made in early earnings season. Stock price of announcements made at the beginning of earnings season on average gain 3.1% over three trading days around earnings announcement date and 2.9% over the post-announcement sixty trading days. In comparison, stocks with announcements at the end of earnings season appreciate significantly less with price reaction of 1.93% and price drift of 0.94%. As earnings season proceeds, the magnitude of price reaction and post-announcement price drift monotonically decreases.

For extreme negative earnings surprise quintile, market reaction is more negative if the bad news is released in late earnings season. Stocks with bad news released at the end of earing season on average are

accompanied with a total price decline of 6.5% with 2.38% on earnings announcement date and 4.12% over the following sixty trading days. The total price decline is only 3.5% for bad news announced at the beginning of earnings season and primary on earnings announcement date. Early announcers of bad news do not significantly underperform their size-B/M matching portfolios. Their post-announcement price drift of -1.11% is not significantly difference from zero. The last column of Table 3 reports the difference in price reaction and post-announcement price drift between at-the-beginning and at-the-end announcements. To verify that these differences are statistically meaningful, the following regression is conducted using announcements in the top and bottom of the earnings surprise quintiles and released at the beginning and end of earnings season,

$$CAR \ (or \ PEAD) = \alpha_0 + \alpha_1 \ FE_5 + \alpha_2 \ BGN + \alpha_3 \ (FE_5)(BGN) + \varepsilon \tag{3}$$

where CAR is the immediate price reaction and PEAD is the post-announcement price drift as defined in equations (1) and (2), FE_5 is an indicator variable that is equal to one for the top quintile of earnings surprises and zero for the bottom quintile of earnings surprises, BGN is a dummy variable that is equal to one if an announcement is made at the beginning of earnings season, or zero if an announcement is made at the end of earnings season. The regression coefficient α_2 tests whether the timing effect associated with extreme negative earnings surprise announcement is statistically significant, while the sum of regression coefficients of α_2 and α_3 tests whether the timing effect associated with extreme positive earnings surprise announcement is statistically significant. The timing effect associated with extreme positive earnings surprise is statistically significant. The price reaction difference between the announcements made at the beginning and at the end of earnings season is 1.17%. The post-announcement price drift difference is 1.96%. Both differences are statistically different from zero at the 10% level using standard errors adjusted for heteroskedasticity and clustering by date.

The timing effect associated with extreme negative earnings surprise is mainly due to the significant difference in the post-announcement price decline. The 3% difference in price drift is statistically significant at the 5% level, while the price reaction difference is not statistically significant. Prior research shows that market reaction to earnings news varies with firm size, B/M ratio, number of analyst following, institutional ownership, earnings persistence, and day of the week (e.g. Chamber and Penman (1984), Bernard and Thomas (1989), DellaVigna and Pollet (2009)). Thus, to control for other determinants of market reaction to earnings news, a multivariate test is performed. Price reaction (CAR) or post-announcement price drift (PEAD) is regressed on the earnings surprise quintile rank (FE), the timing of earnings announcement (Timing), the interaction term (FE x Timing), control variables (X_i), and the interaction of control variables with FE:

$$CAR \ or \ PEAD = \alpha_0 + \alpha_1 \ FE + \alpha_2 \ Timing + \alpha_3 \ (FE \times Timing) + \sum_{i=1}^{n} c_i \ X_i + \sum_{i=1}^{n} \beta_i \ (FE \times X_i) + \varepsilon \tag{4}$$

where control variables include size and B/M decile ranks, the log of the number of analysts following during the most recent fiscal year, institutional ownership, earnings persistence, earnings volatility, day of week/month/year dummies, and industry dummies using Fama-French twelve industry classification. The size and B/M deciles are formed at the end of June of each year. Size is based on the market value of equity at the end of June. B/M ratio is calculated as the book value of equity for the last fiscal year-end in the previous calendar year dividend by the market value of equity for December of the previous calendar year. Earnings persistence is the first-order autocorrelation coefficient of quarterly EPS during the past 4 years (minimum four observations required). Earnings volatility is the standard deviation during the preceding 4 years of the deviations of quarterly earnings from a-year-ago earnings (minimum four observations required). Institutional ownership is measured as the percentage of shares owned by institutions at the end of the most recent calendar quarter. The indictor of timing takes value of 1 if earnings news is reported at

the beginning of earnings season, 2 if earnings news is reported in the middle of earnings season, or 3 if earnings news is reported at the end of earnings season.

Following existing literature, the quintile rank of earnings surprises is used in regression, as apposed to the magnitude of earnings surprises, to reduce the impact of outliers. This is because the relationship between announcement-day abnormal returns and earnings surprise is highly nonlinear with small negative surprises having big effects (Kothari (2001)). Regression results with all observations (Regressions (1) and (2)) and with observations in the top and bottom earnings surprise quintiles (Regressions (3) and (4)) are reported in Table 4.

Table 4: Regression Analyses of Price Reaction to Earnings Surprise and Post-Announcement Price Drift

Independent Variables	(1) Price Reaction (Car)	(2) Price Drift (Pead)	(3) Price Reaction (Car)	(4) Price Drift (Pead)
FE	0.0193***	0.0098***		
FE interacted with Timing	-0.0012**	-0.0013*		
$FE_{extreme}$			0.0196***	0.0121***
$FE_{extreme}$ interacted with Timing			-0.0010**	-0.0024*
Control variables interacted with FE	Yes	Yes	Yes	Yes
Constant	-0.032***	-0.016***	-0.031***	-0.012***
Observations	105,833	105,833	38,790	38,790
R^2	7.6%	0.2%	11.4%	4%

This table reports the multivariate test of the effect of announcement timing on price reaction to earnings surprise and post-announcement price drift. FE is the earnings surprise quintile (FE=1: lowest, 5: highest) based on quarterly ranking of earnings surprises. $FE_{extreme}$ is an indicator variable for the top and bottom earnings quintiles. Timing is an indicator variable that equals to 1/2/3 if an announcement is made at the beginning/middle/end of the earnings season. Control variables include size and B/M deciles, log of the number of analyst following, institutional ownership, earnings persistence, earnings volatility, indicator variables for year, month, day of week, and Fama-French 12 industry classification. Notation *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively, and based on standard errors adjusted for heteroskedasticity and clustering by the day of announcement.

The regression coefficient on the timing interaction term is significantly negative at 5% level for price reaction and at 10% level for price drift (Regressions (1) and (2)). The coefficient estimates on FE and the interaction term (FE x Timing) imply that market reaction to earnings surprise is significantly stronger if an announcement is made at the beginning of earnings season. For example, the price reaction to earnings announcements released at the beginning of earnings season is more sensitive: the sensitivity is 0.0181 (= 0.0193-0.0012 x 1) for announcements at the beginning of earning season, 15.3% larger than the sensitivity of 0.0157 (=0.0193-0.0012 x 3) associated with announcements made at the end of earnings season. Similarly, price drift is 44% more sensitive if news is released at the beginning of earnings season. Results are similar when extreme earnings surprise quintiles are used (Regressions (3) and (4)).

Industry Information Transfer and the Timing Effect

To examine whether the documented timing effect is due to industry earnings information transfer, I examine whether the stock price of companies that report earnings at the end of earnings season is positively correlated with earnings surprises announced at the beginning of earnings season by companies in the same industry. At the end of June of each calendar year, companies in research sample are assigned to one of twelve Fama-French industries based on the firm's four-digit SIC code. For each Fama-French industry, the average earnings surprise of the companies in the same earnings surprise quintile that have released earnings results at the beginning of earnings season is calculated.

A Fama-McBeth regression is conducted as follows. At the end of each calendar quarter, for each company that reports at the end of earnings season, its immediate price reaction (CAR) is regressed on its own earnings surprise (FE), the reported industry average earnings surprise (FE$_{industry}$), size, book-to-market ratio (B/M), and the its abnormal buy-and-hold returns over the first and second ten-day windows of earnings season (R$_{BGN}$; R$_{MID}$). The time series averages of the cross-sectional regression coefficients for companies in extreme earnings surprise quintiles are presented in Table 5.

Table 5: Industry Information Transfer and Timing Effect

	Log (Size)	Log (B/M)	FE	Fe$_{industry}$	R$_{BGN}$	R$_{MID}$
Regression (1)	−0.0006***	0.0004***	0.0075***			
Regression (2)	−0.0006***	0.0004***		0.1252***		
Regression (3)	−0.0006***	0.0004***	0.0064***	0.1246**		
Regression (4)	−0.0006***	0.0004***	0.0059**	0.0014*	0.1481**	0.0621**

*This table reports the time-series average of the regression coefficients of regressing price reaction (CAR) to extreme earnings surprises announced at the end of earnings season on industry earnings news and the announcing firm's earnings surprise and its pre-announcement price change. Size and B/M ratio are defined in data section. FE is the earnings surprise of announcing firm. FE$_{industry}$ is the average earnings surprise of the companies in the same earnings surprise quintile that have reported at the beginning of earnings season. R$_{BGN}$ (R$_{MID}$) is the announcing firm's abnormal buy-and-hold return (BHR) over the first (second) ten days of the earnings season, measured as the difference between the BHR of the announcing firm and its size-/B/M matching portfolio. Notation *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.*

Regression results in Table 5 confirm that earnings news disseminates within industry. The price reaction to late-in-earnings-season announcements is positively correlated with the industry earnings news announced at the beginning of earnings season (Regression (2)). The regression coefficient of FE$_{industry}$ remains positive at 5% significance level after the earnings surprise of announcing firm is added (Regression (3)), suggesting that earnings news announced at the beginning of earnings season contains information about the future prospects of companies in the same industry, and thus affects the stock price discovery of companies announcing at the end of earnings season. In the last regression in Table 5, the abnormal cumulative returns of the announcing firm over the first and second ten days of earning season are added for additional evidence on industry earnings news transfer. The regression coefficients on both cumulative returns are significant at 5% level, while the regression coefficient of announced industry earnings news is much smaller and significant at 10% level. This result suggests that market participants extrapolate from the announced earnings news for common industry opportunities and constraints that apply to all firms within. The pre-announcement price adjustment to industry earnings news helps explains the weaker price reaction and post-announcement price drift associated with extreme positive earnings surprise.

Information transfer theory, however, does not well explain the timing effect associated with extreme negative earnings surprise. An examination of the pre-announcement price change associated with extreme negative earnings surprise announced in the last ten days of earnings season shows a significant price decline of 1.3% over the first twenty days of earnings season (results untabulated for brevity). Despite the significant pre-announcement price drop, market reaction (measured by both price reaction and post-announcement price decline) is still significantly more negative for bad news announced at the end of earnings season. Therefore, an alternative explanation is explored in the following section.

Strategic Timing of News Announcements and the Timing Effect

Corporate managers have become increasingly aware of the potential impact that corporate disclosure strategies can have on a firm's value. An important component of a firm's disclosure strategy is the timing of its public news announcements. Existing studies show that companies strategically choose the time of the day and the day of the week to make news announcements for optimization of post-announcement stock price. Companies also intentionally accelerate or delay news announcements, depending on the nature of

the news and market condition. If investors interpret the timing of earnings announcement in earnings season as indication of the likelihood of manipulated earnings news or bad earnings news, and delayed announcements dominate the announcements released at the end of the earnings season, the timing effect associated with extreme negative earnings surprise can be attributed to market penalty on delayed bad news announcements. Table 6 provides descriptive statistics on the stability of companies' reporting pattern. The mean of reporting lag (RepLag), which is the number of calendar days between fiscal quarter end and quarterly earnings announcement date, indicates that firms spend approximately one month on earnings announcement preparation. The standard deviation of RepLag (std Replag) is relatively small because weekends and holidays naturally introduce some variations.

Table 6: Reporting Pattern of Individual Firms

Fiscal Quarter	Mean Replag	Std Replag	Mean Del	Median Del	Mean |Del|	Median |Del|
1	32	4.9	-0.23	0.00	4.41***	3.56***
2	32	4.7	-0.24	-0.06	4.14***	3.44***
3	31	4.9	-0.19	0.00	4.33***	3.46***

This table reports evidence on the reporting pattern of individual firms. Reporting lag ("RepLag") is defined as the number of calendar days between fiscal quarter end and earnings announcement date. Announcement Delay ("DEL") is the difference between the RepLag of the reported quarter and the same fiscal quarter of previous year. The mean and median of the absolute value of DEL are reported in the last two columns.

The stability of a firm's reporting pattern is indicated by announcement delay (DEL). Following earlier studies (e.g. Begley and Fischer (1998)), *DEL* for firm i in quarter q and year t is defined as $DEL_{i,q,t}$ = $RepLag_{i,q,t}$ − $RepLag_{i,q,t-1}$. A negative (positive) *DEL* indicates that an earnings report is accelerated (delayed) compared with the same quarter last year. As shown in Table 6, the mean and median DEL are negative but not significantly different from zero, representing little time trend of reporting lags for individual firms. The mean and median of the absolute value of announcement delay (|DEL|) are of similar magnitude as the standard deviations of reporting lag. This shows that the within-firm time variation of reporting lag is due to the swing associated with reports of the same fiscal quarter in consecutive years. Table 7 presents the average announcement delay (DEL) of extreme earnings surprise announcements. Based on the reporting pattern of individual firms, an earnings announcement is classified as "on time" if its *DEL* satisfies -5≤DEL≤5, or as "advanced (delayed)" if its *DEL* is less (more) than 5. Robustness check shows similar results when classification is based on variation of 3 or 4 days.

There is little evidence that firms intentionally accelerate release of good news. Among 26, 125 announcements of extreme positive earnings surprise, the proportion of advanced announcements is similar to that of delayed announcements (16.7% vs. 13.2%). In addition, advanced good news announcements spread evenly over earnings season. For example, 15.6% of announcements released at the beginning of earnings season are accelerated, compared with the 14.4% for announcements released at the end of earnings season. In comparison, there is clear evidence that firms intend to delay bad news announcements. Out of 26,244 announcements of extreme negative earnings surprise, 25.3% are delayed announcements while 12.3% are accelerated. There is clear evidence that the proportion of delayed announcements increases as earnings season proceeds. At the beginning of earnings season, only 5.6% of extreme positive earning surprise announcements are delayed. The proportion increases to 23.8% at the end of earnings season. Such increase is more dramatic for extreme negative earnings surprise announcements. There are 37.2% announcements made at the end of earnings season that are delayed, compared with only 7.6% at the beginning of earnings season.

Table 7: Earnings Announcement Delay (DEL) and the Timing of Earnings Announcement

Panel A	Extreme Positive Earnings Surprise Quintile					
Timing	**Before**	**BGN**	**MID**	**END**	**After**	**Nobs**
Advanced	-12.8*	-12.2*	-13.7*	-15.1*	-16.8*	4,350
	[25.1]	[15.6]	[17.0]	[14.4]	[16.6]	[16.7]
On Time	-1.1	-0.6	0.0	-0.10	0.1	18,323
	[73.3]	[78.8]	[67.0]	[61.8]	[49.5]	[70.1]
Delayed	7.1*	7.4*	8.5*	12.1*	23.6*	3,452
	[1.6]	[5.6]	[16.0]	[23.8]	[33.9]	[13.2]
Number of observations	1,928	10,996	7,250	3,528	2,367	26,125
	[100]	[100]	[100]	[100]	[100]	[100]

Panel B	Extreme Negative Earnings Surprise Quintile					
Timing	**Before**	**BGN**	**MID**	**END**	**After**	**Nobs**
Advanced	-14.1*	-13.2*	-13.8*	-16.7*	-17.5*	3,235
	[20.5]	[12.9]	[12.8]	[9.5]	[11.1]	[12.3]
On Time	-0.8	-0.4	0.4	0.3	0.7	16,383
	[77.3]	[79.5]	[63.7]	[53.3]	[36.8]	[62.4]
Delayed	7.4*	7.2*	8.9*	12.7*	25.1*	6,626
	[2.2]	[7.6]	[23.5]	[37.2]	[52.1]	[25.3]
Number of observations	1,429	7,879	7,183	5,189	4,564	26,244
	[100]	[100]	[100]	[100]	[100]	[100]

This table reports the announcement delay (DEL) for announcements of extreme earnings surprises. DEL is defined as $RepLag_{i,q,t} - RepLag_{i,q,t-1}$, where RepLag is the number of calendar days between the fiscal quarter end and the earnings announcement date. An earnings announcement is "On Time" if its DEL satisfies $-5 \leq DEL \leq 5$. An announcement is "Delayed" ("Advanced") if its DEL>5 (DEL<-5). Timing indicators (e.g. "BGN") are defined in Table 3. Numbers in bold brackets are the percentage proportions of observations relative to the column sum of number of observations (Nobs). Notation * indicate significance at 5% level.

Table 8 summarizes the comparison of price reaction and price drift associated with extreme negative earnings surprises announced at the beginning versus at the end of earnings season.

Table 8: Timing Effect and Strategic Delay of Extreme Negative Earnings Surprise Announcements

	Price Reaction (CAR)				Price Drift (PEAD)			
	BGN	**MID**	**END**	**BGN-END**	**BGN**	**MID**	**END**	**BGN-END**
Advanced	-2.05*	-1.83*	-1.60*	-0.45	-1.4	-0.96	-1.27	-0.13
Delayed	-2.41***	-2.67***	-2.96***	0.55*	0.73	-1.88**	-5.16***	5.89***
On Time	-2.46***	-2.47***	-2.18***	-0.28	-0.51	-1.73**	-2.43***	1.92**

This table shows the price reaction and price drift associated with extreme negative earnings surprises announcements categorized by the timing of announcement in earnings season ("BGN", "MID", "END") and whether the announcement is accelerated, on-time, or delayed ("Advanced", "On Time", "Delayed").

Consistent with the argument of strategic timing theories, the timing effect is the most pronounced for delayed bad news announcements. In particular, the more negative price reaction associated with announcements released at the end of earnings season only applies to delayed bad news announcements. Delayed bad news announcements are also accompanied by the largest negative post-announcement price drift (-5.16%), which quadruples the price decline associated with advanced announcements (-1.27%), and doubles that for on-time announcements (-2.43%). It is worth of notice that timing effect does not apply to bad news announced earlier than expected. The immediate price reaction is independent of the timing of advanced announcements. Moreover, there is no significant underperformance relative to the size-B/M matching portfolio in the following sixty trading days. This result suggests that investors perceive the acceleration of bad news announcement as driven by manager's attempt to be informative. In Table 9, a regression framework is used to separate the impact of strategic delay of bad news announcement from the

impact of the timing of news announcement. Results are based regressions of price reaction and price drift associated with extreme negative earning surprise announcements made at the beginning and at the end of earnings season.

Table 9: Regression Analyses of the Impact of Strategic Timing on Price Discovery Associated With Extreme Negative Earnings Surprises

Independent Variables	(1) Price Reaction (Car)	(2) Price Reaction (Car)	(3) Price Drift (Pead)	(4) Price Drift (Pead)
FE	0.0068***	0.0068***	0.0051***	0.0051***
FE interacted with END	0.0031*	0.0031	0.0047**	0.0040**
FE interacted with Strategic		0.0002*		0.0013**
Control variables interacted with FE	Yes	Yes	Yes	Yes
Constant	-0.051***	-0.051***	-0.067***	-0.067***
Observations	26, 244	26, 244	26,244	26,244
R^2	7.5%	7.5%	6.2%	6.2%

*This table reports the regression analyses of the impacts of announcement timing and strategic delay of bad news release on stock price discovery process. FE, as defined in data section, is worsorized at the 1% and 99% levels. "END" is a dummy variable that equals to 1/0 if an announcement is made at the end/ beginning of earnings season. "Strategic" is a dummy variable that equals to 1 if an announcement is delayed and 0 otherwise. Control variables include size and B/M deciles, log of the number of analyst following, institutional ownership, earnings persistence, earnings volatility, indicator variables for year, month, day of week, and Fama-French 12 industry classification. Notation *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively, and based on standard errors adjusted for heteroskedasticity and clustering by the day of announcement.*

Table 9 results reinforce that strategic delay of bad news announcements significantly contributes to the documented timing effect associating with extreme negative earnings surprise announcements, especially to the significant post-announcement price decline. The post-announcement price decline is stronger if an announcement is made at the end of earnings season (Regression (3)). The regression coefficient of 0.0047 is statistically significant at 5% level. The post-announcement price decline is the most pronounced if an end-of-earnings-season announcement is a delayed announcement (Regression (4)). Similar results apply to immediate price reaction (Regressions (1) and (2)). The stronger negative price reaction is mainly due to penalty on delayed bad news announcement. After the indicator of strategic timing is added to regression, the explanatory power of timing indicator becomes insignificant.

CONCLUSION

This study investigates stock price discovery in a unique setting: over a time window called "earnings season" when a cluster of corporate earnings announcements arrive the market and complicate the information environment. Results in this study show that the immediate price reaction to earnings news and post-announcement price drift are more favorable if a news announcement is released at the beginning of earnings season rather than at the end of earnings season ("timing effect"). Specifically, price increase on and after earnings announcement date is significantly more positive for good news announced at the beginning of earnings season, while bad news announced at the end of earnings season is associated with the most pronounced price decline on and after earnings announcement date. Two possible explanations for the documented timing effect are explored: industry earnings news transfer and market penalty on delayed news announcement. The timing effect associated with positive earnings news announcement is consistent with information transfer theory. Investors extrapolate from the earnings announcements by competing firms in the same industry to update their expectations of to-be-released earnings news. The stock price of companies report at the end of earnings season shows a pre-announcement price increase, which explains the weaker price reaction to earning announcement and post-announcement price drift. The timing effect associated with negative earnings news announcements is mainly due to market penalty on delayed bad

news announcement. Announcements made at the end of earnings season that are delayed have the most significant price decline on and after earnings announcement date. In comparison, earlier-than-expected bad news announcements have the smallest price decline on earnings announcement date. In addition, these accelerated announcers do not significantly underperform their size-B/M matching portfolios.

After controlling for the impact of strategic delay of bad news announcement, the timing effect still exists. End-of-earnings-season on-time announcements are accompanied by significant post-announcement price decline, while stocks of on-time announcements made at the beginning of earnings season do not significantly underperform. This suggests that investors' cognitive bias plays an important role in stock price discovery process. It appears that investors perceive the timing of announcement as an indicator of manipulated or poor quality earnings news, although the timing of announcement may be merely due to a firm's accounting complexity that calls for more time to prepare and release earnings results.

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BIOGRAPHY

Dr. Qi Sun is an assistant professor of Finance at California State University San Marcos. She can be reached at College of Business Administration, California State University San Marcos, 333 South Twin Oaks Valley Rd., San Marcos, CA 92096. Email: qsun@csusm.edu