

Information content of Quarterly Earnings Announcements revisited

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One major objective of earnings numbers is to provide decision-relevant information to users of financial statements that include, among other groups, capital market participants. However, the debate over whether earnings reports contain useful information to these groups has been, and still is, a controversial issue. For instance, Ball and Brown (1968) provided an early analysis of stock market response to published financial data. Their study supported the efficient market hypothesis (EMH) and indicated that subsequent to earnings announcements, no abnormal return to securities in their sample could be made. A similar conclusion was also obtained by Benston (1973). He argued that studies relating published accounting statement data with stock prices lead to the conclusion that the data either are not useful or have been fully impounded in stock prices before they are published.

On the other hand, Jones and Litzenberger [1970], Joy *et al.* [1977], and Brown [1978], among others, have presented contrary evidence to that obtained by Ball and Brown. Jones and Litzenberger found some abnormal returns from purchasing securities whose actual and expected earnings per share (EPS) differed. Joy *et al.* concluded that stock price adjustments to the information contained in unexpected earnings reports are gradual rather than instantaneous. Accordingly, above average risk adjusted rates of return could be obtained based on an evaluation of earnings information. More recently, Brown [1978] also concluded that market inefficiency existed for a sample of securities over the time period considered.

These conflicting results provide the basis for further investigation into the informa-

tion content of earnings reports. Furthermore, this study was also motivated by two other aspects: First, since most prior accounting and finance research has been largely concerned with annual earnings numbers, quarterly earnings series may provide a more appropriate data base for further empirical investigation into the issue of usefulness of earnings reports to market participants. Second, a number of methodological and data problems existed in most of the previous studies. The prior studies employed relatively small sample sizes; used only NYSE firms which are relatively large in size;¹ and utilized a relatively long-term holding period which might fail to reveal the security price variability that could have existed immediately surrounding the announcement date.

The main purposes of this study are twofold. First, the study examines the information content of quarterly earnings announcements. Our objective here is to determine the usefulness of quarterly earnings reports to security market participants. Second, the study investigates whether the market evaluates third quarter earnings differentially from first and second quarter earnings. Our objective here is to determine whether the market evaluates each quarter report independently or as an integral part of the annual results. If no significant difference in market response is found between first, second and third quarter reports, then it will be concluded that the market evaluates each quarter report independently from the final results of the year. On the other hand, if third

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¹ Several previous studies have acknowledged this potential problem. Beaver (1968), for example, indicates that the effect of large firms would tend to include a bias against earnings reports because the large firms are more generally associated with a greater flow of additional information than smaller firms.

quarter reports are found to have more information content than either first or second quarter reports, it will be concluded that the market evaluates quarterly reports as an integral part of the final results. An additional contribution of this study lies in its attempt to employ a short-term holding return methodology (daily returns) and a relatively large sample selected from securities listed on both the New York Stock Exchange (NYSE) and American Stock Exchange (AMSE).

In the following section, the sample selection procedures and the information content measures are discussed. Next, the results of the study are reported. In the final section, the study is summarized, findings are discussed, and implications drawn.

METHODOLOGY

Sample Design

Seven selection criteria were used in the selection of the sample firms. They are as follows: (1) the firm must be a member of either NYSE or AMSE; (2) quarterly earnings data must be available on quarterly industrial COMPUSTAT tape; (3) daily rates of return for 1977-1978 period must be available on the tapes constructed by the Center for Research in Security Prices (CRSP) at the University of Chicago; (4) the firm must be a member of an industry with at least twenty firm members as classified by Standard Industry Classification (SIC) two-digit code; (5) quarterly earnings announcements for the 1977-1978 period must be reported in the *Wall Street Journal*; (6) the fiscal year must end on December 31; and (7) no dividends, stock split or other major news announcement was made during the test period. All firms meeting these selection criteria were included in the current analysis.

The justification for the first criterion is to have firms from both exchange markets. Over-The-Counter (OTC) firms were not included because there are no daily security data available for these firms on the CRSP tape. Criteria 2, 3 and 4 were imposed to obtain a sufficient data base needed for the analysis. Criterion 5 provides a means of identifying when the quarterly earnings

number first became publicly available. Although this number may have been released later through alternative sources, it has been generally accepted that one of the first releases which provides quick and thorough dissemination of the data is the *Wall Street Journal*. Criterion 6 was included to ensure that the price-earnings (P/E) ratio is measured on a similar basis and to avoid potential problems resulting from earnings covering different time spans.² Criterion 7 was imposed to isolate the effect of other significant events.³

Applying these selection criteria, the screening process resulted in a total sample of 319 firms. Of these, 227 (71 percent) were NYSE firms, and 92 (29 percent) were AMSE firms. The sample firms covered ten major industries as classified by the 2-digit SIC. A total of 1657 quarterly earnings announcements were made by the selected firms during a 1978-79 period. To isolate the effect of the year-end results, only the first three quarters of each year were utilized in this analysis. Table I shows the classification of the sample by industry and stock market, while Table II segregates the earnings announcements by fiscal year and quarter number.

Analysis and Testing Procedures

The residual analysis technique was employed in this study. Reviews of the efficient market literature and the resulting models may be found in Fama [1970], Beaver [1972], and Kaplan [1975], among others. Specifically, the model employed in the current study is the familiar market model:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + U_{jt} \quad (1)$$

where,

$$E(U_{jt}) = 0;$$

$$S(R_{mt}, U_{jt}) = 0;$$

² This study is a part of a larger investigation into the usefulness of quarterly earnings and the effect of corporate characteristics. Among the characteristics investigated was the P/E ratio.

³ Prior research has shown that announcements of either stock splits or dividends may have information content. (See Fama, *et al.* (1969) and Pettit (1972).

$$S(U_{jt}, U_{it}) = 0 \text{ for } j \neq i \\ S^2 \text{ for } j = i$$

and

$$R_{jt} = (P_t + D_t - P_{t-1})/P_{t-1}$$

$$Rm_t = SP_t/SP_{t-1}$$

 P_t = closing price for security j in day t ,

 D_t = dividends paid in day t ,

 SP_t = closing price for Standard and Poor Index in day t

$$U_{jt} = R_{jt} - \alpha_j - \beta_j Rm_t \quad (2)$$

Table 1
CLASSIFICATION OF THE SAMPLE FIRMS BY INDUSTRY

2-digit SIC Code	Industry	No. NYSE Firms	No. AMEX Firms	Total	Percent	Cumulative Percent
10	Metal Mining	11	11	22	7	7
13	Oil & Gas Extraction	5	20	25	8	15
28	Chemical & Allied Products	31	10	41	13	28
32	Stone, Clay and Glass Products	18	2	20	6	34
33	Primary Metal Industry	16	6	22	7	41
34	Fabricated Metal Products	13	13	26	8	49
35	Machinery, Except Electronic Machinery	24	13	37	12	61
36	Electrical and Electronic Machines	21	13	34	11	72
49	Electric & Gas Services	63	2	65	20	92
60	Banking	25	2	27	8	100
Total		227	92	319		
Percent		71%	29%	100%		

Table 2
CLASSIFICATION OF EARNINGS ANNOUNCEMENTS BY QUARTER

Quarter	1977	1978	Total	Percent	Cumulative Percent
First Quarter	267	254	521	31	31
Second Quarter	228	271	559	34	65
Third Quarter	300	277	577	35	100
Total	855	802	1657		

U_{jt} represents return residuals of security j in day t during the report period. The parameters α_j and β_j were estimated using the market model (equation 1) during the nonreporting period of 50 trading days which immediately preceded the reporting period. The analysis (report) period was determined to be 21 trading days, ten trading days prior

to the earnings announcement and ten trading days subsequent to the announcement day ($t = -10$ to $t = +10$). Therefore, the nonreporting period is the time period from $t = -60$ to $t = -11$.

The form of the market model (equation 1) was chosen for several reasons. It has enjoyed widespread use and therefore makes

the results of this study more comparable to the results of prior research studies. Additionally, it has been shown by Collins and McKeown [1979] that this form of the market model is relatively free of specification errors.

To determine the information content of quarterly earnings announcements, a test used by Beaver [1968], Grant [1980] and Oppong [1980] was also employed here. Simply, this test implies that if

$$\bar{U} > 1$$

earnings reports contain new information to security market participants; where

$$\begin{aligned} t &= +10 \\ \bar{U} &= \sum_{t=-10}^{t=+10} U_{jt}/N \\ t &= -10 \end{aligned}$$

N = the number of announcements made in day t

$$U_{jt} = U_{jt}^2 / S^2(U_j)$$

where

U_{jt}^2 = squared residuals of security j in day t during the report period as calculated in equation 2, and

$S^2(U_j)$ = the variance of residuals (U_{jt}) of security j during the nonreporting period as calculated in equation 1.

The results of this test are reported in the next section.

To determine whether the market evaluates third quarter earnings announcements differentially from first and second quarter announcements, the Analysis of Variances (ANOVA) technique was employed.⁴ The dependent variable is the cumulative average residual (CAR), while the independent variable is the relative quarter number (first, second, or third). The CAR's were calculated as follows:

$$CAR = \frac{1}{N} \sum_{t=-10}^T \sum_{j=1}^N U_{jt}$$

⁴ An alternative test that could have been used is the T-statistic test to compare CAR's of different quarter.

where

U_{jt} are residuals as calculated in equation 2 and N is the number of firms in each category. Employing the above methodology, the following two hypothesis (stated in the null form) were tested:

H_{01} : there is no significant difference in price residuals between the report period and the nonreporting period. Notationally,

$$U_{jt}^2 / S^2(U_j) - 1 > S.L.$$

where

S.L. is the significance level.

H_{02} : there is no significant difference in security price movements during the report period between first, second and third quarters. Symbolically,

$$CAR_{q1} = CAR_{q2} = CAR_{q3}$$

RESULTS

Results of the Information Content Test

Summary statistics on the information content measures for the sample firms for each of the 21 trading days in the report period are presented in Table 3 and by Figure 1. Analysis of these results shows that quarterly earnings announcements possess new information to security market participants. The mean of U_t measures ranges from 1.15 in day $t-9$ to 2.40 in day $t-1$. It also reveals that the mean value of the information content measure, U_t , is statistically significant for all values of t ($t = -10$ to $t = +10$) at the .0001 level of significance. Accordingly, the null hypothesis that the variability of price residuals during the report period should not be different from that observed for the nonreport period is rejected.

Based on these findings, the following remarks could be made:

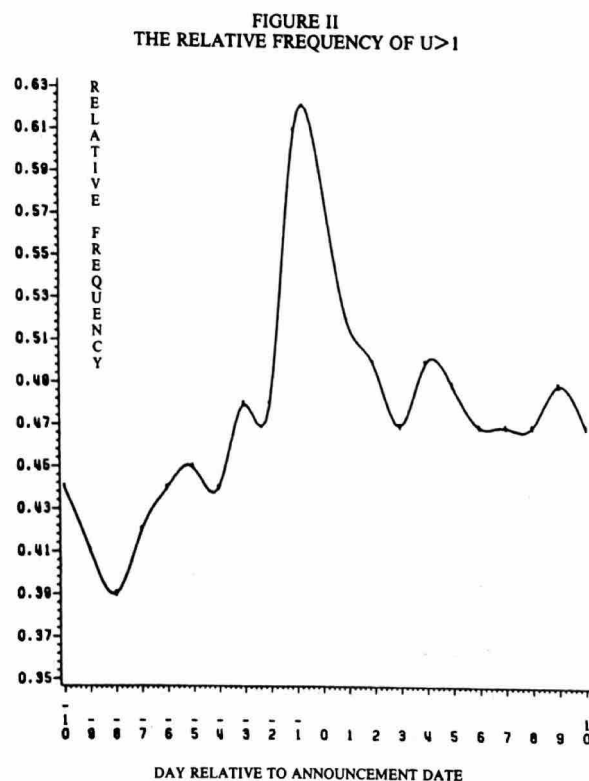
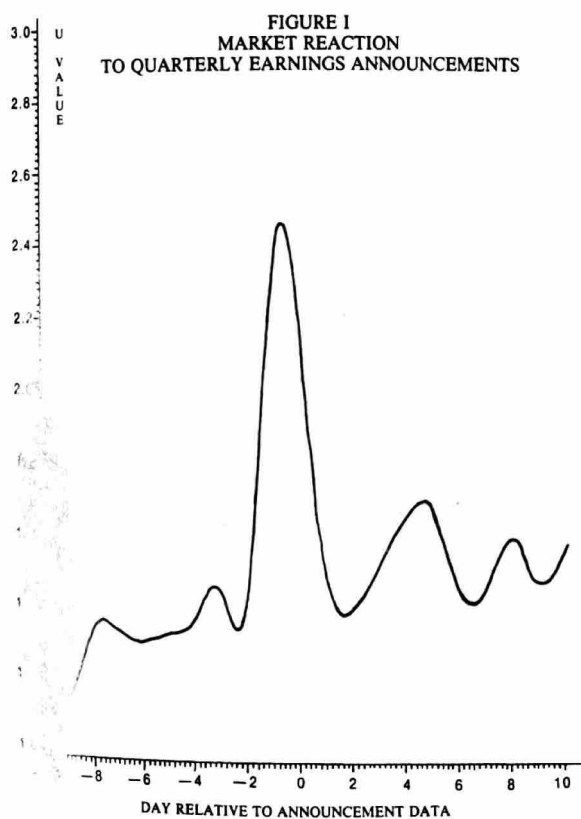
(1) The mean value of the information content measures, U_t , on day $t-1$ is slightly higher than that of the announcement day or $t = 0$. The same conclusion could also be obtained from Figure 2 which presents the relative frequency of $U > 1$ during the report period. These findings imply that the earnings information may be used by market participants one day prior to its publication in the *Wall Street Journal*.

TABLE 3
SUMMARY STATISTICS ON INFORMATION CONTENT MEASURES (U)
FOR THE TOTAL SAMPLE

Day in Report Period	Mean	Standard Deviation	t-value to test* Mean = 0	t-value to test** $U^2/S^2 = 1$	Level of Significance
-10	1.30	3.30	15.75	3.52	.0001
-9	1.15	2.30	20.02	2.62	.009
-8	1.34	4.19	12.79	2.98	.003
-7	1.34	3.60	14.95	3.77	.0001
-6	1.31	2.96	17.77	3.90	.0001
-5	1.33	3.21	16.54	3.70	.0001
-4	1.37	2.96	18.59	4.34	.0001
-3	1.46	4.21	13.91	4.21	.0001
-2	1.44	3.09	18.61	5.19	.0001
-1	2.40	6.21	15.48	8.37	.0001
0	2.12	4.35	19.52	9.48	.0001
1	1.50	2.95	20.45	6.27	.0001
2	1.40	2.83	19.83	4.93	.0001
3	1.53	3.73	16.41	4.94	.0001
4	1.66	3.93	16.85	5.64	.0001
5	1.68	4.47	15.05	5.29	.0001
6	1.46	3.69	15.88	4.26	.0001
7	1.46	3.20	18.20	4.84	.0001
8	1.60	4.55	14.07	4.87	.0001
9	1.48	3.37	17.55	5.30	.0001
10	1.57	4.13	15.20	5.18	.0001

* t-statistic is significant at .0001 for each day.

** This test was designed to test hypothesis 1.



Since earnings announcements are usually made by corporate executives one day prior to the publication in the *Wall Street Journal*, it seems that investors and other groups may react in the same day in which the announcements are made. Certainly, had weekly or monthly observations been used, as opposed to daily observations, the results would have not shown exactly when investors reacted to the earnings announcements. They would only show that there was a market reaction to the announcement in the report week or month.

(2) The last two columns of Table IV present the results of a test designed to test the hypothesis that there is no significant difference in price variations between the report period and the control (nonreport) period. Notice that the difference in price variations between these two periods was found statistically significant during each trading day of the test period (see column 5). These results suggest that the new information conveyed by the quarterly earnings announcements was impounded in security prices gradually rather than instantaneously. In fact, even at the end of the test period ($t = +10$), the information had not fully been considered. This finding implies that it is possible to realize abnormal returns by acting on the earnings information. (Notice that transaction costs are not considered here). These results are consistent with previous findings by Joy *et al.* [1977] and Brown [1978] who investi-

gated the properties of quarterly earnings reports.

(3) Comparing the results reported in Table 3 and Figure 1 with previous studies which examined annual earnings announcements and employed similar information content measures, it seems that quarterly earnings reports possess more information content than those of annual reports, except for the OTC firms which were not included in this study. For instance, the mean value of U_t in the announcement week was 1.67 in the Beaver [1968] study, 1.33 in the Oppong [1980] study, and 1.28 and 2.59 for NYSE firms and OTC firms, respectively, in the Grant [1980] study. However, since these three studies employed weekly data, this fact might have moderated their results.

Results of the Effect of Quarter Number Test

Table 4 presents the ANOVA results of testing whether the market evaluates third quarter earnings differentially from first and second quarter earnings. Based on these results, the null hypothesis that there is no significant difference in market response to earnings reports between first, second and third quarter is rejected at .0001 level of significance. These results, however, do not reveal how the market evaluates each quarter. In other words, based on these results, it cannot be determined which quarter possesses more information content than the others.

TABLE 4
ANOVA RESULTS FOR THE EFFECT OF QUARTER NUMBER

Factor	Degrees of Freedom	Sum of Squares	F.Value	Level of Significance
Quarter	2	.28723	12.26	.0001

The case of differential reaction can perhaps be clarified by a simpler and more conventional approach to research in security prices. Table 5 presents the measure, U_t , for each quarter. Figure 3 presents this table graphically. Analysis of these results reveals that the earnings announcements of the third quarter possess more information than either first or second quarter. The mean value of

the information content measures, U_t , on the announcement day for quarters 1, 2 and 3 are 1.64, 1.72 and 2.94, respectively. Notice that the mean value of U_t in day $t-1$ is greater than the mean value of U_t in day $t=0$ which confirms the previous finding of this study concerning when the magnitude of market response to earnings announcements reaches the highest possible level.

SUMMARY AND IMPLICATIONS

The objectives of this study were (1) to examine the information content of quarterly earnings announcements, and (2) to determine whether the market evaluates third quarter earnings reports differently from first and second quarter earnings. With respect to the first issue, our analysis supports the conclusion that quarterly earnings reports possess new information to security

market participants. In fact, quarterly reports contain more information content than annual earnings reports. This conclusion is consistent with previous findings by Ball and Brown (1968). They reported that the annual income report does not rate highly as a timely medium, since most of its content (about 85 to 90 percent) is captured by more prompt media which perhaps include interim reports.

With respect to the second issue, the ma-

TABLE 5
SUMMARY STATISTICS ON THE IMPACT OF QUARTER NUMBER

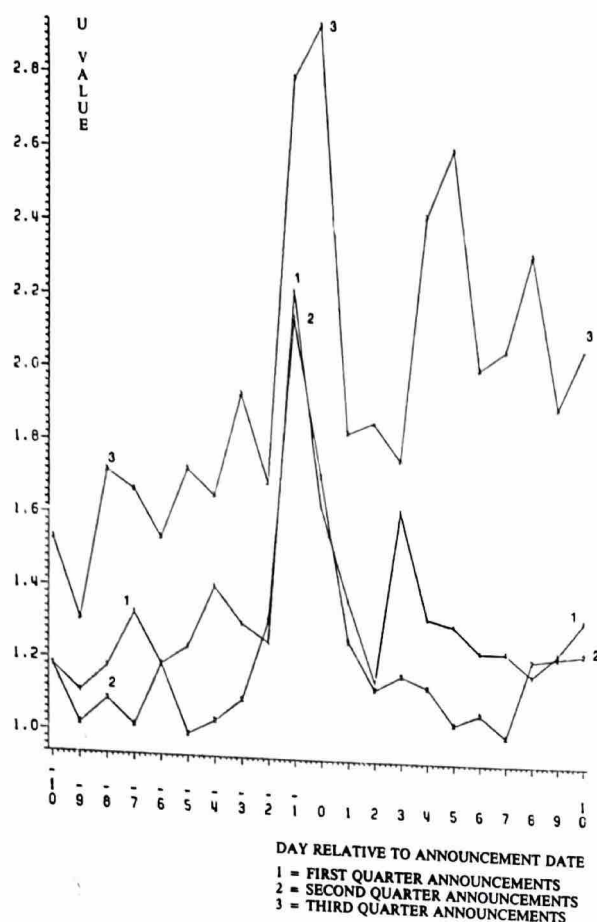
Day in Report Period	Mean	First Quarter Standard Deviation	t-value	Mean	Second Quarter Standard Deviation	t-value	Mean	Third Quarter Standard Deviation	t-value
-10	1.18	2.09	12.55	1.18	3.55	7.79	1.53	3.89	9.26
-9	1.11	2.07	12.00	1.02	1.95	12.23	1.31	2.76	11.22
-8	1.18	3.08	8.57	1.09	2.72	9.41	1.73	5.88	6.90
-7	1.33	3.14	9.49	1.02	1.99	11.95	1.67	4.92	7.00
-6	1.19	2.39	11.07	1.19	3.08	9.03	1.54	3.27	11.17
-5	1.24	2.20	12.55	1.00	2.07	11.22	1.73	4.56	8.94
-4	1.41	3.07	10.26	1.04	1.93	12.64	1.66	3.58	10.95
-3	1.31	3.16	9.30	1.10	2.02	12.79	1.94	6.13	7.47
-2	1.26	2.73	10.35	1.32	2.57	12.05	1.70	3.77	10.63
-1	2.22	6.19	8.06	2.15	5.33	9.42	2.80	6.97	9.48
0	1.64	3.45	10.61	1.72	2.91	13.81	2.94	5.87	11.85
1	1.38	2.34	13.21	1.27	2.63	11.31	1.84	3.62	11.99
2	1.15	1.80	14.39	1.14	2.16	12.36	1.87	3.90	11.33
3	1.63	5.01	7.29	1.18	2.47	11.12	1.77	3.35	12.50
4	1.34	2.73	11.00	1.15	2.32	11.56	2.43	5.61	10.21
5	1.32	3.09	9.57	1.05	1.61	15.29	2.61	6.70	9.19
6	1.25	3.65	7.67	1.08	2.03	12.47	2.02	4.76	10.03
7	1.25	2.75	10.13	1.02	1.95	12.19	2.07	4.29	11.41
8	1.19	3.07	8.64	1.23	3.72	7.71	2.33	6.05	9.07
9	1.25	2.26	12.34	1.24	3.02	9.58	1.92	4.35	10.42
10	1.34	3.27	9.13	1.25	3.18	9.18	2.08	5.40	9.11

Amplitude of market response to third quarter announcements was found to be greater than the market response to either first or second quarter. Apparently, this conclusion is consistent with the current generally accepted accounting principle that interim reports should be viewed as an integral part of the annual period. Third quarter reports provide more information toward reducing the uncertainty regarding the final results of the year than either first or second quarters.

These results have, at least, two major implications. First, since quarterly earnings reports are found to be a major source of

information to security market participants, interim reporting improvements may be needed to increase reliability and, accordingly, usefulness. Such improvements may be achieved through applying reporting standards similar to those used for the annual reports. Audits by a Certified Public Accountant may also be a needed improvement. Second, since different quarter reports contain different amounts of information, care must be exercised in designing and interpreting the results of studies which evaluate the information content of quarterly earnings reports.

FIGURE III
THE QUARTER NO. EFFECT ON MARKET RESPONSE



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