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Timeliness of Annual Earnings Announcements: Some Empirical Evidence

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ABSTRACT: Timeliness of annual reports is an important determinant of their usefulness. This study examines several aspects of the timeliness of earnings announcements which have implications for regulatory actions as well as for research design. The results show a considerable shortening of the reporting lag over the years. This implies that the assumption conveniently made in many "event studies" that the announcement week or month is fixed over the years is inappropriate and tends to weaken the power of the tests. The reporting lag of individual companies appears to be more related to intra-industry patterns and tradition than to company attributes. The ability of most companies to report well ahead of the filing deadline coupled with the finding that bad news tends to be delayed might be considered in assessing the adequacy of the length of the current filing period. The price reaction to the disclosure of early earnings announcements was significantly more pronounced than the reaction to late announcements suggesting a decrease in the information content as the reporting lag increases.

Introduction

The need for timeliness in financial reporting is recognized by both the accounting profession and the SEC. Statement No. 4 of the Accounting Principles Board [1970] specifies timeliness as one of the objectives of accounting. The importance assigned by the profession to timeliness is manifested also by the sense of urgency that makes accountants work a significant amount of overtime to complete annual reports. The SEC explicitly requires that the annual report (the 10-K form) be filed within 90 days following the end of the fiscal year. While the annual report is not the only source of information, other sources might be more costly to the user and perhaps less reliable.

Feltham [1968, p. 692] points to two important elements of timeliness: "reporting delay" and "reporting interval." While numerous studies have focused on the usefulness of annual reports and some have examined the added benefits of the more frequent quarterly reports, only limited research on the phenomenon of reporting lags has been conducted. Delay in releasing financial statements is

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likely to increase the level of uncertainty associated with decisions for which the financial statements provide information. As a result, decisions might be nonoptimal or be delayed. Beaver [1968, p. 74] provides empirical evidence on the information content of annual earnings announcements and suggests that "investors may postpone their purchases and sales of the security until the earnings report is released."

A few studies concerning the timeliness of the annual report appear in the literature. Dyer and McHugh [1975] report an increase in the reporting lags of Australian companies during the period 1965 to 1971. They found some negative association between reporting lag and company size. This finding for Australian companies is reported also in a recent study by Davies and Whittred [1980]. Similar results for New Zealand are reported by Courtis [1976]. While Dyer and McHugh did not find any meaningful relationship between reporting lag and level of profitability, Courtis was able to discern an inverse relationship which he described nonetheless as tentative and dependent upon the profitability measure used.

The objectives of this paper are to present evidence on the timeliness of annual earnings announcements in the U.S., to analyze its possible determinants and to examine the relationship between the information content of the accounting report and its timeliness. The evidence is important for regulatory purposes: if almost all companies are capable of and are actually issuing their statements within a much shorter period, the 90-day requirement might be too loose. Further, evidence on judicious timing of the annual announcement (e.g., delaying bad news) might indicate an abuse of the provision and may point to a need to reexamine the regulations concerning the timing of the annual report.

The finding of an improvement in the timeliness of annual reports over the years is of importance to researchers. If such a trend exists, studies that measure market reaction to earnings announcements should carefully consider the assumption of a fixed arbitrary announcement date through the years (see, for instance, the assumption made by Beaver and Dukes [1972] and by Basu [1977; 1978]. Moreover, in a recent study, Brown and Warner [1980] demonstrate that, in "event studies," the power of the tests for abnormal performance falls off dramatically when the research is unable to identify the specific time of the event. Moreover, the accurate determination of the event date appears in general to be more important to the overall power of the tests than refinements in the valuation models or improvements in the estimation methods. If, in addition, the intensity of market reaction to earnings announcements is a function of their timeliness, any measure of reaction (e.g., abnormal returns), estimated from observations pooled across years may be biased in an unknown direction, if the timeliness of the tested announcements is not factored into the analysis. This pooling across years is often performed in "information content" studies (see, for example, Basu [1977; 1978]).

The possible deterioration in the information content of annual reports as the reporting delay increases might point to the presence of effective (and plausibly more expensive) alternative sources of information or to the prevalence of leaks and exploitation of inside information. To the extent that these sources are costlier than an improvement in the timeliness of accounting information, the existence of such a phenomenon would further underscore the importance of timeliness.

The evidence presented in this paper

reveals a steady decline in the reporting delay over most of the 15-year period, 1960–1974. The paper analyzes the relationship between timeliness of the annual report, its content, and certain company attributes. The results show a high degree of regularity in the order in which companies announce their earnings within their industry.

The findings point to a relationship between the reporting delay and the content of the report. Specifically, announcements containing bad news tend to be delayed. Investigation of the relationship between company characteristics and timeliness indicates that size is inversely related and complexity of the audit is directly related to the reporting delay. However, the explanatory power of all of these variables is small.

The results of the market tests suggest that there is a significant diminution in the information content of annual reports when the reporting lag is unusually long. Thus, timeliness appears to be a nontrivial element in assessing the impact of financial statements on investors expectations. There are also some indications that the flow of alternative sources of information about firms might not be uniform over time.

Methodology and Data

Four important events might constitute a public release of annual accounting information by the company. They are the release of

(a) management estimate of annual earnings, made after year-end.
(b) preliminary earnings figure released by the corporation prior to auditor's certification;
(c) abbreviated audited annual report which typically contains sales, cost of goods sold, net income and earnings per share figures. These figures are published in the Earnings Digest of *The Wall Street Journal*.
(d) full annual report including all of the financial statements and notes.

The frequency of appearance of either the management estimate or corporation release is low. These types of information were available in only four percent of the cases (company/years). For the bulk of the cases the first release to the public concerning the annual result was in the form of an abbreviated audited annual report. Accordingly, we used this release date ((c) above) for most parts of the study.[1]

The survey period was selected as the 15 years from 1960 to 1974. The company sample was collected from the primary COMPUSTAT file of industrial corporations. All industries (four-digit classification) with at least six companies that satisfy all of the following criteria were selected: (1) New York Stock Exchange listing, (2) fiscal year ending December 31, and (3) availability of dates of annual earnings announcements for at least three out of the 15 years. The sample contains 210 companies in 25 industries.

Dates of annual earnings announcement were collected from *The Wall Street Journal Index*. The total number of observations (company/years) is 2,836 representing an average of 13.5 annual announcement dates (out of 15) for each company. For 130 companies, the announcement dates are available for all 15 years. In addition, for 121 cases (com-

[1] Admittedly, the exclusion of those few cases in which either management estimate or unaudited figures existed might have introduced a bias. This is particularly true if the availability of this information is not independent of other factors (such as corporation attributes or the content of the report) whose effect on timeliness is being explored. However, we conducted tests which indicated that no such bias exists. These tests are reported later.

pany/years) in the sample, either type (a) or (b) announcements were made and were reported in *The Wall Street Journal Index*. These cases do not appear to concentrate in any year, industry, or company (see further discussion in the Empirical Results section). Accounting data were retrieved from the COMPUSTAT file, and stock return were derived from the CRSP tape.

Five aspects of timeliness are investigated in the paper: the trend in reporting delay over the years, the pattern of announcements within industries, the relationship between reporting delay and the content of the report, the association between the reporting delay and company attributes, and the relationship between timeliness and the information content of the financial statements. The methodology employed in the examination of each of these aspects is detailed below.

Trend in Reporting Lag and Pattern Within Industry

The reporting delay is measured as the number of days between the end of the fiscal year and the announcement date. To assess the extent and significance of the phenomenon over time, a trend line based on the least-squares regression $L_{it}=\alpha_i+\beta_i t$ was fitted, where L_t is the time lag (or the average time lag) at year t and t is indexed (1960=1, . . . , 1974=15). The regression was computed for the entire sample, for each of the industries, and for those companies in the sample for which at least eight observations were available.

The order in which announcements of the annual results of companies in a given industry are made could be a function of the size, the complexity, the quality of the internal control system, and the administrative capability of the auditors of the respective companies in that industry. It could also reflect some tradition under which a certain company in the industry, perhaps the largest, reports its results first, followed by the other companies. Alternatively, the order of appearance in a given year might be a result of the work of some transitory effects rather than permanent characteristics of the firms.

To test whether a consistent order of announcements exists over the years within industries, the companies in each industry (four-digit classification) were ranked each year according to the order in which they announced their earnings. The existence of correlation between the ranks assigned to the same company in different years was tested using the nonparametric Friedman test for several related samples (see Conover [1971, pp. 265–270]). The findings reported in the next section show a rather stable order of appearance in most industries and a steady and significant improvement in timeliness over time for most companies. Deviations from these patterns do occur, of course, every year. In fact, the variance of the rank (within industry) assigned to an individual company as well as the variance of the reporting lag unexplained by the trend line are quite considerable.

Timeliness and the Content of the Report

One often-suggested explanation for an unusual advancement or postponement of the annual earnings announcements is the content of the report. It is suggested that earnings announcements containing good news might be advanced and, in particular, that earnings announcements containing bad news tend to be delayed. References to this popular belief are scattered in the accounting and finance literature (see, for example, Beaver [1968, p. 95]; Bates [1968, p. 72]; Dyer and McHugh [1975, p. 217]; Courtis [1976, p. 45]; and Watts [1978,

pp. 138–139]). Several possible reasons are offered for the delay in bad news: the natural desire of managers to defer any repercussions from shareholders, the wish to continue and complete current negotiations and contracts in the best possible light, and the time-consuming attempts which are presumably made to improve the reported results through accounting manipulations.

The issue as to whether bad news is delayed relative to good (or neutral) news was addressed by Dyer and McHugh [1975] and Courtis [1976] who investigated the timeliness of Australian and New Zealand corporate reporting, respectively. Both studies examined the relationship between profitability and reporting lag without finding significant (negative) correlation between them. Yet these studies used the profitability *level* rather than the direction and *change* in profitability as a measure of the news content of the financial report. Plausibly, the perception of good news and bad news by management and investors is associated with the *unanticipated* changes in earnings rather than with the average profitability level. The results of these studies cannot thus be considered as a valid refutation of the commonly held view that bad news is disclosed later than good news.

To test the hypothesis of the delay of bad news, the earnings of each company in every year should be defined as good or bad news (or, perhaps, neutral news), and the announcement lag should be classified as early or late (or, perhaps, on-time).

Three alternative expectation models for earnings were employed to define the news content of earnings announcements:

1. $E(I_t) = I_{t-1}$ (martingale)
2. $E(I_t) = I_{t-1} + c_t$ (martingale with drift)
3. $E(I_t)$ = S&P's forecast of earnings outstanding at the end of year t

where I_t is the value of the earnings variable in year t and c_t is the (arithmetic) average growth computed over the last five years. The earnings variable used for models 1 and 2 was the net income before extraordinary items, and the variable used for model 3 was the primary earnings per share (EPS) before extraordinary items.

Recent studies found the first two models to represent quite adequately the time-series behavior of earnings (see Albrecht, Lookabill, and McKeown [1977] and Watts and Leftwich [1977]). Furthermore, as a general representative firm model the martingale with drift was found to perform as well as the firm-specific Box-Jenkins models in describing the time series characteristics of annual earnings (see Albrecht, Lookabill, and McKeown [1977]).

The third model employs financial analysts' forecasts as a surrogate for market expectations. Financial analysts' forecasts were found to be at least as accurate as "naive" models in predicting next year's earnings (see Chrichfield, Dyckman, and Lakonishok [1978] and Brown and Rozeff [1978]). Other evidence (Givoly and Lakonishok [1979]) suggests that changes in market expectations are closely associated with revisions in analysts' forecasts. Given this evidence, the content of the earnings announcements as perceived by investors can be appropriately assessed by comparing the actual result with the forecasted numbers.

The source of financial analysts' forecasts was the S&P's Earnings Forecaster, a weekly publication which lists updated earnings forecasts made by about 70 analysts and brokerage houses for about 1,500 companies. S&P's forecasts were used because they are most widely

circulated and were available for almost all of the companies and years in the sample. S&P's predictions might not mirror the consensus even among analysts. However, the forecasts used here are those made toward the end of the year, and, as shown by Crichfield, Dyckman, and Lakonishok [1978] and by Elton, Gruber, and Guletkin [1981], the dispersion of forecasts of different analysts tend to decrease somewhat as the end of the year approaches.

Announcements were identified as "good news" or "bad news" according to two alternative partitions:

(1) "Good news" if $I_t > E(I_t)$
"Bad news" otherwise.
(2) "Good (bad) news" if the difference $I_t - E(I_t)$ is one of the m largest (smallest) on record for the respective company
Neutral news otherwise.

The latter partition is less sensitive to insignificant fluctuations of earnings which might not necessarily represent exceptionally "good" or "bad" results. This is true particularly when the selected m is small. Three values of m were used: 1, 3, and (when the number of observations allowed) 5.

Three alternative definitions of timeliness were employed. The first rested on the comparison between the announcement date for the year and the company's "normal" reporting lag; the second was based on the sequence in which the sample companies released their earnings for the year relative to the "normal" sequence of releases; the third definition was similar to the second except that the reference group was the (four-digit) industry in which the company operates.

Four alternative models were used to determine the "normal" or expected reporting lag under the first definition, and one model was used for that purpose under each of the other two definitions. The models are specified and the resultant classification of earnings announcements into "early" or "late" (and for some models also into "on time") is explained in the Appendix.

Company Attributes

The single most important determinant of the timeliness of the earnings annoucement is the length of the audit. Three main factors are likely to decide the total input required for an external audit: the size of the company, the quality of its internal control system, and the complexity of its operation. The last is presumably related to factors such as the composition of assets and liabilities, prevalence of business combinations and subsidiary-parent transactions, and the extent of the company's international operations. The duration of the audit is not a perfect measure for the auditor's input: obviously, more or less resources per time unit could be expended depending on the scale and difficulty of the assignment. Nonetheless, it is reasonable to expect some relationship between the above factors and the reporting lag. As discussed in the introduction, recent studies on Australia's and New Zealand's reporting practices did indeed find an association between company size and reporting lag.

An attempt is made here to estimate the association between the duration of the audit and the size and complexity of its operations. The duration of the audit was measured by the time lag from the end of the fiscal year to the date of the auditor's signature, which usually signifies the end of the field work. To insure compatibility, the explanatory variables were those selected by the previous studies. The variables may not result in a well-specified model, and in the absence of an established theory their selection is

being made on an *ad hoc* basis. Nonetheless, the variables included are those that, *a priori*, appear to be determinants of the audit length.

Volume of activity is cited by Mautz as one of the determinants of audit time over-runs [1954, p. 116]. At the same time, big corporations may be more closely watched by investors and therefore under greater pressure to release information on a timely basis. The log of the sales volume was used as a surrogate for size.

Two variables were used as a surrogate for complexity: sales growth in the recent past and the ratio of inventories to total assets. A big increase in the scale of the operation might indicate that some of the tests and examinations employed by the auditors in the past are no longer adequate in the current year, leading to a longer audit period. The second complexity variable is the relative size of the inventory. Inventory is commonly the single greatest current asset and is often the largest asset in the balance sheet. It is "another of the most important and most difficult verification problems" [Mautz, 1954, p. 211) and "the greatest difficulty to the auditor" in the attest function [Stettler, 1977, p. 245]. Thus, the ratio of inventory to assets might capture an important aspect of the difficulty level of the audit.

If audit assignments of larger scale do not attract a proportional amount of resources per period, the audit of larger or more complex companies is expected to result in a longer reporting lag. No such lag is expected if enough resources are assigned to the audit.

The following cross-section regression was used:

$$L_{it} = \rho_{0t} + \rho_{1t}S_{it} + \rho_{2t}(I/A)_{it} + \rho_{3t}(GS)_{it} + \sum_{i=4}^{5} \rho_{it}D_{it}$$

where L_{it} is the signature lag of company i (days) in year t, S is log (sales), I/A is the ratio of inventory to total assets, and GS is the (arithmetic) average growth rate of sales computed over the last five years. Two separate regressions were applied, one to each of the years 1973 and 1974. D_4 and D_5 are dummy variables designed to remove the transitory effect, if any, of the content of the earnings announcement on the audit duration ($D_1 = 1$ for good news, $D_2 = 1$ for bad news, and both are zero for neutral news; the martingale + drift model was used).

Timeliness and the Information Content of the Report

The annual report (audited or preliminary) is not the only source for, and clearly not the first indication of, the results for the past year. In addition to the information contained in the interim (unaudited) reports for the first three quarters, investors have a knowledge of the economic developments in the company and the market during the fourth quarter. Investors also receive analytical reports and earnings forecasts produced by financial analysts (and occasionally by management). As more and more companies in the same industry release their earnings figures, much of the uncertainty surrounding the yet-unannounced earnings of the remaining companies diminishes (for a recent evidence on this phenomenon, see [Foster, 1981]). Moreover, possible leaks of information by insiders may make the prediction of the forthcoming results more certain, rendering the official report of little value except as a final confirmation. While it is plausible that such a deterioration in the information value occurs when prolonged delays are experienced, it is questionable whether the process exists or is noticeable during the relatively short reporting lag period allowed by law (90 days).

To test the hypothesis that the reporting lag is associated with a decrease in information content, we examined the magnitude of price changes surrounding early and late announcements. Consistent with the semi-strong form of the efficient market hypothesis ([Fama, 1970]), price adjustments are perceived as an indication of a disclosure of new information. The extent to which an earnings announcement alters investors' beliefs (and induces price adjustments) is a function of (among other things) its newness—or the prior public nonavailability of its content. Presumably, as the reporting lag becomes longer, more of the content becomes, through various channels, publicly available.

The test design and measurement procedures used here rely on those which had been used by Beaver [1968] in his study on the information content of annual earnings announcements and which were later refined by Patell [1976]. Two portfolios of company/years were constructed—one representing early announcements and the other late announcements. We then examined the stock price behavior in each portfolio during a test period of 17 weeks centered on the announcement week.

For the purpose of this test, it is desirable that the selected timeliness definition be related to the amount of alternative information. That is, "late" announcements should be those expected to contain the least news due to the prior availability of information through other channels. The most intuitively appealing classification is apparently the one based simply on the chronological announcement date. Accordingly, the selection of early and late announcements to the respective portfolios was based on the chronological order of the announcements in the year (Model V in the Appendix). In addition, an alternative classification was based on the announcement date relative to some "norm" estimated from the past. If production of firm-specific information is intensified when the "due" period passes without an announcement, we would expect to find only a modest price reaction to overdue announcements. This classification gave rise to another pair of early/late portfolios: an announcement was defined as early/late if it was so classified by *both* the past order-within-industry and past mean-lag criteria (Models VI and III, respectively, in the Appendix).

To minimize the effect of other intervening variables which might confound the comparison between the price reaction to early and late announcements, inclusion in the portfolio was limited to those cases (company/years) in the sample that satisfied the following criteria: (1) no preliminary release of unaudited earnings or management forecast, (2) no dividend announcement during the announcement week, and (3) no stock split during the 17-week test period.

An undesirable yet unavoidable feature of the data is the pronounced clustering of announcements in certain days or weeks. As a result, a cross-section distribution of return-based variables cannot be regarded as consisting of independent observations due to the presence of contemporaneous cross-section dependence (see King [1966] and Meyers [1973]). To alleviate this problem, if not to remove it completely, each calendar week in each year was allowed to be represented *only once* in any two-portfolio (early/late) set.[2] This remedy had its "side-effect" of reducing the size of the portfolios constructed for the test.

[2] Some dependence among observations might still be present if the response time of some securities to market-wide effects is delayed by weeks. Such lags are discussed by Schwartz and Whitcomb [1977]. We tend to concur with their assessment that the phenomenon, attributed to thinness of trade, has only a marginal effect on the time-series of returns measured over intervals longer than a few days.

The market model of Sharpe [1964] and Lintner [1965] is used to eliminate market-wide elements of price changes and is given by

$$\tilde{R}_{i\tau} = \alpha_i + \beta_i \tilde{R}_{m\tau} + \varepsilon_{i\tau}$$

$i = 1, \ldots, N$, security index
$\tau = 1, \ldots, T$, week index, nonreport period.

where $\tilde{R}_{i\tau}$ is the rate of return of security i in week τ. R_m is the market rate of return. The market is represented by the equally-weighted index (including all distributions) of the NYSE and AMEX stocks.

The coefficients are estimated from observations in the nonreport period. The report period is defined as the 17-week period centered on the announcement week; the nonreport period extends over the 70 weeks comprising of the 35 weeks preceding and the 35 weeks following the report period.

The estimated coefficients are employed to form the prediction of $\tilde{R}_{it}$ and corresponding prediction errors during the report period. The prediction error is defined as

$$\tilde{\mu}_{it} = \tilde{R}_{it} - (\hat{\alpha}_i + \hat{\beta}_i \tilde{R}_{mt}) \quad t = -8, \ldots, +8.$$

To test the "information-content" hypothesis, certain statistics that are based on $\tilde{\mu}_{it}$, the deviations from the market model, are developed below. Note first that $\tilde{\mu}_{it}$, whose values are estimated from the nonreport periods, are not residuals in the strict ordinary least-squares (OLS) sense. Nonetheless, it will be assumed that the underlying assumptions of the OLS model concerning the residuals, as well as the assumption of their cross-sectional independence, hold during the nonreport (estimation) period. Under the assumptions of OLS, the standardized prediction error,

$$SPE_{it} = \frac{\mu_{it}}{\sigma_i \sqrt{C_{it}}} \sim N(0, 1),$$

where σ_i^2 is the variance of the error term (residual) of firm i during the estimation period. When σ_i is substituted in the above expression by its sample estimate, S_i, the resulting variable is distributed according to the t-distribution:

$$V_{it} = \frac{\mu_{it}}{S_i \sqrt{C_{it}}} \sim t(T-2)$$

where S_i^2 is the unbiased estimator of

$$\sigma^2 \cdot S_i^2 = \frac{1}{T-2} \sum_{\tau=1}^{T} \varepsilon_{i\tau}^2.$$

T is the number of weeks in the estimation period. For most firms the number is 70, but it may vary due to data availability. C_{it} is a correction factor which reflects the increase in variance due to prediction outside the estimation period.[3]

V_{it}^2 can be viewed as a measure of volatility of rates of return:

$$V_{it}^2 \sim F(1, T-2),$$

and

$$E(V_{it}^2) = \frac{T-2}{T-4} > 1.$$

To produce a more easily interpreted statistic and to account for the slight variation of T across firms, V_{it}^2 can be standardized to yield an expected value of 1:

$$U_{it} = V_{it}^2 \cdot \frac{T_i - 4}{T_i - 2}$$

with $E(U_{it}) = 1$ and

$$\text{Var}\,(U_{it}) = \frac{2(T_i - 3)}{T_i - 6}.$$

U_{it} is used in this study as a measure of

[3] $C_{it} = 1 + \frac{1}{T} + \frac{(R_{mt} - \bar{R}_m)^2}{\sum_{\tau=1}^{T} (R_{m\tau} - \bar{R}_m)^2}$; $\bar{R}_m = \frac{1}{T} \sum_{\tau=1}^{T} R_{m\tau}$. For further discussion, see Theil [1971, pp. 122–123]. As reported later, the value of C_{it} is invariably very close to 1.

TABLE 1

DISTRIBUTION OF REPORTING LAG FOR SELECTED YEARS
(Number of days from end of the year to the date of earnings announcement)

	1960	*1963*	*1966*	*1969*	*1972*	*1974*
Mean	63	56	46	44	41	41
First Quartile	47	36	29	29	29	29
Median	63	52	44	40	37	37
Third Quartile	81	75	58	55	52	51

volatility of rates of return (abstracted from market effects) in week t. A value significantly greater than 1 in the announcement week would imply the existence of information content. The higher the value, the greater is the information content. To test the significance of deviations of U_{it} from its theoretical mean, it is assumed that U_{it} are independent random variables and according to the Lindeberg Central Theorem,[4] the following normalized sum can now be constructed:

$$Z_t = \sum_{i=1}^{N} (U_{it} - 1) \Big/ \left[\sum_{i=1}^{N} \frac{2(T-3)}{(T_i - 6)} \right]^{1/2}.$$

where N is the number of cases in the portfolio. The sum approximates the unit normal distribution for large N[5] and can be used to test hypotheses on the size of the ratio U_{it}, which under the null hypothesis of non-content have an expected value of 1.

Since return data were available from July 1962, the above market tests could be performed only for the earnings announcements relating to the 13 fiscal years, 1962 to 1974.

EMPIRICAL RESULTS

a. *Trend in Reporting Lag*

Table 1 presents the distribution of the reporting lag of the companies in the sample. A continuous reduction in the time lag is evident. The mean lag decreased over the 15-year period from 63 days to only 41 days. In 1974, only 25 percent of the companies released their financial statements more than 51 days after the end of the year. In 1960, almost 75 percent of the companies published their statements after that date. The rate of decrease has slowed over the second part of the period, with most of the reduction in the time lag occurring over the first six years from 1960 to 1966. During that period, the mean lag was cut by 17 days. Over the period 1966 to 1972, the average lag was further reduced by five days, and no noticeable improvement was found for the period 1972 to 1974.

The regression results, reported in Table 2, indicate that the decline in the time lag was almost universal and significant, with 105 out of 130 companies and 21 out of 25 industries showing a significant (at the 5-percent significance level) negative slope coefficient.

Table 3 provides summary results of the regression for the total sample and for selected industries. The average annual improvement in the time lag was significant and at a rate of 1.8 days for the sample, with some industries showing considerably faster improvement. The values of the coefficients of determina-

[4] See Feller [1966, p. 256].

[5] Another condition that must be satisfied is that the T_i's will be fairly similar. In our sample, T_i ranges from 52 to 70. For almost all company/years, T_i is equal 70.

TABLE 2

DISTRIBUTION OF THE AVERAGE ANNUAL CHANGE IN REPORTING LAG
(The Slope Regression Coefficient) for Individual Companies and for Industries

		Number of Companies	*Number of Industries*
Average Decrease in Time Lag	Significant (5%)	105	21
	Insignificant	4	3
Average Increase in Time Lag	Significant (5%)	7	0
	Insignificant	14	1
Total Number of Cases		130	25

TABLE 3

AVERAGE REGRESSION STATISTICS FOR THE SAMPLE AND FOR SELECTED INDUSTRIES*

	α	β (*Annual Change in Reporting Lag*)	$t(\beta)$	R^2
Total Sample	60.8	−1.8	7.70	0.88
Paper and Allied Products	44.0	−1.2	5.94	0.53
Chemicals and Allied Products	58.8	−1.7	6.33	0.60
Drugs	55.2	−1.8	6.98	0.72
Petroleum Refining	66.4	−3.1	6.90	0.78
Metal Working Machinery	53.1	−0.5	3.31	0.17

* The industries selected are those with the highest representation in the sample.

tion (R^2) were relatively high (an average of 0.88 across companies and a median of 0.59 across industries).

The significant and persistent decline in the reporting lag is quite remarkable in light of the increase in the complexity of business in terms of operational diversification (e.g., mergers, acquisitions, international activities) and the new modes of financing (e.g., leases, joint ventures), and regarding the ever-increasing reporting requirements. The number of new SEC releases and accounting pronouncements (APB or FASB) could perhaps serve as a rough indication for the expansion and tightening of disclosure and reporting requirements. It is instructive to note that the number of authoritative pronouncements issued during the three years 1972 to 1974 (a total of 59) was equal to the total number issued in the preceding 12-year period. It might be hypothesized that it was this very factor which acted to hinder the pace of improvement in the reporting lag over the last few years.

The improved timeliness could possibly be attributed to several factors. One is the development of data processing devices and the increase in their use in operations and internal control systems. Inventories and monetary assets as well as production operations are monitored in most companies by computers. This results in a faster preparation of financial reports and, despite the extra skills required of the auditor, in a shorter audit period.

TABLE 4
DISTRIBUTION OF EARNINGS ANNOUNCEMENTS BY CONTENT AND TIMELINESS: CONTENT IS DEFINED RELATIVE TO EXPECTATIONS PRODUCED BY MARGINGALE WITH DRIFT
(good news and bad news are defined as the three best and the three worst annual results, respectively)

a. Timeliness is Defined Relative to Last Year

	Timeliness			
	Early (Three Earliest Years)	*On-Time*	*Late (Three Latest Years)*	*Total*
Content:				
Good News	126	264	117	507
Neutral News	163	396	159	718
Bad News	90	284	178	552
Total	379	944	454	1777

$\chi^2_4(3\times 3)=25.2$; critical values: 1% = 13.3, 5% = 9.5
$\chi^2_1(2\times 2)=17.4$; critical values: 1% = 6.6, 5% = 3.8

b. Timeliness is Based Each Year on the Chronological Order of the Announcements

	Timeliness			
	Early (First Quartile of the Sample)	*On-Time*	*Late (Fourth Quartile of the Sample)*	*Total*
Content:				
Good News	137	281	109	527
Neutral	203	373	161	737
Bad News	134	282	156	572
Total	474	936	426	1836

$\chi^2_4(3\times 3)=9.1$
$\chi^2_1(2\times 2)=4.8$

Specific data on the aggregate use of computers and software for accounting purposes by businesses is apparently unavailable. A survey of the ACT/Technology-Analysis Group (TAG), reported by Lecht [1977], revealed, however, that the most common uses of computers are for accounting and internal control purposes (70 percent and 50 percent of the computers are used for these purposes, respectively). Furthermore, the average cost of computation declined sharply from $1.26 per 100,000 computations in 1952 to $0.12 in 1964 and to $0.005 in 1977. These developments have undoubtedly facilitated internal and external audits.

Another factor that might contribute to the timeliness of financial statements is the possible increase in the auditor's involvement during the year, which is due, in part, to the preparation of quarterly reports by more companies. It is plausible that auditor involvement tends to increase as the reporting and disclosure requirements are extended and tightened.

Finally, it appears that the improve-

TABLE 5

DISTRIBUTION OF EARNINGS ANNOUNCEMENTS BY CONTENT AND TIMELINESS: CONTENT IS DEFINED RELATIVE TO FORECASTS MADE BY FINANCIAL ANALYSTS
(good news and bad news are defined as the three best and the three worst annual results, respectively)

a. Timeliness is Defined Relative to Last Year

	Timeliness			
	Early (Three Earliest Years)	*On-Time*	*Late (Three Latest Years)*	*Total*
Content:				
Good News	135	283	148	566
Neutral News	48	98	49	195
Bad News	117	271	182	570
Total	300	652	379	1331

$\chi^2_4(3\times 3)=6.5$
$\chi^2_1(2\times 2)=4.4$

b. Timeliness is Based Each Year on the Chronological Order of the Announcements

	Timeliness			
	Early (First Quartile of the Sample)	*On-Time*	*Late (Fourth Quartile of the Sample)*	*Total*
Content:				
Good News	154	297	137	588
Neutral	54	97	50	201
Bad News	135	293	162	590
Total	343	687	349	1379

$\chi^2_4(3\times 3)=3.9$
$\chi^2_1(2\times 2)=3.3$

ment in the timeliness of financial reports should not be attributed exclusively to technical or production aspects but also to the demand by the investment community. Seemingly, the increased awareness by investors of the potential value of accounting reports and their expressed concern over the reliability and relevance of accounting numbers not only prompted the response of regulatory and accounting policy-making bodies but also exerted some pressure on corporations to release their financial statements as early as possible.

b. *Chronological Order of Announcements, Within Industry*

The test results indicate that in most industries a significant regular pattern in the order of earnings announcements exists. The null hypothesis, that there is no consistent order over the years in earnings release dates of companies, was rejected for 21 of the 25 industries at the five-percent significance level.

A tentative examination of the "leaders" in each industry could not confirm the *a priori* assumption that

large companies announce their earnings first. The leader in each industry was defined as the company that was the first to announce its earnings in more years than any other company in that industry, given that this number of years exceeds six. As a result, there are some industries in which no leader could be identified. The null hypothesis that the size of the leader (the variable used here was sales for 1974) is not significantly larger than the size of the average company in the industry, could not be rejected for any industry at the five-percent significance level (using the *t* test).

c. *Timeliness and the Content of the Report*

Tables 4 and 5 provide results for two of the earnings expectation models in conjunction with two of the definitions of timeliness. The results indicate a nonrandom concentration of announcements in the Bad/Late cells.[6] Using the 2×2 contingency tables and the χ^2 test, the null hypothesis of no association between the timeliness and the content of the announcement could be rejected at least at the five-percent significance level for timeliness definitions (a) and (b) in Table 4, and for definition (a) in Table 5. The significance level of rejecting the null hypothesis is somewhat lower when the 3×3 contingency tables are considered. Examination of the contingency tables reveals that the main contributor to the significance of the result was the apparent tendency to delay bad news rather than the earlier-than-usual release of announcements containing good news.

Note that in the Tables only a nontrivial deviation from the "norm" leads to classification of an announcement as good/bad or as early/late. The frequency of rejection did not increase considerably when only extreme good or bad news (the best or the worst year for each company) were analyzed.[7] Consideration of other expectation models (for earnings and timeliness) and for other filters for the deviation from the norm led to essentially similar results.[8] The similarity between the results obtained under the industry-based timeliness definition (Model VI in the Appendix) and the other timeliness models implies that co-movement in the earnings of individual firms within an industry (i.e., between-industry differences) may not be sufficiently dominant to suppress differences between the earnings pattern of those firms.

The phenomenon of delayed bad news is significant but clearly not overwhelming: most of the bad news is still released either "on time" or even earlier than expected. By the same token, good news is very often announced later than usual. A related finding is that the lowest rate of rejections was obtained when the benchmark for timeliness was simply the

[6] The total number of observations in each table is smaller than the number of company/years in the sample for which the announcement date was available (2,836), due to the unavailability of earnings expectation data. In particular, data on financial analysts forecasts (Table 5) are unavailable for the years 1960–1966.

[7] This might be due to the fact that exceptional earnings are often a reflection of a single identifiable event such as a strike or a change in regulations. These events are often known to the public well before the official announcement of earnings, and, thus, their disclosure does not constitute good or bad news. Another explanation could be the possible inadequacy of the martingale models (and to the extent that they incorporate similar extrapolations—also of analysts' forecasts) to classify earnings signals in extreme years. There is some evidence that suggests that a mean-reverting process might better describe the time-series behavior of earnings around extreme years (see Brooks and Buckmaster [1976] and some indirect evidence in Beaver, Lambert, and Morse [1980]).

[8] When no filter was employed, the hypothesis of no association could be rejected at least at the 5 percent significance level for 67 percent of the 2×2 contingency tables. When only the three extreme cases of (separately) bad, good, early and late were considered, the frequency of rejection at the five percent level increased to 72 percent. Obviously, these statistics are not independent; still, they suggest that the findings concerning the delay of bad news are quite robust to alternative definitions of content and timeliness.

TABLE 6

COMPANY ATTRIBUTES AND TIMELINESS: SUMMARY OF THE CROSS-SECTION REGRESSION RESULTS

Year	Number of Observations	R^2	Durbin-Watson Statistics	*t* Values of the Slope Coefficients				
				Sales	Inventory Ratio	Sales Growth	D_1	D_2
1973	142	0.26	2.152	−0.848	2.123	0.757	−0.475	1.532
1974	149	0.19	1.972	−1.118	0.741	−0.065	−1.006	1.824

chronological order of the announcement in the sample. This might suggest that the variability of announcement dates among companies is determined to a large extent or perhaps primarily by factors other than the content of the report. Some of these factors are analyzed in the next section.

d. *Company Attributes and Timeliness*

The results for 1973 and 1974 are reported in Table 6. The correlation coefficients were typically below 0.20 and the highest correlation coefficient recorded (negative; between growth and inventory ratio, in 1973) was 0.46. No autocorrelation was apparently present in the data. The Durbin-Watson statistics were outside the respective critical areas (at five-percent significance level or above).

The findings indicate that size (as measured by sales) is inversely related to signature lag. Larger companies appear to report earlier than smaller companies, although the relationship is insignificant. This finding conforms to those reported by Dyer and McHugh [1975] and by Davies and Whittred [1980] for Australian companies (these authors used the book value of the assets as a surrogate for size). They explained the result by the greater resources of the large firm which enable it to "purchase less delay." In the United States, large corporations are usually audited by the big CPA firms that command necessary audit resources for timely reporting (see Schiff and Fried [1976]); likewise, big CPA firms deal primarily with big customers (see Simunic [1980]). Another plausible explanation is that larger companies are often those with widely held stock and, as such, are more susceptible to pressures from shareholders to be more timely.

One of the two complexity variables, Inventory to Total Assets is directly related to the time lag, with significant regression coefficients in 1973. The growth variable shows no consistent relation with the lag. The content of the news (good/bad) appears to be associated with the signature lag. In particular, reports that contain bad news are associated with a relatively longer audit period.

It should be noted that the regressions described above explain only a small portion of the total variation of the reporting lag across firms (R^2 of 0.26 and 0.19). This was also the finding of Dyer and McHugh [1975] and of Courtis [1976], who concluded that, while certain attributes are associated with reporting lags, they contain very little explanatory power. This result, coupled with the finding on the regularity in the order of appearance within industry, implies that tradition and randomness might be the major explanations of the average reporting delay.

TABLE 7

SUMMARY STATISTICS FOR THE MARKET MODEL IN THE ESTIMATION PERIOD

	Timeliness is defined according to chronological order of announcements (Model V in the Appendix)		*Timeliness is defined relative to past reporting patterns (Models III and VI in the Appendix)*	
	"Early" Portfolio	*"Late" Portfolio*	*"Early" Portfolio*	*"Late" Portfolio*
Number of Cases	40	69	50	53
β Distribution				
Mean	1.019	1.062	1.033	1.075
Q_1	0.813	0.684	0.587	0.775
Median	1.040	0.973	0.852	1.029
Q_3	1.185	1.528	1.193	1.279
R^2 Distribution				
Mean	0.306	0.228	0.262	0.248
Q_1	0.173	0.113	0.172	0.172
Median	0.312	0.207	0.221	0.254
Q_3	0.407	0.323	0.379	0.300
ρ-first order serial correlation				
Mean	−0.056	−0.093	−0.084	−0.079
Q_1	−0.166	−0.186	−0.191	−0.177
Median	−0.047	−0.101	−0.084	−0.048
Q_3	0.020	0.010	0.004	0.018
DW Statistic				
Mean	2.089	2.158	2.140	2.124
Q_1	1.939	1.962	1.938	1.927
Median	2.067	2.145	2.125	2.077
Q_3	2.317	2.362	2.378	2.345
C_0				
Mean	1.038	1.025	1.029	1.027
Q_1	1.017	1.016	1.017	1.016
Median	1.026	1.018	1.021	1.019
Q_3	1.040	1.026	1.031	1.027

e. *Timeliness and the Information Content of the Report*

Table 7 summarizes the regression results from the weekly return data over the estimation period. The size of the portfolio ranges from 40 to 64 companies. The main characteristics of the portfolios appear to be similar: The average value of the β is above, but very close to 1. The average value of R^2 for the weekly returns (which ranges between 0.228 to 0.306) is similar to the value reported by Beaver [1968], yet higher than those found by Kaplan and Roll [1972] and Patell [1976]. The differences might be due to the different survey periods and sample composition.[9]

The first-order serial correlation of the

[9] Another plausible explanation for the higher R^2 is that the systematic exclusion of report periods (by this study as well as by Beaver's) had the effect of removing from the estimation basis those periods which are characterized by more market-independent, firm-unique price fluctuations.

TABLE 8

INTENSITY OF PRICE MOVEMENTS IN THE PERIOD SURROUNDING EARLY AND LATE ANNOUNCEMENTS

	Timeliness is defined according to chronological order of announcements (Model V in the Appendix)				*Timeliness is defined relative to past reporting patterns (Models III and VI in the Appendix)*			
	"Early" Portfolio		*"Late" Portfolio*		*"Early" Portfolio*		*"Late" Portfolio*	
Week	$\bar{U}_t$	Z_t^*	$\bar{U}_t$	Z_t^*	$\bar{U}_t$	Z_t^*	$\bar{U}_t$	Z_t^*
−8	0.813	−0.921	0.932	−0.388	1.198	0.967	0.911	−0.397
−7	1.082	0.362	1.060	0.342	1.008	0.050	0.915	−0.428
−6	1.582	2.792	1.367	2.109	1.473	2.322	1.139	0.706
−5	1.170	0.955	0.784	−1.241	1.148	0.725	0.642	−1.817
−4	1.099	0.433	1.132	0.758	1.417	2.036	0.683	−1.602
−3	1.357	1.563	0.620	−2.181	1.592	2.893	0.617	−1.940
−2	1.494	2.157	1.011	0.068	1.427	2.086	0.574	−2.162
−1	1.444	1.940	1.243	1.397	1.285	1.393	1.079	0.401
0	2.068	4.667	1.819	4.700	1.634	3.098	0.966	−0.174
+1	1.066	0.288	0.911	−0.509	1.187	0.918	0.973	−0.139
+2	0.537	−2.020	0.851	−0.857	1.045	0.221	0.884	−0.585
+3	1.232	1.014	1.114	0.657	1.294	1.437	1.474	2.407
+4	1.250	1.096	1.813	4.667	0.604	−1.934	0.769	−1.169
+5	0.827	−0.754	1.168	0.964	0.976	−0.128	1.202	1.027
+6	0.659	−1.490	0.956	−0.253	0.897	−0.502	1.258	1.311
+7	0.765	−1.028	1.116	0.668	0.979	−0.102	1.066	0.311
+8	1.222	0.968	1.486	2.787	1.103	0.064	1.082	0.339

* As explained, the Z values represent the normalized deviations of U from its theoretical mean, 1. Thus, U values smaller than one correspond to negative Z values.

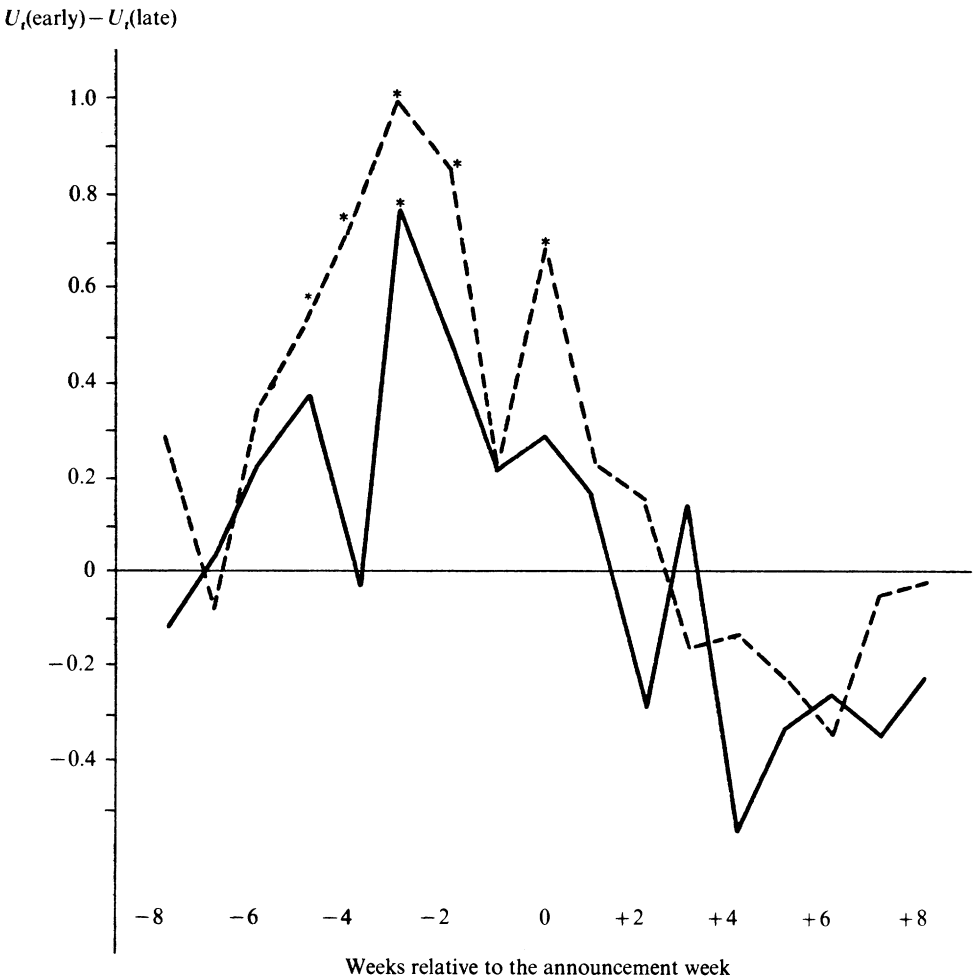
residuals (ρ), with an average varying from −0.056 to −0.093, conforms to the value reported by earlier studies. The effect of the variance adjustment in the announcement week (C_0) appears to be almost negligible (the values for other weeks in the report period are very close). A minute effect of the adjustment procedure is also reported by Patell [1976].

Table 8 provides the U mean values for the period surrounding the announcement week. As expected, and in line with previous evidence, the announcement week is characterized by a significant larger-than-usual price movement (in three of the four portfolios).[10] An unusual price activity can be detected as early as six weeks prior to the announcement, and the movement subsides fairly rapidly—within a week or two. The average values of U_0 for the two sets of paired portfolios (1.91 and 1.29) are about the values reported by Patell for 12/31 firms (1.47) and close to the value of an essentially similar variable reported by Beaver (1.67). The V values for the test period (not shown) are not significantly different from zero (five-percent significant level) except for month +8 in the "late" portfolio, under Model V. This suggests that U can be properly

[10] The Z values in the entire test period are relatively large. This is consistent with previous research on market reactions to earnings announcements. To ascertain that the distribution of Z approximates normal, we examined its behavior for the same portfolios in (a) an extended test period of 29 weeks and in (b) a "test" period of 14 weeks around a week that was randomly selected from outside the original test period. In both cases, the hypothesis that Z is distributed standard normal could not be rejected (at the 5-percent level using the χ^2 test).

FIGURE 1

THE DIFFERENCE BETWEEN THE INTENSITY OF PRICE MOVEMENT IN THE PERIOD SURROUNDING THE REPORT WEEK OF EARLY AND LATE ANNOUNCEMENTS



Solid Line = Portfolios are formed according to timeliness definition based on the chronological order of the announcement.

Broken Line = Portfolios are formed according to timeliness definition based on past reporting patterns of the company.

* = The value for the "early" portfolio is significantly larger (5% significance level).

interpreted as a test for changes in the variance of $\tilde{\mu}_{it}$.

When the magnitude of price movements (measured by U) of the "early" and "late" portfolios is compared, an interesting result emerges: price movements in the announcement week and in the adjacent weeks are more pronounced for early announcements under both definitions of timeliness. The difference in the announcement week is significant (at the five-percent significance level) for the set of the paired portfolios for which timeliness is defined according to past

reporting patterns (the t test for differences between means was used, after testing for equality of the variances).[11]

The differences between the mean U values of the "early" and "late" portfolios are presented in Figure 1. The figure indicates that, under both definitions of timeliness, the "noisier" behavior of price in the "early" portfolio persists in the weeks preceding the announcement week. Interestingly, two weeks after the announcement the price movements corresponding to late announcements appear to be somewhat stronger. This reversal of the relative volatility might be due to the possible overlapping of weeks +4 to +8 of late announcements (and particularly of those which are chronologically late) with the release time of the first quarter results (usually the second half of April).

The effect of timeliness on the intensity of market activity appears to be stronger when timeliness is defined relative to past reporting lags of the company. This is true throughout most of the report period. This finding might suggest that the production of alternative information on the firm over time is not carried at a steady rate but rather concentrates around the firm's expected announcement date: when this date approaches (or when it passes without an announcement), production of alternative information (assisted by leaks, analysis of results already reported by other firms in the industry, etc.) is intensified.

The market reaction's results should be analyzed with some caution. The comparison of the U values between "early" and "late" portfolios is meaningful only if the announcements grouped under each portfolio contain the same proportion of unexpected news (good or bad) and represent the same degree of content extremity. The relative frequency of the combined number of good and bad news, while not exactly equal in the paired portfolios tested here, does not seem to be disproportionate.[12] The same conclusion is reached when different filters are used to classify content (e.g., the best m years are considered "good," with varying m), which implies that the extremity of unexpected news in each portfolio is about equal.

These findings are reassuring only if the employed earnings expectation models adequately represent market expectations. Given the empirical evidence of previous research (which is discussed in the methodology section), we incline to believe that they do.

f. *Frequency of Unaudited Announcements*

Most of the analyses use the date of the release of the abbreviated (audited) statement as a measure of timeliness. Depending on the prevalence of unaudited announcements and their timing relative to the timing of the release of the abbreviated statement, some of the conclusions discussed above might not be entirely valid.

First, the reported improvement in timeliness might not necessarily represent a real information gain to users if unaudited announcements were more prevalent in earlier years, thus providing a temporary substitute for the audited report. (It should be noted that the unaudited figures coincided invariably

[11] When the equality-of-variances hypothesis could be rejected, we used the Welch procedure, which has the effect of reducing the number of degrees of freedom of the t statistic (see Brownlee [1965, pp. 299–303]).

[12] When martingale with drift is used and the chronological date determines timeliness, the proportion of "unexpected" (good or bad) announcements was 48 percent in the "early" portfolio and 59 percent in the "late" portfolio, respectively; when the post-reporting pattern determines timeliness, the corresponding percentages were 45 percent and 39 percent. The use of other earnings models also resulted in similar proportions of unexpected news in the matched portfolios.

TABLE 9

FREQUENCY OF PRELIMINARY EARNINGS ANNOUNCEMENTS AND ANNOUNCEMENTS OF AUDITED EARNINGS BY THE CONTENT OF THE AUDITED STATEMENT

Content of Audited Statement Martingale with Drift	*Number of Audited Announcements*	%	*Number of Preliminary Announcements*	%
Good News	572	20	29	24
Neutral News	737	26	38	31
Bad News	529	19	26	21
Unclassifiable	998	35	28	23
Total	2,836	100%	121	100%*

*Rounded

with the audited results.) Preliminary announcements were made in only 121, or four percent of the cases. Furthermore, they were found to be spread fairly evenly among the 15 years; therefore the finding of a decreasing reporting lag of the audited figure truly represents improvement in the timeliness of financial information.

Another potential distortion of the results might be due to a possible relationship between the content of the report (good or bad news) and the voluntary release of the unaudited figures. If, for instance, these figures are typically released in good years, the investigation of the association between the content of the report and the time of the announcement of the *audited* figures would be of little relevance. The results presented in Table 9 do not show any discernible association between the disclosure of unaudited figures and the content of the final report.

CONCLUDING REMARKS

The evidence presented in the paper shows an improvement in timeliness of the annual earnings announcement over the period 1960–1974, with a median delay of 37 days in 1974. The average delay of an individual company appears to be more closely related to industry patterns and tradition rather than to the company's attributes such as size or complexity of operation.

The decrease in the reporting lag over time means that time-series studies in which a determination of announcement dates is needed should employ actual dates, rather than resort to the simplifying assumption of some arbitrary uniform announcement date. The benefits, particularly in the form of an increase in the power of the tests, appear to justify the relatively low cost of gathering this kind of datum.

The study also provides indications that bad news tends to be delayed. Although apparently not a major determinant of the reporting lag, this tendency is nonetheless significant.

The most interesting finding is perhaps the differential degree of market reaction to early and late announcements. Judged by the intensity of market response, late earnings reports appear to convey less new information than earlier reports. The phenomenon is more pronounced for portfolios formed under timeliness classification which relies on past behavior of the reporting lag of the company. It thus appears that the timing of production of alternative sources of information on the firm, which cause a reduction in the content of the ultimate

report, might not be uniform across firms: most of these efforts might be geared toward the expected disclosure time based on past years.

The findings suggest that, in terms of feasibility if not cost, the SEC's 90-day filing requirement for the annual report was easily met by virtually all NYSE companies. The results also suggest that there is an occasional abuse of the right to report within 90 days by companies delaying the release of bad news. Re-examination of the adequacy of the 90-day deadline with the intent to shorten it, at least for the population of large corporations, is perhaps in order. Such an examination should explore the contributors to the lag and may be conducted along the lines pursued by the research on the Australian and New Zealand corporations. Intentional delays by managements rather than the audit duration may be the real culprit. If audit duration is the issue, the costs associated with shortening the deadline (less-efficient allocation of the auditor's time and possibly a reduction in the audit's quality) should be assessed against the benefits from a more timely disclosure of the 10-K report.[13]

[13] Note that the annual report is only a subset of the 10-K, the subject of the SEC's filing requirement. Thus, the net benefits from a more timely disclosure of the annual report represents the lower limit of the benefits from an early filing of the 10-K.

Appendix

Definition of Timeliness of Announcements

The following benchmarks and models were used:

Benchmark 1: Timeliness is defined according to a "normal" reporting lag derived from the history of the company. The following models were employed to determine the expected announcement date in each year:

I: $E(L_t)=L_{t-1}$ where L_t is the reporting lag (in days) in year t. $t=1961,\ldots,1974$

II: $E(L_t)=\frac{1}{K}\sum_{\tau=1}^{K} L_\tau$ where K is the number of years for which announcement dates are available ($K\leq 15$).

III: $E(L_t)=\frac{1}{t-1}\sum_{\tau=1}^{t-1} L_\tau$

IV: $E(L_t)=\hat{\gamma}+\hat{\delta}\cdot t$ where $\hat{\gamma}$ and $\hat{\delta}$ are derived from the time-series regression $L_t=\gamma+\delta\cdot t$. The model was applied only when the number of observations exceeded 10.

Announcements were classified as "early" or "late" based on the following alternative demarcation points:

Define $D_t=L_t-E(L_t)$, then

(a) Late if $D_t>0$
Early if $D_t<0$
On-Time if $D_t=0$

(b) Late if D_t is one of the m largest in the 15-year period
Early if D_t is one of the m smallest in the 15-year period
On-Time, otherwise.

Three values of m were used, 1, 3, and (when the number of observations allowed) 5.

Benchmark 2: Timeliness is defined each year according to the chronological order of the announcement. The model used is

V: $E(L_t)=Q_2(L)$ where $Q_i(L_t)$ is the upper bound of the i^{th} quartile of the announcement dates in year t in the sample.

The demarcation points were

Late if $L_t > Q_3(L)$
Early if $L_t < Q_1(L)$
On-Time, otherwise.

Benchmark 3: Timeliness is defined relative to last year's chronological sequence of announcements in the (four-digit) industry. The model used is

VI: $E(R_t)=R_{t-1}$ where R_t is the rank (order) of the company's announcement date within the industry, if year t.

The demarcation points were

Late if $E(R_t) > R_{t-1}+1$
Early if $E(R_t) < R_{t-1}-1$
On-Time, otherwise.

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