EARNINGS FORECASTS AND STOCK PRICES: AN EXAMINATION OF THE DISTRIBUTION OF ANALYST'S FORECASTS

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

This study will develop and test a model that posits the existence of skewed earnings forecast distributions. There are four main purposes of this study. The first purpose is to determine the existence of skewness of earnings forecast distributions. Peterson and Peterson (1982) document the existence of skewed earnings forecast distributions but no study has tested for significant skewness of earnings forecast distributions. Second, the skewness of the distributions is examined for significant information with respect to unexpected earnings. Next, an examination of determinants of skewness of earnings forecast distributions is conducted. Finally, this study examines the securities market's use of information contained in the skewness of the earnings forecast distributions to price the underlying stock.

Each month new information is released concerning future corporate earnings expectations which can impact the prices of the underlying securities. Private firms gather annual earnings estimates for corporations from professional forecasters. The data are summarized and sold to public and private financial firms for use as a security analysis tool. The forecast distributions can be used as proxies for market expectations of future earnings. Each of the major forecasting services implicitly assumes that the distribution of analysts' forecasts is normal or that higher moments are not important in forecasting earnings. They each report only mean, median, and variance of forecasts for each firm. If analysts are truly independent in their forecasts and are not influenced by other forecasters then a normal distribution of forecasts would be expected. However, there is evidence that forecasts do not always have normal distributions or that they are biased predictors.

The value of the information contained in earnings forecast distributions is dependent upon its predictive power of actual earnings. If a skewed distribution exists and is the result of either asymmetric information or bias by a majority of analysts then the skewness would provide additional information of future earnings. The skewness of the distribution would be directly related to unexpected earnings.

If skewness of the forecast distributions provides significant information relative to future earnings, a semi-strong form efficient market would adjust the price of the underlying security to reflect that new information. The importance of information contained in skewed earnings forecast distributions can be investigated by determining whether stock prices are adjusted to reflect that information. This study extends the current literature by postulating and testing the relationship that the skewness of earnings forecast distributions has with future actual earnings and securities prices.

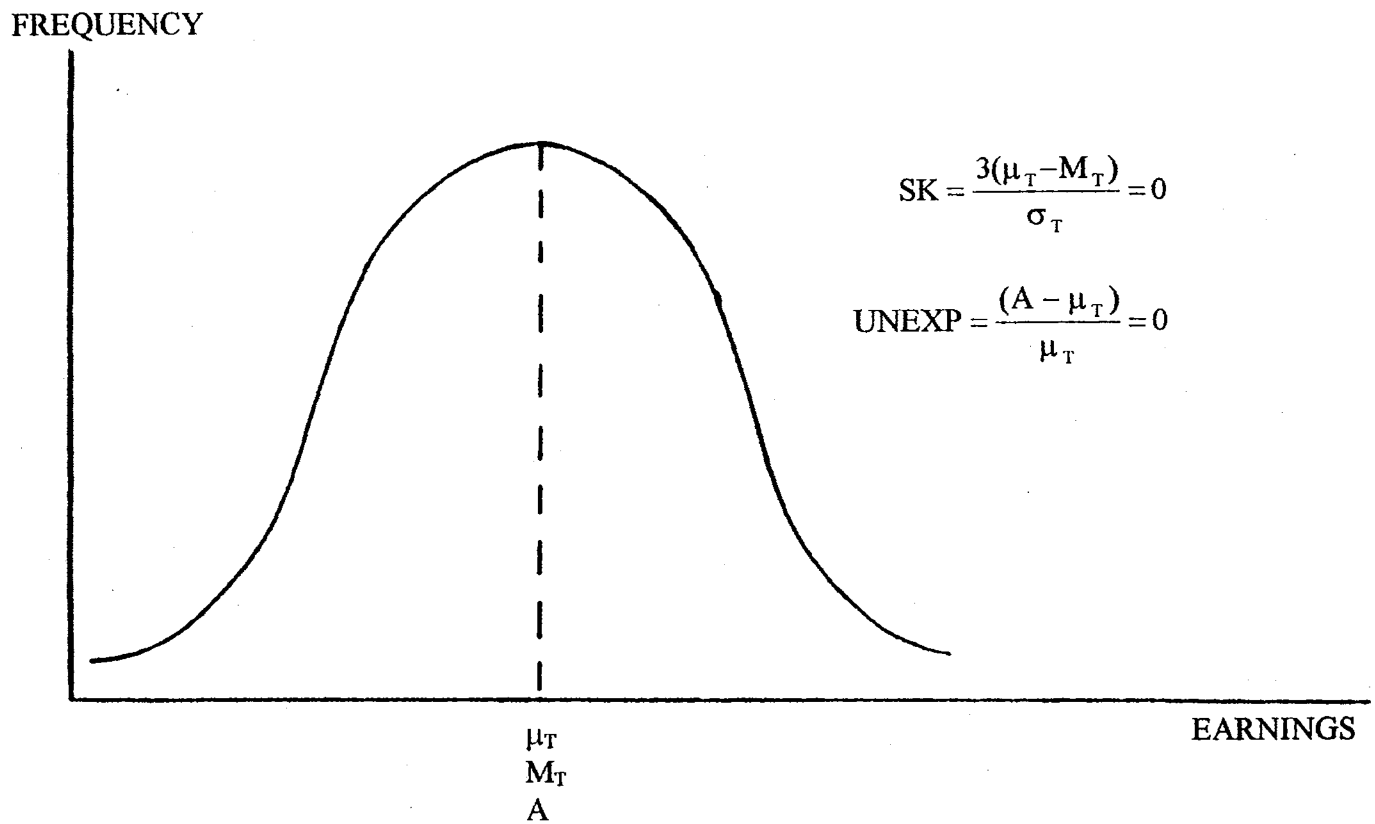
Theoretical Model

The theoretical model is for one point in time when all earnings analysts have submitted their annual earnings forecast for a particular firm to a private data collection firm. The firm has gathered the earnings forecasts with the expressed intent to publish a summary of the forecasts including mean, median and variance of the earnings forecast distribution. The publication does not contain individual forecasts and the identity of the earnings analysts is confidential. The earnings analysts work for financial institutions and submit their forecasts on or before a predetermined day each month. In return for their forecasts each analyst's employer receives the summary data free of charge. The earnings forecasts are published electronically and in hard copy form.

The publishing firms make available to subscribers only mean, median, and variance of the earnings forecast distribution. This implies that all distributions are normal or that any other characteristics of the distribution are unimportant. It is reasonable to believe that the distribution of earnings forecasts will be normal given the following assumptions: (1) any differences in earnings forecasts among analysts are random but not extreme, (2) analysts have homogeneous information, and (3) each analyst provides unbiased earnings forecasts. The resulting earnings forecast distribution will be normal and the mean will be an unbiased estimate of future actual earnings. The variance of forecasts would be a measure of uncertainty and be correlated to unexpected earnings. Unexpected earnings are defined as actual earnings minus the mean of analyst's forecasts adjusted for scale, see figure I. It should be noted that this study will use discrete earnings forecast observations but for purposes of clarity the example figures are depicted as continuous earnings forecast distributions.

The thrust of the theoretical model is to relax each of the above assumptions independent of the others and to evaluate their effects on the characteristics of the earnings forecast distribution. If extreme random forecast errors are allowed to exist, the resulting distribution would have at least one significantly long tail whenever

FIGURE I
Continuous Distribution Of Earnings Forecasts When Anaysts Have The Same Information And Unbiased Estimates



$$SK = \frac{3(\mu_T - M_T)}{\sigma_T} = 0$$

$$UNEXP = \frac{(A - \mu_T)}{\mu_T} = 0$$

Where: μ_T = the mean earnings estimate for all analysts
M_T = the median earnings estimate for all analysts
A = the actual earnings

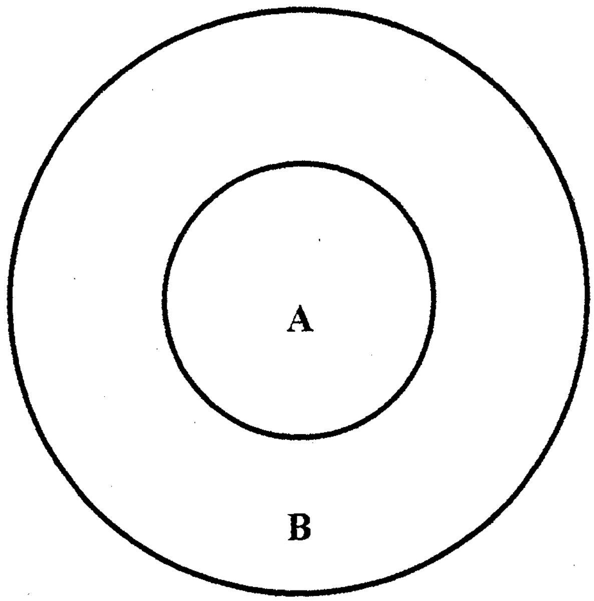
SK = the skewness of all earnings estimates
UNEXP = the unexpected earnings adjusted for scale
σ_T = the standard deviation of all earnings estimates

significantly different forecasts from the mean are included in the distribution (outliers). The earnings forecast distribution would be significantly nonnormal and skewness and/or kurtosis would be significant characteristics. However, because the extreme errors are random, the skewness and/or kurtosis would not be correlated with unexpected earnings.

The information set each analyst has will affect his earnings forecast. If the second assumption is relaxed and asymmetric information allowed, the resulting earnings forecast distribution will be bimodal and skewed because the better informed analysts will have an earnings forecast distribution with a different mean than the less informed analysts. This scenario occurs when there are two information sets available to analysts, one a subset of the other, figure II. This is possible when some analysts have access to non-public information and that information is significantly different than the public information. There will be two groups of analysts, those with information set A, public information, and those with information set B, public and non-public information. Information set B would contain all information in set A plus additional and valuable information.

If the group with information set A is the largest group, the smaller and better informed group B will skew the

FIGURE II
Earnings Information Sets Available To Analysts

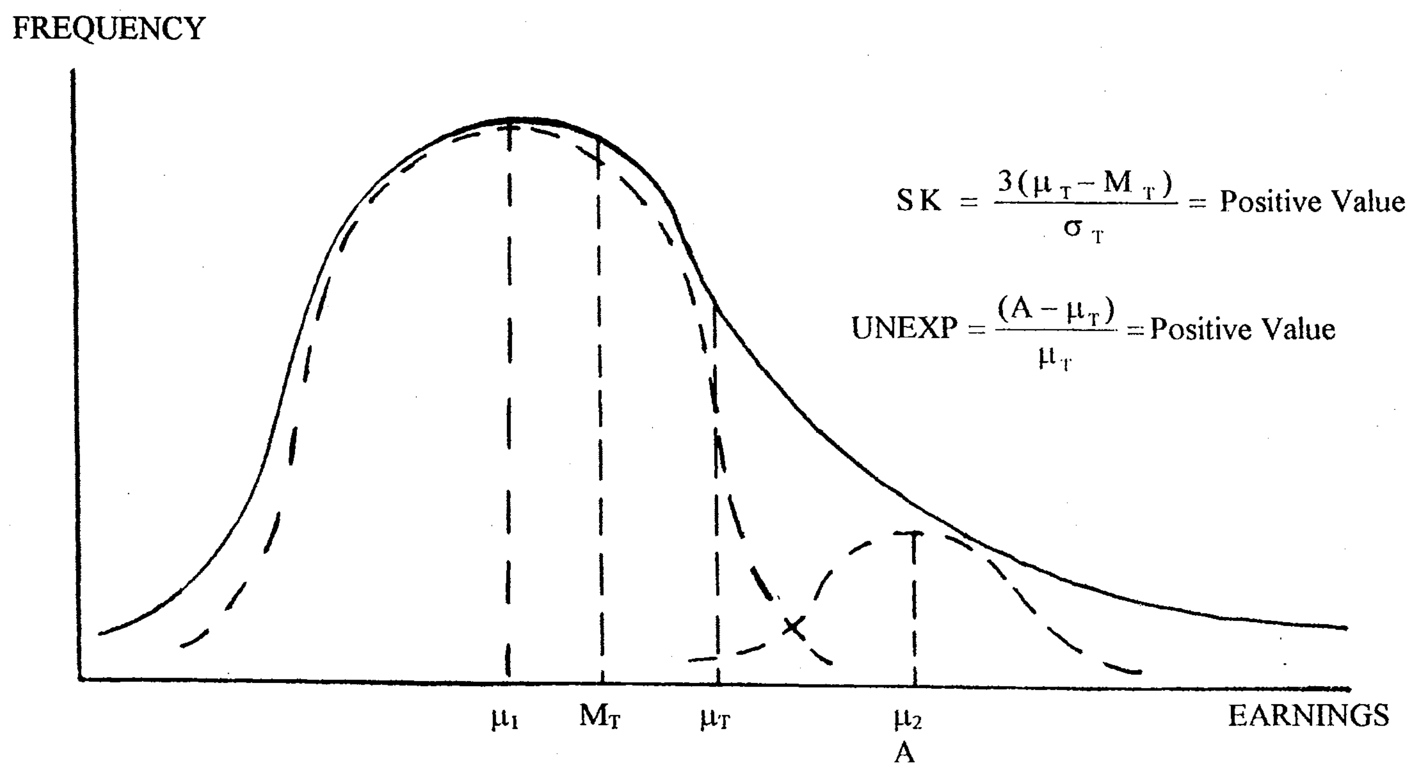


Information set A represents all public information. Information set B represents all public and non-public information. The size of the circles depicts the amount of information available to analysts in groups A and B, it is not a representation of the relative number of analysts with that information.

earnings forecast distribution towards the future actual earnings. Group B will have a mean forecast that is equal to the actual earnings while the mean forecast of the less informed group A will either be too high or too low. The total population of both groups of analysts will have a earnings forecast distribution that is skewed towards the actual earnings. If the mean earnings forecast for the informed group B is greater than that of group A, the unexpected earnings will be positive as will be the skewness of the earnings forecast distribution for all analysts, figure III. The magnitude of unexpected earnings and skewness will be dependent upon the difference in mean earnings forecasts for the two groups. As the difference in the mean earnings forecasts increases then unexpected earnings and the skewness of the earnings forecast distribution for all analysts will increase. Under this scenario, the skewness of the earnings forecast distribution will be positively correlated with the sign and magnitude of unexpected earnings.

If group A, analysts with public information, is the smaller group then the earnings forecast distribution will be skewed away from actual earnings. Again, group B, analysts with public and non-public information, will have a mean earnings forecast that is equal to the actual earnings. The mean forecast of the less informed group A will be

FIGURE III
Continuous Distribution Of Earnings Forecasts When There Is Asymmetric Information And Unbiased Estimates (Most Analyst Are Uninformed)

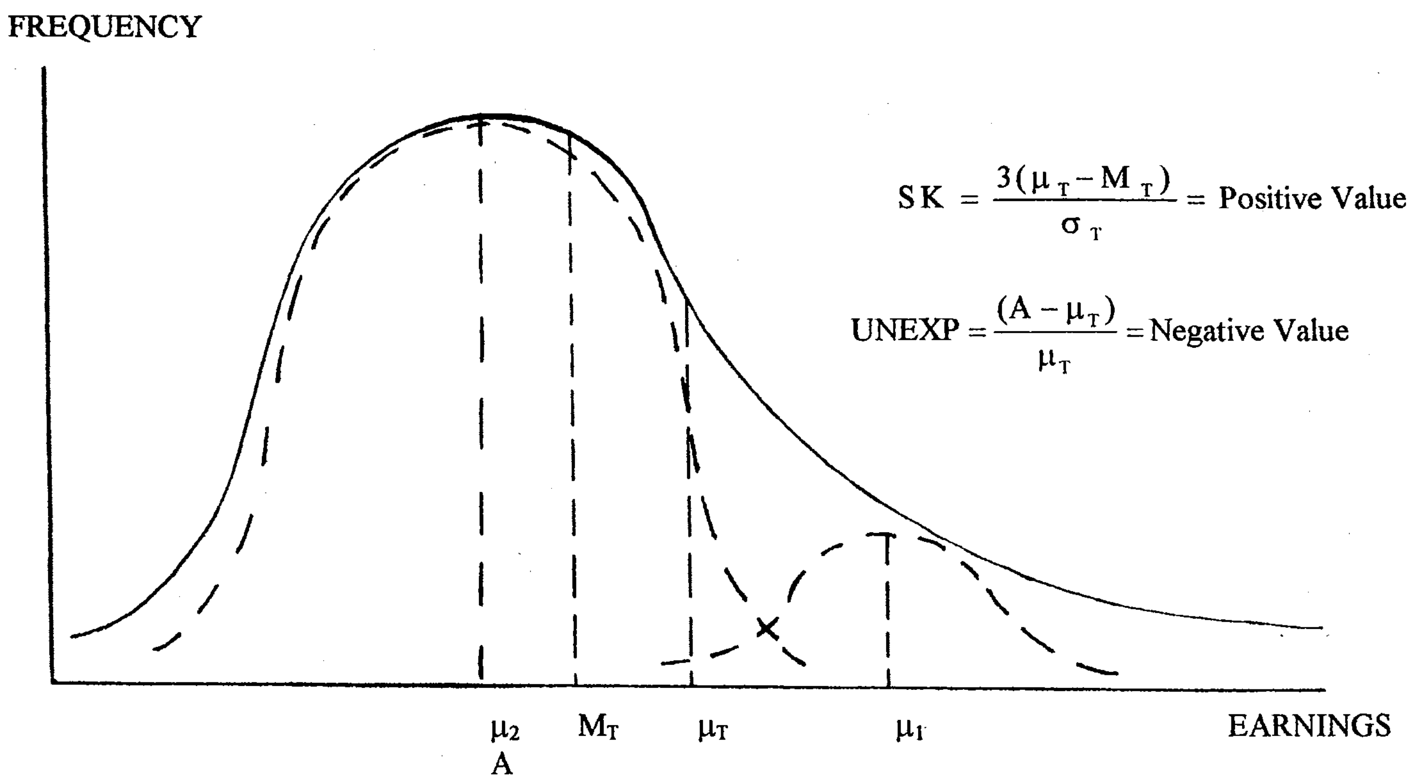


Where: μ_1 = the mean earnings estimate of uninformed analysts
μ_2 = the mean earnings estimate of informed analysts
μ_T = the mean earnings estimate of all analysts
M_T = the median earnings estimate of all analysts
σ_T = the standard deviation of all earnings estimates
SK= the skewness of all earnings estimates
UNEXP = the unexpected earnings adjusted for scale
A = the actual earnings

either to high or to low. The smaller group of analysts, group A, will skew the total earnings forecast distribution away from the actual earnings. If the mean earnings forecast for the uninformed group A is greater than that of group B, the unexpected earnings will be negative and the skewness of the earnings forecast distribution for all analysts will be positive, figure IV. The magnitude of unexpected earnings and skewness will be dependent upon the difference in mean earnings forecasts for the two groups. The skewness will therefore be negatively correlated with unexpected earnings.

The third assumption for normality of the earnings forecast distribution is unbiased estimates by analysts. If analysts as a group are biased and their forecasts are consistently either too optimistic or pessimistic, a normal distribution of forecasts will persist with a biased mean. The earnings forecast distribution will have a skewness equal to zero and unexpected earnings will be significantly different from zero, figure V. If some analysts are superior forecasters (not biased) then these analysts will skew the distribution toward the actual earnings. If the mean earnings forecast for the unbiased analysts is greater than the mean earnings forecast of the larger and biased group of analysts, the resulting earnings forecast distribution will have a positive skewness and unexpected

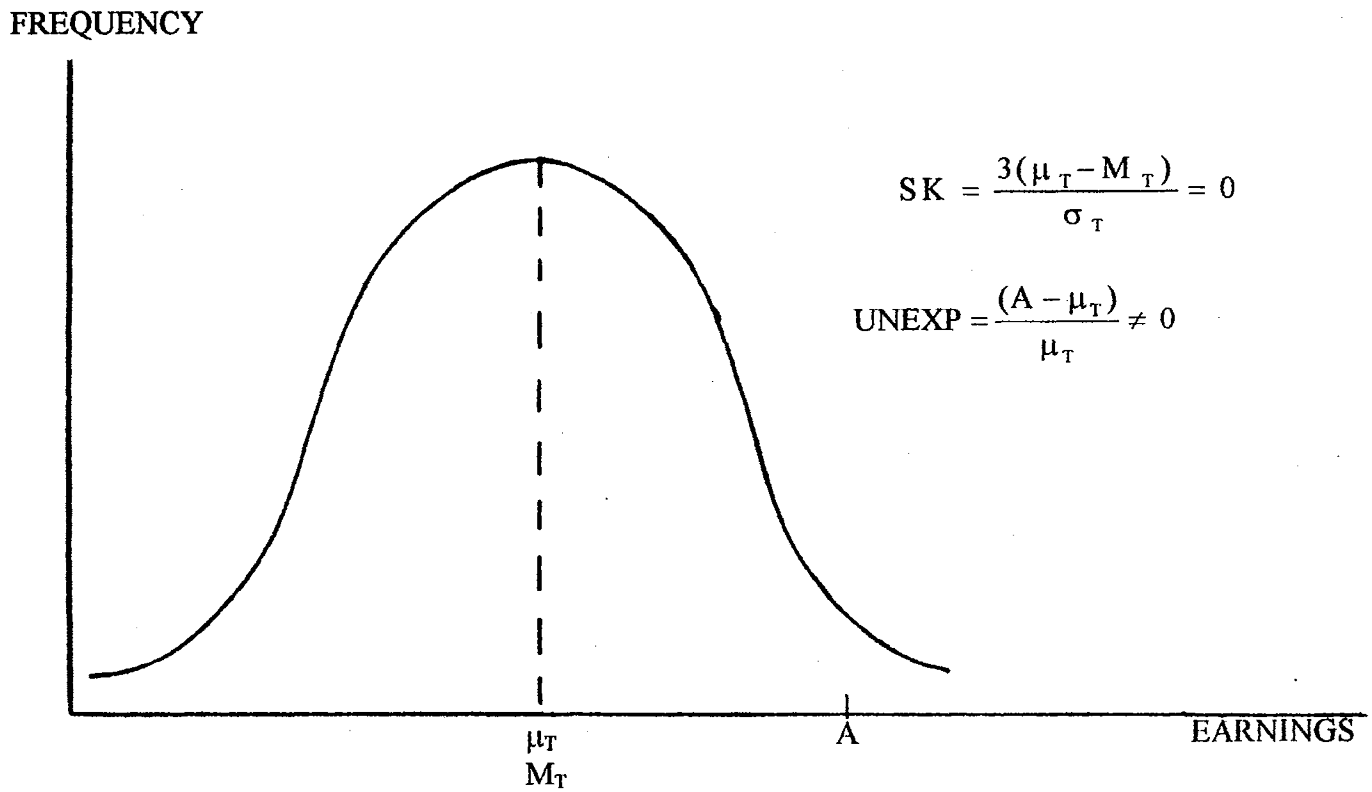
FIGURE IV
Continuous Distribution Of Earnings Forecasts When There Is Asymmetric Information And Unbiased Estimates (Most Analyst Are Informed)



Where: μ_1 = the mean earnings estimate of uninformed analysts
μ_2 = the mean earnings estimate of informed analysts
μ_T = the mean earnings estimate of all analysts
M_T = the median earnings estimate of all analysts

σ_T = the standard deviation of all earnings estimates
SK= the skewness of all earnings estimates
UNEXP = the unexpected earnings adjusted for scale
A = the actual earnings

FIGURE V
Continuous Distribution Of Earnings Forecasts When Analysts Have The Same Information And All Biased Estimates



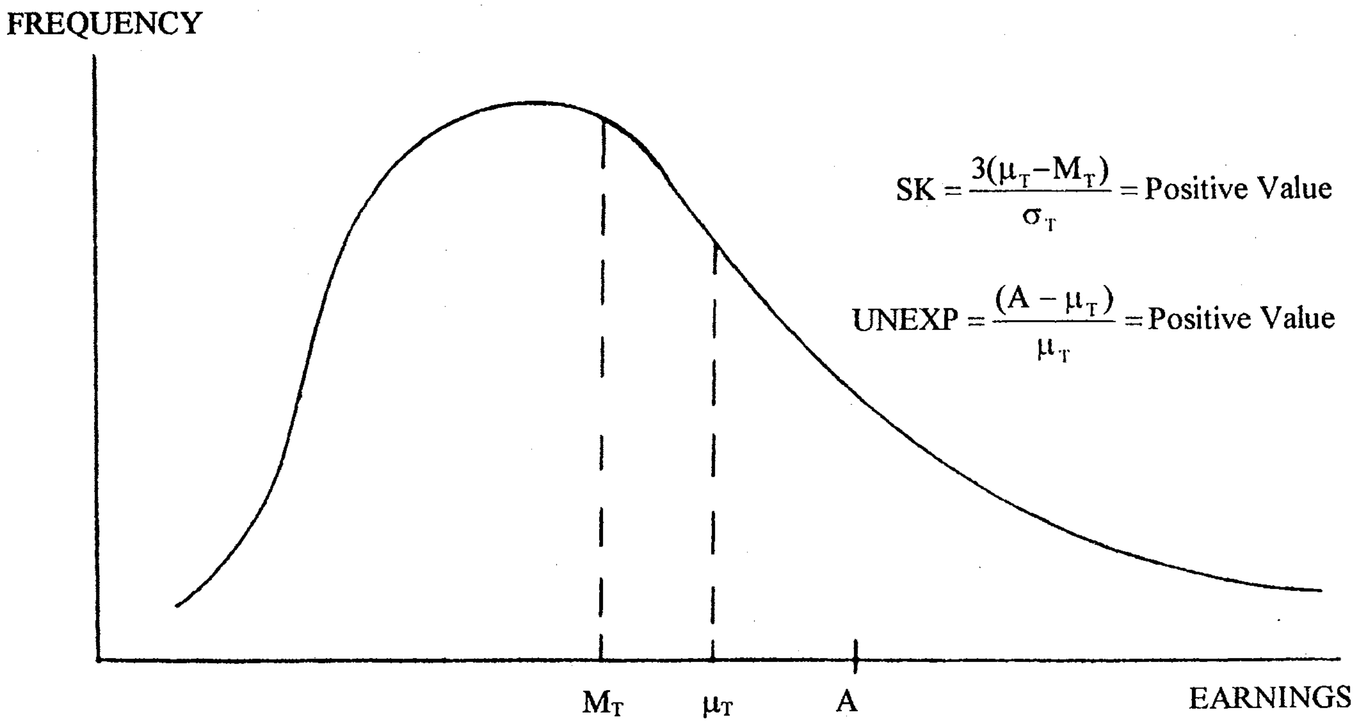
$$SK = \frac{3(\mu_T - M_T)}{\sigma_T} = 0$$

$$UNEXP = \frac{(A - \mu_T)}{\mu_T} \neq 0$$

Where: μ_T = the mean earnings estimate for all analysts
M_T = the median earnings estimate for all analysts
σ_T = the standard deviation of all earnings estimates

SK = the skewness of all earnings estimates
UNEXP = the unexpected earnings adjusted for scale
A = the actual earnings

FIGURE VI
Continuous Distribution Of Earnings Forecasts When Analysts Have The Same Information And A Few Analysts Are Unbiased (All Other Analysts Are Biased)



Where: μ_T = the mean earnings estimate for all analysts
M_T = the median earnings estimate for all analysts
σ_T = the standard deviation of all earnings estimates

SK = the skewness of all earnings estimates
UNEXP = the unexpected earnings adjusted for scale
A = the actual earnings

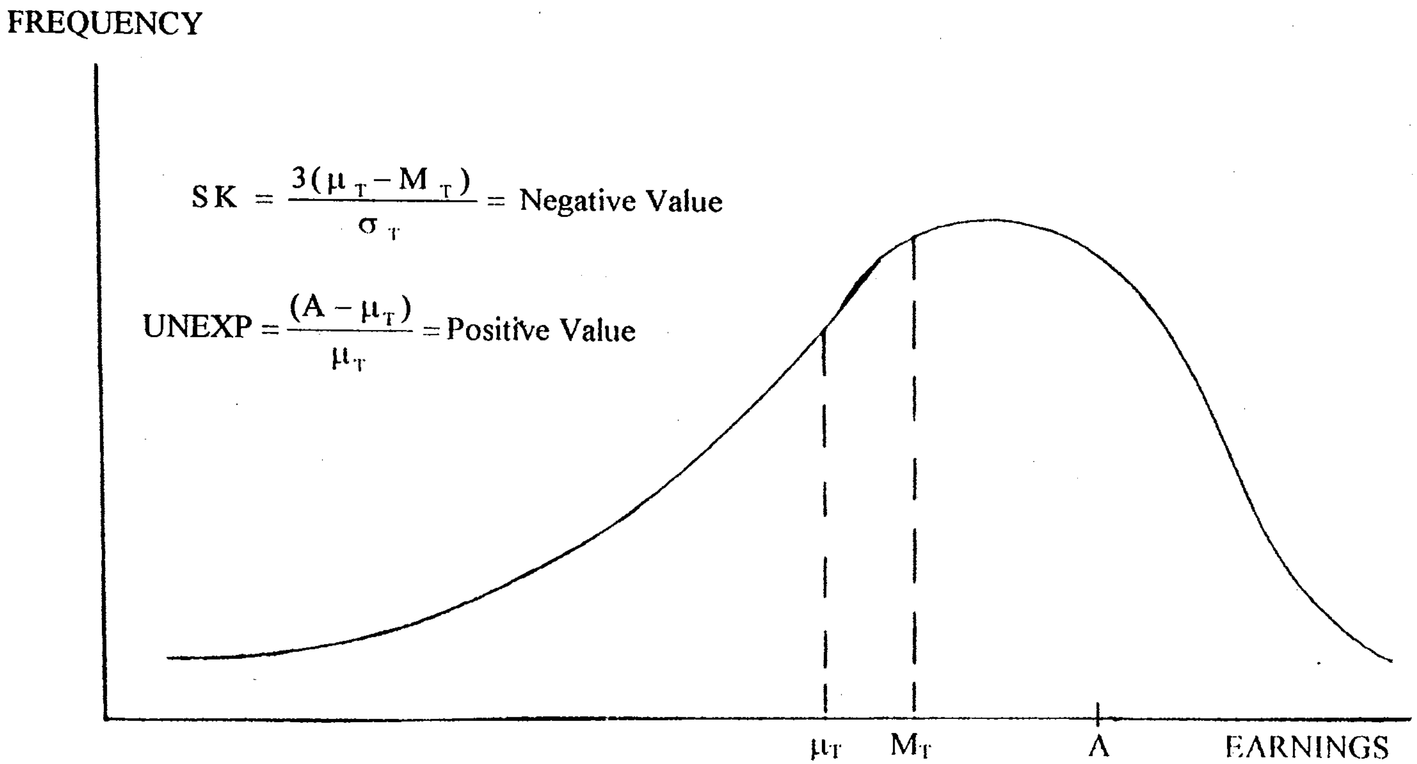
earnings will be positive, figure VI. As with the asymmetric information scenario, the skewness of the forecast distribution will be positively correlated to the sign and magnitude of the bias or unexpected earnings.

If most of the analysts are unbiased in their estimate of earnings and only a few are biased, the biased forecasts will skew the distribution away from the actual earnings. If the mean earnings forecast for the unbiased analysts is greater than the mean earnings forecast of the smaller and biased group of analysts, the resulting earnings forecast distribution will have negative skewness and the unexpected earnings will be positive, figure VII. The skewness of the forecast distribution will be negatively correlated to the sign and magnitude of the bias or unexpected earnings.

If a skewed distribution exists and is the result of asymmetric information or bias by a majority of analysts then the skewness would provide additional information of future earnings. The skewness of the distribution would be directly related to unexpected earnings.

If skewness of the forecast distributions provides significant information relative to future earnings, a semi-strong form efficient market would adjust the price of the underlying security to reflect that new information. Finally, this study will test to see if the securities

FIGURE VII
Continuous Distribution Of Earnings Forecasts When Analysts Have The Same Information And A Few Analysts Are Biased (All Other Analysts Are Unbiased)



Where: μ_T = the mean earnings estimate for all analysts
M_T = the median earnings estimate for all analysts
σT = the standard deviation of all earnings estimates

SK = the skewness of all earnings estimates
UNEXP = the unexpected earnings adjusted for scale
A = the actual earnings

market considers the information contained in the skewness of earnings forecast distributions to be valuable.

Market Response to Earnings Forecasts

The accurate forecast of earnings is important for both the practical and theoretical applications of share valuation models. The investment community exercises great efforts to analyze and predict corporate earnings. Many investment banking firms employ analysts to produce estimates of next year's earnings. Academic researchers require accurate measures of the market's expectations of future earnings to test market efficiencies.

Information of future earnings is significant to the securities market given the strong relation between future earnings and securities prices. Gordon's (1959) Constant Growth model and its subsequent variations imply that security prices are the present value of a firm's expected future dividends discounted at the market's risk-adjusted required rate of return. Future dividends represent a payment to shareholders from future earnings, so a direct relation exists between current stock prices and future earnings. Expected future dividends are derived from expected future earnings.

Empirical studies appear to find a relationship between expected future earnings and stock price changes. Beaver, Clarke and Wright (1979) report a positive relation between portfolio returns and mean forecast errors of earnings. Neiderhoffer and Regan (1972) find that stock prices are strongly dependent on both absolute earnings changes and relative earnings changes to analysts' estimates. McNichols (1988) documents more significant stock price adjustments at earnings report dates than during non-earnings announcement periods. So earnings and the expectations of future earnings have a direct impact on current stock prices.

If analysts have access to all public information and possibly some private information, then they will provide the best available forecast of future earnings. The better the information is, the better the forecast. Analysts have access to the most recent financial reports, forecasting models and statistical tools. With the added benefit of qualitative judgment, professional forecasters should be able to outperform earnings forecast models.

Even if all analysts have access to the same information, there is no a priori reason to expect them to all arrive at a homogeneous forecast. The interpretation of information does not have to be the same, nor is it expected to be the same. However, any differences in earnings forecasts among analysts should be random and unbiased when evaluating the same set of data. Nor should we expect that any one analyst would consistently outperform all other analysts. The distribution of analysts' forecasts is expected to be normal and the best earnings forecast would be the mean of those forecasts. The variance of the forecast distribution should be a measure of the forecasters' uncertainty and as such, is expected to be directly related to forecast errors, measured as the difference between actual earnings and the mean of forecasted earnings adjusted for scale.

Institutional Brokers Estimate System (**I/B/E/S Inc.**) and other earnings forecast distributors publish only the mean, median and variance of gathered earnings forecasts. The skewness (SK) of the forecast distributions is not published but can be calculated using available information. Pearson's (1895) second coefficient of skewness (SK) is measured as:

$$SK = 3(MEAN - MEDIAN)/(STD.\ DEV.) \qquad (1.1)$$

where

STD. DEV. = the standard deviation of the distribution.

Subscribers have not demanded that skewness be included in the summary of earnings forecasts. It might be concluded that the market is not using the information contained in skewness. It is not being used because investors do not consider the measure valuable, or because investors do not know that it is valuable.

The justification for investigating the information content of the shape of the earnings forecast distributions comes from an examination of the breakdown of the assumptions of market efficiency. A semi-strong form efficient market is one in which current market prices reflect all public information and quickly and fully reflects any new, relevant information. Appropriate assumptions for efficient markets include: transaction costs are zero for all participants; information is costless for all participants; and information is available to all market players at the same time. If the skewness of earnings forecast distributions is important then the announcement of that information should impact the underlying stock price. The market efficiency approach to pricing information is used in this study.

Earnings Forecast Data

Every month, the **Value Line Investment Survey, S & P Earnings Forecaster**, and **I/B/E/S Inc.** gather, organize and publish the corporate earnings forecasts made by professional institutional forecasters. These forecasters prepare estimates for over 3,500 companies of quarterly and annual earnings for the current and next fiscal year, and long-term growth forecasts. The **I/B/E/S** database, used in this study, contains forecasts collected from over 2,100 securities analysts employed by 140 participating institutional brokerage and research firms. **I/B/E/S** publishes current and historical consensus forecasts from 1976 to the present which include the mean, median and variance of earnings forecasts for each company. Also included in the **I/B/E/S** published summary is the number of forecasters, which ranges from one to fifty one, the number of forecasts that were increased or decreased from the previous month and the changes in the mean and median of the forecasts from the previous month. The data are available to subscribers in printed form and electronically through over 25 redistributors. The analysts are required to submit their earnings forecasts on or before the third Thursday of each month. **I/B/E/S** compiles and summarizes the data that Thursday, known as the RUNDATE. During the period of this study, 1983 - 1990, the summary data were made available electronically to a few subscribers in the New York area during the following day (Friday) but the majority of the subscribers received the data electronically and in hard copy form the following Monday. **I/B/E/S** did not have a specific policy for releasing data other than getting it to their customers as soon as possible. This meant that on some occasions the data may have been available to subscribers as early as before market closing on Friday and as late as Tuesday morning. The goal was to release data the Monday morning following the RUNDATE.

Organization of the Thesis

This thesis will consist of a total of six chapters. Chapter two will include a review of the major theoretical and empirical research on earnings forecasts relevant to this investigation. A statement of hypotheses will follow in chapter three. The research methodology and a description of the data comprise chapter four. Chapter five will contain the test results. Chapter six will contain the summary and conclusions.

CHAPTER II

LITERATURE REVIEW

Introduction

Financial and accounting academicians recognize the need for information before financial decisions can be made or policies adopted. For information to be useful it must enable decision makers to forecast events or variables of interest. Both accounting and finance have many common areas of forecasting research. Examples include the prediction of security risk, enterprise failure and financial distress, trade credit and lending decisions, judgments by rating agencies, and the likelihood of a merger. The forecasting area that has received considerable attention is the prediction of a firm's future earnings, cash flows, and dividend streams.

The investment practitioner requires earnings forecasts to value firms, to estimate costs of capital, and to make portfolio decisions. Accurate measurement of earnings expectations is essential to academic researchers in order to conduct various market efficiency studies. The rational expectations hypothesis (Muth, 1961) predicts that prices are formed on the basis of the expected future payout of the assets, including their resale value to third parties. Thus a rational expectations market will be an efficient market because prices will reflect all information. It follows that both the practitioner and the academician will use the best information available in earnings forecasts to measure earnings expectations. This chapter will review theoretical and empirical research as it relates to earnings forecasts, information contained in those forecasts, and the market's efficient use of that information.

Analysts Versus Other Forecasting Tools

There are three primary sources from which to draw earnings forecasts: corporate management, financial analysts, and quantitative models that process historical or time series data. There have been several major studies comparing management forecasts with analysts' forecasts: Basi, Carey, and Twark (1976 and 1977), Imhoff (1978), Jaggi (1978 and 1980), Ruland (1978), Barefield, Comiskey, and McDonald (1979), Imhoff and Pare (1982), and Hassell and Jennings (1986). Each of these studies compared the absolute percentage error of management's and analysts' annual forecasts to actual earnings. The studies used data for two and three year periods. Management forecasts were superior in all seven studies, and statistically significant ($p<.05$) in three of them. The average mean error for management forecasts was 15.6%, compared with 17.6% for analysts'. Imhoff (1978) finds that management's variance of mean absolute error is consistently lower than that of analysts.

Armstrong (1983) provides four possible explanations for management's superior performance. The first explanation is that managers sometimes have inside information. Finnerty (1976) and Jaffe (1974) show that insiders earn market-adjusted excess returns. Ruland (1978) finds that management's apparent knowledge of inside information is valuable in predicting changes in the price of the firm's stock. Nichols and Tsay (1979) confirm the importance of inside information with a finding that the announcement of long-term corporate forecasts affect the stock price. Given that management has inside information, their forecasts should be superior to analysts' forecasts, all other things being equal.

The second explanation for the superiority of management's forecasts over analysts' forecasts is management's impact on performance. Forecasts by management often become targets, with efforts then being made to reach them. One technique management uses to reach its forecasts is to smooth earnings. To avoid pressure from stockholders, management can decrease expenditures to boost earnings in bad years. To avoid high expectations among stockholders, management can increase spending to bring earnings down in good years. Kamin and Ronen (1978) and Smith (1976) find evidence that firms engage in smoothing. Kross (1981) implies that, in an attempt to smooth earnings, firms with poor earnings report earnings later, which could relate to attempts to improve reported earnings.

A third explanation for management's superior ability to forecast earnings is that reported earnings can be manipulated to bring them into line with management's forecast. For example, extraordinary items are often a significant component of earnings per share (Nichols, 1973) and are subject to control by management. Since 1973, however, changes in generally accepted accounting procedures (GAAP) have made it more difficult to manipulate earnings by arbitrarily classifying certain events as extraordinary.

The final possible explanation for management's superior forecasting performance over analysts' forecasting performance is their access to more recent information. This is especially true just prior to the release of the interim reports. If this more recent information on the current earnings is valuable, one would expect analysts' forecasts to improve relative to management's forecasts after the publication of the interim reports. Jaggi (1978 and 1980) finds that management's forecasts were significantly better than analysts' before, but not after, the release of interim reports. Ruland (1978) reports that management's superiority over analysts decreases after the release of interim reports. Similarly, Crichfield et al. (1978) find that the later in the year that analysts made forecasts, the better their forecasts.

Time series models provide the third method of generating earnings forecasts. Since management and security analysts have access to historical, current and expectations data and can be expected to use quantitative as well as qualitative methods, their earnings forecasts should be superior to time series forecasts. Even though their forecasts process substantially more data and require more time and expense to generate, analysts continue to be employed by profit-maximizing firms. This suggests that analysts' forecasts must be superior to forecasting models.

The evidence concerning the efficacy of various quantitative models is mixed and inconclusive. Some studies find that forecasting errors are not sensitive to the choice of extrapolation technique. Among these are comparisons for seven extrapolation techniques by Brandon and Jarrett (1977), ten by Johnson and Schmitt (1974), three by Hagerman and Ruland (1979), and twenty-one by Carey (1978). Elton and Gruber (1972) find that the exponentially weighted moving average produces the best mechanical forecasts. Brandon and Jarrett (1979) find that mechanical revisions improve forecast models. Ruland's (1980) study of forecasts from 1973 to 1977 finds that the simple martingale model is superior to trend analysis. Collins and Hopwood (1980) find a seasonally differenced first-order autoregressive and seasonal moving average model, originally used by Brown and Rozeff (1978), to be the most accurate of four univariate models tested. This study conflicts with that by Lorek (1979) which finds that the Griffin (1977) and Watts (1975) seasonally differenced first-order moving average and seasonal moving average model is superior to other univariate models. Albrect et al. (1977) find the martingale model to be equal in accuracy to firm-specific Box-Jenkins models.

While the authors of these studies might not agree on the best mechanical model to forecast earnings, those studies that compare mechanical to judgment based forecasts do overwhelmingly conclude that management and securities analysts do consistently forecasts earnings significantly better than any mechanical model. Armstrong (1983) combines the results of 17 studies and finds the average error for judgment based forecasts to be 21.0% and the average error for extrapolated forecasts to be 28.4%. Conroy and Harris (1987), using more recent data (1976-1983), confirm this superiority of analysts' forecasts. They find that the analysts' advantage declines rapidly for forecasts greater than one year. Armstrong reports that judgment is more accurate than extrapolation for 14 of the 17 comparisons (significant at $p<.05$).

The three studies (Hagerman and Ruland, 1979; Lorek, 1976; Elton and Gruber, 1972) that present extrapolation to be superior to judgment are suspect. Hagerman and Ruland use one judgment outlier which was 4400 percent incorrect. Lorek is unable to replicate his own study using a new sample. Finally, Elton and Gruber do not find a significant advantage of extrapolation over judgment forecast.

Part of the superiority of the judgment methods may be due to the advantages of management forecast; that is, inside information and the control over earnings by management. However, the analysts' forecasts are also superior to those based on extrapolation. Armstrong (1983) reviews 12 studies that compare analysts' forecasts with extrapolation models. The analysts had an average mean error of 17.7% compared to a 27.4% average mean error for extrapolations. In addition, two studies, Collins et al. (1980) and Brown et al. (1987), report that standard deviations of forecast errors made by analysts are also significantly lower than those of extrapolation methods. Collins et al. finds that analysts are apparently able to incorporate the effects of economic events such as strikes or sudden swings in earnings, whereas statistical models are either unable to respond or are slow to do so. Brown et al. suggests that security analysts' superiority is due to better utilization of information that exists at the forecast initiation date for the extrapolation models, a contemporaneous advantage, and the acquisition and use of information after the extrapolation model's forecast initiation date, a timing advantage.

The implications for those who use annual earnings forecasts for financial planning within the firm, for investment purposes by outsiders, or for research are: (1) use earnings forecasts as published by top management if they are available; (2) use published forecasts by outside analysts if published forecasts from top management are not available; and (3) use extrapolations if judgmental forecasts are not available.

There is a lack of widespread published forecasts by management. For practical purposes, analysts' forecasts of future earnings have become popular for investors and academicians for stock valuation. Two additional studies offer insight to the limitations of management's earnings forecasts. Imhoff (1978) provides evidence that firms that voluntarily provide earnings forecasts have, on average, relatively high systematic risk and relatively stable accounting earnings properties in comparison to non forecast firms. In the work of McDonald (1973), managers expecting bad years are found to be less likely to make forecasts of their firm's earnings. I conclude from these studies that management provides limited forecast information for investors and researchers. Analysts' forecasts, on the other hand, are relatively inexpensive and readily available to both practitioners and researchers. Sources of analysts' forecasts include The Value Line Investment Survey, S&P Earnings Forecaster, ICARUS, and the Institutional Brokers Estimate System **(I/B/E/S Inc.)**.

Information Contained in Analysts' Forecasts

Of value to the practitioner and academician is the information contained within the forecasts. It has already been established that given the lack of widespread management forecasts, the mean of analysts' forecasts is superior to any other method for predicting annual or quarterly earnings. This section expands on the information content and characteristics of analysts' forecasts.

If analysts have the same information and are not biased, then they will produce the same earnings forecasts. Any differences in earnings forecasts among analysts will be random and nonbiased. The resulting distribution will be normal and the mean will be a nonbiased estimate of future earnings. Ball and Brown (1968) published one of the first studies of forecast information. They find that only 10 to 15% of the information contained in announced earnings had not been anticipated by the month of the preliminary announcement. Not only are actual earnings related to the mean of analysts' forecasts, but the variance of forecasts is related to analysts' errors. Elton, Gruber, and Gultekin (1984), Hughes and Ricks (1987), and Daley, Senkow, and Vigeland (1988) all report a significant positive association between the variance of analysts' forecasts and the ex post magnitude of the unexpected earnings.

Each of the major forecasting services implicitly assumes that the distribution of analysts' forecasts is normal or that higher moments are not significant in forecasting earnings. They each report only mean, median, and variance of forecasts for each firm. However, there is evidence that forecasts do not always have normal distributions or are biased predictors. An example of bias is given by Niederhoffer and Regan (1972). They find that analysts consistently underestimate the earnings gains of the top fifty companies, defined by earnings growth, and overestimate earnings of the lowest fifty firms. Later studies by Elton, Gruber, and Gultekin (1984) and Benesh and Peterson (1986) report a significant tendency of analysts to overestimate the growth rates of companies they believe will perform well and to underestimate the growth rate of companies they believe will perform poorly. O'Brien (1988) finds an optimistic bias in forecasts that suggests the period 1975-1981 was one of primarily negative unanticipated earnings. DeBont and Thaler (1990) find that forecasts are too optimistic, too extreme, and even more extreme for two-year forecasts than for single-year predictions.

There are examples of findings of nonnormal distributions of analyst's forecasts. Peterson and Peterson (1982) document the existence of skewed forecast distributions in their study of changes in annual forecasts and stock prices. A skewed distribution of analysts' forecasts could be the result of heterogeneous expectations. There may be occasions when a small group of analysts has better information than the general population of analysts. The result could be a bimodal distribution or a distribution of all analysts that is skewed toward the actual earnings. It is not possible to distinguish the "better" informed group of analysts in any one month, so a measure of the bimodal distribution is impossible. But a measure of skewness would provide information of actual earnings.

Aggarwal and Rao (1990) find that the level of institutional ownership of a firm is inversely related to security returns surrounding earnings announcement dates.

They report that abnormal stock returns increase as institutional ownership decreases. This implies that institutional owners have more accurate knowledge of good or bad earnings information prior to its release and the underlying security value is adjusted accordingly. The same should be true for earnings forecasts. The forecasts of institutional owners should be superior to other forecasts. This superior information will on occasion result in nonnormal forecast distributions.

If analysts are truly independent in their forecasts and are not influenced by other forecasters then a normal distribution of forecasts would be expected. However, there is evidence that forecasters are not independent. Forecasts are not submitted simultaneously in any month. The last forecast is able to incorporate more information and in some cases even the previously submitted forecasts for that month into his/her forecast for the same month. O'Brien (1988) finds that later forecasts, while not generally available to researchers or practitioners, are understandably the best forecasts for the month. These factors may have an effect on the distribution of forecasts. The later and more accurate forecasts may result in a skewed distribution in months of delayed influential information.

Market Response to Earnings Forecasts

In a semi-strong form efficient capital market, prices quickly and fully reflect all available relevant public information. If capital markets are efficient, then no one can earn abnormal returns. But without abnormal returns, there is no strong incentive to acquire information; random selection of securities is just as effective. This argument would have merit if information were costless. However, in a world where information acquisition is a costly activity, Cornell and Roll (1981) show that there is nothing inconsistent about the coexistence of efficient markets and security analysis. The average individual who utilizes costly information to perform security analysis will outperform other individuals who use less information, but only in terms of gross returns. The net return to both strategies should be identical. This section reviews the relationships found between unexpected earnings and stock prices.

There is a sound theoretical relation between future earnings, dividends and stock values. The Gordon (1959) constant growth model and other variations of this model are founded on the fundamental principal that an asset's value is simply the present value of all future income. In the case of a firm, its stock value is the present value of future dividends discounted at the market determined required return. This implies a direct relation between the expectations of future earnings and the current stock value. The Rational Expectations Theory as identified by Forsythe, Palfrey, and Plott (1982) predicts that prices are formed on the basis of the expected future payouts of the assets, including their resale value to third parties. Thus a rational expectations market is an efficient market because prices will reflect all information. Unexpected information should lead to a revision of probability beliefs and, hence, a change in stock prices.

Several studies document a positive relation between unexpected earnings and abnormal returns. Beaver, Clarke, and Wright (1979) report a positive relationship between abnormal portfolio returns and mean forecast errors. Joy, Litzenberger, and McEnally (1977) report that unanticipated favorable quarterly earnings announcements have a statistically significant association with abnormal returns over the subsequent 6 months. Niederhoffer and Regan (1972), using 1970-1971 security prices, find that stock prices are strongly dependent on both absolute earnings changes and earnings changes relative to analysts' estimates. Studying the 50 best and worst performing stocks, they find three important differentiating characteristics. The most important factor separating the best from the worst is profitability, followed by the size of the error of earnings forecasts, and the size of predicted earnings increases. The analysts consistently underestimate the earnings gains of the top 50 and just as consistently overestimate the same data for the bottom 50. Similar findings are reported by Elton, Gruber, and Gultekin (1984).

McNichols (1988) documents that the proportion of extreme negative to extreme positive stock price adjustments is greater at earnings report dates than during non earnings announcement periods. McNichols also finds that observed skewness of returns is higher for smaller firms than for larger firms. Damodaran (1987) provides theoretical support for this small firm skewness phenomenon by showing that bias in information release reduces skewness of returns.

As lower institutional ownership is associated with less intensive coverage, Aggarwal and Rao (1990), such firms are likely to reveal both good and bad news on the report dates. This conclusion is consistent with Woodruff and Senchack (1988) who find that positive and negative earnings surprises on report dates are most associated with stocks with relatively low levels of institutional ownership. Aggarwal and Rao (1990) find that skewness of equity returns is inversely related to the extent of institutional ownership. This implies that institutions have superior information to individuals and other analysts and use that earnings information to price securities before the earnings announcement.

There have been few studies of the stock market's reaction to earnings forecasts. The bulk of the research has centered around forecast accuracy. Benesh and Peterson (1986) find that securities that are the subject of significant earnings forecast revisions (a 5% or more change in the mean) tend to experience significant excess returns over the remainder of the year. Dowen and Bauman (1991), using 1977-1986 data, find that when the mean earnings per share forecast for a company rose between March and April, the stocks of those companies produced market adjusted abnormal returns for the remainder of the year. Hawkins, Chamberlin, and Daniel (1984) find that, during the 1975-1981 period, portfolios composed of the 20 stocks with the largest monthly upward revisions in mean earnings estimates subsequently experienced positive abnormal returns over the following year 75 percent of the time. Mendenhall (1991) reports a significant positive association between security analysts' earnings forecast revisions and the abnormal returns around subsequent earnings announcements. This implies that investors underestimate the persistent signal in revisions of the mean of earnings forecasts. A study by Peterson and Peterson (1982) finds a significant relationship between the change in the mean and variance of earnings forecasts and security returns over the following year, implying a relatively slow market reaction to forecast information. This is substantiated by Schneeweis and Strock (1985) who find that earnings forecast variance is generally a better predictor of actual security returns than beta.

The present study will test the market's reaction to information contained in the skewness of earnings forecast distributions. If the publication of skewed earnings forecasts is a unique and valuable event then a semi-strong form efficient market would quickly incorporate that information into the price of the underlying security. This study will test the explanatory power of skewness on any abnormal returns around the event data as well as variables previously reported to contribute to abnormal returns, the mean and variance of earnings forecasts.

Summary

Earnings forecasts by management are superior to those by analysts. However, the lack of widespread published forecasts by management, especially in years when earnings are expected to not meet stockholder expectations, means that management provides limited forecast information for investors and researchers. Analysts provide superior earnings forecasts over all historical based extrapolation methods, are relatively inexpensive, and are available to practitioners and researchers.

The mean of analysts' earnings forecasts is the best predictor of future earnings. The variance of those forecast is directly related to the magnitude of the forecast error. The major forecasting services implicitly assume that the distributions of analysts' forecasts are normal or that skewness is not significant in forecasting earnings. Peterson and Peterson (1982) document the existence of skewed earnings forecast distributions. Other studies have implied biases by analysts in their forecasts of earnings but none of the studies have tested for significant skewness of earnings forecast distributions.

The findings of two studies, Aggarwal and Rao (1990) and O'Brien (1988) provide possible explanations for the existence of skewness of earnings forecasts. Aggarwal and Rao find that the level of institutional ownership of a firm is inversely related to security returns surrounding earnings announcement dates. Abnormal returns decline with increasing levels of institutional ownership. This implies that institutional owners have knowledge of earnings information prior to its release. The nonnormal earnings forecast distributions can be a result of asymmetric information.

There is a strong theoretical and empirical relationship between corporate earnings and security prices. A semi-strong form efficient market will incorporate any new and valuable earnings information into the price of the underlying security. The market does react quickly to unexpected earnings announcements. However, much of the information has already been priced before the earnings announcement for large firms and for firms with large institutional ownership. This is evidence of an efficient market for these firms.

Tests of the securities market's reaction to earnings forecast announcements find that securities with significant mean forecast revisions tend to experience significant excess returns for the remainder of the year. Peterson and Peterson (1982) find a significant relationship between the variance of earnings forecasts and security returns for the following year, implying a relatively slow reaction by the market to forecast information. This suggests that the market ignores the initial publication of information contained in mean forecast revisions. This study will replicate the analysis of variance study to include abnormal returns surrounding the release of forecast information and extend it to include skewness of earnings forecasts.

Chapter three will formulate and describe the hypotheses to be tested in this study.

CHAPTER III

STATEMENT OF HYPOTHESES

Introduction

There are four main purposes of this study. The first purpose is to determine the existence of skewness of earnings forecast distributions. Second, the skewness of the distributions is examined for significant information with respect to unexpected earnings. Next, an examination of determinants of skewness of earnings forecast distributions is conducted. Finally, this study examines the market's use of information contained in the skewness of the earnings forecast distributions to price the underlying stock.

None of the referenced studies have used the same data base used in this study. The **I/B/E/S** earnings forecasts from 1983 to 1990 is the data base from which the sample in this study is drawn. This sample will be examined to insure that characteristics in the areas of unexpected earnings and the variance of the earnings forecast distributions are similar to those of previous studies.

Studies by Collins et al. (1980), Armstrong (1983), Conroy and Harris (1987), and Brown et al. (1987) have shown that the mean of earnings forecasts is the best known predictor of actual earnings. This study will replicate the tests for correlation between variance of earnings forecast and unexpected earnings. Tests such as those of Elton, Gruber and Gultekin (1988), Woodruff (1984), and Daley, Senkow and Vigeland (1988) provide evidence of a positive correlation between the variance of earnings forecasts and unexpected corporate earnings. Unexpected earnings are defined as the difference between actual annual earnings and expected earnings (the mean of earnings forecasts), divided by expected earnings to adjust for scale.

$$UNEXP_{jt} = (EPS_{jt} - MEAN_{jt})/MEAN_{jt} \qquad (3.1)$$

where

$UNEXP_{jt}$ = unexpected earnings (scaled by mean forecast) for firm j in year t.

$MEAN_{jt}$ = the mean of the earnings forecasts for firm j in year t, and

EPS_{jt} = the actual annual earnings for firm j in year t.

The uncertainty of future earnings is reflected in the magnitude of the disparity of earnings forecasts. The variance of analysts' earnings forecasts is a measure of the disparity of earnings forecasts. It is expected that as analysts become more uncertain of future earnings then the mean of their forecasts will be less accurate. Therefore, the variance of earnings forecasts should be positively correlated to unexpected earnings. In addition to variance this study will test for the existence of skewed earnings forecasts and examine the relationship that skewness has with actual corporate earnings and stock prices.

This chapter will state and provide reasoning for the nine hypotheses to be tested in this study.

Hypotheses

The Existence of Skewness

One aspect of earnings forecasts which has not been examined extensively is the existence of skewness of forecast distributions and its information content. The first examination is a test of the existence of skewness of earnings forecast distributions. It is not the intention of this study nor is it expected that all earnings forecast distributions will be nonnormal. This study contends that there are reasons to expect a significant number of distributions with significantly skewed characteristics.

There are four possible explanations for skewed earnings forecast distributions: (1) a few analysts have superior forecasting ability; (2) there exists asymmetric information among analysts; (3) there exists a lack of objectivity among a few analysts resulting in overly optimistic or pessimistic forecasts; and (4) a few analysts occasionally make very poor forecasts. In each case, if there exists a small group of analysts, relative to the total number, who make significantly different earnings forecasts than the general population of analysts then the distribution of forecasts will be skewed toward the small group's forecast, leading to the following hypothesis:

$H_{1,O}$: The monthly earnings forecast distribution is normal.

$H_{1,A}$: The monthly earnings forecast distribution is nonnormal.

If the W test statistic (Shapiro and Wilk, 1965) is less than the critical value for a significance level of .01, the null hypothesis of normality is rejected.

This study is primarily concerned with the existence of significantly skewed earnings forecast distributions, leading to the second hypothesis:

$H_{2,O}$: The monthly earnings forecast distribution has a skewness equal to zero.

$H_{2,A}$: The monthly earnings forecast distribution has a skewness that is significantly different from zero.

This study will use the Johnson S_U statistic (Z) to test the null hypothesis that skewness is equal to zero.

Information Contained in Earnings Forecast Distributions

The second purpose of this study is to determine if the skewness of earnings forecast distributions contains significant information of future unexpected earnings. Individual analysts can make randomly extreme forecasts over time. Referring back to the possible explanations for skewed forecast distributions, if the forecast distribution is skewed by extreme forecasts then it must be assumed that these large forecast errors are random over time and there would be no correlation between skewed distributions and unexpected earnings. Should the tendency of a few analysts to over or underestimate earnings be the overriding cause of the skewed distributions then a negative correlation between skewed earnings forecast distributions and unexpected earnings would result. If skewed earnings forecast distributions are the result of a few superior analysts or asymmetric information among analysts then the distribution of earnings forecasts will be skewed relative to the analysts with superior information or forecasting ability. This leads to the third hypothesis:

$H_{3,O}$: There is no relationship between skewness of earnings forecast distributions and unexpected earnings.

$H_{3,A}$: There is a positive relationship between skewness of earnings forecast distributions and unexpected earnings.

The null hypothesis will be rejected if the correlation coefficient is significantly different from zero at the .05 level.

Institutional Ownership's Role

If there is significant evidence that there are periods when some analysts have superior earnings forecasts in relation to other analysts then why are their forecasts better? One explanation is the role of institutional ownership in the securities market. A number of studies have examined the relationship between institutional ownership and security returns. Aggarwal and Rao (1990), Arbel and Strebel (1983), Arbel, Carvell and Strebel (1983) and Edelman and Baker (1987) find that institutionally "neglected" stocks earn market-adjusted excess returns compared to firms with large institutional ownership. The implication is that institutions have access to nonpublic information and as more institutions invest in a firm and gain access to this information, the market becomes more efficient in its pricing of those securities. The nonpublic information could be the result of direct contacts that these institutions have with corporate officials and are not necessarily illegal but more timely and accurate. The investing power of these institutions often demands the attention of corporate managers. It is reasonable to believe that institutional owners have access to nonpublic information or are better able to interpret public information which leads to more accurate earnings forecasts. If the information significantly alters the analyst's earnings forecast, then it would also skew the distributions of earnings forecasts. As more institutions invest in a firm and, consequently, more analysts are privy to the nonpublic information, then the distribution of earnings forecasts would become dominated by informed analysts and would tend to resemble a less skewed or normal distribution. As institutional ownership decreases, the opportunity for all earnings forecasters of a particular firm to gain private information diminishes and the resulting distribution of forecasts is skewed toward the mean of the informed forecasters. This leads to the forth hypothesis:

$H_{4,o}$: There is no relationship between the magnitude of skewness of earnings forecast distributions and institutional ownership.

$H_{4,A}$: There is a negative relationship between the magnitude of skewness of earnings forecast distributions and institutional ownership.

The null hypothesis will be rejected if the correlation coefficient is significantly different from zero at the .05 level.

Biased Earnings Forecasts

In addition to asymmetric information, a tendency of analysts to be biased in their earnings forecasts could result in skewed forecast distributions. If analysts have the same information and are not biased, it is reasonable to believe that they will produce the same earnings forecasts. Any differences in earnings forecasts among analysts are assumed to be random and nonbiased. The resulting distribution will be normal and the mean will be an unbiased estimate of actual future earnings. If all analysts are biased, meaning they are consistently either too optimistic or pessimistic in their forecasts of earnings, a normal distribution of forecast will persist with a biased mean. It is reasonable to believe that while some analysts will be biased, not all analysts will be biased in their forecast of earnings. If some analysts are superior forecasters (not biased) then these analysts will skew the distribution toward the actual earnings. The skewness of the forecast distribution will be positively correlated to the sign and magnitude of the bias or unexpected earnings (actual earnings minus the mean of the forecasts). If most of the analysts are not biased in their estimate of earnings and only a few are biased, then the analysts with biased forecasts will skew the distribution away from the actual earnings. The skewness of the earnings forecast distribution will be negatively correlated to the sign and magnitude of the bias or unexpected earnings.

A general tendency of analysts to be biased in their earnings forecasts would be consistent with the correlation between unexpected earnings and the skewness of earnings forecast distributions. The expected bias related to skewed earnings forecast distributions leads to the fifth and sixth hypotheses:

$H_{5,O}$: Earnings forecasts with skewed distributions are not biased.

$H_{5,A}$: Earnings forecasts with skewed distributions are significantly biased.

The null hypothesis will be rejected if the mean of the unexpected earnings for skewed earnings forecast distributions is significantly different from zero at the .05 level. Furthermore, the existence of unbiased analysts for skewed earnings forecast distributions would shift the mean of the unexpected earnings towards zero relative to the mean of the unexpected earnings for normal earnings forecast distributions.

$H_{6,O}$: The bias exhibited by earnings forecasters with skewed distributions is equal to the bias exhibited by earnings forecasters with normal distributions.

$H_{6,A}$: The bias exhibited by earnings forecasters with skewed distributions is significantly different than that by forecasters with normal distributions.

The null hypothesis will be rejected if the means of the unexpected earnings for normal and skewed distributions are significantly different from each other at the .05 level.

Market Response to Earnings Forecasts

Of equal concern is the market's use of the information contained in the earnings forecast distributions. This study examines whether the market uses information contained in the skewness of analysts' forecasts to price the underlying security. As this information is readily available and relatively inexpensive to any financial firm, a semi-strong form efficient market will incorporate any new valuable public information into security prices. If the information leads to expectations of higher future earnings, then the stock price should increase and vice a versa if the information leads to expectations of lower future earnings. The change in predicted stock prices leads to the seventh and eighth hypotheses:

$H_{7,o}$: There is no stock price effect from the publication of positively skewed earnings forecast distributions.

$H_{7,A}$: There are positive abnormal returns on the underlying security following the publication of positively skewed earnings forecast distributions.

If abnormal returns are positive and significantly different from zero at the .05 level, the null hypothesis is rejected.

$H_{8,o}$: There is no stock price effect from the publication of negatively skewed earnings forecast distributions.

$H_{8,A}$: There are negative abnormal returns on the underlying security following the publication of negatively skewed earnings forecast distributions.

If abnormal returns are negative and significantly different from zero at the .05 level, the null hypothesis is rejected.

An additional test can provide further evidence consistent with the hypothesis that skewness of the earnings forecast distribution contains valuable information of future earnings. If the market is semi-strong form efficient, then any new and valuable information should be quickly reflected in stock prices. If the skewness of earnings forecast distributions reflects asymmetric information and is positively correlated to unexpected future earnings, then a semi-strong form efficient market would use the skewness information to price the stock. If abnormal returns on the underlying security exists following the publication of skewed distributions, this study predicts that the influence on the stock price is a result of the new information revealed in the skewness of the earnings forecast distribution. This leads to the final hypothesis:

$H_{9,O}$: There is no relationship between abnormal returns and skewed earnings forecast distributions.

$H_{9,A}$: There is a positive relationship between abnormal returns and skewed earnings forecast distributions.

The null hypothesis will be rejected if the regression coefficient is positive and significantly different from zero at the .05 level.

The next chapter will outline the methodology to be used to test these hypotheses.

CHAPTER IV

METHODOLOGY

Research Design

Introduction

As stated previously, the purposes of this study are: to investigate whether the skewness of earnings forecasts distributions contain significant information of future earnings; and if this information exists, to examine the stock market's reaction to this earnings information.

The testing of the hypotheses developed earlier requires the existence of skewness of earnings forecast distributions. The first step is to examine the characteristics of this study's total sample and compare it with the characteristics of samples in other studies. Daley, Senkow, and Vigeland (1988) report mean and standard deviations of unexpected earnings and forecast variance (both scaled by mean forecast). Their sample includes forecasts from 1977 to 1979. This study also finds descriptive statistics for the variables of unexpected earnings and variance. The variables as defined by Daley, Senkow, and Vigeland (1988) are:

$$UNEXP1_{jt} = (EPS_{jt} - MEAN_{jt})/MEAN_{jt} \tag{4.1}$$

$$UNEXP2_{jt} = ABS(UNEXP1_{jt}) \tag{4.2}$$

$$MEAN_{jt} = \frac{1}{n_j}\sum_{i=1}^{N} x_{ijt} \tag{4.3}$$

$$VAR_{jt} = \frac{1}{\left(n_j - 1\right)}\sum_{i=1}^{N}\left(x_{ijt} - MEAN_{jt}\right)^2 \tag{4.4}$$

where

$UNEXP1_{jt}$ = unexpected earnings (scaled by mean forecast) for firm j in year t.

$UNEXP2_{jt}$ = the absolute value of unexpected earnings (scaled by mean forecast),

$MEAN_{jt}$ = the mean of the earnings forecasts for firm j in year t,

VAR_{jt} = the variance of the earnings forecasts for firm j in year t,

EPS_{jt} = the actual annual earnings for firm j in year t,

x_{ijt} = earnings forecast from analyst i for firm j in year t, and

n_j = the number of earnings forecasts for firm j.

A key assumption of the now standard Sharpe (1964) and Lintner (1965) capital asset pricing model is that investors have homogeneous expectations of asset returns. All investors are assumed to have identical estimates of the expected return and the probability distribution of returns for all securities. Miller (1977) contends that while the future is uncertain and forecasts are very difficult to estimate, it is unlikely that all investors make identical estimates of the return and risk of every security. Bart and Masse (1981) report a strong indication that market participants' return expectations for a particular stock and across stocks are not homogeneous. Consistent with established theory, buyers of a stock are found to be more optimistic about its future price behavior than sellers. In practice, the very concept of uncertainty as defined by Miller (1977), implies that reasonable investors may differ in their forecasts. This fact is seen in the forecasts of earnings. The existence of companies that gather earnings forecasts from professional analysts and sell the characteristics of the earnings forecast distributions to market participants is evidence of heterogeneous expectations of future corporate earnings.

Tests of Normality

It is not a requirement of this study, nor is it expected, that all earnings forecast distributions will be nonnormal. The purpose is to determine if skewness, when it exists, provides information about future earnings.

There are many statistical tests of normality [see D'Agostino and Stephens, 1986 (ch. 9) for an extensive review]. These tests of normality can be grouped into five categories: Chi-square test, empirical distribution function (EDF) tests, moment tests, regression tests, and miscellaneous tests. The first four of these normality tests will be discussed and the reasons for using certain tests and not considering other tests will be indicated. Due to the large number of tests in the fifth category of "miscellaneous" test these will not be discussed in detail.[1]

D'Agostino and Stephens (1986) state the chi-square test should not be used in testing departures from normality when the full ungrouped sample of data is available because other tests are more powerful. In general, the chi-square test is not a powerful test of normality. Given the other four tests are more powerful than the chi-square, this study will not use the chi-square test to test for normality.

Two of the most prominent tests based on the empirical distribution function are the Kolmogorov (1933)-Smirnov (1939) test and the Anderson-Darling A2 Test (1954). The Kolmogorov-Smirnov test has poor power in comparison to the other tests available, especially with small sample sizes

[1]This section is based on the work of Gribbin, D. W. "Analysis of the Distribution Properties of Cost Variances and Their Effects on the Cost Variance Investigation Decision." 1989.

like those in this study (D'Agostino, 1986). The Anderson-Darling A2 test is considered to be the most powerful of all the EDF tests but it has not been studied as extensively as the moments tests or the regression tests. Thus, it is unknown how the power of the Anderson-Darling A2 test compares with some of the other tests which have been studied and are considered to be the most powerful. Due to the reasons indicated above, neither the Kolmogorov-Smirnov test or the Anderson-Darling A2 test will be used in the present study.

The third category of tests for normality is that of moment tests. Pearson (1895) observed that deviations from normality could be characterized by the standardized third and fourth moments of a distribution. The third and fourth moments, respectively, of a normal distribution are determined as follows:

$$\sqrt{\beta_1} = \Sigma(x_i-\mu)^3 / \sigma^3 = 0 \qquad (4.5)$$

$$\beta_2 = \Sigma(x_i-\mu)^4 / \sigma^4 = 3 \qquad (4.6)$$

where

$\sqrt{\beta_1}$ = the skewness of the distribution,

β_2 = the kurtosis of the distribution,

μ = the mean of the distribution, and

σ = the standard deviation of the distribution.

The third standardized moment ($\sqrt{\beta_1}$) is a measure of the skewness of a distribution. If a distribution is symmetric about its mean, as is the normal distribution, $\sqrt{\beta_1} = 0$. Values of $\sqrt{\beta_1}$ not equal to 0 indicate skewness and nonnormality.

The fourth standardized moment (β_2) is a measure of the kurtosis or peakedness of a distribution. If the distribution is normal, $\beta_2 = 3$. Values of β_2 not equal to 3 indicate nonnormality. β_2 also indicates tail thickness of a distribution. Values of $\beta_2 > 3$ indicate distributions with "thicker" than normal tails and higher than normal peaks (leptokurtosis), and values of $\beta_2 < 3$ indicate flatter than normal distributions with "thinner" than normal tails (platokurtosis).

Pearson (1895) suggests that the standardized third and fourth moments of the sample can be used to judge nonnormality. The actual values of skewness and kurtosis for a sample are calculated as:

$$b_{1jt} = [\Sigma(x_{ijt}-MEAN_{jt})^3/(n-1)]/VAR_{jt}^{3/2} \qquad (4.7)$$

$$b_{2jt} = [\Sigma(x_{ijt}-MEAN_{jt})^4/(n-1)]/VAR_{jt}^{2} \qquad (4.8)$$

where, in this study,

b_{1jt} = the skewness of the earnings forecasts of firm j in year t, and

b_{2jt} = the kurtosis of the earnings forecasts of firm j in year t.

Among the many moment tests of normality, some attempt to detect nonnormality due to skewness while others attempt to detect nonnormality due to kurtosis. The more powerful "omnibus tests" of normality are those which consider both skewness and kurtosis. D'Agostino and Stephens (1986) indicate that the Shapiro-Wilk W test (Shapiro and Wilk, 1965) and the K_s^2 test (Bowman and Shenton, 1986) are two of the best omnibus tests available. The K_s^2 is a moment test of normality and the Shapiro-Wilk W test is a regression test of normality.

The K_s^2 test consists of calculating the sample skewness (b1) and kurtosis (b2). The couplet (b1,b2) is plotted on a 90% or 95% contour chart. If the plotted point is within the interval of the appropriate contour, the null hypothesis of normality is accepted. Due to the size of the sample used in this study, over 20,000 distributions, a manual plot of each point is impractical.

The fourth category of tests for normality is that of regression tests. The Shapiro-Wilk W test is a regression test of normality, It is considered by Bowman and Shenton (1986) as one of the two best omnibus tests available.

The Shapiro-Wilk W test statistic is determined as follows:

$$W = \frac{\left(\Sigma a_i x_i\right)^2}{\Sigma\left(x_i - \bar{x}\right)^2} \tag{4.9}$$

where

W = the Shapiro-Wilk test statistic,

x_i = the sample values, and

$\bar{x}$ = the mean of the sample distribution.

The sample values (x_i) are ordered from smallest to largest. The values are then multiplied by the weights a_i. The a_i values for n = 3 to 50 are given by Shapiro and Wilk (1965). The W value can be treated like an R^2 value. Large values of W indicate normality and small values indicate nonnormality. The computed W test statistic is compared with the critical values of W, which are also given by Shapiro and Wilk (1965). If the W test statistic is greater than or equal to the critical value then the null hypothesis of normality would be accepted. If the W test statistic is less than the critical value, it can be concluded that the data are not normally distributed.

Many studies have investigated the sensitivity of the various test of normality to determine if there is a single test that is optimal for all possible deviations from normality. These studies have investigated a wide range of nonnormal populations for a variety of sample sizes. The results of these studies indicate no one test is optimal for all possible deviations from normality. However, D'Agostino and Stephens (1986) state that the Shapiro-Wilk W test is a very sensitive omnibus test and for many skewed populations clearly the most powerful test. For these reasons, the Shapiro-Wilk W test will be used to test the earnings forecast data for normality.

There are also many tests for skewness. However, most of these tests require the use of unique probability tables. These include the Probability Points Table For Skewness by D'Agostino and Tietjen (1973) and the Percentage Points Table For Skewness by Pearson (1954). Given the large number of earnings forecast distributions to be tested, this study will use the Johnson S_U test shown by D'Agostino (1970) to be adequate for sample sizes larger than 8. The Johnson S_U statistic (Z) is approximated as follows:

$$Z = \delta \ln\left[\frac{Y}{\alpha} + \sqrt{\left(1 + \left(\frac{Y}{\alpha}\right)^2\right)}\right] \tag{4.10}$$

where

$$Y = b_1\sqrt{\frac{(n + 1)(n + 3)}{(6n - 12)}}, \tag{4.11}$$

$$V = \frac{3(n^2 + 27n - 70)(n + 1)(n + 3)}{(n - 2)(n + 5)(n + 7)(n + 9)}, \tag{4.12}$$

$$W^2 = -1 + \sqrt{(2V - 2)}, \tag{4.13}$$

$$\delta = 1 / \sqrt{\ln W}, \tag{4.14}$$

$$\alpha = \sqrt{2/(W^2 - 1)} \text{ , and} \tag{4.15}$$

n = the number of observations.

The Z statistic is approximately a standard normal variable with a mean equal to zero and a variance of unity. Once Z is computed, rejection or acceptance is decided by reference to a standard normal distribution. Using a two-sided test with a .1 level of significance, the hypothesis that skewness is equal to zero is rejected if $|Z| \geq 1.65$. Significant values of Z would be consistent with the second alternative hypothesis that there are skewed earnings forecast distributions.

Tests of Correlation

This section will discuss the tests to be used to investigate the relationship between unexpected earnings and divergence of opinion. Correlation coefficients are estimated between the variance and skewness of the earnings forecast distributions and unexpected earnings (UNEXP1, UNEXP2) and tested for significance.

There are many statistical tests of association between variables. Most of the procedures only test for the presence of association and do not measure the degree of the relationship. This study uses the Pearson product-moment correlation coefficient, r, and the Spearman rank correlation coefficient, s. These tests measure the strength of the relationship between variables.

The Pearson product-moment correlation coefficient does assume normality of variables. However, when the variables are measured on an ordinal scale and the sample size is large, as is this study's data, then r will provide similar results to nonparametric tests [see Kendall (1970)]. This methodology was used by Daley, Senkow, and Vigeland (1988) in their study of variance and unexpected earnings and will be used in this study for comparative purposes.

Under the null hypothesis that the correlation coefficient in the population is not significantly different from zero, the Pearson product-moment correlation coefficient, r, has a normal distribution and a two-tailed t-test is used to test for significant correlations. The correlation coefficient r can assume any value from -1 to +1 inclusive. A value of +1 signifies that the variables are perfectly positively correlated and a value of -1 is an indication that the variables are perfectly negatively correlated. The Pearson product-moment correlation coefficient is computed as follows:

$$r = \frac{\left[n(\Sigma XY) - (\Sigma X)(\Sigma Y)\right]}{\left\{\left[n\left(\Sigma X^2\right) - (\Sigma X)^2\right]\left[n\left(\Sigma Y^2\right) - (\Sigma Y)^2\right]\right\}^{1/2}} \tag{4.16}$$

where

r= the Pearson product-moment correlation coefficient,

Y= unexpected earnings, and

X= the correlated variable.

The formula for the t test is:

$$t = \frac{r(n-2)^{1/2}}{(1-r)^{1/2}} \tag{4.17}$$

with n-2 degrees of freedom.

The second measure of association used in this study is the Spearman (1904) rank correlation coefficient, s. This is a nonparametric procedure that requires the variables to be measured on an ordinal scale. Like Pearson's r, the Spearman correlation coefficient, s, can assume any value from -1 to +1, inclusive, with -1 and +1 indicating perfect correlation and 0 no relationship. Under the null hypothesis that the correlation coefficient in the population is not significantly different from zero, the

Spearman rank correlation coefficient, s, has a normal distribution and a two-tailed t test is used to test for significant correlations. The Spearman rank correlation coefficient is computed as follows:

$$S = \frac{\Sigma\left\{\left[R(X_i) - R(\overline{X})\right]\left[R(Y_i) - R(\overline{Y})\right]\right\}}{\left\{\Sigma\left[R(X_i) - R(\overline{X})\right]^2 \Sigma\left[R(Y_i) - R(\overline{Y})\right]^2\right\}^{1/2}} \tag{4.18}$$

where

S = the Spearman rank correlation coefficient,

$R(X_i)$ = the rank of value i for variable x, and

$R(Y_i)$ = the rank of value i for variable y.

The alternative for the third hypothesis posits that there is a positive relationship between skewness of earnings forecast distributions and unexpected earnings. The following correlations are tested using both the Pearson product-moment and Spearman rank correlation coefficients:

UNEXP2 with VR,

UNEXP2 with CHGVR,

UNEXP1 with SK,

UNEXP1 with CHGSK,

where

VR = the variance of the earnings forecast distribution standardized by the mean,

CHGVR = the percentage change in variance from the previous month,

SK = the skewness of the earnings forecast distribution, and

CHGSK = the percentage change in the skewness from the previous month.

A significantly positive correlation coefficient for skewness (SK) on unexpected earnings (UNEXP1) would be consistent with the third hypothesis that there is a positive association between skewness of analysts' earnings forecasts and the magnitude and sign of ex post deviations from expected earnings.

A Test of Asymmetric Information

It is hypothesized that institutional ownership might be correlated with the existence of skewed earnings forecast distributions. The extent of institutional ownership will be measured by the number of institutions holding the stock (NOI) and the percent of stock owned by institutions (PERIO). Pearson product-moment correlation coefficients, equation 4.16, and Spearman rank correlation coefficients, equation 4.18, are estimated between variance and the absolute value of skewness (ABS-SK) of the earnings forecast distributions on NOI and PERIO. An inverse relation between the magnitude of skewness and institutional ownership would be consistent with the forth hypothesis that skewed earnings forecast distributions are the result of asymmetric information among analysts.

A Test of Earnings Forecast Bias

If skewness of earnings forecast distributions is correlated to unexpected earnings, it is hypothesized that the skewness is a by-product of forecast bias. If forecasts are not biased, then the sum of unexpected earnings (actual earnings minus the mean of earnings forecasts) will be zero. Previous studies find that bias in earnings forecasts does exists. This finding suggests that analysts are either too optimistic or pessimistic in their forecast of earnings. This study uses a two tailed t-test to determine if analysts were consistently biased in their earnings forecasts during the sample period and if this bias is significantly different for normal versus skewed earnings forecast distributions.

The student t is a parametric test of the hypothesis that the mean of the sample data is equal to the expected value. The mean of the unexpected earnings, UNEXP1, is expected to be zero if the analysts are not biased in their earnings forecasts. The test statistic t is computed by:

$$t = \frac{\Sigma \text{UNEXP1} / n}{s / \sqrt{n}} \tag{4.19}$$

where

t = the student t test statistic, and

s = the standard deviation of the sample values,

A finding that the mean of UNEXP1 for skewed earnings forecast distributions is significantly different zero would be consistent with the hypothesis that skewed earnings forecast distributions are a by-product of bias by analysts.

The t statistic for testing the equality of means from two independent samples is:

$$t = \frac{\left(\overline{UNEXP1_S} - \overline{UNEXP1_N}\right)}{\sqrt{s^2\left(\frac{1}{n_S} + \frac{1}{n_N}\right)}} \tag{4.20}$$

where s^2 is the pooled variance,

$$s^2 = \frac{\left[(n_S - 1)s_S^2 + (n_N - 1)s_N^2\right]}{(n_S + n_N - 2)} \tag{4.21}$$

and where

$\overline{UNEXP1_s}$ = the mean of the UNEXP1 values for skewed earnings forecast distributions, and

$\overline{UNEXP1_N}$ = the mean of the UNEXP1 values for normal earnings forecast distributions.

A finding that the mean of UNEXP1 for skewed earnings forecast distributions is significantly less than the mean of UNEXP1 for normal earnings forecast distributions would be consistent with the sixth alternative hypothesis that skewed earnings forecast distributions are the result of a few unbiased analysts, while most analysts are biased in their forecast of earnings.

A Test of Market Response to Earnings forecasts

The final tests in this study are designed to see if the market considers the information contained in the mean, variance, and skewness of the earnings forecast distributions to be valuable. A semi-strong form efficient market should use valuable information to price the underlying securities. Any new and relevant information should be quickly and fully reflected in security prices. The market studies pertaining to earnings forecasts have focused on abnormal returns during the following fiscal year. Benesh and Peterson (1986) find that securities that are the subject of significant earnings forecast revisions (a 5 percent or more change in the mean) tend to experience significant excess returns over the remainder of the year. Mendenhall (1991) reports a significant positive association between security analysts' earnings forecast revisions and the abnormal returns around subsequent earnings announcements. This implies that investors underestimate the persistent signal in revisions of the mean of earnings forecasts. Peterson and Peterson (1982) find a significant relationship between the change in the mean and variance of earnings forecasts and security returns over the following year. This study will measure abnormal returns immediately following the **I/B/E/S** publication of skewed earnings forecasts. An efficient market will quickly and fully price the underlying security to reflect any valuable information contained in the skewness of earnings forecast distributions.

The seventh and eighth hypotheses that there exist abnormal returns following the publication of skewed earnings forecast distributions can be tested using event study methodology with the first date of publication by **I/B/E/S** on a particular security as the event date. Event study methodologies compare the actual return for a particular security to an estimate of what the return would have been using a particular market model. Brown and Warner (1985) have established procedures for measuring the extent of stock price reactions to events which affect them. They tested the single factor market model which is used in this study and found it to be robust in determining excess returns. The single factor market model is used to estimate the cumulative average abnormal return as the sum of the firm's excess returns during the event period. The event period extends from ten days before the publication of earnings forecasts to ten days after the publication. The security returns are assumed to follow a single factor market model:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + \varepsilon_{jt}, \tag{4.22}$$

where

R_{jt} = the rate of return of the common stock of firm j on day t,

R_{mt} = the rate of return of an equally weighted CRSP market index on day t,

ε_{jt} = a random variable that, by construction, must have an expected value of zero , and

β_j = a parameter that measures the sensitivity of R_{jt} to the market index.

The abnormal return for the security of the j^{th} firm on day t is defined as:

$$A_{jt} = R_{jt} - (a_j + B_j R_{mt}) \tag{4.23}$$

where

a_j = the ordinary least squares estimate of α_j , and

B_j = the ordinary least squares estimate of β_j.

The market model parameters, a_j and B_j, are calculated using returns from an estimation period of 220 days prior to the test period. The cumulative average abnormal return is:

$$CAAR_{T1,T2} = \frac{1}{N} \sum_{j=1}^{N} \sum_{t=T1}^{T2} A_{jt} \tag{4.24}$$

where

T1 = the beginning day,

T2 = the ending day, and

N = the total number of days.

This study predicts a price effect immediately following the publication of skewed earnings forecast distributions. If skewness does contain significant information of future earnings, then the security prices should quickly adjust for that information resulting in abnormal returns. The effect is predicted to be dependent upon the magnitude and sign of that skewness. In order to identify significant abnormal returns following the event date, the event dates are sorted by the sign of the skewness.

This study uses two test statistics to determine the existance of abnormal returns. The first test uses standarized abnormal returns to test the null hypothesis that $CAAR_{T1,T2}=0$ (Patell,1976). The $Z_{T1,T2}$ statistic follows the standard normal distribution and is:

$$Z_{T1,T2} = \frac{1}{\sqrt{N}} \sum_{j=1}^{N} Z^{j}_{T1,T2} \tag{4.25}$$

where

$$Z^j_{T1,T2} = \frac{1}{Q^j_{T1,T2}} \sum_{t=T1}^{T2} \frac{A_{jt}}{S_{jt}}, \tag{4.26}$$

$$Q^j_{T1,T2} = (T_2 - T_1 + 1) \frac{D_j - 2}{D_j - 4} \text{ , and} \tag{4.27}$$

D = the number of non-missing trading day returns used to estimate the parameters for firm j.

The second test is a nonparametric generalized sign z test. The null hypothesis for this test is that the fraction of positive returns during the test window is the same as in the estimation period (Cowan, 1992). This is a paired difference test using the normal approximation to the binomial probability distribution:

$$z = \frac{(y - .5n)}{.5\sqrt{n}} \tag{4.28}$$

where

y = the number of positive returns in the test window that exceed the number of positive returns in the extimation period and

n = the total number of paired observations.

The final hypothesis is that there is a positive relationship between abnormal returns and the skewness of earnings forecast distributions. This hypothesis is tested with a cross-sectional regression of the abnormal returns from the event study against skewness. Two other variables are added to the regression to account for mean and variance of the earnings forecast distribution of the underlying security, as follows:

$$CAAR_{T1,T2} = A_0 + A_1MEAN_{jt} + A_2VR_{jt} + A_3SK_{jt} \quad (4.29)$$

$$CAAR_{T1,T2} = A_0 + A_1CHGMEAN_{jt} + A_2CHGVR_{jt} + A_3CHGSK_{jt} \quad (4.30)$$

$$CAAR_{T1,T2} = A_0 + A_1CHGMEAN_{jt} + A_2CHGVR_{jt} + A_3SK_{jt} \quad (4.31)$$

where

$CHGMEAN_{JT}$ = the percentage change in the mean of earnings forecasts from the previous month for firm j in year t,

$CHGVR_{JT}$ = the percentage change in the variance of earnings forecasts from the previous month for firm j in year t, and

$CHGSK_{JT}$ = the percentage change in the skewness of earnings forecasts from the previous month for firm j in year t.

If the regression slope coefficient, A_3, is positive and significantly different from zero, the null hypothesis would be rejected. A significant A_3 would provide evidence consistent with skewness of earnings forecast distributions being used to predict future corporate earnings and causing abnormal returns on the underlying stock. This is consistent with a semi-strong form efficient market that quickly incorporates valuable information into stock prices.

Data

This study will evaluate earnings forecasts from 1983 through 1990. The yearly forecasts (by month) and corresponding annual earnings will be obtained from **I/B/E/S Inc.** data tapes. The institutional ownership data will be obtained from Standard and Poor's Corporation Stock Guide.

Common stock prices, returns on common stocks, and market index data will be obtained from the Center for Research in Security Prices (CRSP) data tapes, Graduate School of Business, University of Chicago. Daily data are recorded from July 2, 1962 to the present.

Data drawn from these files will be cross-referenced to ensure consistency and accuracy. Companies selected for analysis will satisfy the following criteria:

1) consensus forecasts reported by **I/B/E/S** represents ten or more analysts;
2) the earnings per share for the sample year are greater than $.10;
3) the mean of earnings forecasts for the sample year are greater than $.10;
4) the earnings forecasts the previous month are reported by **I/B/E/S**;

5) the institutional ownership for the sample month and the previous month are reported by Standard and Poor's Corporation Stock Guide; and

6) the CRSP tapes must contain daily stock returns and prices for 220 days prior to the earnings forecast.

Summary

This chapter outlines the methodology that this study uses to test its nine hypotheses. The first and second hypotheses are of normality and skewness of the sample earnings forecast distributions respectively. The Shapiro-Wilk W test statistic is used to test for the existence of nonnormal distributions. The Johnson S_U curve Z statistic is used to test for the existence of significantly skewed earnings forecast distributions.

The third alternative hypothesis posits that the skewness of earnings forecast distributions is correlated to unexpected earnings. The Pearson product-moment correlation coefficient and the Spearman rank correlation coefficient are used to test for significant positive correlation between the variance and skewness of the earnings forecast distributions and unexpected earnings.

The forth alternative hypothesis posits that the skewness of earnings forecast distributions is negatively correlated to institutional ownership. The Pearson product-moment correlation coefficient and the Spearman rank correlation coefficient is used to test for significant negative correlation between the skewness of earnings forecast distributions and institutional ownership. Institutional ownership is measured by the number of institutions holding the stock (NOI) and the percent of stock owned by institutions (PERIO). A significantly negative correlation coefficient between skewness and institutional ownership would be consistent with the hypothesis that skewed earnings forecast distributions are the result of asymmetric information among analysts.

The fifth and sixth hypotheses test for biased earnings forecasts. The mean of the unexpected earnings for skewed earnings forecasts, $UNEXP1_S$, is expected to be zero if the analysts are not biased in their earnings forecasts. The student t test statistic is used to test for a mean of $UNEXP1_S$ significantly different from zero and significantly different than the mean of unexpected earnings for normally distributed earnings forecasts, $UNEXP1_N$. A mean of $UNEXP1_S$ that is significantly different from zero and less than the mean of $UNEXP1_N$ would be consistent with the hypothesis that skewed earnings forecast distributions are a by-product of a few unbiased analysts, while all other analysts are biased in their forecast of earnings.

The final tests in this study are of the market's use of the earnings information contained in the mean, variance and skewness of the earnings forecast distributions to price the underlying security. The single factor market model is used to estimate cumulative average abnormal returns immediately following the publication of earnings forecasts by **I/B/E/S.** Significant positive and negative returns following the publication of positively and negatively skewed earnings forecasts respectively would be consistent with the seventh and eighth alternative hypothesis that the publication of the skewness of earnings forecast distributions impacts security prices. The final alternative hypothesis is that the information contained in the skewness of earnings forecast distributions is positively correlated to abnormal security returns. A cross-sectional regression of the skewness of earnings forecast distributions on cumulative average abnormal returns is used to test for a positively relationship. A significantly positive slope coefficient for skewness would be consistent with a securities market valuing the information contained in the skewness of earnings forecast distributions to price securties.

Chapter five will summarize the results of this study.

CHAPTER V

RESULTS

Introduction and Summary of Data

As stated in the introduction, the purposes of this study are: to develop and to test a model that posits the existence of skewed earnings distributions, to determine the information content of skewness as it relates to actual corporate earnings, and to examine the stock market's use of this information. This chapter will outline the procedures used to test the hypotheses and the results.

The **I/B/E/S** Detail Tapes are used to evaluate the distributions of earnings forecasts. There are 8 magnetic tapes with earnings forecast data from March, 1983 through June, 1991. The files are missing 12 months of data. The following data were put into a SAS readable format and stored in SAS files:

PDATE = date the stock price is recorded,

RUNDATE = date the data is computed by **I/B/E/S**,

PMON = month of the stock price,

PDAY = day of the stock price,

PYR = year of the stock price,

RUNMON = month the data are computed,

RUNDAY = day the data are computed,

RUNYR = year the data are computed,

CUSIP = the name of the company,

MONEPS = the month that actual earnings are reported,

YREPS = the year that actual earnings are reported,

EPS = the company's actual earnings per share,

INDNAME = the company's industry,

CANDFLAG= Canadian company's,

FY1EST = the one year earnings estimate,

NEST1 = the number of analysts making forecasts,

MEAN1 = the mean of the earnings forecast distribution,

MEDIAN1 = the median of the earnings forecast distribution and,

STD1 = the standard deviation of the earnings forecast distribution.

The above 20 variables represent one observation for one analyst's annual earnings forecast for one company during one month. There are 732,974 total observations stored on 8 SAS data files. The number of observations (analyst's forecasts) for any one company in a month varies from 1 to 51.

Tests of Hypotheses 1 and 2

The first two hypotheses concern the normality of earnings forecasts by analysts. This study posits that there are earnings forecast distributions that are significantly nonnormal and skewed. The first hypothesis is a test of normality.

The mean, variance, and skewness are calculated for each month's annual earnings forecasts by CUSIP. This study includes only those distributions with 10 or more forecasts per month, an earnings per share greater than $.10 in the forecast year, an earnings forecast distribution mean greater than $.10, and earnings forecasts reported by **I/B/E/S** the previous month resulting in a total of 16,529 testable forecast distributions.

The Shapiro-Wilk W test statistic is used to test for normality of earnings forecast distributions and is determined as follows:

$$W_{jt} = \frac{\left(\Sigma a_{ijt} x_{ijt}\right)^2}{\Sigma\left(x_{ijt} - \overline{x_{jt}}\right)^2} \qquad (4.9)$$

where

W_{jt} = Shapiro-Wilk statistic for firm j at time t,

a_{ijt} = the optimal weights for forecast i of firm j at time t,

x_{ijt} = analyst's earnings forecast i for firm j at time t,

$\overline{x_{jt}}$ = the mean of forecasts for firm j at time t.

The analysts' earnings forecasts in each distribution are ordered from smallest to largest. The forecast values are multiplied by the optimal weights a_{ijt}, given by Shapiro-Wilk (1965). Using significance levels of p=.01 and p=.001, each W statistic is compared with the critical values of W, also given by Shapiro-Wilk (1965).

Each of the 16,529 earnings forecast distributions is tested for Hypothesis 1, that the earnings forecast distributions is normally distributed. Using the Shapiro-Wilk W statistic, there are 6,505 earnings forecast distributions which have significant nonnormal distributions at the significance level p=.01. Thus, Hypothesis 1 is rejected 6,505 times out of 16,529 observations, a rejection rate of 39.4 percent, which is consistent with the predicted findings of the theoretical model. There are 3,622 earnings forecast distributionS which are significantly nonnormal at the .001 level.

Hypothesis 2 tests whether the nonnormal distributions have significant skewness measures. The Johnson S_U statistic (Z) is used to test for significant skewness and is approximated as follows:

$$Z = \delta \ln\left[\frac{Y}{\alpha} + \sqrt{\left(1 + \left(\frac{Y}{\alpha}\right)^2\right)}\right] \tag{4.10}$$

where

$$Y = b_1\sqrt{\frac{(n+1)(n+3)}{(6n-12)}}, \tag{4.11}$$

$$V = \frac{3(n^2 + 27n - 70)(n+1)(n+3)}{(n-2)(n+5)(n+7)(n+9)}, \tag{4.12}$$

$$W^2 = -1 + \sqrt{(2V - 2)}, \tag{4.13}$$

$$\delta = 1 / \sqrt{\ln W}, \tag{4.14}$$

$$\alpha = \sqrt{2/(W^2 - 1)} \text{ and,} \tag{4.15}$$

n = the number of observations.

Z is approximately a standard normal variable with a mean equal to zero and a variance of unity. Once Z is computed, rejection or acceptance is decided by reference to a standard normal distribution. Using a two-sided test with a .1 level of significance, the hypothesis that skewness is equal to zero is rejected if $|Z| \geq 1.65$.

Of the 3,622 earnings forecast distributions that are nonnormal, 3,136 distributions are significantly skewed at p=.1, see Table I. This is consistent with the Peterson and Peterson (1982) study. That study documents the existence of skewed earnings forecast distributions but does not provide statistical evidence of the number of skewed distributions.

Test of Hypothesis 3

The second test is an examination of the information contained within the skewness of earnings forecast distributions. Inorder to be consistent across all hypothesis tests, the 3,136 skewed earings forecast distributions are matched with instututional ownership data from the Standard and Poor's Corporation Stock Guide and trading data from the CRSP tapes. The 3,136 skewed distributions are reduced by 822 distributions that can not be matched with the Standard and Poor's Corporation Stock Guide. There are an additional 395 skewed distributions for which trading data for 220 days prior to the event date can not be obtained. The remaining 1,919 Skewed earnings forecast distributions are used for the remainder of the hypothesis tests.

As stated in the hypothesis, skewness is expected to be positively correlated to unexpected earnings. The forecast distributions are matched with the corresponding actual earnings data. Unexpected earnings are defined as:

$$UNEXP1_{jt} = (EPS_{jt} - MEAN_{jt})/MEAN_{jt} \tag{4.1}$$

$$UNEXP2_{jt} = abs(UNEXP1_{jt}) \tag{4.2}$$

This study uses the Pearson product-moment correlation coefficient, r, and the Spearman correlation coefficient, s, to measure the strength of the relationship between measures of variance and skewness of the earnings forecast distributions and unexpected earnings. The following correlations are tested:

UNEXP2 with VR

UNEXP2 with CHGVR

UNEXP1 with SK

UNEXP1 with CHGSK

where

VR = the variance of the earnings forecast distribution standardized by the mean,

CHGVR = the percentage change in variance from the previous month,

SK = the skewness of the earnings forecast distribution, and

CHGSK = the percentage change in the skewness from the previous month.

Table IIA contains a summary of sample descriptive statistics for the total sample of testable data, 16,529 distributions. The sample descriptive statistics reported by Daley, Senkow, and Vigeland (1988) are listed in parentheses below those of this study. The differences of the statistical nature of the two samples can be attributed to the size of the studies. The previous study includes only 100 earnings forecast distributions from June of 1977 through December of 1979. It also used distributions with as few as 4 and no more than 9 earnings forecasts in each distribution. This study includes 16,529 distributions from March of 1983 through June of 1991. The number of earnings forecasts in each distribution ranges from 10 to 51. The magnitude of this study is expected to provide a better representation of analysts' forecasts.

Tables IIB and IIC contain Pearson product-moment correlation coefficients, r, and Spearman correlation coefficients, s, respectively for the tested variables. Variance, VR, and the percentage change in variance from the previous month, CHGVR, are significantly correlated with the absolute value of unexpected earnings, UNEXP2, in both tests at the .01 level, consistent with previous studies. Daley, Senkow, and Vigeland (1988) report a Pearson product-moment correlation coefficient between variance and the absolute value of unexpected earnings of .347 (versus .215 for this study), which is significantly different from zero at $p<.01$. The higher correlation from the previous study could be due to market conditions in the two year study, the limited number of earnings forecasts for each distribution or the small number of earnings forecast distributions in the sample.

The results for skewness are mixed and inconclusive. Skewness is significantly correlated with unexpected earnings, UNEXP1, at the .01 level for the Spearman test in the general sample of data, but is not significantly correlated for the Pearson test. The lack of a clear significant correlation between skewness of earnings forecast distributions and unexpected earnings is expected since 81 percent of the earnings forecasts are not significantly skewed. The percentage change in skewness from the previous month is not significantly correlated to unexpected earnings. Appendix A contains a summary of correlation coefficients and t tests for significantly nonnormal earnings forecast distributions.

Table III contains a summary of the resulting correlation coefficients and t tests for those earnings forecast distributions with significant skewness (n=1,919). Variance and the percentage change in variance are significantly correlated with unexpected earnings in both tests at the .01 level, again, consistent with the Daley, Senkow, and Vigeland (1988) study. The percentage change in skewness is not significantly correlated to unexpected earnings. This could be due to the fact that skewness is equal to zero when the distribution is normal, distorting any measurement of the change in skewness from one month to the next. Also, since skewness is a measure of current expectations, a change in skewness is more likely to be correlated to a change in unexpected earnings.

Skewness is significant and positively correlated with unexpected earnings at the .01 level in both tests. Thus, Hypothesis 3 that there is no relationship between skewness of earnings forecast distributions and unexpected earnings is rejected. This finding is consistent with the idea that the skewness of earnings forecast distributions is the result of asymmetric information or biased forecasts. There are periods when some analysts are superior forecasters, either because they are not biased in their earnings forecast or they possess better information than other analysts and this information leads to a significantly different and superior earnings forecast.

Test of Hypothesis 4

The third step in this study is to examine institutional ownership's role as an explanation for skewed earnings forecast distributions. The previous test implies that skewed earnings forecast distributions are a result of a few superior earnings forecasts. It is hypothesized that one reason for analysts' superior forecasts is asymmetric information. It is reasonable to believe that superior analysts gain their knowledge as a result of a close financial relationship with the forecasted firm. If financial relationships contribute to asymmetric information among earnings forecasters, then a significantly negative correlation between institutional ownership and the magnitude of skewed earnings forecast distributions is expected. Asymmetric information would also contribute to higher variances of earnings forecast distributions. The variance of earings forecast distributions is expected to also be negatively correlated with institutional ownership. Institutional ownership is a measure of access to information and is not expected to affect the rate of change in expectations of future earnings, CHGVR.

The Standard and Poor's Corporation Stock Guide was used for institutional ownership data by month and CUSIP. Using equations 4.16, 4.17 and 4.18, the Pearson and Spearman correlation coefficients are computed for variance, VR, the percentage change in variance, CHGVR, and the absolute value of skewness of the earnings forecast distributions, ABS-SK, on 1) the number of institutional owners, NOI, and (2) the percent of stock owned by institutions, PERIO.

Table IV contains a summary of sample descriptive statistics and correlation coefficients for those earnings forecast distributions with significant skewness. There is a significant and negative correlation between both NOI and PERIO with variance and the absolute value of skewness of earnings forecast distributions at the .01 level for both the Pearson and Spearman tests. Thus, Hypothesis 4 that there is no relationship between the magnitude of skewness of earnings forecast distributions and institutional ownership is rejected. This result is consistent with skewed earnings forecast distributions being the result of asymmetric information among earnings forecasters. As expected, the percentage change in variance is not significantly correlated with either measure of institutional ownership. Appendix B contains a summary of sample descriptive statistics and correlation coefficients for significantly nonnormal earnings forecast distributions.

Tests of Hypotheses 5 and 6

The fourth step in this study is to test for the existence of biased earnings forecasts for those distributions that are skewed. In addition to asymmetric information, a tendency of analysts to be biased in their earnings forecasts could result in skewed forecast distributions. If analysts have the same information and are not biased, it is reasonable to believe that they will produce the same earnings forecasts. Any differences in earnings forecasts among analysts are assumed to be random and unbiased. The resulting distribution will be normal and the mean will be an unbiased estimate of future actual earnings.

Previous studies have reported a biased of all earnings forecasts. If all analysts are biased, meaning they are consistently either too optimistic or pessimistic in their forecasts of earnings, a normal distribution of forecast will persist with a biased mean. The unexpected earnings will be significantly different from zero.

It is hypothesized that skewed forecast distributions could be a by-product of forecast biased. It is reasonable to believe that while some analysts will be biased, not all analysts will be biased in their forecast of earnings. If some analysts are superior forecasters (not biased) then these analysts will skew the distribution toward the actual earnings. The skewness of the forecast distribution will be positively correlated to the sign and magnitude of the bias or unexpected earnings (actual earnings minus the mean of the forecasts). However, if most of the analysts are not biased in their estimate of earnings and only a few are biased, then the analysts with biased forecasts will skew the distribution away from the actual earnings. The skewness of the earnings forecast distribution will be negatively correlated to the sign and magnitude of the bias or unexpected earnings.

Table VA contains a summary of the t test for the hypothesis that unexpected earnings (UNEXP1) are equal to the expected value, 0, for all firms exhibiting a normal distribution of earnings forecasts at the .1 level, 9,042 observations, and also for those firms with a skewed distribution. The mean of UNEXP1 for normal earnings forecast distributions is -.088 and significantly different from 0 at the .001 level. This is consistent with previous studies that found analysts to be overly optimistic and biased in their forecasts of annual earnings (Elton, Gruber, and Gultekin (1984), Benesh and Peterson (1986), O'Brein (1988) and, DeBont and Thaler (1990)). Using the 1,919 observations for which the distribution of annual earnings forecasts is skewed, the mean of the unexpected earnings is -.074 and significantly different from 0 at the .001 level. Thus, hypothesis 5 that skewed earnings forecast distributions are not biased is rejected.

It is not enough to show biased earnings forecasts among skewed distributions, the bias must be significantly different from the bias associated with normally distributed earnings forecasts. Hypothesis 6 is that the mean of unexpected earnings for skewed distributions is not significantly different than the mean of unexpected earnings for normal distributions. The means of the normal and skewed distributions are similar in Table VA. A t test is conducted for differences of means of unexpected earnings for normal and skewed earnings forecast distributions. A t value of 1.98 (p=.047) was found, Table VB. The hypothesis that the means of unexpected earnings for the normal and skewed earnings forecast distributions are the same is rejected at the .05 level. The bias does appear to change with changes in the characteristics of earnings forecast distributions. The skewed earnings distributions are significantly less biased in their mean forecast of future earnings. Thus, hypothesis 6 is rejected which is consistent with skewed earnings forecast distributions being the result of some analysts being less biased in their forecast of earnings than the majority of forecasters. This is also consistent with the results of Hypothesis 3 that there is a positive relationship between skewness of earnings forecasts and unexpected earnings.

Tests of Hypotheses 7 and 8

The final two tests in this study are of the market's use of the earnings information contained in the mean, variance, and skewness of the earnings forecast distributions. The alternatives for the seventh and eighth hypotheses are that there are positive and negative abnormal returns following the publication of positively and negatively skewed earnings forecast distributions, respectively. Brown and Warner (1985) have established procedures for measuring the extent of stock price reactions to events which affect them. Daily abnormal returns were calculated using the single factor market model:

$$AR_{jt} = R_{jt} - (a_j + B_j R_{mt}) \tag{4.23}$$

The values for a_j and B_j are calculated using returns from an estimation period of 220 days prior to the test period. The event date is defined as the date of the earnings forecast publication by **I/B/E/S**. This date is normally the RUNDATE +2 days but **I/B/E/S** reports that the information was occasionally available to a limited number of subscribers as early as RUNDATE +1 day and occasionally as late as RUNDATE +3 days for all subscribers. Abnormal returns were calculated for those earnings forecast distributions with significant negative skewness and then again for those with significant positive skewness. This was done because the abnormal returns are expected to be positively correlated with the magnitude and sign of the skewness of the earnings forecast distributions. In order to identify significant abnormal returns, the negative and positive returns need to be isolated or they cancel each other out when averaged together. Tables VI and VII show the daily average abnormal returns for an 11 day window surrounding the earliest date that **I/B/E/S** could have published the earnings forecast distributions (day 0=RUNDATE +1 day). There are 906 positively skewed distributions and 1013 negatively skewed distributions. Note that days +1 and +2 have significantly positive abnormal returns for both positive and negative distributions at the .05 level for both the Z test and the generalized sign z test.

Table X shows the cumulative average abnormal return for the positive and negative distributions for windows (0,+1), (0,+2), (+1,+2). The cumulative average abnormal returns for both positively and negatively skewed earnings distributions are significantly positive at the .05 level for each of the three windows for both the Z test and the generalized sign z test. Thus, Hypotheses 7 and 8 are rejected which is consistent with the publication of skewed earnings forecast distributions having an effect on the underlying security price.

The existence of significant abnormal security returns around the announcement of skewed earnings forecast distributions by itself does not establish a relationship between the two events. The test of Hypothesis 9 is designed to evaluate stock price reaction to skewed earnings forecast distribution announcements. Another method of establishing a relationship between information announcements and market reaction is to compare abnormal returns on specific dates of a stock portfolio that has a significant information announcement with another stock portfolio for which there is no such information announcement. This study compares the abnormal returns immediately following the announcement of earnings forecast distributions containing significant skewness with the abnormal returns of a sample of earnings forecast distributions that are not significantly skewed at the .1 level (normal distributions).

Of the 16,529 earnings forecast distributions tested in this study, there are 9,042 normal distributions. Using a SAS random sample generator, 1,000 earnings forecast distributions were randomly chosen to represent a sample of distributions for which no significant information relative to skewness would be contained in the announcement of the earnings forecast distribution. Using the single factor market model (equations 4.23 and 4.24), average abnormal returns were calculated for an 11 day window surrounding the earliest date that **I/B/E/S** could have published the earnings forecast distributions (day 0= RUNDATE +1 day). Note that of the 1,000 observation, 153 observations were deleted for lack of daily stock returns and prices for the 220 days prior to the earnings forecast announcement. Table IX shows the daily average abnormal returns for the sample of normal earnings forecast distribution announcements. Note that there are significant negative abnormal returns at day 0 and significant positive abnormal returns at day +2 at the .01 level. Table VIII shows the daily average abnormal returns for all 1,919 skewed earnings forecast distribution announcements. Note that there are significant positive abnormal returns at days +1 and +2 at the .01 level. Table X contains a summary of cumulative average abnormal returns of the two portfolios for various windows.

If the mean cumulative average abnormal return (CAAR) for the portfolio of skewed earnings forecast distributions is significantly different than the mean CAAR for the portfolio of normal earnings forecast distributions then it can be inferred that the difference is the result of the information contained in the skewness. Using equations 4.20 and 4.21, a t-test is conducted for differences of means of the CAARs for normal and skewed earnings forecast distributions for various windows, [(0,0), (+1,+1), (0,+1), (0,+2), (+1,+2)]. Table XI contains the results of this test. Note that the mean CAARs are significantly different for all tested windows at the .1 level. The CAARs for the skewed distributions are significantly larger than the CAARs for the normal distributions. This is consistent with skewness providing significant information that the market uses to price the underlying security. The information contained in skewness of the earnings forecast distribution has a positive influence on security prices regardless of the sign of the skewness.

Test of Hypothesis 9

The alternative hypothesis for the last test is that there is a positive relationship between abnormal returns and the publication of the skewness of earnings forecast distributions. This hypothesis is tested by a cross-sectional regression of the cumulative average abnormal returns (CAAR) for the windows (0,0), (+1,+1), (0,+1), (0,+2) and (+1,+2), as follows:

$$CAAR_{T1,T2} = A_0 + A_1MEAN + A_2VR + A_3SK \qquad (4.29)$$

$$CAAR_{T1,T2} = A_0 + A_1CHGMEAN + A_2CHGVR + A_3CHGSK \qquad (4.30)$$

$$CAAR_{T1,T2} = A_0 + A_1CHGMEAN + A_2CHGVR + A_3SK \qquad (4.31)$$

Tables XII-A through XII-O show the results of these regressions. A summary of these results is in Table XIII. Note that Table XII-B and Table XII-G contain the only significant coefficients. The coefficients for mean (MEAN) and variance (VR) are found to significantly explain the cumulative average abnormal returns for day +1 at the .05 level (Table XII-B). The coefficient for the percentage change in skewness from the previous month (CHGSK) is found to significantly explain the cumulative average abnormal returns for day +1 at the .05 level (Table XII-G). However, the coefficient is so small (.00002) that its usefulness is questionable.

The finding that MEAN and VR are significant explanatory variables for abnormal returns following the announcement of earnings forecasts is not consistent with previous studies. It is the change in mean and variance that has been reported by Dowen and Bauman (1991), Hawkins, Chamerlin, and Daniel (1984), Benesh and Peterson (1986), and Peterson and Peterson (1982) to provide the highest level of explanation of abnormal returns. However, the percentage change in mean (CHGMEAN) and the percentage change in variance (CHGVR) are not significant in explaining abnormal returns following the release of earnings forecast data.

The existence of a skewed distribution is hypothesized to be evidence of a specific event that is unique to that set of earnings forecasts. Since the skewness is significantly correlated to future actual earnings then, if it is also valuable information, the market should revalue stock prices based on that information. However, Hypothesis 9 can not be rejected. There is no evidence that stock price reaction around the announcement of earnings forecast distributions is dependent upon the skewness of the distribution. Furthermore, the mean and variance of earnings forecast distributions do significantly explain stock price reactions at the announcement date.

Summary

This chapter contains the results of emperical tests of the theoretical model that is outlined in chapter one. The model postulates that it is reasonable to find skewed earnings forecast distributions. These skewed distributions are hypothesized to be the result of either extreme random forecast errors, asymmetric information and/or a bias among analysts.

This study finds that of the 16,529 earnings forecast distributions tested, there are 6,505 distributions that are significantly nonnormal at the .01 level, using the Shapiro-Wilk W statistic, and 3,136 distributions that are significantly skewed at the .1 level, using the Johnson S_U Z statistic. Using the Pearson and Spearman tests of correlation, this study finds that skewness of earnings forecast distributions is significant and positively correlated to unexpected earnings at the .01 level for both tests. This finding is consistent with the idea that the skewness of earnings forecast distributions is the result of asymmetric information and/or biased forecasts.

It is hypothesized that one reason for analysts' superior earnings forecasts is asymmetric information. It is reasonable to believe that superior analysts gain their knowledge as a result of a close financial relationship with the forecasted firm. If financial relationships contribute to asymmetric information among earning forecasters, then a significantly negative correlation between institutional ownership and the magnitude of the skewness of earnings forecast distributions is expected. This study finds a significant and negative correlation between both the number of institutional owners and the percentage of owners that are institutions with the absolute value of skewness of earnings forecast distributions at the .01 level for both the Pearson and Spearman tests. This result is consistent with skewed earnings forecast distributions being the result of asymmetric information among earning forecasters.

In addition to asymmetric information, a tendency of analysts to be biased in their earnings forecasts could result in skewed earnings forecast distributions. If analysts are not biased then the mean of the earnings forecast distribution will be an unbiased estimate of future actual earnings and unexpected earnings (UNEXP1) will be zero. Using a t-test, this study finds that the mean of UNEXP1 for all normal earnings forecast distributions, 9,042 observations, is significantly different from zero (-.088) at the .001 level. Using the 1,919 observations for which the distribution of annual earnings forecasts is skewed, the mean of the unexpected earnings is -.074 and significantly different from zero at the .001 level. A t-test for difference of means of unexpected earnings for normal and skewed earnings forecast distributions is conducted. The means for normal and skewed distributions are significantly different at the .05 level. The bias does appear to change with changes in the characteristics of earnings forecast distributions. The skewed earnings distributions are significantly less biased in the mean forecast of future earnings. This is consistent with skewed earnings forecast distributions being the result of some analysts being less biased in their forecast of earnings than the majority of forecasters.

The final tests in this study are of the markets' use of the earnings information contained in the mean, variance, and skewness of earnings forecast distributions. Using the single factor market model, this study finds that days +1 and +2 have significantly positive abnormal returns for both positively and negatively skewed distributions. In addition, this study finds that the mean CAARs for the skewed distributions are significantly larger than the mean CAARs for a sample of normal distributions for various windows immediately following the announcement of earnings forecast distributions. This is consistent with skewness providing significant information that the market uses to price the underlying security. However, a regression of skewness on abnormal returns does not find significant coefficients for skewness. The evidence of a stock price reaction that can be attributed to the skewness of earnings forecast distributions is inconclusive.

TABLE I

NUMBER OF EARNINGS FORECAST DISTRIBUTIONS

Below is a summary of the sample size of earnings forecast distributions used in this study[a].

TOTAL[b] DISTRIBUTIONS	NORMAL[c] DISTRIBUTIONS	NONNORMAL[d] DISTRIBUTIONS	NONNORMAL & SKEWED[e] DISTRIBUTIONS
16,529	9,042 (.1)	7,487 (.1)	3,136 (.1)
		6,505 (.01)	
		3,622 (.001)	

a)Numbers in parentheses are significance values, p.

b)The total sample of earnings forecast distributions that meet the critea for this study.

c)The number of earnings forecast distributions that are not significantly nonnormal at the .1 level as defined by the Shapiro-Wilk W test.

d)The number of earnings forecast distibutions that are significantly nonnormal as defined by the Shapiro-Wilk W test.

e)The number of earnings forecast distibutions that are significantly nonnormal and skewed as defined by the Shapiro-Wild W test and the Johnson S_U test.

TABLE II

ALL TEST DATA AND UNEXPECTED EARNINGS

Below are descriptive statistics and correlation coefficients for all earnings forecast distributions in this study. The sample consists of 16,529 observations.

A. SAMPLE DESCRIPTIVE STATISTICS[a]

VARIABLE[b]	MEAN	STD DEV	MINIMUM	MAXIMUM
UNEXP1	-0.0768 (-.0046)	0.4126 (.0795)	-0.9800 (-.3324)	27.2295 (0.1734)
UNEXP2	0.1915	0.3735	0.0000	27.2295
VR	0.0415 (0.0017)	0.2419 (.0035)	0.0000 (0.0000)	18.2893 (0.0249)
CHGVR	0.4757	4.4745	-0.9999	292.60
SK	-0.0117	1.0771	-6.0761	5.4866
CHGSK	0.0140	116.44	-7446.70	10492.0

B. PEARSON CORRELATION COEFFICIENTS[c]

	VR	CHGVR	SK	CHGSK
UNEXP1			0.0056 (.4689)	0.0066 (.3944)
UNEXP2	0.2154 (.0001)	0.0654 (.0001)		

C. SPEARMAN CORRELATION COEFFICIENTS[c]

	VR	CHGVR	SK	CHGSK
UNEXP1			0.0781 (.0001)	0.0114 (.1435)
UNEXP2	0.4332 (.0001)	0.0834 (.0001)		

a) Numbers in parentheses are values reported by Daley, Senkow, and Vigeland (1988).

b) Variable definitions are as follows: UNEXP1 is the unexpected earnings, UNEXP2 is the absolute value of unexpected earnings, VR is the variance of the earnings forecast distribution, CHGVR is the percentage change in variance from the previous month, SK is the skewness of the earnings forecast distribution, and CHGSK is the percentage change in skewness from the previous month.

c) Numbers in parentheses below the coefficients are significance values, p.

TABLE III

SKEWED DISTRIBUTIONS AND UNEXPECTED EARNINGS

Below are descriptive statistics and correlation coefficients for skewed earnings forecast distributions on unexpected earnings. The sample consists of 1,919 observations.

A. SAMPLE DESCRIPTIVE STATISTICS

VARIABLE[a]	MEAN	STD DEV	MINIMUM	MAXIMUM
UNEXP1	-0.0736	0.2875	-0.9545	2.6663
UNEXP2	0.1665	0.2456	0.0000	2.6663
VR	0.0480	0.1967	0.0000	4.1607
CHGVR	1.1439	6.9504	-0.9940	140.93
SK	-0.1451	2.1876	-5.7391	5.4866
CHGSK	-0.3570	45.6991	-563.35	1509.3

B. PEARSON CORRELATION COEFFICIENTS[b]

	VR	CHGVR	SK	CHGSK
UNEXP1			0.0559 (.0143)	0.0085 (.7108)
UNEXP2	0.2196 (.0001)	0.0613 (.0072)		

C. SPEARMAN CORRELATION COEFFICIENTS[b]

	VR	CHGVR	SK	CHGSK
UNEXP1			0.0817 (.0003)	0.0055 (.8106)
UNEXP2	0.4584 (.0001)	.1103 (.0001)		

a) Variable definitions are as follows: UNEXP1 is the unexpected earnings, UNEXP2 is the absolute value of unexpected earnings, VR is the variance of the earnings forecast distribution, CHGVR is the percentage change in variance from the previous month, SK is the skewness of the earnings forecast distribution, and CHGSK is the percentage change in skewness from the previous month.

b) Numbers in parentheses below the coefficients are significance values, p.

TABLE IV

INSTITUTIONAL OWNERSHIP AND SKEWED DISTRIBUTIONS

Below are sample descriptive statistics and correlation coefficients for earnings forecast distribution characteristics on institutional ownership. The sample includes 1,919 skewed earnings forecast distributions.

A. SAMPLE DESCRIPTIVE STATISTICS

VARIABLE[a]	MEAN	STD. DEV.	MINIMUM	MAXIMUM
VR	0.049	0.197	0.000	4.160
CHGVR	1.143	6.950	-0.994	140.9
ABS-SK	2.023	0.854	0.712	5.739
ABS-CHGSK	5.719	47.73	0.00	1509.3
NOI	421.56	264.4	3	1786
PERIO	16.413	9.511	0.143	90.73

B. PEARSON CORRELATION COEFFICIENTS[b]

	NOI	PERIO
VR	-0.066	-0.063
	(.0070)	(.0108)
CHGVR	-0.004	0.002
	(.8853)	(.9428)
ABS-SK	-0.125	-0.077
	(.0001)	(.0018)
ABS-CHGSK	-0.003	0.003
	(.9115)	(.9011)

C. SPEARMAN CORRELATION COEFFICIENTS

	NOI	PERIO
VR	-0.219	-0.220
	(.0001)	(.0001)
CHGVR	-0.035	-0.030
	(.1513)	(.2158)
ABS-SK	-0.181	-0.114
	(.0001)	(.0001)
ABS-CHGSK	0.059	0.076
	(.0157)	(.0019)

a) VR is the variance of the earnings forecast distribution, CHGVR is the percentage change in variance from the previous month, ABS-SK is the absolute value of skewness of the earnings forecast distribution, and ABS-CHGSK is the absolute value of the percentage change in skewness from the previous month, NOI is the number of institutional owners, PERIO is the percent of stock owned by institutions.

b) Numbers in parentheses below the coefficients are significance values, p.

TABLE V

A. TEST FOR BIAS

Below is a summary of the t test for the hypothesis that unexpected earnings (UNEXP1) are equal to the expected value, 0, for all firms exhibiting a normal distribution of earnings forecasts at the .1 level and for those firms with a skewed earnings forecast distribution.

UNEXP1	N	MEAN	STD DEV	T	PROB>|T|[a]
NORMAL DISTRIBUTION	9,042	-0.088	0.317	-40.99	.0001
SKEWED DISTRIBUTION	1,919	-0.074	0.288	-11.22	.0001

a)The significance level for the alternative hypothesis that the mean of the unexpected earnings is different from zero.

B. TEST FOR DIFFERENCE OF MEANS

Below is a summary of the t test for the hypothesis that the mean of UNEXP1 for normal earnings forecast distributions is equal to the mean of UNEXP1 for skewed earnings forecast distributions.

UNEXP1 MEAN		T	DEGREES OF FREEDOM	PROB>|T|[b]
NORMAL DISTRIBUTIONS	SKEWED DISTRIBUTIONS			
-0.088	-0.074	1.986	2,996	0.047

b)The significance level for the alternative hypothesis that the means of the unexpected earnings for normal and skewed earnings forecast distributions are different.

TABLE VI

AVERAGE ABNORMAL RETURNS FOR POSITIVELY

SKEWED EARNINGS FORECAST DISTRIBUTIONS

Below are average and mean abnormal returns as measured by the market model for the 906 positively skewed earnings forecast distributions. Day 0 is defined as the first day that earnings forecast information is available to the public.

DAY	AVERAGE ABNORMAL RETURN	MEDIAN ABNORMAL RETURN	Z[a]	POSITIVE: NEGATIVE	GENERALIZED SIGN Z[a]
-5	-.01%	-.08%	0.59	424:482	-0.63
-4	.17%	.19%	3.75***	517:389	5.55***
-3	.17%	.14%	4.31***	496:410	4.15***
-2	.01%	-.02%	-0.07	447:459	0.89
-1	.02%	-.02%	0.94	447:459	0.89
0	.03%	-.04%	0.69	440:466	0.43
+1	.08%	.09%	2.01*	481:425	3.16***
+2	.43%	.13%	7.58***	502:404	4.55***
+3	-.07%	-.03%	-0.79	442:464	0.56
+4	-.06%	-.14%	-0.92	406:500	-1.83*
+5	-.10%	-.18%	-2.17*	400:506	-2.23*

a)The asterisks denote significance levels; * = .05, ** = .01, *** = .001.

TABLE VII

AVERAGE ABNORMAL RETURNS FOR NEGATIVELY

SKEWED EARNINGS FORECAST DISTRIBUTIONS

Below are average and mean abnormal returns as measured by the market model for the 1013 negatively skewed earnings forecast distributions. Day 0 is defined as the first day that earnings forecast information is available to the public.

DAY	AVERAGE ABNORMAL RETURN	MEDIAN ABNORMAL RETURN	Z^a	POSITIVE NEGATIVE	GENERALIZED SIGN Z^a
-5	-.04%	-.05%	-0.39	486:527	-0.02
-4	.23%	.16%	5.21***	574:439	5.52***
-3	.06%	.01%	1.35	515:498	1.81*
-2	-.10%	-.18%	-2.73**	453:560	-2.09*
-1	-.03%	-.01%	-0.20	502:511	0.99
0	-.08%	-.08%	-1.12	484:529	-0.14
+1	.16%	.06%	3.87***	527:486	2.56**
+2	.28%	.02%	5.20***	518:495	2.00*
+3	-.03%	.00%	0.20	506:507	1.24
+4	-.13%	-.18%	-2.18*	445:568	-2.60**
+5	-.03%	-.08%	-0.05	475:538	-0.71

a) The asterisks denote significance levels; * = .05, ** = .01, *** = .001.

TABLE VIII

AVERAGE ABNORMAL RETURNS FOR ALL SKEWED

EARNINGS FORECAST DISTRIBUTIONS

Below are average and mean abnormal returns as measured by the market model for the 1,919 skewed earnings forecast distributions. Day 0 is defined as the first day that earnings forecast information is available to the public.

DAY	AVERAGE ABNORMAL RETURN	MEDIAN ABNORMAL RETURN	Z[a]	POSITIVE NEGATIVE	GENERALIZED SIGN Z[a]
-5	-0.02%	-0.07%	0.12	910:1009	-0.45
-4	0.20%	0.17%	6.36***	1091:828	7.82***
-3	0.11%	0.07%	3.94***	1011:908	4.17***
-2	-0.04%	-0.10%	-2.03*	900:1019	-0.91
-1	-0.01%	-0.01%	0.50	949:970	1.33
0	-0.03%	-0.06%	-0.33	924:995	0.19
+1	0.12%	0.07%	4.19***	1008:911	4.03***
+2	0.35%	0.08%	8.99***	1020:899	4.58***
+3	-0.05%	-0.02%	-0.40	948:971	1.29
+4	-0.10%	-0.17%	-2.21*	851:1068	-3.14***
+5	-0.06%	-0.12%	-1.52	875:1044	-2.05*

a)The asterisks denote significance levels; * = .05, ** = .01, *** = .001.

TABLE IX

AVERAGE ABNORMAL RETURNS FOR NORMAL

EARNINGS FORECAST DISTRIBUTIONS

Below are average and mean abnormal returns as measured by the market model for a sample of 847 normal earnings forecast distributions. Day 0 is defined as the first day that earnings forecast information is available to the public.

DAY	AVERAGE ABNORMAL RETURN	MEDIAN ABNORMAL RETURN	Z[a]	POSITIVE NEGATIVE	GENERALIZED SIGN Z[a]
-5	-0.05%	-0.11%	-0.22	379:468	-1.92*
-4	0.12%	0.17%	3.04**	467:380	4.13***
-3	0.14%	0.05%	3.34**	445:402	2.62**
-2	0.02%	-0.04%	0.05	409:438	0.14
-1	-0.01%	-0.05%	-0.44	406:441	-0.07
0	-0.18%	-0.15%	-3.33***	378:469	-1.99*
+1	0.00%	0.00%	1.46	422:425	1.04
+2	0.21%	0.04%	4.03***	440:407	2.27
+3	0.06%	-0.02%	0.57	415:431	0.59
+4	-0.23%	-0.23%	-4.10***	347:500	-4.12***
+5	0.04%	-0.03%	0.97	417:430	0.69

a)The asterisks denote significance levels; * = .05, ** = .01, *** = .001.

TABLE X

CUMULATIVE AVERAGE ABNORMAL RETURNS

Below are average and median cumulative abnormal returns for positively and negatively skewed, all skewed, and normal earnings forecast distributions for various windows.

FOR WINDOW 0 THROUGH +1

DISTRIBUTION	CAAR	MEDIAN CAR	Z[a]	POSITIVE NEGATIVE	GENERALIZED SIGN Z[a]
POSITIVE SKEWNESS	.10%	.13%	1.91*	476:430	2.82**
NEGATIVE SKEWNESS	.08%	.07%	1.95*	528:485	2.62**
ALL SKEWED	.09%	.12%	2.73**	1004:915	3.85***
NORMAL	-.18%	-.14%	-1.32	386:461	-1.44

FOR WINDOW 0 THROUGH +2

DISTRIBUTION	CAAR	MEDIAN CAR	Z[a]	POSITIVE NEGATIVE	GENERALIZED SIGN Z[a]
POSITIVE SKEWNESS	.53%	.18%	5.94***	492:414	3.89***
NEGATIVE SKEWNESS	.36%	.16%	4.60***	538:475	3.25***
ALL SKEWED	.44%	.16%	7.42***	1030:889	5.03***
NORMAL	.02%	-.06%	1.25	417:430	0.69

FOR WINDOW +1 THROUGH +2

DISTRIBUTION	CAAR	MEDIAN CAR	Z[a]	POSITIVE NEGATIVE	GENERALIZED SIGN Z[a]
POSITIVE SKEWNESS	.50%	.24%	6.78***	504:402	4.69***
NEGATIVE SKEWNESS	.43%	.14%	6.42***	544:469	3.63***
ALL SKEWED	.46%	.19%	9.32***	1048:871	5.86***
NORMAL	.23%	.05%	3.89***	436:411	2.00*

a)The asterisks denote significance levels; * = .05, ** = .01, *** = .001.

TABLE XI

TEST FOR DIFFERENCE OF CAAR MEANS

Below is a summary of the t test for the hypothesis that the mean of the CAARs[a] for normal earnings forecast distributions is equal to the mean of the CAARs for skewed earnings forecast distributions for various windows.

WINDOW	CAAR[a] MEAN		T	DEGREES O FREEDOM	ROB>|T|[b]
	NORMAL DISTRIBUTIONS	SKEWED DISTRIBUTIONS			
(0, 0)	-.18%	-.03%	2.59	2764	.0097
(+1,+1)	.00%	.12%	1.72	2764	.0862
(0,+1)	-.18%	.09%	2.93	2764	.0034
(0,+2)	.02%	.44%	2.90	1701	.0037
(+1,+2)	.23%	.46%	1.99	2764	.0468

a)CAAR is the cumulative average abnormal return.

b)The significance level for the alternative hypothesis that the means of the CAARs for normal and skewed earnings forecast distributions are different.

TABLE XII-A

CROSS-SECTIONAL REGRESSIONS

Dependent Variable: $CAAR_{(0,0)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 0) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	MEAN	VR	SK	R^2	F-STAT.[b]
(1)	-0.0000 (.9420)	-0.0000 (.7014)	0.0006 (.7448)	0.0002 (.1640)	.0013	0.806 (.4904)
(2)	0.0000 (.9300)	-0.0001 (.5611)			.0002	0.338 (.5611)
(3)	-0.0003 (.3651)		0.0007 (.6910)		.0001	0.158 (.6910)
(4)	-0.0002 (.4613)			0.0002 (.1419)	.0011	2.159 (.1419)
(5)	0.0000 (.9764)	-0.0001 (.5710)	0.0006 (.7069)		.0002	0.240 (.7870)
(6)	-0.0000 (.9805)	-0.0001 (.6934)		0.0002 (.1600)	.0012	1.157 (.3148)
(7)	-0.0002 (.4260)		0.0006 (.7352)	0.0002 (.1461)	.0012	1.136 (.3213)

a)Variable definitions are as follows: MEAN is the mean of the earnings forecast distribution, VR is the variance of the earnings forecast distribution, and SK is the skewness of the earnings forecast distribution.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-B

CROSS-SECTIONAL REGRESSIONS

Dependent Variable: $CAAR_{(1,1)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 1) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	MEAN	VR	SK	R^2	F-STAT.[b]
(1)	-0.0005 (.5439)	0.0004 (.0339)	0.0041 (.0442)	-0.0000 (.7943)	.0044	2.834 (.0370)
(2)	-0.0003 (.7445)	0.0004 (.0359)			.0023	4.409 (.0359)
(3)	0.0010 (.0140)		0.0039 (.0545)		.0019	3.700 (.0545)
(4)	0.0012 (.0031)			-0.0001 (.6470)	.0001	0.210 (.6470)
(5)	-0.0005 (.5301)	0.0004 (.0298)	0.0041 (.0450)		.0044	4.219 (.0148)
(6)	-0.0003 (.7567)	0.0004 (.0398)		-0.0000 (.8509)	.0023	2.221 (.1088)
(7)	0.0010 (.0160)		0.0040 (.0521)	-0.0001 (.5913)	.0021	1.994 (.1365)

a)Variable definitions are as follows: MEAN is the mean of the earnings forecast distribution, VR is the variance of the earnings forecast distribution, and SK is the skewness of the earnings forecast distribution.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-C

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(0,1)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 0 through day 1) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	MEAN	VR	SK	R^2	F-STAT.[b]
(1)	-0.0005 (.6152)	.0003 (.1749)	0.0047 (.0855)	0.0002 (.4967)	.0026	1.663 (.1729)
(2)	-0.0002 (.8492)	0.0003 (.2244)			.0008	1.477 (.2244)
(3)	0.0007 (.1999)		0.0046 (.0894)		.0015	2.888 (.0894)
(4)	0.0009 (.0772)			0.0001 (.5631)	.0002	0.334 (.5631)
(5)	-0.0005 (.6498)	0.0003 (.2005)	0.0047 (.0809)		.0024	2.264 (.1042)
(6)	-0.0003 (.8036)	0.0003 (.1934)		0.0002 (.4581)	.0011	1.014 (.3630)
(7)	0.0007 (.1882)		0.0046 (.0937)	0.0001 (.6101)	.0016	1.573 (.2076)

a)Variable definitions are as follows: MEAN is the mean of the earnings forecast distribution, VR is the variance of the earnings forecast distribution, and SK is the skewness of the earnings forecast distribution.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-D

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(0,2)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 0 through day 2) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	MEAN	VR	SK	R^2	F-STAT.[b]
(1)	0.0040 (.0175)	0.0001 (.7488)	-0.0004 (.9316)	0.0004 (.2505)	.0007	0.451 (.7163)
(2)	0.0042 (.0128)	0.0000 (.8602)			.0000	0.031 (.8602)
(3)	0.0044 (.0001)		-0.0002 (.9594)		.0000	0.003 (.9594)
(4)	0.0045 (.0001)			0.0004 (.2649)	.0006	1.244 (.2649)
(5)	0.0042 (.0136)	0.0000 (.8616)	-0.0002 (.9647)		.0000	0.016 (.9836)
(6)	0.0040 (.0168)	0.0001 (.7465)		0.0004 (.2513)	.0007	0.674 (.5099)
(7)	0.0045 (.0001)		-0.0004 (.9233)	0.0004 (.2637)	.0007	0.626 (.5347)

a) Variable definitions are as follows: MEAN is the mean of the earnings forecast distribution, VR is the variance of the earnings forecast distribution, and SK is the skewness of the earnings forecast distribution.

b) The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-E

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(1,2)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 1 through day 2) against various independent variables. The sample consists of 1918 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	MEAN	VR	SK	R^2	F-STAT.[b]
(1)	0.0041 (.0071)	0.0002 (.5946)	-0.0009 (.8077)	0.0002 (.5112)	.0004	0.231 (.8751)
(2)	0.0041 (.0060)	0.0002 (.6452)			.0001	0.212 (.6452)
(3)	0.0047 (.0001)		-0.0009 (.8127)		.0000	0.056 (.8127)
(4)	0.0047 (.0001)			0.0002 (.5594)	.0002	0.341 (.5594)
(5)	0.0042 (.0060)	0.0001 (.6514)	-0.0008 (.8260)		.0001	0.130 (.8780)
(6)	0.0040 (.0072)	0.0002 (.5888)		0.0002 (.5165)	.0003	0.317 (.7287)
(7)	0.0048 (.0001)		-0.0010 (.7942)	0.0002 (.5527)	.0002	0.204 (.8151)

a) Variable definitions are as follows: MEAN is the mean of the earnings forecast distribution, VR is the variance of the earnings forecast distribution, and SK is the skewness of the earnings forecast distribution.

b) The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-F

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(0,0)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 0) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	CHGSK	R^2	F-STAT.[b]
(1)	-0.0002 (.4899)	0.0008 (.5682)	-0.0000 (.4380)	-0.0000 (.9164)	.0005	0.315 (.8148)
(2)	-0.0003 (.4084)	0.0008 (.5636)			.0002	0.334 (.5636)
(3)	-0.0002 (.4853)		-0.0000 (.4360)		.0003	0.607 (.4360)
(4)	-0.0003 (.4032)			-0.0000 (.9251)	.0000	0.009 (.9251)
(5)	-0.0002 (.4902)	0.0008 (.5679)	-0.0000 (.4388)		.0005	0.467 (.6272)
(6)	-0.0003 (.4081)	0.0008 (.5639)		-0.0000 (.9265)	.0002	0.171 (.8428)
(7)	-0.0002 (.4851)		-0.0000 (.4351)	-0.0000 (.9150)	.0003	0.309 (.7341)

a)Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and CHGSK is the percentage change of the skewness of the earnings forecast distribution from the previous month.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-G

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(1,1)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 1) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	CHGSK	R^2	F-STAT.[b]
(1)	0.0013 (.0019)	0.0011 (.4786)	-0.0000 (.4846)	0.0000 (.0247)	.0032	2.032 (.1075)
(2)	0.0012 (.0027)	0.0011 (.4795)			.0003	0.500 (.4795)
(3)	0.0013 (.0021)		-0.0000 (.4587)		.0003	0.549 (.4587)
(4)	0.0012 (.0026)			0.0000 (.0241)	.0027	5.098 (.0241
(5)	0.0013 (.0020)	0.0011 (.4833)	-0.0000 (.4623)		.0005	0.520 (.5944)
(6)	0.0012 (.0025)	0.0011 (.4749)		0.0000 (.0240)	.0029	2.804 (.0608)
(7)	0.0013 (.0020)		-0.0000 (.4809)	0.0000 (.0248)	.0029	2.797 (.0613)

a)Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and CHGSK is the percentage change of the skewness of the earnings forecast distribution from the previous month.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-H

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(0,1)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 0 through day 1) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	CHGSK	R^2	F-STAT.[b]
(1)	0.0010 (.0573)	0.0019 (.3719)	-0.0001 (.3103)	0.0000 (.1039)	.0024	1.512 (.2095)
(2)	0.0009 (.0808)	0.0019 (.3702)			.0004	0.803 (.3702)
(3)	0.0010 (.0601)		-0.0001 (.2945)		.0006	1.099 (.2945)
(4)	0.0009 (.0807)			0.0000 (.1009)	.0014	2.693 (.1009)
(5)	0.0010 (.0585)	0.0019 (.3748)	-0.0001 (.2979)		.0010	0.944 (.3893)
(6)	0.0009 (.0785)	0.0019 (.3675)		0.0000 (.1004)	.0018	1.753 (.1736)
(7)	0.0010 (.0589)		-0.0001 (.3068)	0.0000 (.1045)	.0019	1.869 (.1545)

a)Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and CHGSK is the percentage change of the skewness of the earnings forecast distribution from the previous month.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-I

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(0,2)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 0 through day 2) against various independent variables. The sample consists of 1918 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	CHGSK	R^2	F-STAT.[b]
(1)	0.0046 (.0001)	0.0035 (.2832)	-0.0001 (.3494)	0.0000 (.2718)	.0017	1.094 (.3506)
(2)	0.0044 (.0001)	0.0035 (.2812)			.0006	1.162 (.2812)
(3)	0.0045 (.0001)		-0.0001 (.3358)		.0005	0.927 (.3358)
(4)	0.0044 (.0001)			0.0000 (.2665)	.0006	1.236 (.2665)
(5)	0.0046 (.0001)	0.0035 (.2847)	-0.0001 (.3402)		.0011	1.036 (.3550)
(6)	0.0044 (.0001)	0.0035 (.2797)		0.0000 (.2651)	.0013	1.202 (.3007)
(7)	0.0046 (.0001)		-0.0001 (.3449)	0.0000 (.2733)	.0011	1.064 (.3453)

a)Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and CHGSK is the percentage change of the skewness of the earnings forecast distribution from the previous month.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-J

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(1,2)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 1 through day 2) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	CHGSK	R^2	F-STAT.[b]
(1)	0.0048 (.0001)	0.0028 (.3454)	-0.0001 (.4860)	0.0000 (.2012)	.0016	1.015 (.3850)
(2)	0.0047 (.0001)	0.0028 (.3444)			.0005	0.894 (.3444)
(3)	0.0048 (.0001)		-.0001 (.4683)		.0003	0.526 (.4683)
(4)	0.0047 (.0001)			0.0000 (.1980)	.0009	1.658 (.1980)
(5)	0.0048 (.0001)	0.0027 (.3475)	-0.0001 (.4730)		.0007	0.705 (.4944)
(6)	0.0047 (.0001)	0.0028 (.3424)		0.0000 (.1970)	.0013	1.280 (.2783)
(7)	0.0048 (.0001)		-0.0001 (.4812)	0.0000 (.2022)	.0011	1.077 (.3408)

a)Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and CHGSK is the percentage change of the skewness of the earnings forecast distribution from the previous month.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-K

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(0,0)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 0) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	SK	R^2	F-STAT.[b]
(1)	-0.0002 (.5418)	0.0008 (.5355)	-0.0000 (.4996)	0.0002 (.1501)	.0016	1.002 (.3909)
(2)	-0.0003 (.4084)	0.0008 (.5636)			.0002	0.334 (.5636)
(3)	-0.0002 (.4853)		-0.0000 (.4360)		.0003	0.607 (.4360)
(4)	-0.0002 (.4613)			0.0002 (.1419)	.0011	2.159 (.1419)
(5)	-0.0002 (.4902)	0.0008 (.5679)	-0.0000 (.4388)		.0005	0.467 (.6272)
(6)	-0.0002 (.4679)	0.0008 (.5308)		0.0002 (.1366)	.0013	1.276 (.2795)
(7)	-0.0002 (.5356)		-0.0000 (.4955)	0.0002 (.1559)	.0014	1.311 (.2697)

a)Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and SK is the skewness of the earnings forecast distribution.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-L

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(1,1)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 1) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	SK	R^2	F-STAT.[b]
(1)	0.0012 (.0023)	0.0011 (.4939)	-0.0000 (.4436)	-0.0001 (.6272)	.0007	0.425 (.7348)
(2)	0.0012 (.0027)	0.0011 (.4795)			.0003	0.500 (.4795)
(3)	0.0013 (.0021)		-0.0000 (.4587)		.0003	0.549 (.4587)
(4)	0.0012 (.0031)			-0.0001 (.6470)	.0001	0.210 (.6470)
(5)	0.0013 (.0020)	0.0011 (.4833)	-0.0000 (.4623)		.0005	0.520 (.5944)
(6)	0.0012 (.0030)	0.0011 (.4888)		-0.0001 (.6638)	.0004	0.345 (.7086)
(7)	0.0012 (.0024)		-0.0000 (.4392)	-0.0001 (.6107)	.0004	0.404 (.6676)

a)Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and SK is the skewness of the earnings forecast distribution.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-M

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(0,1)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 0 through day 1) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	SK	R^2	F-STAT.[b]
(1)	0.0010 (.0551)	0.0019 (.3654)	-0.0001 (.3164)	0.0001 (.5899)	.0011	0.726 (.5365)
(2)	0.0009 (.0808)	0.0019 (.3702)			.0004	0.803 (.3702)
(3)	0.0010 (.0601)		-0.0001 (.2945)		.0006	1.099 (.2945)
(4)	0.0009 (.0772)			0.0001 (.5631)	.0002	0.334 (.5631)
(5)	0.0010 (.0585)	0.0019 (.3748)	-0.0001 (.2979)		.0010	0.944 (.3893)
(6)	0.0010 (.0747)	0.0019 (.3599)		0.0001 (.5430)	.0006	0.587 (.5563)
(7)	0.0010 (.0568)		-0.0001 (.3118)	0.0001 (.6110)	.0007	0.679 (.5073)

a) Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and SK is the skewness of the earnings forecast distribution.

b) The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-N

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(0,2)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 0 through day 2) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	SK	R^2	F-STAT.[b]
(1)	0.0046 (.0001)	0.0036 (.2687)	-0.0001 (.3800)	.0004 (.2761)	.0017	1.086 (.3536)
(2)	0.0044 (.0001)	0.0035 (.2812)			.0006	1.162 (.2812)
(3)	0.0045 (.0001)		-0.0001 (.3358)		.0005	0.927 (.3358)
(4)	0.0045 (.0001)			0.0004 (.2649)	.0006	1.244 (.2649)
(5)	0.0046 (.0001)	0.0035 (.2847)	-0.0001 (.3402)		.0011	1.036 (.3550)
(6)	0.0045 (.0001)	0.0036 (.2647)		0.0004 (.2496)	.0013	1.244 (.2884)
(7)	0.0046 (.0001)		-0.0001 (.3738)	0.0004 (.2927)	.0011	1.017 (.3617)

a)Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and SK is the skewness of the earnings forecast distribution.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XII-O

CROSS-SECTIONAL REGRESSION

Dependent Variable: $CAAR_{(1,2)}$

Below are estimated coefficients for a cross-sectional regression of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions (day 1 through day 2) against various independent variables. The sample consists of 1919 observations over the 1983-1990 time period. P-values are in parentheses.

INDEPENDENT VARIABLES[a]

	INTERCEPT	CHGMEAN	CHGVR	SK	R^2	F-STAT.[b]
(1)	0.0048 (.0001)	0.0028 (.3380)	-0.0001 (.4982)	0.0002 (.5700)	.0009	0.577 (.6300)
(2)	0.0047 (.0001)	0.0028 (.3444)			.0005	0.894 (.3444)
(3)	0.0048 (.0001)		-0.0001 (.4683)		.0003	0.526 (.4683)
(4)	0.0047 (.0001)			0.0002 (.5594)	.0002	0.341 (.5594)
(5)	0.0048 (.0001)	0.0027 (.3475)	-0.0001 (.4730)		.0007	0.705 (.4944)
(6)	0.0047 (.0001)	0.0028 (.3344)		0.0002 (.5382)	.0007	0.637 (.5292)
(7)	0.0048 (.0001)		-0.0001 (.4919)	0.0002 (.5920)	.0004	0.407 (.6659)

a)Variable definitions are as follows: CHGMEAN is the percentage change of the mean of the earnings forecast distribution from the previous month, CHGVR is the percentage change of the variance of the earnings forecast distribution from the previous month, and SK is the skewness of the earnings forecast distribution.

b)The F-statistic tests the hypothesis that all coefficients are different from zero. The p-values are shown in parentheses under the F-statistic.

TABLE XIII

SUMMARY OF CROSS-SECTIONAL REGRESSIONS

Below is a summary of the estimated coefficients for all the cross-sectional regressions of cumulative average abnormal returns (CAAR) for the period following publication of skewed earnings forecast distributions against independent variables. The sample consists of 1,919 observations from 1983-1990. P-values are in parentheses.

$CAAR = B_0 + B_1 MEAN + B_2 VR + B_3 SK$

VARIABLES	INTERCEPT	MEAN	VR	SK
CAAR(0,0)	-0.0000 (.9420)	-0.0001 (.7014)	0.0006 (.7448)	0.0002 (.1640)
CAAR(+1,+1)	-0.0005 (.5439)	0.0004 (.0339)	0.0041 (.0442)	-0.0000 (.7943)
CAAR(0,+1)	-0.0005 (.6152)	0.0003 (.1749)	0.0047 (.0855)	0.0002 (.4967)
CAAR(0,+2)	0.0040 (.0175)	0.0001 (.7488)	-0.0004 (.9316)	0.0004 (.2505)
CAAR(+1,+2)	0.0041 (.0071)	0.0002 (.5946)	-0.0009 (.8077)	0.0002 (.5112)

$CAAR = B_0 + B_1 CHGMEAN + B_2 CHGVR + B_3 CHGSK$

VARIABLES	INTERCEPT	CHGMEAN	CHGVR	CHGSK
CAAR(0,0)	-0.0002 (.4899)	0.0008 (.5682)	-0.0000 (.4380)	-0.0000 (.9164)
CAAR(+1,+1)	0.0013 (.0019)	0.0011 (.4786)	-0.0000 (.4846)	0.0000 (.0247)
CAAR(0,+1)	0.0010 (.0573)	0.0019 (.3719)	-0.0001 (.3103)	0.0000 (.1039)
CAAR(0,+2)	0.0046 (.0001)	0.0035 (.2832)	-0.0001 (.3494)	0.0000 (.2718)
CAAR(+1,+2)	0.0048 (.0001)	0.0028 (.3454)	-0.0001 (.4860)	0.0000 (.2012)

$CAAR = B_0 + B_1 CHGMEAN + B_2 CHGVR + B_3 SK$

VARIABLES	INTERCEPT	CHGMEAN	CHGVR	SK
CAAR(0,0)	-0.0002 (.5418)	0.0008 (.5355)	-0.0000 (.4996)	0.0002 (.1501)
CAAR(+1,+1)	0.0012 (.0023)	0.0011 (.4939)	-0.0000 (.4436)	-0.0001 (.6272)
CAAR(0,+1)	0.0010 (.0551)	0.0019 (.3654)	-0.0000 (.3164)	0.0001 (.5899)
CAAR(0,+2)	0.0046 (.0001)	0.0036 (.2687)	-0.0001 (.3800)	0.0004 (.2761)
CAAR(+1,+2)	0.0048 (.0001)	0.0028 (.3380)	-0.0001 (.4982)	0.0002 (.5700)

a)Variable definitions are as follows: MEAN, VR, and SK are the mean, variance, and skewness of the earnings forecast distributions, respectively. CHGMEAN, CHGVR, and CHGSK are the percentage changes of the mean, variance, and skewness from the previous month, respectively.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The research in this dissertation leads to several conclusions regarding the information contained in the skewness of earnings forecast distributions, explanations for skewness and the market's use of this information. The major contributions of this research are summarized in the following paragraphs along with practical implications and recommendations for future research.

First of all, this study develops a theoretical model to explain why skewed earnings forecast distributions exist. The model postulates that skewness is the result of either extreme random forecast errors, asymmetric information and/or a bias among analysts. If the Skewness is due to extreme random errors by analysts, the skewness will not be correlated with unexpected earnings. If the skewness of earnings forecast distributions is due to asymmetric information then the skewness will be positively correlated to unexpected earnings. If the skewness is the result of most earnings forecasts being biased and a few being unbiased, the skewness will be positively correlated to unexpected earnings. Finally, if the skewness is a result of a few biased earnings forecasts then the skewness will be negatively correlated to unexpected earnings.

If the market perceives the information contained in the skewness of earnings forecast distributions to be valuable, there should be a stock price reaction to the announcement of skewed distributions.

Empirical tests of the theoretical model in this dissertation provide evidence consistent with the model. First of all, 6,505 earnings forecast distributions were significantly nonnormal at the .01 level representing 39.4 percent of the 16,529 tested distributions. There are 3,622 earnings forecast distributions which are significantly nonnormal at the .001 level. Of these 3,622 distributions, 3,136 distributions are significantly skewed at the .1 level.

This study finds that the skewness of the earnings forecast distributions is significantly correlated to unexpected earnings (actual future earnings minus expected earnings, adjusted for size) at the .01 level. There is a positive relationship between skewness and unexpected earnings which is consistent with the skewness of earnings forecast distributions being the result of asymmetric information and/ or bias among forecasters. A more definitive test is a t-test of correlation coefficients for skewness with institutional ownership. Institutional ownership is used as a proxy for access to private information and defined as both the number of institutional owners (NOI) and the percentage of owners that are institutions (PERIO). Skewness of earnings forecast distributions is significantly correlated with both measures of institutional ownership at the .01 level. The correlation is negative which is consistent with skewness increasing as access to private information is limited to fewer earnings forecasters, thus magnifying the possibility of asymmetric information. Furthermore, a test of biased earnings forecasts is shown to exist and the bias is significantly less for skewed earnings forecast distributions than normal earnings forecast distributions. This is consistent with skewed earnings forecast distributions being the result of a few unbiased forecasters. These empirical tests provide evidence consistent with the theoretical model developed in this dissertation. Thus, the model developed in this dissertation provides an explanation for skewed earnings forecast distributions and its relationship with future earnings.

A second contribution from the research in this dissertation is evidence that the market values the information contained in the skewness of earnings forecast distributions to price the underlying stock. Cumulative average abnormal returns of .53 percent and .36 percent for positively and negatively skewed distributions, respectively, do exist over the three day period following the publication of skewed distributions. These abnormal returns are measured using single factor event study methodology and are statistically significant at the .001 level.

The mean cumulative average abnormal return (CAAR) for the portfolio of skewed earnings forecast distributions is significantly larger than the mean CAAR for a sample portfolio of normal earnings forecast distributions for the 3 day period immediately following the publication of the distributions. This is consistent with skewness providing significant information that the market uses to price the underlying security. However, a cross sectional regression of the earnings forecast distribution characteristics (mean, variance and skewness) on the abnormal returns does not provide evidence of a significant relationship between skewness of earnings forecast distributions and abnormal returns. While skewness is positively related to the abnormal returns, the relation is not statistically significant at the .05 level. These empirical tests provide evidence of a stock price reaction to the announcement of skewed earnings forecast distributions. However, there is conflicting evidence that the skewness is a significant factor in explaining the stock market reaction. This could be the result of a nonlinear relationship or that there are other economic factors contribution to the stock price reaction that have not been included in the regression analysis.

This study does not confirm the Peterson and Peterson (1982) study that finds a significant relationship between the change in mean and variance of earnings forecast distributions and abnormal returns. This study does find that the coefficients for mean and variance of the earnings forecast distribution are significant in the cross-sectional regression on the cumulative average abnormal return for day +1 at the .05 level.

Conclusions

Practical implications from the research in this dissertation relate to the importance of the skewness of earnings forecast distributions as information. The theoretical model shows that the skewness contains significant information of future earnings. Corporations that gather and publish earnings forecast information have available insight on improving the data they provide their consumers. The market has available insight to the value of the skewness of earnings forecast distributions. Investors can obtain estimates of skewness with currently published data or demand the explicit publication of skewness.

Finally, the research in this dissertation provides insights to additional research. The model developed in this dissertation may be useful in explaining other forecast distributions, such as inflation or crop yield forecasts. Should the skewness of earnings forecast distributions be published, a study of the markets use of this information would provide additional evidence of the value of that information. Additionally, a study of the earnings forecasters reaction to skewed distributions would provide more evidence of the value of this information. If skewness provides significant information of future earnings, the earnings forecasters should adjust their earnings forecasts in subsequent months in accordance with the information.

The finding that the publication of both positively and negatively skewed earnings forecast distributions resulted in positive abnormal returns suggests that the information contained in skewness is not dependent upon the sign of the skewness. The proposed model assumed that the sign of the skewness contained relevant information to future actual earnings. A study of the information differences for negative and positive skewness and reasons for these differences is needed.

In summary, the research in this dissertation has developed a model that provides a link between the skewness of earnings forecast distributions and future actual earnings. Empirical tests show there is a positive relationship between skewness and unexpected earnings. The skewness is directly related to institutional ownership of the underlying security providing evidence that asymmetric information is a contributor of skewed earnings forecast distributions. There is also evidence that the skewness is the result of fewer biased earnings forecasts. Thus, the empirical tests are consistent with the theoretical model. There is evidence of a stock price reaction to the announcement of skewed distributions. However, the abnormal returns surrounding skewed distribution announcements are not significantly explained by the skewness, mean or variance of earnings forecast distributions.

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APPENDIX A

NONNORMAL DISTRIBUTIONS AND UNEXPECTED EARNINGS

Table A-I contains a summary of the descriptive statistics, correlation coefficients, and t tests for the 3,622 significantly nonnormal earnings forecast distributions at the .001 level. Variance is significantly correlated with unexpected earnings in both tests at the .01 level, consistent with previous studies. Skewness is significantly positively correlated with unexpected earnings at the .01 level in both tests. This is consistent with the hypothesis that there are periods when some analysts are superior forecasters, either because they are unbiased in their earnings forecast or they poses better information than other analysts and this information leads to a significantly different and superior earnings forecasts.

An examination of the data reveals that there are three extreme outlier values of the variable UNEXP1. The values are 12.3, 9.5, and 7.8 while the fourth largest value is 4.8. When these forecast distributions are excluded, the skewness is still significantly positively correlated with unexpected earnings at the .02 level as reported in Table A-II.

TABLE A-I

NONNORMAL DISTRIBUTIONS AND UNEXPECTED EARNINGS

Below are descriptive statistics and correlation coefficients for nonnormal earnings forecast distributions on unexpected earnings. The sample consists of 3,622 observations.

A. SAMPLE DESCRIPTIVE STATISTICS

VARIABLE[a]	MEAN	STD DEV	MINIMUM	MAXIMUM
UNEXP1	-0.0692	0.4073	-0.9548	12.3213
UNEXP2	0.1683	0.3772	0.0000	12.3213
VR	0.0553	0.3469	0.0000	9.5923
SK	-0.1159	2.0441	-6.0761	5.4866

B. PEARSON CORRELATION COEFFICIENTS

	VR	SK
UNEXP1		0.0468 (.0048)
UNEXP2	0.2551 (.0001)	

C. SPEARMAN CORRELATION COEFFICIENTS

	VR	SK
UNEXP1		0.0915 (.0001)
UNEXP2	0.4511 (.0001)	

a) Variable definitions are as follows: UNEXP1 is the unexpected earnings, UNEXP2 is the absolute value of unexpected earnings, VR is the variance of the earnings forecast distribution, SK is the skewness of the earnings forecast distribution.

b)Numbers in parentheses below the coefficients are significance values, p.

TABLE A-II

NONNORMAL DISTRIBUTIONS EXCLUDING OUTLIERS AND

UNEXPECTED EARNINGS

Below are descriptive statistics and correlation coefficients for nonnormal earnings forecast distributions on unexpected earnings. The sample consists of 3,619 observations.

A. SAMPLE DESCRIPTIVE STATISTICS

VARIABLE[a]	MEAN	STD DEV	MINIMUM	MAXIMUM
UNEXP1	-0.0775	0.2839	-0.9548	4.8367
UNEXP2	0.1603	0.2468	0.0000	4.8367
VR	0.0545	0.3453	0.0000	9.5923
SK	-0.1176	2.0418	-6.0761	5.4866

B. PEARSON CORRELATION COEFFICIENTS[b]

	VR	SK
UNEXP1		0.0390 (.0189)
UNEXP2	0.2923 (.0001)	

C. SPEARMAN CORRELATION COEFFICIENTS[b]

	VR	SK
UNEXP1		0.0926 (.0001)
UNEXP2	0.4498 (.0001)	

a) Variable definitions are as follows: UNEXP1 is the unexpected earnings, UNEXP2 is the absolute value of unexpected earnings, VR is the variance of the earnings forecast distribution, SK is the skewness of the earnings forecast distribution.

b) Numbers in parentheses below the coefficients are significance values, p.

APPENDIX B

INSTITUTIONAL OWNERSHIP AND NONNORMAL DISTRIBUTIONS

Table B-I contains a summary of the correlation analysis of institutional ownership with variance and skewness of significantly nonnormal earnings forecast distributions. There is a significant and negative correlation between both NOI and PERIO with variance and the absolute value of skewness of earnings forecast distributions at the .02 level for both the Pearson and Spearman tests. This is consistent with the findings of the test for only skewed earnings forecast distributions and with skewed earnings forecast distributions being the result of asymmetric information among earnings forecasters.

TABLE B-I

INSTITUTIONAL OWNERSHIP AND NONNORMAL DISTRIBUTIONS

Below are sample descriptive statistics and correlation coefficients for earnings forecast distribution characteristics on institutional ownership. The sample includes 3,619 nonnormal earnings forecast distributions.

A. SAMPLE DESCRIPTIVE STATISTICS

	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
VR	0.050	0.243	0	6.309
ABS-SK	1.792	0.987	0	6.076
NOI	411.5	264.2	3	1786
PERIO	15.89	9.090	0.14	90.73

B. PEARSON CORRELATION COEFFICIENTS

	NOI	PERIO
VR	-0.052	-0.043
	(.007)	(.026)
ABS-SK	-0.132	-0.077
	(.0001)	(.0001)

C. SPEARMAN CORRELATION COEFFICIENTS

	NOI	PERIO
VR	-0.190	-0.186
	(.0001)	(.0001)
ABS-SK	-0.178	-0.090
	(.0001)	(.0001)

a)VR is the variance of the earnings forecast distribution, ABS-SK is the absolute value of skewness of the earnings forecast distribution, NOI is the number of institutional owners, PERIO is the percent of owners represented by institutions.

b)Numbers in parentheses below the coefficients are significance values, p.

2

VITA

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