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Analyzing the Analysts

Familiar headlines in the financial press announce that a company's earnings have "met analysts' expectations," "beat analysts' forecasts," or "disappointed analysts." A company with strong earnings may see its stock price drop if the earnings are not as strong as anticipated, and weak earnings may be good news if they are not as weak as was forecasted. In light of the importance attached by both the news media and the investor community to analyst forecasts, it is natural to ask how reliable these forecasts are. Reliability here includes both the magnitude and direction of forecast errors, which is to say both their variability and mean. Some have suggested that the financial industry creates incentives for analysts to be optimistic in their earnings forecasts. If true, this would result in forecast errors with a positive mean. Determining whether or not there is a bias in analyst forecasts is in large part a statistical issue.

The Forecast Process

An earnings forecast reported in the press is not ordinarily the forecast of a single analyst but rather a "consensus" figure reflecting the views of several people at several firms who follow a particular company. The forecasts are compiled by financial information services who then make the data available to their subscribers. Two of the best known services are I/B/E/S and Thom-

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son FirstCall¹. These services compile data on several financial measures; the most widely followed is earnings per share.

Hundreds of analysts at hundreds of brokerage firms submit forecasts to financial information services. For example, Thomson FirstCall accepts forecasts from any analyst that works for a major brokerage firm. The consensus figure is the median forecast submitted for a particular company over a particular horizon. The number of analysts forecasting annual earnings of a major corporation is typically in the range of 10 to 40; somewhat fewer forecasts are usually available for quarterly earnings.

Forecasts of quarterly earnings are compiled for the current quarter, the next quarter, and so on for about eight quarters, but few if any forecasts may be available beyond the first two. Forecasts of annual earnings are compiled for the current year and the next year.

A consensus forecast for the current year is reported once results for the previous year are known. In the case of a company whose fiscal year coincides with the calendar year, this means that the annual forecast may first be compiled at the end of April in the current year, after the previous year's earnings have been reported. In addition, analysts routinely revise their projections within the quarter or year they are forecasting.

To facilitate comparisons over time, financial information service providers typically include in their databases optional adjustments to historical data. This makes it possible to correct for stock splits, for example. Other things being equal, a two-for-one split cuts the earnings per share in half and would create the illusion of an enormous forecast error if no adjustment were made.

Are Analysts Optimists?

The bull market of the 1990s brought with it accusations that financial analysts bias their earnings forecasts. Specifically, brokerage firms' profits depend directly on commission revenues, and analyst compensation is also based, in part, on trading volume generated by their research. This potentially gives analysts an incentive to announce their forecasts early, in the hope of attracting attention and capturing greater trading volume. Also, analysts may have incentives to bias their forecasts to support the investment banking arms of their employers. To address this perception, several firms have instituted stricter rules limiting analysts' opportunities to profit from the stocks they follow and also stricter rules separating the firm's brokerage and investment banking operations.

Barring an analyst from trading in a stock does not necessarily eliminate all incentives for the analyst to overestimate earnings. An optimistic forecast

¹Publishing giant Thomson acquired I/B/E/S in 2001, and the two services will eventually be integrated.

may generate commissions; it may also curry favor with the company being followed, which may reciprocate with greater access in the future. The S.E.C. recently introduced a new rule, Regulation FD, that effectively prohibits companies from telling analysts any private information that is not also disclosed to the public. Even in the absence of an incentive to over- or underestimate earnings, the average forecast error could be positive or negative for several periods due to unexpected changes in an industry or the creation of a new industry.

The empirical evidence on a possible bias in analyst forecasts is mixed and controversial. The issue is clouded by the interplay between the forecasts and how firms manage their earnings. Forecasting the weather does not affect rainfall; but corporations pay close attention to analyst forecasts and may be willing to go to great lengths to avoid falling short of these targets.

The effect of deviating from a consensus forecast is asymmetric, or is at least widely perceived to be so. Conventional wisdom holds that the market penalizes a firm that disappoints more substantially than it rewards a firm that beats the consensus forecast. If a firm can manage its earnings to buffer fluctuations, it would have an incentive to reserve extra earnings in a good quarter to inflate earnings in a future bad quarter. Of course, a firm would not be able to disguise bad quarters indefinitely. This theory therefore predicts that the amounts by which firms fall short of forecasts will be greater than the amounts by which they exceed forecasts. Moreover, companies may have an incentive to systematically manage analysts' expectations by manipulating the information that is disclosed to them. This could result in a systematic bias in forecast errors, even if the analysts themselves were completely unbiased.

Data

Table 1 summarizes results of annual forecasts for eleven companies. For eight of the companies the summary is based on 20 years of forecasts from 1980 through 2000; for two of the companies only 19 years are available and for Microsoft only 13 years are available. Six of the companies are in the transportation sector (airlines or railroads) and five are technology companies.

The results reported for each company are based on percentage forecast error, defined as

$$\frac{\text{Forecast EPS} - \text{Actual EPS}}{\text{Share Price}},$$

where "EPS" is earnings per share and "Forecast EPS" is the consensus (median) forecast. Thus, a positive forecast error indicates an overestimate and a negative forecast error indicates an underestimate. Dividing by the share price makes it possible to compare errors across time and across companies.

		Mean	Std Dev	Count	Std Err	t-stat
American Airlines	AMR	5.78%	16.39%	20	3.66%	1.58
CSX	CSX	1.02%	1.95%	19	0.45%	2.28
Delta Airlines	DAL	3.58%	8.13%	19	1.87%	1.92
IBM	IBM	0.57%	2.56%	20	0.57%	0.99
Intel	INTC	-2.62%	3.25%	20	0.73%	-3.61
Microsoft	MSFT	-0.80%	1.14%	13	0.32%	-2.55
Natl. Semiconductor	NSC	0.65%	2.48%	20	0.55%	1.18
US Air	USAIR	1.00%	22.55%	20	5.04%	0.20
United Airlines	UAL	3.20%	9.06%	20	2.03%	1.58
Union Pacific	UNP	1.01%	1.48%	20	0.33%	3.04
Xerox	XRX	1.06%	1.75%	20	0.39%	2.72
All		1.37%	9.54%	211	0.66%	2.09

Table 1: Summary of forecast errors for eleven corporations

Table 1 shows that all but two of the eleven companies experienced positive mean forecast errors, which is suggestive of analyst optimism. Note, however, that the standard deviations of the forecast errors are very large, so it is not immediately clear which of the sample means is appreciably different from zero. Each standard error measures the variability in the estimate of the mean in the same row. Each t -statistic is calculated from the sample mean \bar{X} , sample standard deviation s , and sample mean n as

$$t = \frac{\bar{X} - 0}{s/\sqrt{n}}$$

and thus measures the distance from \bar{X} to zero in standard errors. The larger the t statistic, the stronger the evidence that the forecasts are systematically overestimating actual earnings.

Questions

Answer the questions below using the data in the **AnalystData** spreadsheet. The various tabs of the spreadsheet sort the data in different ways to facilitate calculations for these questions.

1. Calculate a 95% confidence interval for the proportion of forecast errors that are positive. Comment.
2. Calculate a 95% confidence interval for mean forecast error for transportation companies. Calculate a 95% confidence interval for technology companies. Calculate a 95% confidence interval for the difference between the two means.
3. Did forecast accuracy change from the 1980s to the 1990s? Execute a hypothesis test to compare the mean errors in the two decades. Clearly state the hypotheses and the conclusion.
4. Are forecasts based on more analysts more or less accurate than those based on fewer analysts? Carry out a hypothesis test to compare forecasts based on 20 or fewer analysts with forecasts based on more than 20 analysts.
5. There are 37 forecasts (same company, same period) for which our data includes specific forecasts submitted by Goldman Sachs and by Credit Suisse First Boston. Find the mean forecast error for each of these two brokerage houses. Use a matched pairs hypothesis test to determine whether the difference is statistically significant.
6. Give two distinct reasons why assumptions underlying the techniques you used in answering one or more of the questions above may be violated. Be specific.