Improving Analysts' Negative Earnings Forecasts

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In contrast to positive earnings forecasts, the negative earnings forecasts of security analysts are grossly optimistic. We adjusted negative earnings forecasts downward by varying amounts and evaluated forecast performance according to (1) forecast accuracy relative to the consensus, (2) the frequency of being closer to actual earnings than the consensus, and (3) the frequency with which adjusted forecasts underestimate actual earnings, thereby jeopardizing the analyst's relations with corporate managers. Relative forecast accuracy and the probability of beating the consensus are improved, without an inordinate increase in the probability of underestimating earnings, by adjusting negative forecasts downward by a small amount.

In his review of the academic research on security analysts' forecasts of earnings, Brown (1993) concluded that analysts' earnings forecasts are positively biased. Documented positive biases include forecasts provided by a company's broker (Carleton, Chen, and Steiner 1998) or investment banker (Dugar and Nathan 1995),[1] forecasts of companies with less-predictable earnings (Das, Levine, and Sivaramakrishnan 1998), forecasts of companies in financial distress (Moses 1990; Klein 1990), and forecasts of companies reporting negative earnings (Clayman and Schwartz 1994; Dowen 1996).

The question of whether or not this forecast bias is intentional has been the focus of several recent studies. One proposed cause of bias is that analysts do not strive for earnings forecast accuracy in all circumstances because, among other tasks, they must generate commissions (Hayes 1998) and maintain good relations with company managers (Francis and Philbrick 1993). Another proposal is that analysts' earnings forecasts are biased by the tendency of analysts to herd with other analysts (Olsen 1996; Hong, Kubik, and Solomon 1998). Pressures toward optimism are especially strong for companies that report bad news or are viewed unfavorably by analysts. Francis and Philbrick found that analysts' earnings forecasts tend to be optimistic for stocks on the analysts' sell or hold lists. McNichols and O'Brien (1997) reported that analysts tend to add coverage of companies they view favorably and drop companies they view unfavorably, which results in a censoring of the lower tail of the distribution of forecasts.

We extend Clayman and Schwartz's and Dowen's observation that analysts tend to overestimate the earnings of companies reporting negative earnings. We show that, whereas the earnings of companies reporting positive earnings are fairly accurately forecasted by security analysts, analyst forecasts for companies reporting negative earnings are grossly overoptimistic. Furthermore, when a consensus forecast is negative in sign, it usually overestimates actual earnings.

We incrementally decreased negative earnings forecasts and assessed the resulting forecast performance along three dimensions: (1) the change in forecast accuracy relative to the consensus estimate, (2) the probability of beating the consensus, and (3) the probability of underestimating actual earnings.

Figure 1 contains a plot of actual annual earnings per share (EPS) against forecasted annual earnings per share (FEPS) based on median consensus forecasts reported during November for a sample of 4,250 observations in the 1984–91 period. (Throughout, "earnings" and "EPS" refer to the earnings-to-price ratio, E/P. We provide a description of the sample in a later section.) A casual inspection of Figure 1 suggests that positive earnings outcomes tend to be clustered around a 45-degree line through the origin, as one would expect of rational forecasts. The forecasts associated with negative earnings outcomes, on the other hand, are clearly overoptimistic. Indeed, rarely do negative earnings outcomes exceed the consensus forecast and fall above the 45-degree line.

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Figure 1. Actual EPS versus Forecasts of EPS, 1984–91

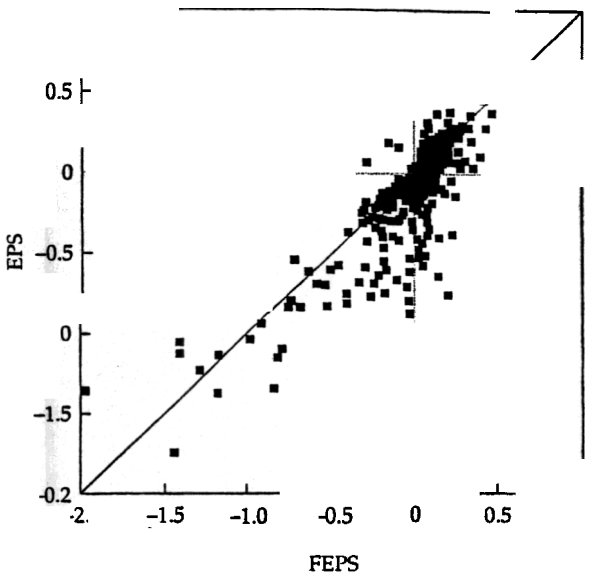


Table 1 presents the percentage of cases in which forecasts overestimated actual earnings in the sample period; the data are presented on a year-by-year basis, and observations are categorized according to the sign of actual earnings and the sign of the consensus forecast. Forecasts of positive earnings outcomes do not appear to be inaccurate in any systematic way, but forecasts of negative earnings overestimate actual earnings in each of the sample years in Table 1. The upper right quadrant of Figure 1 (EPS ≥ 0 and FEPS ≥ 0) corresponds to the positive-earnings/positive-forecast category in the center of Table 1. The forecasts in this quadrant appear to be unbiased and efficient. In contrast to that quadrant, more than 75 percent of forecasts in the lower left quadrant (EPS < 0 and FEPS < 0) are overoptimistic. The cluster of observations scattered in the lower right quadrant of Figure 1 reflects a tendency of analysts to report positive forecasts when actual earnings end up being negative.

The upper left and lower right quadrants of Figure 1 are also asymmetrical. In only a handful of cases did analysts make the error of forecasting negative earnings when actual earnings turned out to be positive (which placed them in the upper left quadrant). Of the 258 negative forecasts, only 14 earnings outcomes (or about 5 percent of the sample) were positive. Many more analysts made the opposite error of forecasting positive earnings when actual earnings turned out to be negative. As many as 206 of the 450 forecasts associated with negative earnings outcomes were positive, and about 87 percent of those forecasts were higher than actual earnings. Negative forecasts, as a whole, overestimated actual earnings 71.7 percent of the time.

No one can tell *ex ante* whether a positive earnings forecast is an unbiased forecast of a positive earnings outcome drawn from the upper right quadrant of Figure 1 or a biased forecast of a negative earnings outcome from the lower left quadrant. Table 1 indicates, however, that given that a consensus forecast is negative, the forecast is overoptimistic 71.7 percent of the time. The implication is that the accuracy of negative forecasts can be improved by adjusting for forecast bias.

We assess the performance of adjustments of varying magnitude to negative earnings forecasts and develop a prescription for deciding on the size of the bias adjustment. Because the costs and benefits of over- and underadjustment differ depending on one's perspective, the choice of how far to diverge from the consensus forecast is best left to the individual. Our goal is to provide information on the likely gain in forecast performance arising from adjusting negative forecasts for analyst overoptimism so that both producers and consumers of earnings forecasts can make an informed decision about what is for them an optimal adjustment.

Data and the Forecast Adjustment

We used the I/B/E/S International detail database of annual earnings forecasts for the 1984–91 period, which contains individual security analysts' forecasts of annual primary earnings per share before extraordinary items. We matched these earnings forecasts with the corresponding earnings figures from Standard & Poor's Compustat Full Coverage Annual database.[2] We kept observations if the following conditions were satisfied:

- three or more forecasts of primary EPS reported to I/B/E/S during November for December fiscal year-end companies and
- share price greater than $2.00 from the previous December on Compustat.

We divided forecasted and actual earnings per share for each company by beginning-of-year share price in order to scale for cross-sectional differences in the level of earnings and share price.

We then constructed median consensus forecasts for each sample company and year from the November forecasts. Median consensus forecasts were chosen rather than mean forecasts because of O'Brien's (1988) finding that median earnings forecasts exhibit the smallest bias of competing consensus forecast measures. The filter on share

Table 1. Predictions of Earnings per Sha

		FEPS < 0				FEPS ≥ 0				Total			
Earnings	Year	*N*	Percent Over	Mean EPS	Average Bias	*N*	Percent Over	Mean EPS	Average Bias	*N*	Percent Over	Mean EPS	Average Bias
				0.007906	0.033762	443	53.27	0.100256	−0.003232[a]	445			
						420	53.81	0.077877	−0.004030[a]	420			
				0.050331	0.070199	457	47.92	0.073917	−0.002453[a]	458			
				0.078311	0.221718	510	47.45	0.086444	−0.001119	513			
				0.010526	0.013158	540	44.63	0.091539	−0.001144	541			
				0.000779	0.032409	457	51.20	0.077631	−0.003195[a]	458			
				0.063812	0.124655	461	55.61	0.085385	−0.004017[a]	564			
				0.017386	0.033043	398	50.75	0.059805	−0.003625[a]	401			
				0.039712	0.094396[a]	3,786	50.50	0.082303	−0.002797[a]	3,800			
EPS < 0	1984	21	80.95	−0.371333	−0.101611	16	100.00	−0.106710	−0.164902[a]	37	89.19	−0.256901	−0.128980[a]
	1985	20	85.00	−0.201959	−0.120343[a]	29	100.00	−0.098461	−0.154834[a]	49	93.88	−0.140705	−0.140756[a]
	1986	40	60.00	−0.261952	−0.081119[a]	35	100.00	−0.118035	−0.159977[a]	75	78.67	−0.194791	−0.117919[a]
	1987	33	84.85	−0.311831	−0.080461[a]	12	100.00	−0.115261	−0.162730[a]	45	88.89	−0.259412	−0.102400[a]
	1988	25	72.00	−0.157202	−0.043477[a]	20	100.00	−0.066905	−0.128203[a]	45	84.44	−0.117070	−0.081133[a]
	1989	30	80.00	−0.189943	−0.044111[a]	19	100.00	−0.086157	−0.147544[a]	49	87.76	−0.149700	−0.084218[a]
	1990	32	81.25	−0.423199	−0.153461[a]	39	100.00	−0.110759	−0.178691[a]	71	91.55	−0.251577	−0.167320[a]
	1991	43	72.09	−0.199233	−0.062728[a]	36	100.00	−0.103797	−0.149874[a]	79	84.81	−0.155743	−0.102440[a]
	All	244	75.82	−0.263702	−0.083848[a]	206	100.00	−0.102468	−0.157342[a]	450	86.89	−0.189893	−0.117492[a]
Total	1984	23	73.91	−0.338356	−0.089840	459	54.90	0.093042	−0.008867[a]	482	55.81	0.072456	−0.012731[a]
	1985	20	85.00	−0.201959	−0.120343[a]	449	56.79	0.066487	−0.013770[a]	469	58.00	0.055040	−0.018315[a]
	1986	41	58.54	−0.254335	−0.077428[a]	492	51.63	0.060262	−0.013659[a]	533	52.16	0.036062	−0.018564[a]
	1987	36	77.78	−0.279319	−0.055280[a]	522	48.66	0.081807	−0.004834[a]	558	50.54	0.058508	−0.008089[a]
	1988	26	69.23	−0.150751	−0.041299	560	46.61	0.085880	−0.005681[a]	586	47.61	0.075381	−0.007262[a]
	1989	31	77.42	−0.183791	−0.041643[a]	476	53.15	0.071094	−0.008957[a]	507	54.64	0.055509	−0.010956[a]
	1990	35	74.28	−0.381456	−0.129622[a]	600	40.17	0.072636	−0.015371[a]	635	59.37	0.047607	−0.021668[a]
	1991	46	67.39	−0.186106	−0.056482[a]	434	54.84	0.046234	−0.015757[a]	480	56.04	0.024064	−0.019660[a]
	All	258	71.71	−0.247238	−0.074176[a]	3,992	53.06	0.072768	−0.010772[a]	4,250	54.19	0.053342	−0.014621[a]

[a]The null hypothesis, H_0: Average bias = 0, is rejected by a *t*-test at the 5 percent level of significance.

price (> $2/share) eliminated 22 observations (about 0.5 percent of the sample). A large number of these companies were companies in financial distress with depressed stock prices and large negative earnings outcomes, for which E/Ps are not meaningful.

Overoptimism in negative earnings forecasts (EPS < 0) manifests itself in Table 1 as a negative bias (where BIAS = EPS – FEPS) ranging from 4.35 percent to 15.35 percent of share price for annual samples and averaging 7.42 percent of share price for the pooled sample. Both consumers and producers of earnings forecasts should be able to obtain better forecasts by lowering the negative consensus forecasts farther. Thus, we carried out the following adjustment:

$$AFEPS_{i,t} = FEPS_{i,t} - ADJ_{i,t}, \quad (1)$$

where

$AFEPS_{i,t}$ = adjusted forecast for company i in fiscal year t

$FEPS_{i,t}$ = unadjusted earnings forecast for company i in fiscal year t

$ADJ_{i,t}$ = adjustment factor ($ADJ_{i,t} > 0$) as a percentage of share price for company i in fiscal year t

If the penalties associated with forecast errors are not symmetrical around actual earnings, then individuals will want to adjust consensus forecasts by an amount that varies from the expected bias.

Measures of Analyst Forecast Performance

We used the following three measures of forecast performance to evaluate forecast adjustments of varying magnitudes: (1) the change in forecast accuracy relative to the consensus, as measured by mean square forecast error, (2) the frequency of being closer to actual earnings than the consensus forecast, and (3) the frequency with which adjusted forecasts underestimate actual earnings and thereby jeopardize the analyst's relations with corporate managers.

The performance of earnings forecast adjustments must be evaluated by individual users. If security analysts are deliberately adding bias to their beliefs, whether to maintain good relations with managers or to remain close to the herd, they can use our results as a framework to reevaluate their forecasts while keeping an eye on the criteria by which their performance is assessed. Investors with a need for accuracy in their earnings forecasts can use our results to improve forecast accuracy.

Relative Forecast Accuracy. Consumers of earnings forecasts, such as individual investors and fund managers, use forecasts of current and future earnings to form expectations about security values. Consequently, consumers of earnings forecasts are concerned with the magnitude of actual earnings and would like the earnings forecasts they receive to be unbiased and efficient. Unbiased and efficient forecasts would be neither too high nor systematically too low and would be distributed as tightly as possible around actual earnings. Therefore, a good measure of forecast performance for consumers of earnings forecasts is the mean squared forecast error.

In order to measure the accuracy of our adjusted earnings forecasts relative to unadjusted consensus forecasts, we computed mean squared forecast errors before adjustment (MSE) and after adjustment (AMSE) according to

$$\text{MSE} = \left(\frac{1}{n}\right)\left[\sum_{i=1}^{n}(EPS_{i,t} - FEPS_{i,t})^2\right] \quad (2)$$

and

$$\text{AMSE} = \left(\frac{1}{n}\right)\left[\sum_{i=1}^{n}(EPS_{i,t} - AFEPS_{i,t})^2\right], \quad (3)$$

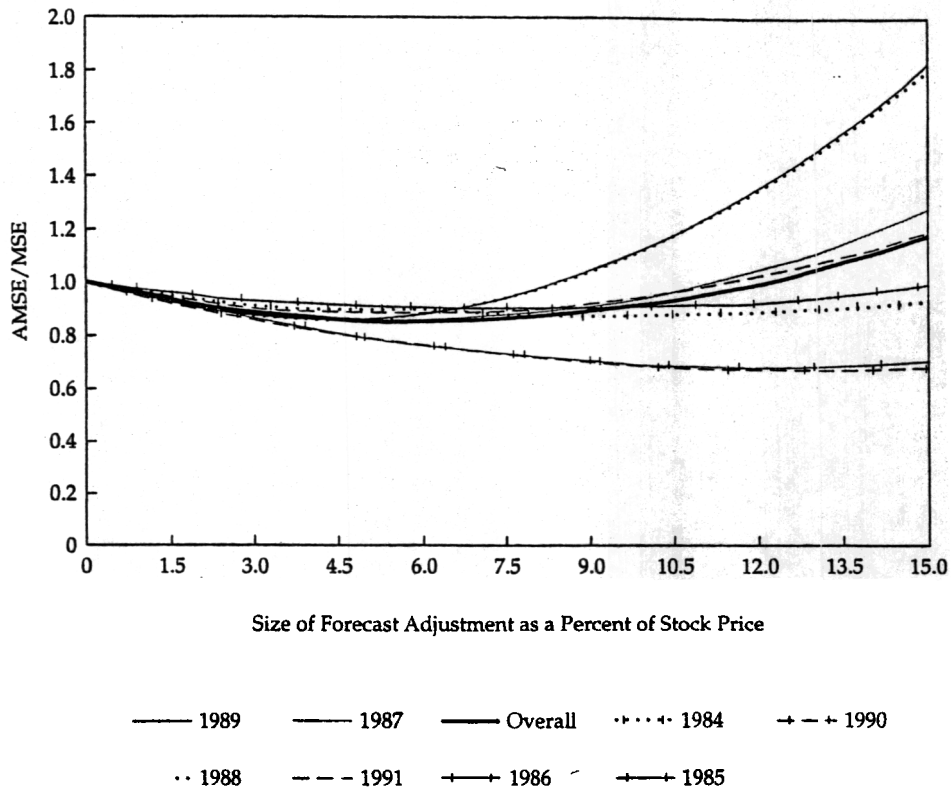
where n is the number of negative forecasts in a particular sample. The performance of adjusted forecasts relative to unadjusted forecasts is measured by the ratio:

$$\text{Relative forecast accuracy} = \text{AMSE/MSE}. \quad (4)$$

This measure of forecast performance will be of interest to both producers and consumers of earnings forecasts.

Figure 2 contains plots of the observed improvement in MSE (Equation 4) against the magnitude of the forecast adjustment in each of the years 1984–1991 and over the pooled 1984–91 sample (the dark line in the figure). A bias adjustment of about 6 percent of share price results in the best forecast accuracy in the negative forecast sample pooled across all sample years. This percentage adjustment corresponds to an earnings forecast adjustment of $6 on a $100 share of stock. This result is fairly close to the mean bias of 7.4 percent of share price in the negative forecast sample of Table 1. With this adjustment, the squared errors of the adjusted forecasts are 85.7 percent of unadjusted forecast squared errors. Adjusted forecast accuracy begins to deteriorate in the overall sample beyond an adjustment of about 6 percent of share price. By the time forecasts have been reduced by 12 percent of share price, adjusted and unadjusted forecasts

Figure 2. Relative Forecast Accuracy, 1984–91



have nearly equal forecast accuracy in the pooled sample. At this level, adjusted forecasts are about as far below actual earnings as unadjusted forecasts are above earnings.

Within each sample year, relative forecast accuracy improves monotonically for adjustments of up to 4 percent of share price. Beyond that point, the magnitude of the optimal adjustment exhibits a good deal of year-to-year variation, as Figure 2 shows. Those years with the largest *ex post* bias in the negative forecasts sample of Table 1 (1985 and 1990) benefit the most from large forecast adjustments. Improvement in forecast accuracy during those years with the smallest bias (1988 and 1989) is correspondingly smaller. The magnitude of the forecast bias in the negative forecast samples is about 4.1 percent of share price in 1988 and 1989, and adjustments of more than this amount begin to lose their effectiveness. Nevertheless, forecast accuracy is improved relative to unadjusted forecasts for adjustments of up to 8 percent of share price in those two years. The accuracy of adjusted forecasts is superior to that of unadjusted forecasts for adjustments of up to 11 percent of share price in the remaining six years.

Beating the Consensus. Forecast accuracy as measured in the previous section is most prized by consumers of earnings forecast data. In contrast to consumers of earnings forecasts, forecast *producers* are judged not on forecast accuracy but on how their forecasts compare with those of other analysts. This performance measure leads to herding behavior as security analysts seek to protect their reputations by issuing forecasts that conform to the consensus, especially when forecasting hard-to-predict earnings (Olsen). In this setting, a successful security analyst is one whose forecasts are consistently closer to actual earnings than competing forecasts. Given the observed overoptimism in the negative forecast samples, analysts should be able to consistently beat consensus forecasts simply by adjusting their consensus forecasts downward by an arbitrarily small amount. More aggressive analysts might attempt larger adjustments in an effort to further improve their forecast accuracy relative to the consensus.

The measure of relative forecast accuracy in Equation 4 is based on a squared error criterion. An alternative measure of forecast accuracy is the frequency with which adjusted forecasts lie closer to actual earnings than the consensus. This frequency can be used to estimate the probability of an analyst beating the consensus forecast:

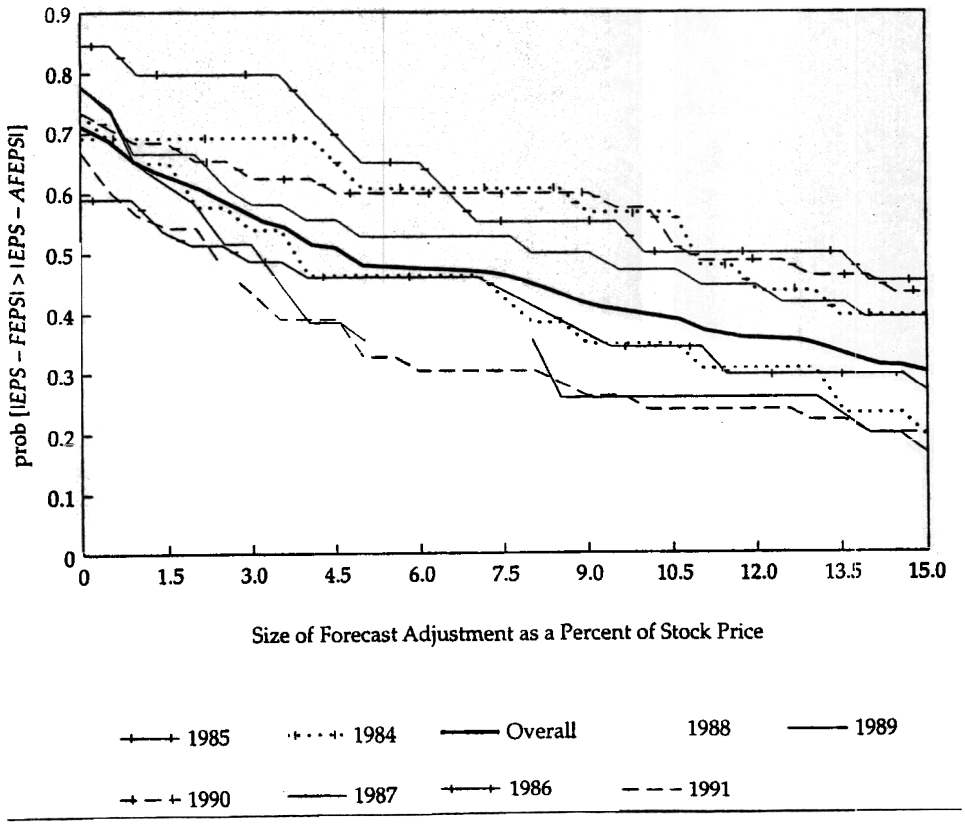
$$\text{prob[Beating the consensus]} = \text{prob}[\,|EPS_{i,t} - FEPS_{i,t}| > |EPS_{i,t} - AFEPS_{i,t}|\,]. \quad (5)$$

For the negative forecast sample, arbitrarily small downward adjustments will beat the consensus forecast by the amount shown in the "Percent Over" column under "Total" in Table 1. For example, because 71.7 percent of the total sample of negative forecast observations overestimated actual earnings, small downward adjustments to the consensus forecasts will be closer to actual earnings 71.7 percent of the time across the entire sample. As progressively larger downward adjustments are made, relative forecast accuracy will improve but the probability of beating the consensus forecast will fall below the initial level of 71.7 percent. Eventually, relative forecast accuracy will deteriorate, and the probability of beating the consensus will fall below 50 percent.

Figure 3 contains the plots of the probability of beating the consensus forecast for progressively larger downward adjustments for the yearly samples and for the pooled sample. For arbitrarily small downward adjustments ($ADJ_{i,t} > 0$), these probabilities emerge from the y-axis in Figure 3 according to the "Percent Over" probabilities in Table 1. The overall sample and each of the yearly samples begin at probabilities well over 50 percent, so it is a good bet that small downward adjustments will beat the consensus. As the size of the downward adjustment is progressively increased, the probability of beating the consensus falls. In the pooled sample, downward adjustments of up to 4.75 percent of stock price continued to yield a greater than 50 percent probability of beating the consensus. Downward adjustments of up to 2.2 percent of stock price yielded a greater than 50 percent probability of beating the consensus in each of the yearly samples. Adjusted forecasts of up to 10 percent of share price continued to beat the consensus more than 50 percent of the time in half the sample years. The years in which forecast bias was smallest tended also to be the years in which the probability of beating the consensus fell most rapidly, although the relationship between these two variables is not as pronounced as the relationship between forecast bias and changes in relative forecast accuracy in Figure 2.

"Politically Correct" Earnings Forecasts. Several recent studies have suggested that analyst overoptimism arises from a deliberate attempt to maintain good relations with company managers (Francis and Philbrick), especially for companies in financial distress (Klein; Clayman and Schwartz).

Figure 3. Probability of Beating the Consensus, 1984–91



Managers are most sensitive to negative publicity during financial distress, and an analyst issuing an unfavorable earnings forecast risks losing access to company managers and their inside knowledge of company performance. If good relations with management are more important than forecast accuracy, then a politically correct forecast will result that is more generous than is warranted by the facts.

An analyst adjusting negative consensus forecasts downward, according to Equation 1, will want an estimate of the probability of being exposed to critical scrutiny by management. Our estimate of the probability of "overadjusting" an earnings forecast is the frequency with which a forecast adjustment of a given size results in earnings overestimates in our sample:

$$\text{prob}[\text{Overestimating earnings}] = \text{prob}[EPS_{i,t} < AFEPS_{i,t}]. \quad (6)$$

Analysts who fear being penalized for underestimating earnings can use the probability

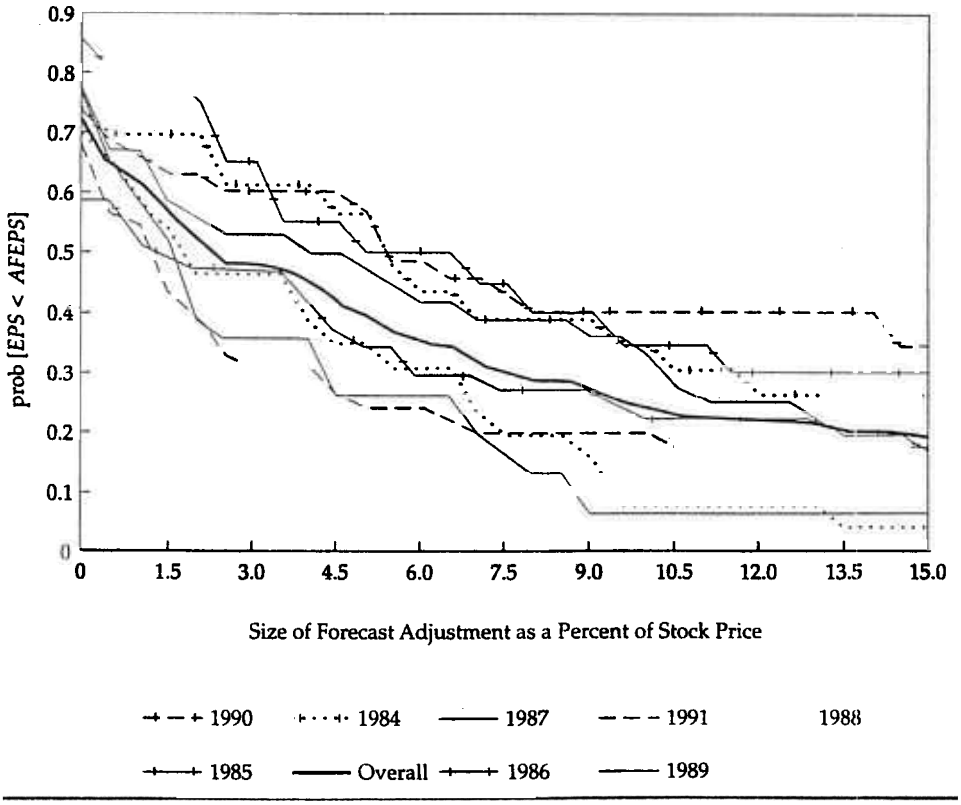
$$1 - \text{prob}\,[EPS_{i,t} < AFEPS_{i,t}]$$

as an estimate of their exposure to this risk. For example, because unadjusted forecasts overestimated actual earnings 71.7 percent of the time in the pooled sample, the risk of underestimating earnings is 28.3 percent. Progressively larger adjustments for overoptimism increase the probability of underestimating earnings. At a probability of 0.5, adjusted forecasts are as likely to be too high as too low.

Figure 4 contains plots of changes in the probability of overestimating earnings for incremental adjustments of 0 to 15 percent of share price. In the pooled sample, the probability of overestimating earnings falls to 0.5 for downward forecast adjustments of about 2.2 percent of share price. The yearly samples fall to a 0.5 probability for adjustments of between 1.2 percent (1986 and 1991) and 5.5 percent (1984 and 1990) of share price. Beyond 5.5 percent of share price, the probability of underestimating earnings exceeds that of overestimating earnings in each yearly sample.

Recommendations for Earnings Forecast Adjustments. Summarizing the results in Figures 1–4, we find that adjustments of up to 1 percent of share price result in improved forecast accuracy, a high probability of beating the consensus forecast, and little increase in the probability of underestimating actual earnings. Forecast adjustments of 1–2 percent of share price consistently beat consensus forecasts and continue to improve forecast accuracy, although the risk of underestimating earnings

Figure 4. Probability of Overestimating Earnings, 1984–91



increases. Relative forecast accuracy continues to improve for adjustments of up to 5 percent of share price. Although the probability of beating the consensus is still, on average, greater than 0.5 for adjustments of up to 5 percent of share price, the extent to which forecasts can be adjusted and still beat the consensus more than half the time exhibits a good deal of year-to-year variation. The maximum adjustment before the probability of beating the consensus falls below 0.5 in our yearly samples ranged from 2 percent to 11 percent of share price. Beyond an adjustment of 2 percent of share price lies substantial risk of underestimating earnings. Forecast adjustments of up to 11 percent of share price are still likely to be more accurate than unadjusted forecasts, but by this point, the analyst has probably overshot the mark; the probability of beating the consensus and the probability of underestimating earnings are both unacceptably high.

Conclusions

Security analysts do a relatively good job of forecasting earnings that turn out to be greater than zero, but they persistently overestimate negative earnings outcomes. This overoptimism arises from an apparent reluctance on the part of security analysts to report negative earnings forecasts. When analysts do report a negative forecast, they are almost certain to be overoptimistic. In our sample of 4,250 consensus forecasts of annual earnings in the 1984–91 period, negative consensus forecasts overestimated actual earnings 71.7 percent of the time whereas positive consensus forecasts were fairly symmetrically distributed around actual earnings.

We found that small adjustments to negative earnings forecasts improve forecast accuracy. Each analyst must make an individual decision, based on the incentives and penalties each faces, about how much to adjust negative earnings forecasts. Small downward adjustments can improve forecast accuracy and the probability of beating the consensus forecast. Larger adjustments continue to improve forecast accuracy at the expense of increasing the probability of underestimating earnings and decreasing the probability of beating the consensus forecast.

If forecast accuracy is paramount, then adjustments of about 5 percent of share price are likely to prove optimal. If beating the consensus forecast is prized, then adjustments of up to 2 percent of share price will capture gains in forecast accuracy while providing the analyst with bragging rights over consensus forecasts. To the extent that a security analyst is penalized for underestimating earnings, attempting to adjust for the full extent of the bias will expose the analyst to undue criticism. Adjustments of up to 1 percent of share price are likely to keep the analyst's probability of underestimating earnings below 0.5, although the managers of individual companies might still find room to complain. Adjustments of 1 percent do not take full advantage of the potential gain in forecast accuracy but do provide a high probability of beating the consensus forecast.

Financial markets react to new information. At the time this article appears in print, the observed bias in security analysts' negative earnings forecasts will be public knowledge. Both producers and consumers of earnings forecasts will then be faced with a dilemma: If analysts follow the recommendations in this article, the forecast bias will disappear. If all analysts adjust their forecasts by the average forecast bias reported in Table 1, forecasts will, on average, underestimate actual earnings by the amount of the current forecast overestimate.

Our prediction, however, is that analysts will be slow to adopt the recommendations in this article because the institutional incentive (and penalty) structure faced by security analysts is unlikely to change overnight. Room will remain for improvement in forecast performance as long as analysts make only incremental, rather than complete, adjustments to their negative earnings forecasts. We forecast that the payoffs to adjustment in the forms of improved forecast accuracy and bragging rights over consensus forecasts will persist. As for the users of forecasts, investors must take into account the overoptimistic bias in negative forecasts before forming their expectations about the underlying stocks.

Notes

1. Lin and McNichols (1998) reported that lead- and co-underwriter analysts' earnings forecasts are generally not greater than those of unaffiliated analysts, although their growth forecasts and buy recommendations are significantly more favorable.

2. To the extent that analysts do not report "earnings before extraordinary items" to I/B/E/S, there is an empirical problem with matching earnings from Compustat with forecasts from I/B/E/S. Discussion of this errors-in-variables problem is beyond the scope of this article.

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