If you rely on analysts' earnings forecasts for investment guidance, you have a significant chance of going the wrong way, according to research in the United Kingdom. JOHN CAPSTAFF, KRISHNA PAUDYAL and BILL REES report that forecasts often fail the test of rationality.

Recent research has found that UK analysts' forecasts of earnings are less accurate than one might have thought. They are superior to a naive time series forecasting model but less so as the forecast horizon lengths. Another finding is that analysts' forecasts are considerably less accurate in cases where firms experienced earnings decreases. There is clear evidence of an optimistic bias in forecasts.

Further tests reveal that forecasts do not appear to be formed in a rational manner, and that analysts overreact when making forecasts. This places some doubt on the reliability and usefulness of earnings forecasts. However, it may be possible to explain some of these findings in terms of the motivations and incentives of analysts.

Forecasts of earnings per share are a prime source of information for both investment practitioners and academic researchers. Apart from actual buy/sell recommendations, earnings forecasts are probably the most important function undertaken by investment and financial analysts. Research into the methods used by UK analysts to appraise investment in shares has consistently shown the price-earnings ratio to be paramount. Forecasts of earnings are therefore central to the prediction of share values.

The importance placed on earnings forecasts is also evidenced by the large number of analysts employed by brokers and investing institutions to produce, inter alia, forecasts of earnings per share. This implies earnings forecasts have commercial value.

We judge the quality of earnings forecasts against accuracy and rationality. It seems obvious that accurate earnings forecasts are better than inaccurate ones, and that the accuracy of forecasts depends on the skill of analysts. But these issues are not clear-cut if analysts motivations and investor requirements are not fully geared to accuracy, something which we try to clarify towards the end of this article.

A rational forecast does not contain systematic errors, and reflects all available information without bias. If forecasts are not formed in a rational manner it will show up in one or more of the following ways:

- biased forecasts ie, consistently optimistic or pessimistic;
- a tendency to overreact to recent information when the forecasts are made;
- all available information is not reflected in the forecasts.

Irrational forecasts are therefore unreliable.

DATA

Analysts' forecasts were taken from the Institutional Brokers Estimation System (IBES), which collects forecasts from security analysts employed by institutional brokers and research firms. We used a sample of more than 50,000 forecasts of earnings per share made during the period February 1987 to December 1990 in the UK and encompassing approximately 1,000 firms.

The data contained forecasts made at horizons defined in terms of months prior to the earnings date (end of a firm's accounting year).
ACCURACY OF FORECASTS

The mean of individual analysts’ forecast errors is used as a measure of forecast accuracy. Each forecast error is the difference between forecast earnings and actual earnings, divided by actual earnings. The absolute value of the error is used.

We judge relative accuracy against the naive benchmark of “no change” in earnings. More sophisticated time series models exist but are little better at prediction over large samples. Whatever model is used, the expectation is that analysts’ forecasts will be superior because they have access to more information than is contained in a mechanical model.

The results on accuracy for a selection of horizons are shown in Table 1. Negative horizons occur because forecasts continue to be made after the accounting date but prior to the earnings announcement.

The mean forecast error of analysts measured over all horizons is 16.6%, and for the naive forecasts it is 24.3%. Figure 1 illustrates absolute and relative accuracy at each horizon. The main points to emerge from this are:

- The accuracy of analysts forecasts improves as the horizon shortens. This is to be expected and is consistent with an improving information set as the earnings date approaches.
- Temporary reversals in the improvement of accuracy occur around the seven-month horizon, and again around the 14 to 13-month horizons. The first case is probably the response to a significant news item, such as the announcement of the previous year’s earnings, which typically occurs between six and eight months before the next earnings date. The blip in the trend at the 14 and 13-month horizons may be due to the news contained in the interim report which arrives approximately six months before the earnings news. The worsening of forecast accuracy at these times is indicative of overreaction to the news.
- Analysts’ forecasts are superior to the naive forecasts over all horizons up to 16 months. Beyond this there is no statistically significant difference between the two, implying that analysts’ forecasts cease to have economic value.

The data uses absolute values to avoid the cancelling out of positive and negative forecast errors when the mean is calculated. However, the mean signed forecast error over the whole sample is +8.5%, which indicates a positive bias in the forecast errors – i.e., analysts’ forecasts tend to be overly optimistic.

MOTIVATIONS

Possible explanations for these findings are analysts’ motivations, agency relationships or psychological factors.

Analysts may not be motivated to maximise forecast accuracy, especially if they have incentives to use forecasts to maximise the volume of trade. Sell-side analysts may be inclined to produce deliberately over-optimistic forecasts in an attempt to generate sales. It is also possible that analysts are reluctant to publish pessimistic forecasts where this could damage relationship with the firm in question as personal contacts are an important source of information. This is more likely to be true when the analysts employer is also the firm’s broker.

Another suggestion is that analysts may be reluctant to significantly revise previous forecasts when they receive new information because of the negative signal it gives about the quality of their previous information. Analysts’ forecasts may not therefore fully reflect the information available.

Another possible reason for inaccurate forecasts is found in psychological research. Studies have shown that people making forecasts tend to give an inordinate weight to recent information which generates a systematic bias in the forecasts. A similar bias might explain analysts’ forecasts being too optimistic.

Some of these views were borne out when the sample was split according to whether the earnings being forecast actually increased or decreased. If the accuracy of analysts’ forecasts is constrained by agency relationships, then this should be most evident in cases of declining earnings as analysts will be especially reluctant to forecast decreases.

We found that forecasts are considerably more accurate when the actual earnings
outcome is an increase. The average forecast error in these cases is less than 10%, whereas the average forecast error when earnings decrease is more than 30%. Also, the accuracy of analysts' forecasts when earnings increase diminishes remarkably little as the horizon lengthens. In contrast, forecast errors associated with earnings decreases worsen considerably over time and become inordinately inaccurate at long horizons, so much so that average errors for all horizons beyond 12 months are close to or above 50%. In fact, the naive model predicts earnings decreases more accurately than analysts for all horizons longer than four months. This suggests an extreme reluctance of analysts to make pessimistic forecasts. Another suggested explanation is that firms with unfavourable prospects put pressure on analysts to provide optimistic forecasts.

RATIONALITY OF FORECASTS

Rational forecasts are not perfect forecasts but they are not systematically wrong. Forecasts that are systematically wrong imply that analysts continue to make the same mistakes or consistently ignore relevant information. If forecasts are rational, then forecast errors are random, and by definition unpredictable.

The accuracy analysis has already indicated a positive bias. A more powerful statistical test of rationality on forecasts is to estimate the following equation across a large sample:

\[ \Delta E_A = \alpha + \beta \Delta E_F + \mu \]

where \( \Delta E_A \) is actual change in earnings, \( \beta \Delta E_F \) is the forecast change in earnings, and \( \mu \) is a random error term with an expected value of zero.

If forecasts are rational, then we should find that

\[ \alpha = 0 \text{ and } \beta = 1 \]

Forecasts contain an optimistic bias (systematic overestimation) if \( \alpha < 0 \) and a pessimistic bias (systematic underestimation) if \( \alpha > 0 \). The interpretation of \( \beta \) is slightly different: \( \beta > 1 \) is taken as a sign of underreaction to available information when the forecast is made because the absolute value of the forecast is too low; \( \beta < 0 \) is taken as a sign of overreaction because the absolute value of the forecast is too high.

For a sample of 56,090 forecasts spread over all horizons, we obtained the following result:

\[ \Delta E_A = -0.085 + 0.085 \Delta E_F \]

\[ R^2 = 35\% \]

\( \alpha \) is significantly less than zero and \( \beta \) is significantly less than one, and a qualitatively similar result is obtained for almost all of the individual horizons examined. The results are extremely robust to statistical tests, while the explanatory power at 35% for the whole sample is high for this type of research.

This strongly suggests that analysts are optimistic and overestimate the change in earnings. This is consistent with overreaction. The results are similar to some US evidence that both share prices and analysts' earnings forecasts overreact to new information. While there are a number of possible interpretations of our results, they are not consistent with forecasts being formed in an efficient manner.

As a further test of rationality we examined whether forecasts included all information available at the time of the forecast. As it is plainly impossible to define the full set of information available to analysts, we used share price as a composite indicator of the future earnings potential of the firm. If it is apparent that analysts do not incorporate information contained in share prices, then this would be a sign of irrationality.

A share price variable was added to the regression equation. This variable, \( \Delta E_{E/P} \), is an earnings forecast based on the idea that a firm's E/P ratio will tend to move towards a market-wide E/P ratio. The E/P variable was specified so that it can be used as an independent forecast of earnings directly comparable with the analysts' forecasts.

Over the whole sample we obtained the following result:

![Figure 1: Analysts' and naive mean forecast errors and forecast horizon](image)
ΔEₙₙ = -0.070 + 0.795ΔEₙ + 0.266ΔEₑ/p
R² = 50%

The interpretation is that price-earnings ratios available at the time of the forecast contain information not utilised by analysts when they make their forecasts. This result is borne out at each individual forecast horizon. Thus the accuracy of analysts’ forecasts can be improved by weighting the forecasts submitted by the analysts with forecasts derived from the share price and market E/P ratios. The obvious conclusion is that valuable information is being neglected by analysts, and that this neglect increases as the horizon lengthens.

It is possible that analysts deliberately ignore information contained in share prices because they have incentives to revise forecasts when they receive new private information, but not when they perceive new information in share prices. The reasoning is that investors are only interested in the private information which analysts have, and this is more easily discerned if it is not combined with new information from publicly available signals such as share-price changes, on which investors prefer to place their own interpretation.

A final test of rationality is whether analysts take account of their previous forecasts when making forecast revisions. Rationality requires that previous forecasts give no guide to forecast revisions. If there is a systematic relationship between forecast revisions and prior forecasts, this implies that prior forecasts are biased. Our tests revealed a systematic tendency to revise forecasts downwards, a sign of prior overreaction and bias.

We adjusted the data to take account of any firm-size effects and time-specific effects but this did not significantly alter our findings.

CONCLUSIONS
The results of this study suggest that the following conclusions can be drawn:
• Analysts’ forecasts of earnings are more accurate than naïve “no change” predictions, but this superiority diminishes over longer horizons and only extends as far as 16 months before the accounting year end. However, when it comes to forecasting earnings decreases, analysts are only superior over relatively short forecasting periods, and forecast errors are large. Analysts appear incapable or reluctant to forecast earnings decreases, most probably because of agency relationships. It is clear that forecasts incorporate a positive bias, reflecting extreme optimism.
• Analysts’ forecasts do not appear to be formed in a rational manner. The results of our tests are consistent with optimistic bias in forecasts and overreaction to information when forecasts are formed. The results also reveal that analysts do not take account of all available information when producing their forecasts. Forecasts derived from firm-specific share prices and the market-wide earnings-to-price ratio, available to the analyst at the time the forecast is published, have incremental explanatory power above that provided by the analysts’ forecasts. We know of no previous evidence for this aspect of irrationality for UK forecasts, but there is some evidence for the US.

We also presented evidence that analysts’ forecast revisions are in part predictable. Forecast revisions are not independent of prior forecast changes in earnings. A regression of forecast revisions on prior forecasts produced a negative relationship. We suspect that this is driven by delayed correction of over-optimistic forecasts, and is also consistent with overreaction.

Taken together, these results cast considerable doubt on the rationality of earnings forecasts made by UK analysts during the period from 1987 to 1990. While a number of descriptive and behavioural explanations may be offered, researchers and practitioners should be wary when using analysts’ forecasts, especially those made some months before the accounting year end. A fuller interpretation should, however, be linked more closely with questions of incentives for analysts to produce accurate/rational forecasts.

At present we know relatively little about earnings forecasting behaviour, the information analysts use, the incentives they have, and what is the prime catalyst in the forecasting process. This is clearly an avenue for further research.

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