CONFIDENTIAL REVENUE AND PROFIT FORECASTS BY MANAGEMENT AND FINANCIAL ANALYSTS : Some First Results

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ABSTRACT

Confidential Revenue and Profit Forecasts by Management and Financial Analysts: Some First Results

Interest in corporate forecasts has increased significantly in the last decade. This interest has been stimulated by the change in policy of several rule-making bodies toward benign acceptance or even requirement of forecast disclosures. Research has focussed on the accuracy of published management forecasts of profit, often taking the accuracy of published analysts' forecasts or forecasts generated from forecasting models as a standard of comparison.

The design of this study differs from previous research in at least three respects: (a) it is based on confidential instead of published data, (b) it includes revenue and profit data, and (c) it investigates to what extent the forecasters were themselves surprised by the actual outcomes. Included in this study are 53 forecasts of a representative sample of companies listed on the Amsterdam Stock Exchange and 124 forecasts provided by the members of the Dutch Financial Analysts Federation.

The results are first presented for the management and analysts' groups separately. Then the comparative accuracy of these groups is analyzed. The paper concludes with a discussion of some implications of this study in the context of the accounting policy debate on disclosure of corporate forecasts.

1. Introduction

Interest in corporate forecasts has increased significantly in the last decade. Researchers and practitioners alike have been concerned with such forecasts, mainly in the context of a discussion of the merits of publishing such information, either on a voluntary or on a mandatory basis. Most of the research done in this field has focussed on the accuracy of published profit forecasts.[1] Our research also concentrates on the accuracy of corporate forecasts but departs from previous research in several respects. Before we sketch our research design, it is perhaps useful to discuss the importance of corporate forecasts in general and their accuracy in particular from several viewpoints:

1. As already noted above, the issue of voluntary or mandatory disclosure of corporate forecasts has been the prime motivation for research in this area. This interest has been stimulated by developments in several countries. In the UK , the City Panel and the London Stock Exchange issued regulations in 1969 with respect to forecast information. The regulations contained in the City Code on Take-Overs and Mergers allowed profit forecasts to be included in documents containing take-over bids. The accounting bases and calculations for the forecasts must be examined and reported on by auditors. It is a Stock Exchange requirement that "a statement as to the financial and trading prospects" of a company should be included in the prospectus when a quotation for securities is sought (Dev & Webb, 1972). In the UK, it is permitted to include a profit forecast in the annual report, but so far this is not a standard practice. In most published reports verbal expressions of expectations are given.

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1) See Abdel- Khalik & Thompson (1978); Richards & Fraser (1978) and Westwick (1982) for a review of such research.

In the USA, it was not permitted to file profit forecasts with the SEC until 1973. Since 1973, inclusion of such forecasts in the documents to be filed is allowed. After several proposals had been aired in 1975 and 1976, a new series of requirements concerning the publication of profit forecasts was issued in 1978-1979. The SEC continued its policy of allowing voluntary profit forecasts. It encouraged auditing these forecasts by introducing a "safe harbor rule" for auditors. This rule stipulates that the burden of proof of auditors' responsibility for providing shareholders with misleading information is on the plaintiffs, i.e. the shareholders.

In the Netherlands, hardly any corporate forecasts are published, although many annual reports contain verbal descriptions of management's expectations. There is presently no rule forbidding or requiring such forecasts. In its proposals to implement the EC 4th Directive, the Dutch government has included a requirement to provide information in the annual report on the expected revenue and profitability for the forthcoming year. Such information need not necessarily be given as an expected revenue or profit figure, but of course this forthcoming legal requirement has stimulated discussions on the merits of alternative forms of presentation.

2. Publication of corporate forecasts may only be useful if the published data have information content. This is often assumed on the basis of a priori reasoning (see e.g. FAF, 1973 or Nichols & Groomer, 1979). Recognizing that almost any shareholder decision model contains estimates of future cash flows, the information content of corporate forecasts is derived from their potential usefulness in estimating these variables. In order to possess such usefulness, the forecast information should be relevant for improving the decision-maker's estimates, which implies that it should be relatively

accurate. If so, societal benefits would also accrue from an improved allocation of resources. Some empirical research has aimed at testing the information content of corporate profit forecasts in an efficient market setting (e.g. Foster, 1973 ; Pattell, 1976; Nichols & Tsay, 1979). These studies have produced results consistent with the assumption of information content in corporate profit forecasts.

In addition to profit forecasts, sales revenue forecasts could also be studied. Although revenue forecasts have so far received less attention than profit forecasts, in some publications the usefulness of revenue forecasts is stressed, since sales revenue is a basic determinant for future profit. It is also suggested that revenue forecasts should be much more accurate than profit forecasts, since profit is only a small difference between two large numbers (Revenues and Costs). In this connection Ijiri (1975) developed the so-called "forecast error multiplier", which is the relationship between the profit forecast error and the revenue forecast error. In Ijiri's analysis, the (lack of) accuracy of profit forecasts is to be explained by the inaccuracy of sales forecasts and the multiplying effect due to the level of fixed costs.

3. Research into the opinions of financial statement users has indicated that they consider forecast information to be useful and that such data rank high on the list of desired information items (cf. Courtis, 1978; Lee & Tweedie, 1977 and 1981; Chang & Most, 1979; Klaassen & Schreuder, 1981). Such usefulness can, however, only be explained by an assumption on the part of the users that management can forecast the future levels of the relevant variables (revenues, profits, dividends etc.) at least as accurately as the users can themselves. This assumption may be based on

the belief that management possesses inside information which is potentially relevant for improving forecasting accuracy.[2)]

4. Finally, from a performance evaluation point of view, forecast information could be considered to be potentially relevant as such forecasts could be used as yardsticks to evaluate performance a posteriori. For this purpose, too, the potential usefulness of forecasts is very much dependent on their accuracy (see Ijiri, 1975).

Summing up: Forecast information may be useful from several viewpoints. This is, however, only the case if it meets standards of accuracy. These standards are to be derived from the present accuracy of decision-makers' estimates of the relevant corporate variables. The usefulness of forecast information is all the more important since in the UK and the USA the role of forecast information has increased considerably in the last decade, while regulating bodies in many other countries show an interest in the provision of such information as well.

Our research has aimed at measuring the accuracy of corporate forecasts of sales revenue and profit as compared to analysts' forecasts and forecasts generated by naive models. The two latter types of forecasts were used as standards of comparison for the accuracy of management forecasts. Only the analysts' forecasts will be used here due to space limitations. In the next paragraphs we shall sketch our research design and present the results obtained. The paper concludes with a summary of these results and a short discussion of their implications.

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2) According to Nichols & Groomer (1980, p. 121) even inaccurate forecasts could contain important information, if these forecasts disclose important effects of new developments. Again, such disclosures would be potentially relevant for improving the accuracy of users' forecasts.

2. Research design

Research on corporate forecasts has mainly focussed on the accuracy of published profit forecasts. In early studies the accuracy of such forecasts has been established without comparative information (e.g. Daily, 1971; McDonald, 1973). Most of the recent research uses the accuracy of published analysts' forecasts and/or the accuracy of predictions based on forecasting models for benchmark purposes (e.g. Basi, Carey & Twark, 1976; Copeland & Marioni, 1972; Imhoff, 1978; Jaggi, 1978 and 1980; Nichols & Groomer, 1979; Ruland, 1978).

As already noted in the introduction, no forecast disclosure practice exists in the Netherlands which is amenable to detailed quantitative analysis. If future-oriented information is provided by corporations, it is mostly couched in qualitative terms. In addition, few analysts' forecasts are made publicly available. Therefore, we could not base our research on published data and we had to devise a different project design from previous research. In the beginning of 1980, we have approached all companies listed on the Amsterdam Stock Exchange with a request to deposit their internal sales revenue and profit forecasts for 1980 in a sealed envelope at a notarial office. In addition, we have asked all 285 members of the Dutch Financial Analysts' Federation to deposit their forecasts of revenue and profit of the participating corporations at the same office. The notarial office guaranteed to all respondents that the forecasts would only be turned over to us after the actual figures on 1980 would have been published. We guaranteed that no individual data would be derivable from our publications.

Since our research was conducted in the context of the discussion on the usefulness of these data for users of financial statements, we requested the companies to deposit their forecasts before the annual report on the previous

financial year (1979) had been approved by the Board. In principle, therefore, these forecasts could have been included in the annual report.

In order to test the uncertainties involved in preparing these forecasts both management and the analysts were requested to indicate two ranges around their "best guess" point estimates of 1980 revenue and profit:

1. A 50 %-confidence interval denoting the area in which they expected the outcome to be with 50 % certainty; and
2. A 100 %-confidence interval indicating the range of which they felt with complete certainty that it would contain the actual outcome. (Of course, they were asked to define this range within as narrow limits as possible).

We obtained the co-operation of 55 out of the 193 companies listed on the Amsterdam Stock Exchange in 1979. Two companies, however, had to be excluded from our sample, as they went into bankruptcy before the end of 1980. Therefore, 53 management forecasts were ultimately included in our sample. This sample proved to be representative for the total population of listed companies with respect to (a) dual tests of the variability of revenue and profit and (b) the absolute prediction errors resulting from the application of two revenue and profit forecasting models.[3]

We received 124 analysts' forecasts from the notary. It is difficult to say how many different analysts participated in our study, as some analysts' departments of banks and institutional investors decided to participate as a group. Therefore, all we can say is that the analysts' forecasts were

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3) We shall not elaborate on these eight tests here. Suffice it to say that all test results were insignificant at the 5 % level. Only one result for the absolute prediction errors of revenue was significant between the 5 % and 10 % levels.

prepared by at least 30 analysts working for 14 different organisations, such as banks, pension funds, insurance companies and brokers. The majority of our participants - preparing 82 forecasts - work for 6 major Dutch banks. It is their task to advise on investment decisions of private investors. As such, they can be considered to be the most important and best-informed alternative source of information for private investors apart from the company itself. Most of the other analysts work for major institutional investors. They are responsible for the investment decisions of their institutions.

Thus, our research design differs from previous studies in at least the following respects:

1. We did not use published forecasts, but asked management and analysts to make internal forecasts confidentially known to us (or to produce such a forecast for this special occasion).
   This may have some impact on the accuracy of the forecasts, since research of Ferris (1975) has indicated that management forecasts might be adapted if forecasts are to be published (in order to have impact on the behavior of users), or even that outcomes might be to some extent manipulated if forecasts have been previously published.
   Our forecasts would not have such effects, and therefore might be expected to be the best, and most unbiased forecasts that management and analysts could produce.
   Another difference might be that companies who would not voluntarily publish forecasts, as they regard these as too unreliable. perhaps would participate in our research since they would perceive no unfavourable effects of such participation.

2. Our research covered both revenue and profit forecasts of the same companies. This enables us to compare the accuracy of both forecasts.

3. We asked our forecasters to express their own uncertainties by indicating their 50 %-and 100 %-confidence interval.

4. As our respondents participated voluntarily in this study, we could ask them certain additional questions in order to get some background information which might be relevant for the explanation of results.

5. For practical reasons we could only include one year of forecasts in our research.[4]

3. Some results

The measures used to determine the accuracy of the management and analysts' forecasts are:

the prediction error (PE) $= x - \hat{x}$

the absolute prediction error (APE) $= |x - \hat{x}|$

the relative prediction error (RPE) $= \frac{x - \hat{x}}{x}$

the absolute relative prediction error (ARPE) $= \frac{|x - \hat{x}|}{|x|}$

where: $\hat{x}$ represents the forecast of revenue or profit for 1980

x represents the actual reported revenue a profit for 1980.

3.1 Management forecasts

Table 3.1 shows the RPE's determined for the management forecasts of sales revenue. The table demonstrates that these forecasts are mainly rather accurate: 55 % within the range of $\pm$ 5 % and 79 % within the range of $\pm$ 10 %. There seems to be no clear systematic bias in these forecasts: 25 show a negative RPE and 28 a positive RPE. The average RPE turned out to be - 0.8 % (σ = 10.5) and the average ARPE 7.2 % (σ = 7.6).

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4) Preliminary tests, based on the results of our forecasting models, indicate that 1980 was a representative year for revenue forecasting purposes. For profit forecasts 1980 might have been representative with respect to the direction of profit changes, but possibly not with respect to the volatility of profits.

Table 3.1 Distribution of relative prediction errors of management forecasts of revenue

RPE	n	% of total	cumulative %
(30 %) - (20 %)	3	6	6
(20 %) - (15 %)	4	7	13
(15 %) - (10 %)	-	-	13
(10 %) - (5 %)	6	11	24
(5 %) - 0 %	12	23	47
0 % - 5 %	17	32	79
5 % - 10 %	7	13	92
10 % - 15 %	2	4	96
15 % - 20 %	-	-	96
20 % - 40 %	2	4	100
	53	100	

A total of 52 companies indicated their 50 %-confidence intervals and 44 their 100 %-confidence intervals. In 22 out of the 52 cases (42.3 %) the outcomes were within the 50 %-range, including one entirely accurate prediction. In 28 of the 44 cases (63.6 %) the actual outcome was within the 100 %-range. Of the 8 companies who defined a 50 %-range, but not a 100 %-range, 4 produced actual sales revenues within their 50 %-range, and thus also within their 100 %-range. The following illustration summarizes these data and shows that at least 16 of the 52 outcomes (30.8 %) came as a complete surprise to our participants.

Figure 3.2 The actual sales revenues in relation to the confidence intervals of management

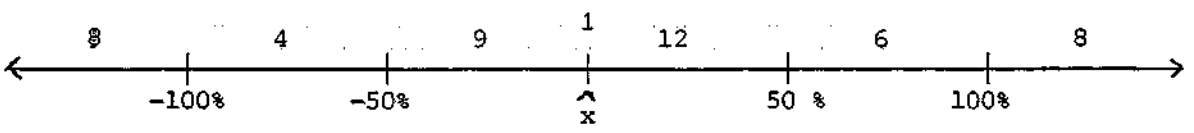


Table 3.3 shows the distribution of the RPE's associated with management's profit forecasts. It is clear that these RPE's are more widely distributed than for the revenue forecasts. Some very large prediction errors result from low actual profit levels (close to zero). The average RPE is -68.9 % (σ = 507.3) and the average ARPE 160.6 % (σ = 485.7). Even after elimination of the six outliers identified in table 3.3 the average ARPE was 50.4 %. Only 9 % of the companies have a RPE between $\pm$ 5 % and only 27 % a RPE between $\pm$ 10 %. Nearly twothirds (64.2 %) of the prediction errors ($x-\hat{x}$) were negative, indicating an optimistic bias of management in forecasting profits.

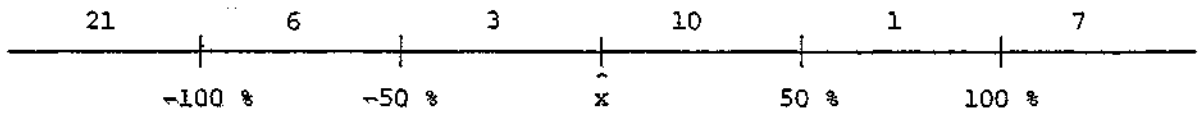
Table 3.3 Distribution of relative prediction errors of management forecasts of profit

RPE	n	% of total[a]	cumulative %
< (200 %)[b]	4	8	8
(200 %) - (150 %)	0	0	8
(150 %) - (100 %)	3	6	13
(100 %) - (50 %)	4	8	21
(50 %) - (40 %)	1	2	23
(40 %) - (30 %)	4	8	30
(30 %) - (20 %)	2	4	34
(20 %) - (15 %)	2	4	38
(15 %) - (10 %)	1	2	40
(10 %) - (5 %)	5	9	49
(5 %) - 0 %	0	0	49
0 % - 5 %	5	9	58
5 % - 10 %	5	9	68
10 % - 15 %	0	0	68
15 % - 20 %	1	2	70
20 % - 30 %	2	4	74
30 % - 40 %	3	6	79
40 % - 50 %	0	0	79
50 % - 100 %	1	2	81
100 % - 150 %	4	8	89
150 % - 200 %	4	8	96
> 200 %[c]	2	4	100
	53	100	

a) Due to rounding errors these percentages do not add up to exactly 100 %.
b) These negative outliers were: -231 %, -460 %, -970 % and -3395 %.
c) These positive outliers were: 370 % and 715 %.

For most managers the actual profits must have been a complete surprise. In 28 cases the companies did not at all expect the profit figure they eventually realised. For 21 of these companies the results were much lower than they expected and for 7 companies the results were much higher. Figure 3.4 summarizes the available information.

Figure 3.4 The actual profits in relation to the confidence intervals of management



A comparison of revenue and profit forecasts shows that revenue forecasts on average were unbiased whereas profit forecasts were too optimistic. The prediction errors of management's revenue forecasts were much smaller than the forecast errors of profits. We have expressed the relation between these forecast errors as the ratio of the revenue and profit ARPE's, which we call the "M-value".[5] Excluding outliers the M-value is

$$M = \frac{\text{average ARPE of profit}}{\text{average ARPE of revenue}} \quad \frac{50.4}{7.2} = 7.0$$

(including outliers $M = \frac{160.6}{7.2} = 22.3$)

We have also analyzed the outcomes by type of industry, company size and time of deposit. Due to space limitations the results of these analyses are not included here.

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5) This "M-value" is not identical to Ijiri's (1975) "forecast error multiplier". In Ijiri's analyses the prediction errors associated with the revenue and profit forecasts should have the same sign. This was only the case for 33 of our 53 observations.

3.2 Analysts' forecasts

Of the analysts invited to participate, more than 30 analysts accepted the invitation. Since some large departments of banks co-operated, which sent all their forecasts under one name, we do not know the exact number of participating analysts. The analysts produced 119 revenue forecasts and 124 profit forecasts mostly - but not only - of the participating companies. Table 3.5 shows the distribution of the RPE's of the analysts' sales revenue forecasts.

Table 3.5 Distribution of relative prediction errors of analysts' forecasts of revenue

RPE	n	% of total	cumulative %
(40 %) - (30 %)	1	1	1
(30 %) - (20 %)	-	-	1
(20 %) - (15 %)	2	2	3
(15 %) - (10 %)	5	4	7
(10 %) - (5 %)	7	6	13
(5 %) - 0 %	17	14	27
0 % - 5 %	33	28	55
5 % - 10 %	32	27	82
10 % - 15 %	12	10	92
15 % - 20 %	4	3	95
20 % - 30 %	5	4	99
30 % - 40 %	-	-	99
40 % - 50 %	-	-	99
50 % - 60 %	1	1	100
	119	100 %	

The average RPE is 4.2 % (σ = 10.0) while the average ARPE is 7.9 (σ = 7.4). Nearly 40 % of the realised sales revenues were outside the predicted 100 % certainty-interval, which means that this 40 % of the outcomes was not at all expected by the analysts. By far most of these outcomes were higher than expected.

Table 3.6 Distribution of relative prediction errors of analysts' forecasts of profit

RPE	n	% of total[a]	cumulative %
< (200 %)	4[b]	3	3
(200 %) - (150 %)	4	3	6
(150 %) - (100 %)	3	2	9
(100 %) - (50 %)	9	7	16
(50 %) - (40 %)	6	5	21
(40 %) - (30 %)	8	6	27
(30 %) - (20 %)	4	3	31
(20 %) - (15 %)	-	-	31
(15 %) - (10 %)	2	2	32
(10 %) - (5 %)	9	7	40
(5 %) - 0 %	9	7	47
0 % - 5 %	15	12	59
5 % - 10 %	6	5	64
10 % - 15 %	9	7	71
15 % - 20 %	1	1	72
20 % - 30 %	8	6	78
30 % - 40 %	6	5	83
40 % - 50 %	-	-	83
50 % - 100 %	6	5	88
100 % - 150 %	9	7	95
150 % - 200 %	2	2	97
> 200 %	4[c]	3	100
	124	100 %	

a) Due to rounding errors these percentages do not add up to exactly 100 %.
b) These negative outliers were: -271 %, -876 %, -1766 % and -7721 %.
c) These positive outliers were: 282 %, 327 %, 356 % and 869 %.

Most of the predictions (73.1 %) showed a positive prediction error, indicating that the analysts were too pessimistic about the sales revenues.

All 124 analysts' forecasts contained a profit forecast. Contrary to the revenue forecasts, the profit forecasts were mainly too optimistic, as 57.3 % of the prediction errors were negative. Table 3.6 shows the distribution of the analysts' profit forecast errors, as measured by the RPE. The RPE's of profit forecasts are clearly more widely distributed than those of sales revenue forecasts. The average RPE is -71.8 % with a very high standard deviation of 723.8. The average ARPE is 138.5 % with a standard deviation of 713.9. If we delete the 8 outliers, identified in table 3.6, the ARPE is 40.6 (σ = 45.5).

The analysts were also in many cases surprised by the magnitude of the realised profit figures. In 70 out of 117 cases (59.8 %) the realised profit was outside the 100 %-confidence interval as defined by analysts, which implies that they did not at all expect the realised outcome when making their forecast.

For analysts, too, the conclusion holds that the predictability of sales revenues is much better than the predictability of profits. If we delete the 8 outliers, identified in table 3.6, we can compute a M-value of $\frac{40.6}{7.9} = 5.1$. If we include the outliers the M.value is 18.0.

We analysed the results by type of industry, type of analyst, time of deposit, company size, and also on the basis of the available information. Only some of the latter results will be reported here. From previous research (e.g. Ruland, 1978; Jaggi, 1978 and 1980) it is clear that the information available

to analysts may have an impact on the accuracy of their forecasts. All analysts were asked to file their forecasts with the notary before the date of publication of the 1979 annual report of the company to be forecasted. This was done to ensure that the timing of the management and analysts' forecasts was about the same. This procedure could, however, introduce a handicap for the analysts if they would have no knowledge of the financial outcomes of the previous year. Therefore, the analysts were asked to indicate in addition to their forecast, whether or not, at the time of making their forecast for 1980, they had reliable information concerning the revenue and profit for 1979. We obtained 84 positive replies and 40 negative replies. The available information had no marked effect on the accuracy of the sales revenue forecasts, but was very important for the accuracy of profit forecasts, as is shown by the following data:

	n	RPE	ARPE
reliable information on 1979	84	-3.7	35.7
no reliable information on 1979	40	-214.7	354.3

So it looks as if information concerning the previous financial year is much more important for the prediction of profits than for sales forecasting.

3.3 A comparison of management and analysts' forecasts

The results reported above were based on management forecasts for 53 companies and on 124 analysts'forecasts for these, but also for some other, companies. For comparative purposes we have reduced our sample to those companies for which there is a management forecast and at least one analyst forecast available. If more than one analysts' forecast was available, the average was computed.

Our sample now contains 34 companies for revenue forecasts and 38 companies for profit forecasts. Included are 98 revenue forecasts and 113 profit forecasts of analysts. The number of analysts' forecasts per company ranges from 1 to 7. Our research question was: are management forecasts more accurate than analysts' forecasts?

Concerning this question table 3.7 gives some insights.

Table 3.7 Some characteristics of management and analysts' revenue and profit forecasts

	Revenue		Profit	
Measure	Management	Analysts	Management	Analysts
PE	25.5	94.0	-13.5	-12.2
σ_{PE}	197.3	203.3	52.4	50.6
APE	81.4	109.3	16.8	17.9
σ_{APE}	181.0	195.2	51.4	48.8
RPE	0.8	1.8	-27.0	-48.6
σ_{RPE}	10.5	10.2	223.0	346.4
ARPE	6.7	7.7	102.9	139.4
σ_{ARPE}	8.0	6.8	199.0	320.1
Other aspects				
% of overestimates	41.2	38.2	65.8	57.9
% of underestimates	58.8	61.8	34.2	42.1
% in 50 %-range	44.1	44.1	29.7	26.3
% in 100 %-range	65.5	64.7	40.6	36.8

Analyzing the comparative revenue data first, we observe that all prediction errors are smaller for management than for the analysts, although the differences are not very impressive for the two absolute measures. In all

cases the standard deviations are quite large, indicating a wide dispersion of the observations. The other characteristics are very similar: both management and the analysts were too pessimistic about the sales revenues and to very much the same extent. Both also defined far too narrow 100 %-certainty intervals.

Turning our attention to the comparative profit data, we observe very small differences between the PE's and APE's of management and the analysts. The relative prediction errors show somewhat larger differences, but these measures are very heavily influenced by outliers, when applied to our profit data. Eliminating 4 of these for both sets of data the RPE for management becomes -2.4 % and for analysts -3.6 %, while the ARPE's are 45.1 % and 51.1 % respectively. Management was a bit more optimistic than the analysts in the case of the profit forecasts. Both groups very much underestimated the uncertainty associated with their profit forecasts and were totally surprised by the actual outcomes in about 60 % of the cases.

In order to test for significance of these differences we have applied two tests to the data in table 3.8, namely the "sign test" and the "Wilcoxon matched-pairs signed-ranks test". [6] Table 3.8 reveals that management outperformed the analysts in 19 out of 34 cases when the absolute prediction error is taken as the measure of the accuracy of their revenue forecasts. In two cases it was a draw, while the analysts outperformed management in 13 cases. This difference is not significant at the normal significance levels of 5 % or 10 %.[7] For the profit forecasts the differences are even

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6) See Brown & Rozeff (1978) for a critique of some other tests used in previous research and for an exposition of the applicability of the latter test.

7) The sign test reveals a significance level of 14 %, the Wilcoxon matched-pairs signed-ranks test a level of 15 %.

Table 3.8 Comparison of performance of management vis-à-vis the analysts

	Revenue	Profit
$APE_{man} < APE_{anal}$	19	20
$APE_{man} = APE_{anal}$	2	-
$APE_{man} > APE_{anal}$	13	18
	34	38
sign test	1.061	0.324
Wilcoxon test	1.028	0.776

smaller. Management outperforms the analyst in only 20 out of 38 cases. Needless to say that this difference is far from significant. It may be added that these comparisons have been made on the basis of all available analysts' forecasts, whether the analyst had indicated that he had reliable information on 1979 or not. As we have seen in the preceding paragraph the availability of such information has a marked effect on the accuracy of analysts' profit forecasts. If the uninformed analysts are eliminated, however, management still shows a slightly greater accuracy than analysts and the differences are still not significant.

3.4 Our results compared with previous research

Our results can only to some extent be compared with previous research, as most studies have focussed exclusively on profit forecasts. In this paragraph we shall review some studies which have compared the accuracy of management's and analysts' profit forecasts in order to see whether our results fall in line with those previously obtained.

Basi, Carey and Twark (1976) studied the relative accuracy of 88 management earnings forecasts published in the Wall Street Journal in 1970 and 1971 with

analysts' forecasts published in Standard and Poor's Earnings Forecaster (before management's publication). The average ARPE of management was 10.1 % with analysts' ARPE being 13.8 %. The differences are not statistically significant at the 5 % level. Both groups of forecasts were on average too optimistic.

Imhoff (1978) replicated the study of Basi, Carey and Twark with data from 1971-1974. His findings confirm their conclusions that there is no statistically significant difference between the accuracy of both types of forecasts.

Ruland (1978) also tested the relative accuracy of management and analysts' forecasts. He distinguished between analysts' forecasts published prior to management's forecasts and analysts' forecasts published after the publication date of management's forecasts.[8] The latter group was more accurate, as could be expected a priori. Although the management forecasts were more often accurate than both groups of analysts' forecasts, the differences were again not statistically significant.

Finally, Jaggi (1978 and 1980) also conducted a similar research study. He used analysts' forecasts from the Value Line Investment Service, published in the first quarter of the years 1971-1974. His findings show that management forecasts were on average significantly more accurate than analysts' forecasts. A more detailed analysis, however, reveals that this is only true for the analysts' forecasts published before the management forecasts. These analysts are, therefore, confronted with a longer forecasting horizon and possibly also with a knowledge handicap, if they are yet unaware of the previous year's outcomes. The differences were not

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8) This difference is important when one uses published forecasts, as the analysts' forecasts issued after the management's forecast cannot be assumed independent of the latter.

significant when analysts' forecasts were published just after the publication of management forecasts, but of course these may not be assumed independent.

All of these studies used published management and analysts' forecasts which implies that there is the timing problem indicated above. Comparing the results of these studies for analysts' forecasts published before the management forecasts, it turns out that management shows a greater accuracy in all studies, but that the difference is only significant in one of the four studies. In the two studies which also investigated the analysts' forecasts issued after management's forecast no significant differences were found. In our study, we have no such timing problem, as we work with confidential data. Keeping this difference in mind, we may conclude that our findings with respect to profit forecasts conform with the general trend in previous research. In this study, too, management forecasts outperform analysts' forecasts in only slightly more than half of the cases. This difference is not at all significant.

4. Conclusions and implications

The conclusions to be drawn from this study may be summarized as follows:

Management forecasts

1. The management forecasts of revenue show no systematic bias. Nearly 80 % of these forecasts were within a range of 10 % around the actual outcome. Nevertheless, nearly onethird of the outcomes fall outside management's 100 %-confidence interval and thus came as a complete surprise.

2. The management forecasts of profit show rather high prediction errors in our study. Only 27 % was in the ± 10 % range around the outcome. Nearly twothirds of the companies were too optimistic about their profits and more than half of the companies were completely surprised by the actual profit figure.
3. Revenue forecasts are much more accurate than profit forecasts. Excluding outliers the ratio is about 1 : 7.
4. In 20 of our 53 cases the prediction errors computed for the revenue and profit forecasts did not show the same sign. Therefore, an explanation of the profit forecast errors in terms of Ijiri's (1975) "forecast error multiplier" is not meaningful for nearly 40 % of our observations.

Analysts forecasts

5. The analysts' forecasts of revenue exhibited a pessimistic bias. About 75 % of these forecasts were within a range of 10 % around the actual outcome. In 40 % of the cases the actual revenue was realized outside the 100 %-confidence interval of the analyst.
6. The analysts' forecasts of profit were mainly (57.3 %) too optimistic. Only 31 % was in the range ± 10 % around the outcome. In nearly 60 % of the cases the actual profit figure fell outside the 100 %-confidence interval of the analyst.
7. Excluding outliers, the ratio between the absolute relative prediction errors of revenue and profit is about 1 : 5 for analysts.
8. Excluding analysts without reliable information on the previous year's financial results of the company has no marked effect on the accuracy of the revenue forecasts, but a large influence on the accuracy of the profit forecasts.

Management versus analysts

9. Management's forecasts of revenue were more accurate than analysts' forecasts, as measured by the four types of prediction errors. However, the number of times management outperformed the analysts in our comparable cases (19 out of 34 cases) was not statistically significant at the 10 % level.
10. The other characteristics of the revenue forecasts are very much the same too. Both groups were, for instance, completely surprised by the actual revenue for about 35 % of the companies.
11. Management's profit forecasts were more accurate than the average analysts' forecasts for only 20 of the 38 companies in our comparison sample. This difference is, of course, far from significant. This result accords well with findings in previous comparative research.
12. Management was slightly more often optimistic about the 1980 profits, and was slightly less often surprised by the actual outcome. Nevertheless, still nearly 60 % of the realized profits came as a complete surprise.

Implications

Which implications can be drawn from this study? As stated in the introduction, most of this type of research is conducted in the context of the forecast disclosure issue. Limiting our attention to this issue, how do our results bear upon the discussion about voluntary or mandatory forecast disclosure? It should be stated from the outset that we regard this issue as a matter of accounting policy, which cannot ultimately be solved by empirical research. All kinds of costs, benefits and preferences play their part in this policy issue, which cannot be totally captured (or reconciled) within a research framework.

Nevertheless, it has been shown in the introduction that a crucial assumption for forecast information to be useful is that it meets standards of accuracy. These standards are to be derived from the present accuracy of decision-makers' estimates of the relevant corporate variables. Analysts can be regarded as one of the main alternative sources of information for decision-makers when making such estimates. If the information to be obtained from management cannot be shown to be more accurate than the information from alternative sources, its usefulness becomes highly questionable.

This study adds to the evidence concerning the relative accuracy of management and analysts' forecasts. It differs from previous studies in several respects. Some of the main differences are that (a) it includes revenue and profit data, (b) it is based on confidential instead of published data, and (c) it investigates to what extent both groups are themselves surprised by the actual outcomes. In this study management did not show a significantly better ability to forecast either revenue or profit. In nearly onethird of the cases management was itself completely surprised by the actual revenues and in more than half of the cases by the actual profits. Our results can be compared with some research on the relative accuracy of management's voluntarily published profit forecasts vis-à-vis published analysts' forecasts. They turn out to be well in line with the findings of this type of research. Generally, management forecasts profits slightly, not significantly, more accurate than analysts.

Of course, our findings are subject to many limitations. They only pertain to the 1980 forecasts of a representative sample of Dutch corporations listed on the Amsterdam Stock Exchange. If, however, the evidence which is gradually being gathered continues to point in the direction described above, the benefits of forecast disclosure might be significantly smaller than believed on a priori grounds. Such a finding would certainly have an important impact on the accounting policy debate concerning such forecasts.

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