

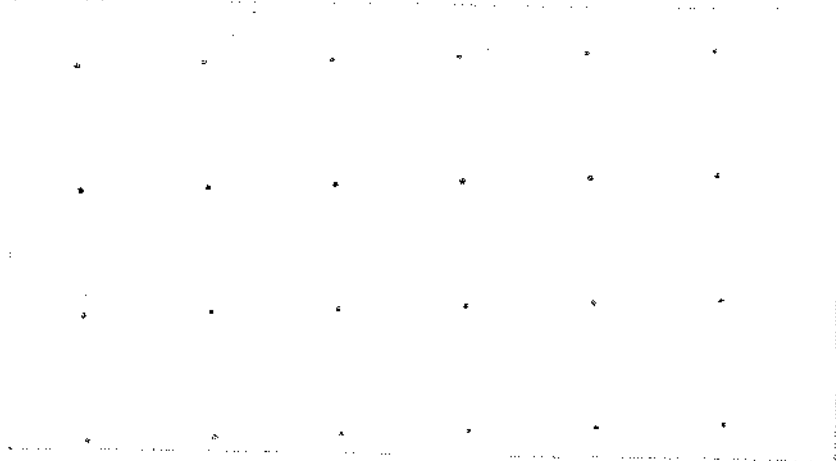
ET

05348

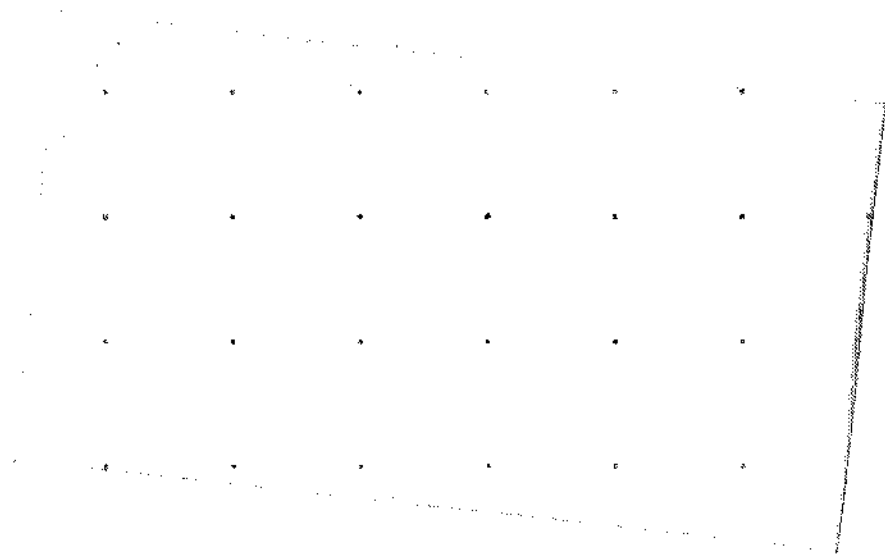
1982
026

SERIE RESEARCHMEMORANDA

437



VRIJE UNIVERSITEIT
EKONOMISCHE FAKULTEIT
AMSTERDAM



ET 05340 -

CONFIDENTIAL REVENUE AND PROFIT FORECASTS
BY MANAGEMENT AND FINANCIAL ANALYSTS:
EVIDENCE FROM THE NETHERLANDS

Hein Schreuder
Jan klaassen

Researchmemorandum 1982-26

November '82



Confidential Revenue and Profit Forecasts by Management and
Financial Analysts: Evidence from The Netherlands

Hein Schreuder and Jan Klaassen

Hein Schreuder is Director of the Economic and Social Institute of the Free University of Amsterdam.

Jan Klaassen is Professor of Accounting at the Free University of Amsterdam.

Acknowledgments: the authors gratefully acknowledge the invaluable statistical and mathematical assistance of David Kodde in the execution of this project as well as the financial support provided by the Limperg Institute, the interuniversity institute of accountancy in The Netherlands.

ABSTRACT

Confidential Revenue and Profit Forecasts by Management and Financial Analysts: Evidence from The Netherlands

Interest in corporate forecasts has increased significantly in the last decade. A major reason for the current interest is the shift in policy of several rule-making bodies toward benign acceptance or even the requirement of forecast disclosures, as in the case of UK take-over prospectuses. Research has focused 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 that, among other things, (a) it is based on confidential instead of published data, (b) it includes revenue and profit data, and (c) it investigates the extent to which the forecasters themselves were 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 aim of our study was to examine the accuracy of these internal forecasts.

The results for the management and analysts' groups are first presented separately, and then the comparative accuracy of these groups is analyzed. Management is shown to forecast revenues and profits slightly, but not significantly, better than do analysts. Both groups of forecasters were to a large extent surprised themselves by the actual 1980 revenues and profits. The paper concludes with a discussion of the results of this study, particularly as they relate to the accounting policy debate on disclosure of corporate forecasts.

Confidential Revenue and Profit Forecasts by Management and
Financial Analysts: Evidence from The Netherlands

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 this information either on a voluntary or on a mandatory basis. Most of the earlier research done in this field has focused on the accuracy of published profit forecasts (see, e.g. Abdel-khalik and Thompson [1978], Richards and Fraser [1978] and Westwick [1982] for reviews). Our study also concentrates on the accuracy of corporate forecasts, but it departs from previous research in several respects including (1) that we were able to use internal forecasts made confidentially available to us by corporate managements and financial analysts and (2) we obtained forecasts of revenue as well as profit. The aim of our study was to examine the accuracy of these internal forecasts.

This paper is divided into four sections. In the first section we briefly discuss some earlier studies focusing on some of the problems that arise in interpreting their results. In section two we describe our research design, including the ways in which it differs from previous research and the contribution this study may therefore make. In section three our results for the corporate and analysts' forecasts are first treated individually, and then the accuracy of the two groups is compared. The final section provides a discussion of the results of this study.

RELATED RESEARCH

Nearly all studies in this field have dealt with the accuracy of published profit forecasts. The background of these studies was the debate on disclosure of corporate forecasts. Recognizing that only relatively accurate forecasts could be deemed relevant, most researchers tried to determine the level of accuracy of corporate forecasts actually published. Early research focused on this accuracy *per se* (Daily [1971]; Westwick [1972]; McDonald [1973]). The difficulty with interpreting the results of these studies is that no standard was provided against which the reported levels of accuracy can be evaluated. Therefore, subsequent research has endeavoured to incorporate such a standard, by taking either forecasts published by financial analysts or those generated by forecasting models as a basis of comparison. The former can be seen as representing the forecasting abilities of the most knowledgeable group of outsiders; the latter postulates the potential accuracy of forecasting methods available to any outsider.¹⁾

The typical study of the comparative accuracy of corporate and financial analysts' forecasts is based on corporate data obtained from the *Wall Street Journal* and analysts' data published in Standard and Poor's *Earnings Forecaster* or the *Value Line Investment Survey*. The forecast errors are preferably compared on a matched-pairs sample basis. Such a research design was followed, for instance, by Basi, Carey and Twark [1976] based on data published in 1970 and 1971. They

1) We have used both types of standards, but, as space is limited, we shall only report on the comparisons with analysts' forecasts in this paper. Consequently, studies employing forecasting models as a standard will not be included in our discussion in this section.

reported an absolute forecast error of 10.1 % for management and 13.8 % for analysts. The difference is not statistically significant at the 5 %-level.²⁾ This main finding was confirmed in a replication by Imhoff [1978] using data from 1971-1974.

Both the above studies used analysts' forecasts produced before the publication of management forecasts. Ruland [1978] and Jaggi [1980] split their samples of analysts' forecasts into those published before the management forecast and those published after. Ruland found no statistically significant difference between the accuracy of management forecasts and both sets of analysts' forecasts. Jaggi reported that the analysts' forecasts announced prior to the management forecast release were significantly less accurate, which was not true of those announced after the management release.

These results run counter to intuition. On the basis of the generally assumed importance of "inside information" and the (scarce) empirical evidence available (e.g. Jaffe [1974]) one would have expected management to consistently out-perform the analysts. However, in only one of the four studies mentioned above were the management forecasts which were issued after the analysts' forecasts significantly more accurate. This is all the more surprising if one takes into account the fact that these analysts were confronted with a longer forecasting horizon and possibly also with a knowledge handicap. The latter may be the case, for instance, if the corporate forecast is announced together with other significant information, such as interim results.

2) See Albrecht *et al.* [1977] for a critique of the BCT-study and Basi *et al.* [1977] for a reply.

There are, however, some problems involved in the interpretation of these results. One problem is that the forecasts cannot be assumed to be independent if they are both published. The finding that analysts' forecasts published after the corporate forecasts do not differ significantly from the latter may, of course, be explained by this dependency. But it is equally conceivable that corporate forecasts are influenced by the expectations which the financial community has made public beforehand.³⁾ Another problem concerns the nature of a published forecast. Is this management's best estimate or does it reflect a bias - optimistic or pessimistic? Results of research conducted in the US support the former (*cf.* Copeland and Marioni [1972]; McDonald [1973]; Basi *et al.* [1976]; Imhoff [1978]), while the latter is generally argued in the UK where profit forecasts are usually derived from take-over prospectuses. In fact, a pessimistic bias has been established empirically by some researchers in the UK (see Dev and Webb [1972]; Westwick [1972]; Ferris [1975, 1976]). Be that as it may, the general problem is whether management forecasting behavior is influenced to the point of bias by the prospect of publication of the forecasts. In addition, there may be a strong pressure on corporations to manage earnings in order to meet a published forecast (see Kearney [1972, p. 54] and Ferris [1975]). A final problem is whether the companies publishing forecasts can be regarded as a representative sample of their populations. This problem is especially relevant if one wants to generalize the research results, say, to predict the effects of a general rule concerning publication of forecasts. Imhoff [1978] and Jaggi and Grier [1980] have shown that

3) Or, alternatively, that only companies which feel they can live up to these expectations publish a forecast. This may lead to non-representativeness of the samples, as discussed later.

firms which do disclose forecasts differ from those who do not particularly with regard to the variability in their historical earnings. Forecast-disclosing firms tend to have more stable earning properties. Therefore, it is highly questionable whether one can generalize the results of studies based on published forecasts to all firms that would be affected by a general rule on forecast disclosure.

A final remark may be made on the research into the information content of forecast disclosures. Such studies have been conducted by, for example, Foster [1973] ; Patell [1976] ; Nichols and Tsay [1979] and Penman [1980] . The results indicate that voluntary forecast disclosures do have information content as measured by the security price reactions. However, as most researchers note, it is not possible to separate the information content of the predicted earnings figure itself from the significance of the voluntary act of publishing such information, as perceived by the investors. Again, if the samples of forecast disclosing firms are non-representative, the investors might react to the self-selection on the part of the firms implicit in the act of voluntary forecast disclosure.⁴⁾

4) Investors might, for instance, believe that these firms look forward to higher earnings than the financial community generally expects and/or which are to be predicted from their historical earnings. These firms might be tempted to signal their higher expectations to the market (see, however, Jaggi and Grier [1980] for empirical evidence).

RESEARCH DESIGN

Data collection

Toward the end of 1979, we approached all 193 companies listed on the Amsterdam Stock Exchange with a request to participate in our study.⁵⁾ All companies who did not demur to this request were subsequently sent a short questionnaire in the beginning of 1980. They were requested to deposit this questionnaire, containing their internal sales revenue and profit forecasts for 1980, in a sealed envelope at a notarial office. In addition, we asked all 285 members of the Dutch Financial Analysts' Federation to deposit their forecasts of revenue and profit of the participating companies at the same office. The notary guaranteed to all respondents that the forecasts would be turned over to us only *after* the actual figures for 1980 were published. We guaranteed that it would not be possible to derive individual data on the companies or the analysts from the publications of our research. The companies were requested to deposit their forecasts *before* the annual report on the previous year (1979) had been approved by the Board. In principle, therefore, these forecasts could have been included in the annual report. Accordingly, the analysts were asked to deposit their forecasts before the company-specific approval date of the annual report.

All participants were asked to indicate their "best guess" point estimates of 1980 revenue and profit. They were specifically instructed to minimize the (expected) difference between their forecast and the actual outcome for 1980. In order to test the uncertainties involved in these forecasts, both management and the analysts were

5) At that time we asked the companies to supply the approval date of the annual report to us. Thus, we could pass this date on to the analysts, as discussed later.

asked to indicate two ranges around their "best guess" point estimates of 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 which they felt with complete certainty would contain the actual outcome. (Of course, they were asked to define this range within as narrow limits as possible.)

We obtained the cooperation of 55 out of the 193 companies listed on the Amsterdam Stock Exchange at the end of 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 of 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 (see appendix A for further information on these tests).

We received 124 analysts' forecasts from the notary. It is difficult to say how many individual analysts participated in our study, as the analysts' departments of some banks and institutional investors decided to participate as a group and to deposit their forecasts under one name. Therefore, all we can say is that the analysts' forecasts were prepared by *at least* 30 analysts working for 14 different organizations, such as banks, pension funds, insurance companies, and brokers. The majority of our analyst participants - preparing 82 forecasts - work for six major Dutch banks. It is their task to give advice

on the investment decisions of private investors. As such, they can be considered 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.

Differences from previous research and their implications

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 confidential forecasts known to us (or to produce such forecasts for this occasion). This may have some impact on the accuracy of the forecasts. Kearney [1972] and Ferris [1975] have produced some empirical evidence that management forecasts may be adapted if they are to be published or even that outcomes may be to some extent manipulated in order to meet forecasts previously published. Our confidential forecasts would not lead to such behavioral effects and might therefore be expected to be the best, i.e. least biased, forecasts that management and analysts could produce. In addition, our forecasts do not represent public information and are thus less likely to have influenced other forecasts.⁶⁾ A final difference one might hypothesize is that companies that would not voluntarily publish forecasts, regarding them as too inaccurate, might nevertheless be willing to participate in our research since they would perceive no unfavorable effects in doing so.

6) We have tested the effect of eliminating the forecasts which could have been based on contacts between management and analysts. See our comparative results for the outcome of this test.

2. Our research covered both revenue and profit forecasts of the same companies, thus enabling us to compare the accuracy of both forecasts. Specifically, we could test the existence and the magnitude of the "forecast error multipliers" as defined by Ijiri [1975, pp. 144-146]. The results of these tests will be presented in the following section. As far as we know, they constitute the first empirical evidence on this phenomenon.
3. We asked our forecasters to express their own uncertainties by indicating their 50 %- and 100 %-confidence intervals. Hence, we could investigate the extent to which the actual outcomes and the resulting forecast errors came as a surprise to the participants themselves.
4. As we established a direct contact with our respondents, we could ask them certain additional questions in order to get some background information which might be relevant to the explanation of the results. We used this opportunity particularly with the participating companies, sending them a follow-up questionnaire. This questionnaire covered (a) checks on the data we used, (b) some characteristics of the forecasts provided, (c) an identification of the main factors causing forecast errors according to the corporations, and (d) possible contacts with analysts. Some of the follow-up information gathered in this way will be used in this paper.
5. We included only one year of forecasts in our research. As such, the study already represented a rather comprehensive and time-consuming project. Extending this to cover additional years would have exceeded the means available to us and also, quite possibly, the patience of our respondents.

We have, however, tested the representativeness of 1980 for forecasting purposes. From these tests (which are presented in more detail in appendix B), it appears that 1980 was a representative year for forecasting sales revenue. For profit forecasting, 1980 seems to have been representative with respect to the direction of profit changes but not with respect to the volatility of profits. This should be kept in mind when interpreting our results.

Error measures used

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

the prediction error (PE)	= $x - \bar{x}$
the absolute prediction error (APE)	= $ x - \bar{x} $
the relative prediction error (RPE)	= $\frac{x - \bar{x}}{x}$
the absolute relative prediction error (ARPE)	= $\frac{ x - \bar{x} }{ x }$

where: \bar{x} represents the forecast of revenue or profit for 1980, and

x represents the actual reported revenue or profit for 1980.

As the reported revenues and earnings varied widely among the participating firms, the relative prediction errors are the most meaningful measures of accuracy.⁷⁾ The PE will only be used to indicate a possible bias in the forecasts (the RPE is not useful for this purpose since it changes sign in the case of losses). The APE will only be used on a matched-pairs basis for comparative purposes, since the size effect is then eliminated.

7) The relative prediction errors have the disadvantage of becoming very large as the profits (or losses) approach zero. As a consequence, such outliers may dominate average relative prediction errors. Therefore, we shall present not only summary statistics on the (A)RPEs but also their distributions.

RESULTS

Management forecasts

Table 1 shows the RPE's determined for the management forecasts of revenue.⁸⁾ The table demonstrates that these forecasts are, in the main, rather accurate: 55 % within the range of + 5 % and 79 % within the range of + 10 %. There seems to be no clear systematic bias in these forecasts: 25 show a negative PE and 28 a positive PE. The average RPE turned out to be -0.8 % ($\sigma = 10.5$) and the average ARPE was 7.2 % ($\sigma = 7.6$).

Table 1 about here

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 eight companies that defined a 50 %-range, but not a 100 %-range, four produced actual sales revenues within their 50 %-range and thus also within their 100 %-range. Figure 1 summarizes

8) Similar data on the other error measures are omitted for the sake of brevity but may be obtained from the authors upon request. Forty management forecasts were deposited before the internal approval date of the annual report; only five forecasts were deposited more than a month later. For 33 of the 50 companies responding to our follow-up questionnaire the internal forecasts were entirely based on budgets; in 10 cases they were partially based on budgets and partially on other forecasting techniques; in the remaining 7 cases mostly a "mixed system" of forecasting was used employing several methods. In 13 cases the forecast provided to us deviated from the internal forecast, mostly to accommodate more recent information but also to provide a "top management interpretation" of the internal forecast.

these data and shows that at least 16 of the 52 outcomes (30.8 %) came as a complete surprise to our participants.

Figure 1 about here

Table 2 shows the distribution of the RPEs associated with management's profit forecasts. It is clear that these RPEs 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 % ($\sigma = 507.3$) and the average ARPE 160.6 ($\sigma = 485.7$). Even after elimination of the six outliers identified in Table 2, the average ARPE was 50.4 %. Only 9 % of the companies have a RPE between ± 5 % and only 27 % a RPE between ± 10 %. Nearly two-thirds (64.2 %) of the prediction errors were negative, indicating an optimistic bias of management in forecasting profits.⁹⁾

Table 2 about here

For most managers the actual profits came as a complete surprise. Figure 2 illustrates that for at least 28 (52.8 %) of our 53 companies the actual results fell outside their 100 %-confidence interval. For 21 of these companies the results were (much) lower than they expected and for seven companies the results were (much) higher.

9) Significant differences exist between the forecast errors per industry. The profit forecasts of insurance companies, printing and publishing firms as well as banks were relatively most accurate. In a multiple regression, the industry dummies proved significant, but no significant relationship could be established between the forecast errors and (a) the size of the companies or (b) the time of deposit of the forecast. These analyses are available from the authors upon request.

Figure 2 about here

Finally, we may compare the prediction errors associated with the management forecasts of revenue and profit. This examination is particularly relevant with respect to Ijiri's [1975, pp. 144-146] "forecast error multiplier". In Ijiri's analysis the forecast error multiplier is defined as the ratio between the profit forecast error and the sales volume (or, with constant prices, sales revenue) forecast error. He shows that the magnitude of the forecast error multiplier is dependent upon the proportion of fixed costs in the total cost structure: the higher the proportion of fixed costs, the higher the forecast error multiplier. What empirical evidence can we present on this matter? One test of Ijiri's assumptions is to determine whether the profit and revenue prediction errors have the same sign. If the former are only an amplification of the latter, this should be the case.

Table 3 shows a classification of the prediction errors according to sign. Twenty of our 53 observations do not conform to the expectation of equivalent signs. Apparently, in these cases it is necessary to take more (or other) factors into account to explain the profit forecast error. It is accordingly meaningless to compute forecast error multipliers in these cases. We have, therefore, computed the ratio of the profit to the revenue ARPE instead. This measure by definition ignores the sign of the prediction error. Excluding outliers, the value of the ratio is $\frac{50.4}{7.2} = 7.0$. In all industries, the profit forecast errors were larger than the revenue forecast errors.

Table 3 about here

Analysts' forecasts

Of the analysts invited to participate, more than thirty accepted the invitation. Since some large departments of banks which cooperated 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, most, but not all, of which related to the participating companies. Table 4 shows the distribution of the RPEs of the analysts' revenue forecasts.

Table 4 about here

The average RPE is 4.2 % ($\sigma = 10.0$), while the average ARPE is 7.9 % ($\sigma = 7.4$). Most of the analysts' forecasts (73.1 %) showed a positive prediction error, indicating that the analysts were in general too pessimistic about the corporate revenues. Nearly forty percent of the actual revenues were outside the analysts' 100 %-confidence intervals, which means that 40 % of the outcomes were not at all expected by the analysts. By far, the majority of these outcomes were higher than expected.

Table 5 about here

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 5 shows the distribution of the analysts' profit forecast errors, as measured by the RPE. The RPEs of profit forecasts are clearly more widely distributed than those of 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 eight outliers, identified in Table 5, the ARPE is 40.6 ($\sigma = 45.5$). The analysts were also in many cases surprised by the magnitude of the actual profit figures. In 70 out of 117 cases (59.8 %) the actual profit was outside the 100 %-confidence interval as defined by the analysts. Nearly two-thirds of these cases involved unexpectedly low profits. In 43 out of 119 cases a positive revenue prediction error was associated with a negative profit prediction error. Added to the eight cases in which the reverse was true, the analysts produced prediction errors with contrary signs in 43 % of the cases. For analysts, too, the predictability of revenues was much better than the predictability of profits. If we delete the eight outliers, indicated in Table 5, the ratio of the profit ARPE to the revenue ARPE turns out to be $\frac{40.6}{7.9} = 5.1$.

We tested the relationships between the analysts' RPEs and (1) the type of industry, (2) the type of analyst, (3) the time of deposit of the forecast, (4) the company size, and (5) the information available

to the analyst.¹⁰⁾ On a univariate basis, the first and the last factor produced significant differences in RPEs. On a multivariate basis (i.e. a multiple regression), however, only the industry variables showed a significant relationship with the analyst RPEs. Therefore, interaction effects are probably responsible for the univariate results with respect to the information available to analysts.

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 one to seven. Table 6 gives some first insights into the comparative accuracy of these forecasts.

Table 6 about here

10) 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 would be about the same. This procedure could, however, introduce a handicap for the analysts in that they might have no knowledge of the financial outcomes of the previous year. Therefore, the analysts were asked to indicate, along with 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. On a univariate basis the available information had no marked effect on the accuracy of revenue forecasts but seemed to affect the accuracy of profit forecasts significantly. The average ARPE of the 84 forecasts based on reliable 1979 information was 35.7 % while the other 40 profit forecasts produced an average ARPE of 354.3 %. All eight outliers, indicated in Table 5, fell into the latter group. See, however, the main text for the multivariate outcomes. Details of these analyses may be obtained from the authors.

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 the confidence intervals far too narrowly.

Turning our attention to the comparative profit data, we observe very small differences between the PEs and APEs 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 four of these for both sets of data, the RPE for management becomes -2.4 % and for analysts -3.6 %, while the ARPEs 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 completely surprised by the actual outcomes in about sixty percent of the cases.

In order to test for significance of these differences, we have applied the Wilcoxon matched-pairs signed-ranks test to the data in Table 7.¹¹⁾ Table 7 reveals that management out-performed 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 out-performed management in 13 cases. This difference

11) See Brown and Rozeff [1978] for a critique of some other tests used in previous research and for an exposition of the applicability of the Wilcoxon test.

is not significant at the normal significance levels of 5 % or 10 %; the Wilcoxon test shows a significance level of 15 %. For the profit forecasts the differences are even smaller. Management out-performed the analysts in only 20 out of 38 cases. Needless to say, this difference is far from significant (Wilcoxon test: 22 %).¹²⁾

Table 7 about here

Finally, we have tested the extent to which these comparative results may have been influenced by prior contacts between the analysts and the companies. In our follow-up questionnaire to the companies we asked whether they generally provided forward-looking information to analysts either by supplying their internal estimates or by providing other information useful for making estimates or by indicating whether they regarded the forecasts prepared by analysts as "reasonable". Fifteen of the 38 companies in our comparative sample answered affirmatively. These fifteen companies were subsequently asked whether they had provided such forward-looking information on 1980 to analysts in the months before depositing their forecast. Five firms replied that this had not been the case. For the other ten firms, therefore, a *possibility* existed that the analysts' forecasts were not independent from management forecasts.¹³⁾ Is our finding that no significant differences exist between

12) 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 shown above, the availability of such information may have had some effect on the accuracy of analysts' profit forecasts. If the uninformed analysts are eliminated, however, management still shows a slightly greater accuracy than the analysts, and the difference is still not significant.

13) As it was not feasible to ask the firms for details of each and every contact with analysts in those months, we could only identify the possibility of contacts with analysts in our sample.

the management and analysts' forecasting accuracy to be explained by the analysts' knowledge of forward-looking information provided to them by these ten firms? Do these ten firms constitute a major portion of the 18 instances in which the analysts out-performed management in forecasting profits? This does not appear to be the case. For only three of the ten firms did the analysts produce a more accurate profit forecast than the company itself. Hence, if we were to eliminate these ten firms from our sample, the comparative results would shift to favor the analysts.

DISCUSSION

The results of this study can only to a limited extent be compared with previous research. As we are aware of no other study designed to investigate the comparative accuracy of confidential internal forecasts of revenue and profit by corporate managements and analysts, we feel that the results reported here may best be regarded by themselves, i.e. as the first indications of the (comparative) quality of internal management and analysts' forecasts of revenue and profit. In our opinion, the most striking outcome is the inaccuracy of these forecasts as measured by the *a priori* expectations of the forecasters themselves. Thirty percent of the actual sales revenues and more than half of the actual profits fell outside the 100 %-confidence intervals of management. For the entire analysts' sample these figures were nearly forty percent and sixty percent, respectively. These outcomes raise serious questions with respect to the corporate and analysts' forecasting systems and/or their ability to assess the uncertainties involved in preparing financial forecasts.

One may, however, wish to compare our results concerning internal profit forecasts with those obtained previously with respect to published

profit forecasts. Two main points emerge from such a comparison. One is that the forecast errors reported in this study are larger than those generally found in previous research. The second point is that management was found to forecast profits slightly, but not significantly, more accurately than analysts. This outcome is well in line with the general findings of previous comparative research as discussed in Section 1. Both points will be commented upon below.

Which factors might explain the differences between the forecast errors established here and those reported in earlier research? Obvious factors include (1) the differences between the Dutch samples used here and the US and UK samples used earlier, (2) the consequences of using internal rather than published forecasts as discussed in Section 2 as well as (3) the different time periods involved. Profit levels were generally lower in the Netherlands in 1980 than in the US in the early 1970s, the years on which the results of Basi *et al.* [1976], Imhoff [1978], Ruland [1978] and Jaggi [1980] are based. This factor tends to inflate the relative prediction errors of profit, especially as the profit levels approach zero, as was the case for some of our observations.¹⁴⁾ Nevertheless, another factor may be operative as well. Imhoff [1978] and Jaggi and Grier [1980] have demonstrated that firms which voluntarily disclose their profit forecasts exhibit more stable earnings properties than non-disclosing firms. Therefore, these firms may be expected to forecast their profits relatively accurately and may be non-representative of all firms in this respect. In this study, similar tests indicate that we

14) In addition, it should be borne in mind that the volatility of profits was higher in 1980 than expected on the basis of previous years (see appendix B). Furthermore, different definitions of RPE may blur the comparison with other research. We used RPEs with actual profits in the denominator. In some other studies, forecasted profits appear in the denominator. If there is an optimistic bias in profit forecasts, as was the case here and in most US research, our definition leads to higher RPEs.

have obtained a representative sample of all firms listed on the Amsterdam Stock Exchange. Thus, the self-selection bias implicit in using published forecasts has been avoided here. To the extent that the attributes examined in the representativeness tests indeed affect the forecast errors, we have probably arrived at a truer picture of the forecasting accuracy for all firms in the population.

The second and last point we would like to comment upon is the congruence between our comparative results for the management and analysts' forecasts and the corresponding results achieved in previous research. Most of the research in this area has been motivated by the desire to contribute to the debate on publication of corporate forecasts. The relative accuracy of these forecasts was regarded as a precondition for the usefulness of such data. We would like to add that corporate forecasts may also be useful if they reflect the uncertainty involved in the prediction of the firm's outcomes more accurately. However, in neither respect did management show a significantly better performance than the analysts in this study. Our results are based on internal rather than published forecasts. As such, they present evidence of another kind on the relative forecasting accuracy of management and analysts. What do these results contribute to the debate on publication of corporate forecasts?

It should be made clear at the outset that we regard the issue of forecast disclosure as a matter of accounting policy which cannot ultimately be resolved by empirical research. All kinds of costs, benefits, and preferences play a role, and these cannot be totally captured (or reconciled) within a research framework. Nevertheless, if forecast information is to meet certain standards of accuracy for it to be useful, research may aim at examining the (expected) accuracy of these data and thus contribute to the assessment of the possible benefits of voluntary or mandatory disclosure

of corporate forecasts. Viewed in this context, research results on the comparative accuracy of corporate forecasts thus bear upon the potential benefits of forecast disclosure. If the empirical evidence which is gradually being gathered on the basis of different samples, time periods and research designs in general continues to point in the direction described above, the benefits of forecast disclosure appear to be significantly smaller than has generally been assumed.

Appendix A

In order to test whether our 53 participating firms were representative of all firms listed on the Amsterdam Stock Exchange, we have conducted two types of tests, both on the revenue and the profit data, and using two different forecasting models to generate the test data. The two types of tests were suggested by previous research of Imhoff [1978] and Jaggi and Grier [1980]. We refer to these articles for a discussion of these tests and deal here only with our test procedures.

We have first applied nine different forecasting models to the 1974-1979 revenue and profit data of our 53 firms.¹⁵⁾ From an evaluation of the resulting prediction errors it turned out that for purposes of forecasting revenue the following models performed best:

I. The random walk plus constant: $\hat{Y}_{j,t+1} = Y_{j,t} + a$

(the constant representing the average historical growth)

II. The model of identical change: $\hat{Y}_{j,t+1} = Y_{j,t} + (Y_{j,t} - Y_{j,t-1})$

For profit forecasting purposes the best performance resulted from:

III. The random walk model: $\hat{Y}_{j,t+1} = Y_{j,t}$

while model I showed good results, too, as well as an exponentially weighted moving average.

Subsequently, these models were used in the following two types of tests:

A) A test on the variability of historical revenue and profit. Models

I and II were fitted to the 1974-1979 revenue data and models I and III to the profit data. On the basis of the residuals we estimated the standard deviation of the prediction error. This standard deviation was used as a measure of the variability.

15) Models not discussed below included a linear and a multiplicative trend model, a random walk multiplied by average percentage growth, a model of identical percentage change, an exponentially weighted moving average and the Elton and Gruber [1972] model of an exponentially weighted moving average with no trend in trend.

B) A test on the forecast errors (i.e. the ARPEs) resulting from the application of both revenue and profit forecasting models to generate predictions for 1980.

From the total population of 182 firms listed on the Amsterdam Stock Exchange by the end of 1981 we eliminated 45 firms for various reasons. Among these reasons were that these firms (a) were (real estate) investment funds, (b) exhibited major structural changes, (c) had been in existence for too short a period, and (d) published insufficient or inadequate information (such as only a revenue index). Thus, we could test the representativeness of our 53 firms against 84 other firms. We employed the two-tailed Wilcoxon rank sum test to determine the differences in variability and forecasting errors between these two samples. The test results are shown in Table 8. The absolute value of the test result should be greater than 1.960 to indicate a significance level of 5 %. None of the tests passes this criterion. Only the application of model I to the revenue data yields a significance level of 10 % for the differences in forecasting errors. None of the other tests shows such a significance level. On the contrary, the differences in variability which were significant in the research of Imhoff [1978] and Jaggi and Grier [1980] are very small in our research, as are the differences in profit prediction errors. Only with the revenue prediction errors does there remain some doubt, as one test points to a significance level of about 7 % and the other yields no significant result. All in all, however, we would conclude from the eight tests together that our sample may be regarded as representative of all firms on the Amsterdam Stock Exchange.

Table 8 about here

Appendix B

Another set of tests was conducted to determine whether 1980 could be regarded as a representative year for forecasting purposes. Again we applied the forecasting models indicated in Appendix A to the 1974-1979 revenue and profit data of the firms forecasted by management and/or the analysts. Our first test was whether the revenue and profit predictions for 1980 showed a significant optimistic or pessimistic bias. By application of the normal approximation of the binomial distribution (assuming an equal chance of over- and underestimation) we calculated the ranges outside of which the percentages of under- and overpredictions should fall to be significant at the 10 %- or 5 %-level. These ranges are shown in Table 9 together with the actual percentages of the models selected. It turns out that none of the distributions of over- and underpredictions falls outside the 10 %-significance range (although model I for profit comes close). Therefore it can be concluded that the direction of revenue and profit changes in 1980 does not significantly differ from what would be expected on the basis of historical data.

Table 9 about here

Our second test involved intervals similar to those we asked from our management and analysts' participants. For the models, too, we calculated a 50 %-interval indicating the area in which the model predicts the outcome to be with 50 % certainty. Instead of a 100 %-interval, which is not empirically testable for forecasting models, we chose a 95 %-interval. Table 10 shows the percentages of actual outcomes falling into both intervals. The percentages of revenue outcomes within the

Table 10 about here

50%-interval conform rather well to the specified levels, but, for the profit outcomes, this is clearly not the case. One of both percentages of revenue outcomes within the 95%-interval is statistically significant at the 5%-level, while both profit percentages are. Overall, this leads us to conclude that the volatility of profits was higher in 1980 than could be expected on the basis of historical data.

REFERENCES

- Abdel-khalik, A.R. and R.B. Thompson, Research on Earnings Forecasts: The State of the Art, *The Accounting Journal* (Winter 1977-78), pp. 180-209.
- Albrecht, W.S., O. Johnson, L.L. Lookabill and D.J.H. Watson, A Comparison of the Accuracy of Corporate and Security Analysts' Forecasts of Earnings: A Comment, *The Accounting Review* (July 1977), pp. 736-740.
- Basi, B.A., K.J. Carey and R.D. Twark, A Comparison of the Accuracy of Corporate and Security Analysts' Forecasts of Earnings, *The Accounting Review* (April 1976), pp. 244-254.
- Basi, B.A., K.J. Carey and R.D. Twark, A Comparison of the Accuracy of Corporate and Security Analysts' Forecasts of Earnings: A Reply, *The Accounting Review* (July 1977), pp. 741-745.
- Brown, L.D. and M.S. Rozeff, The Superiority of Analyst Forecasts as Measures of Expectations: Evidence from Earnings, *Journal of Finance* (March 1978), pp. 1-16.
- Copeland, R.M. and R.J. Marioni, Executives' Forecasts of Earnings per Share versus Forecasts of Naive Models, *Journal of Business* (October 1972), pp. 497-512.
- Daily, R.A., The Feasibility of Reporting Forecasted Information, *The Accounting Review* (October 1971), pp. 686-692.
- Dev, S. and M. Webb, The Accuracy of Company Profit Forecasts, *Journal of Business Finance* (Autumn 1972), pp. 26-39.
- Elton, E.J. and M.J. Gruber, Earnings Estimates and the Accuracy of Expectational Data, *Management Science* (April 1972), pp. 409-424.
- Ferris, K.R., Profit Forecast Disclosure: The Effect on Managerial Behaviour, *Accounting and Business Research* (Spring 1975), pp. 133-139.
- Ferris, K.R., The Apparent Effects of Forecast Disclosure on Managerial Behaviour: An Empirical Examination, *Journal of Business Finance and Accounting* (Autumn 1976), pp. 53-66.
- Foster, G., Stock Market Reaction to Estimates of Earnings per Share by Company Officials, *Journal of Accounting Research* (Spring 1973), pp. 25-37.
- Ijiri, Y., *Theory of Accounting Measurement*, Studies in Accounting Research no. 10, Sarasota, American Accounting Association, 1975.
- Imhoff, E.A. jr., The Representativeness of Management Earnings Forecasts, *The Accounting Review* (October 1978), pp. 836-850.

- Jaffe, J.F., Special Information and Insider Trading, *Journal of Business* (July 1974), pp. 410-428.
- Jaggi, B., Further Evidence on the Accuracy of Management Forecasts Vis-à-Vis Analysts' Forecasts, *The Accounting Review* (January 1980), pp. 96-101.
- Jaggi, B. and P. Grier, A Comparative Analysis of Forecast Disclosing and Non-Disclosing Firms, *Financial Management* (Summer 1980), pp. 38-43.
- Kearney, A.T.Inc., *Public Disclosure of Business Forecasts*, New York, Financial Executives Research Foundation, 1972.
- McDonald, C.L., An Empirical Examination of the Reliability of Published Predictions of Future Earnings, *The Accounting Review* (July 1973), pp. 502-510.
- Nichols, D.R. and J.J. Tsay, Security Price Reactions to Long-Range Executive Earnings Forecasts, *Journal of Accounting Research* (Spring 1979), pp. 140-155.
- Patell, J.M., Corporate Forecasts of Earnings per Share and Stock Price Behavior: Empirical Tests, *Journal of Accounting Research* (Autumn 1976), pp. 246-276.
- Penman, S.H., An Empirical Investigation of the Voluntary Disclosure of Corporate Earnings Forecasts, *Journal of Accounting Research* (Spring 1980), pp. 132-160.
- Richards, R.M. and D.R. Fraser, The Predictability of Corporate Earnings, *Atlanta Economic Review* (March/April 1978), pp. 43-47.
- Ruland, W., The Accuracy of Forecasts by Management and by Financial Analysts, *The Accounting Review* (April 1978), pp. 439-447.
- Westwick, C.A., *The Accuracy of Profit Forecasts in Bid Situations*, London, The Institute of Chartered Accountants in England and Wales, 1972.
- Westwick, C.A., How Accurate Are Profit Forecasts?, in: *Practical Profit Forecasts* (Gower Press, 1982).

Table 1 Distribution of relative prediction errors of management forecasts
of revenue

<u>RPE</u>	<u>n</u>	<u>% of total</u>	<u>cumulative %</u>
(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 % - 30 %	1	2	98
30 % - 40 %	1	2	100
	<u>53</u>	<u>100</u>	

Table 2. Distribution of relative prediction errors of management forecasts of profit

<u>RPE</u>	<u>n</u>	<u>% of total^{a)}</u>	<u>cumulative %</u>
< (200 %) ^{b)}	4	8	8
(200 %) - (150 %)	-	-	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 %	-	-	49
0 % - 5 %	5	9	58
5 % - 10 %	5	9	68
10 % - 15 %	-	-	68
15 % - 20 %	1	2	70
20 % - 30 %	2	4	74
30 % - 40 %	3	6	79
40 % - 50 %	-	-	79
50 % - 100 %	1	2	81
100 % - 150 %	4	8	89
150 % - 200 %	4	8	96
> 200 % ^{c)}	2	4	100
	<u>53</u>	<u>100</u>	

a) Due to rounding errors these percentages do not add up to exactly 100 %.

b) These negative outliers were: -231 %, -460 %, -970 % and -3396 %.

c) These positive outliers were: 370 % and 715 %.

Table 3. A classification of the revenue and profit prediction errors according to sign

		<u>Profit prediction error</u>		
		<u>positive</u>	<u>negative</u>	<u>total</u>
<u>Revenue predic- tion error</u>	<u>positive</u>	13	14	27
	<u>negative</u>	6	20 ^{a)}	26
	<u>total</u>	19	34	53

a) Including one entirely accurate revenue forecast.

Table 4 Distribution of relative prediction errors of analysts' forecasts of revenue

<u>RPE</u>	<u>n</u>	<u>% of total</u>	<u>cumulative %</u>
(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
	<u>119</u>	<u>100 %</u>	

Table 5 Distribution of relative prediction errors of analysts' forecasts of profit

<u>RPE</u>	<u>n</u>	<u>% of total^{a)}</u>	<u>cumulative %</u>
< (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
	<u>124</u>	<u>100 %</u>	

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 %.

Table 6 Some characteristics of management and analysts' revenue and profit forecasts

<u>Measure</u>	<u>Revenue</u>		<u>Profit</u>	
	<u>Management</u>	<u>Analysts</u>	<u>Management</u>	<u>Analysts</u>
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
<u>Other aspects</u>				
% 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

Table 7 Comparison of performance of management vis-à-vis the analysts

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

Table 8. Tests of the representativeness of the participating firms

	<u>Revenue</u>		<u>Profit</u>	
	<u>Model I</u>	<u>Model II</u>	<u>Model I</u>	<u>Model III</u>
Variability	0.212	0.102	-0.340	0.000
ARPE	-1.834*	-1.397	0.115	0.013

* significant at 10 %-level.

Table 9. Percentages of over- and underpredictions resulting from the application of the selected forecasting models

<u>Significance level</u>	<u>REVENUE</u>				<u>PROFIT</u>					
	<u>Range</u>	<u>Model I</u>		<u>Model II</u>		<u>Range</u>	<u>Model I</u>		<u>Model III</u>	
		<u>over</u>	<u>under</u>	<u>over</u>	<u>under</u>		<u>over</u>	<u>under</u>	<u>over</u>	<u>under</u>
10 %	40.0-60.0	43.3	56.7	55.2	44.8	39.6-60.4	60.3	39.7	55.6	44.4
5 %	38.0-62.0					37.7-62.3				
		n = 67					n = 63			

Table 10. Percentage of realizations within the 50 %- and 95 %-intervals resulting from the application of selected forecasting models

<u>Confidence- interval</u>	<u>REVENUE</u>		<u>PROFIT</u>	
	<u>Model I</u>	<u>Model II</u>	<u>Model I</u>	<u>Model III</u>
50 %	47.8 %	53.7 %	31.7 % ^{***}	34.9 % ^{***}
95 %	85.1 % ^{***}	91.0 %	74.6 % ^{***}	81.0 % ^{***}

^{***} significant at 5 %-level.

Figure 1. The actual sales revenues in relation to the confidence intervals of management

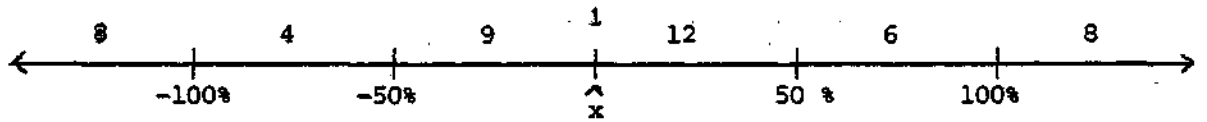


Figure 2 The actual profits in relation to the confidence intervals of management

