"FACTORS AFFECTING JUDGEMENTAL FORECASTS AND CONFIDENCE INTERVALS"

by
Michael LAWRENCE*
Spyros MAKRIDAKIS**

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* Michael LAWRENCE, University of New South Wales, Australia

** Spyros MAKRIDAKIS, Research Professor of Decision Sciences and Information Systems, INSEAD, Fontainebleau, France

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BY

MICHAEL LAWRENCE

University of New South Wales

Kensington, N.S.W., 2033 Australia

AND

SPYROS MAKRIDAKIS

INSEAD

77305 Fontainebleau, France

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ABSTRACT

Eighteen time series differing in their trend (3 categories), randomness (3 categories) and presentation on a graph (2 categories) were given to 350 MBA students in a laboratory experiment. Each student was asked to estimate judgementally a forecast and confidence interval. The results showed that when compared to the commonly used forecasting approach of simple regression, the judgemental forecasts differed significantly in their response to trend and presentation but not to randomness. The judgemental confidence intervals were very influenced by trend but insufficiently influenced by randomness when compared to the regression estimates.

Forecasts are needed for a wide variety of decision making situations. The accuracy, as well as the uncertainty of such forecasts is of considerable interest and practical value. Advances in the field of time series forecasting have increased our understanding of the advantages and limitations of statistical methods (Makridakis, 1986), their accuracy (Lawrence, Edmundson and O'Connor, 1985; Makridakis et al. 1982) and uncertainty (Makridakis and Hibon, 1986; O'Connor, 1987). However, apart from comparisons of accuracy (Lawrence, Edmundson and O'Connor, 1985 and 1986), little is known about judgemental forecasting of time series and judgemental perceptions of future uncertainty, despite evidence (Dalrymple, 1987; Lawrence, 1983) that both are extensively used for planning, strategy and policy making in business and government. The research described in this paper is an effort to understand better how people forecast judgementally and how they assess future uncertainty.

The paper is organized as follows: after a brief literature review, the research hypotheses are advanced in section 2, and the research design and methodology outlined. Section 3 presents and analyses the results. Finally, section 4 discusses the findings and suggests

ways of improving judgemental forecasts and confidence intervals[1] by utilizing the findings of this study.

1. LITERATURE REVIEW

The two activities of establishing a forecast and a confidence interval are closely related - a perceived poor forecast will be associated with a wide confidence interval. While some of the literature is relevant across both activities, we will divide this review into two segments, one reviewing judgemental time series forecasting and one judgemental confidence interval estimation.

Forecast Estimation

A finding in the area of judgemental psychology is that the predictive accuracy of statistical (bootstrapping) models is superior to that of people when the same quantitative inputs are available to both (Dawes, 1971; Camerer, 1981). This finding, however, does not necessarily apply to the area of judgemental time series forecasting. Armstrong (1985), after surveying published evidence of earnings per share, concluded that judgemental forecasts were superior to statistical ones in the majority of cases. A possible explanation of this is the extra information available to the judgemental

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1 The term 'confidence interval' will be used in this paper as it is more widely used than the alternative terms, 'predictive interval' or 'forecast interval'.

forecasters. To ensure a fair comparison of statistical and judgemental extrapolation, Lawrence et al. (1985) restricted judgemental forecasters in an experiment to only time series history information. They concluded that judgemental forecasts of time series are as accurate on the whole, as statistical ones.

Techniques for time series analysis (see for example Makridakis, Wheelwright and McGhee, 1983) have frequently decomposed non-seasonal time series into the components of trend and randomness. Several studies have considered judgemental estimation of trend. Mosteller, Siegel, Trapido & Youtz (1981) found equally high accuracy for judgemental eye-fitting of linear regression lines for both positive and negative slopes when compared to that of least squares regression. Their subjects exhibited a slight tendency (not statistically significant, but consistent) to overstate the least squares slope but were uninfluenced by different levels of randomness in the data. Wagenaar and Sagaria (1975), investigating eye-ball fitting of non-linear curves, concluded that subjects tend to underestimate growth, in particular when it was exponential. The cue probability learning literature also contributes to an understanding of trend estimation. This body of research has examined the ability of subjects to judgementally estimate a criterion value given a cue, when the cue and criterion are related by a regression equation. The dominant findings in this

field (Brehmer, 1971; Brehmer, 1976; Naylor & Clark, 1968) are that:

a) subjects are more accurate working with positive linear relationships than with negative linear or non-linear and are more accurate with negative linear than non-linear relationships;

b) subjects tend to overestimate the slope of the linear relationship; more particularly for positive slopes (as opposed to negative) and more particularly for lower cue validity (as opposed to higher cue validity).

Note that point a) above is in contrast to Mosteller et al. (1981) while b) is consistent.

Another factor relating to judgemental estimation that has been investigated is the presentation of information (e.g. tabular forms and graphs of several types). The findings, however, are not consistent. Remus (1984), Lawrence et al. (1985) and Stock and Watson (1984) found that the type of presentation influenced judgemental accuracy. Dickson, Senn and Chervany (1977) found no influence (see Desanctis, 1984, for a review of the evidence). Overall, given the importance of judgemental forecasting (Mentzer and Cox, 1984; Dalrymple, 1987) little is known about how the factors of trend, randomness and presentation influence future prediction.

Confidence interval estimation

Research results from studies not involving extrapolation have shown that the width of judgemental confidence intervals is usually too narrow (Lichtenstein, Fischhoff and Phillips, 1982; Raiffa, 1982), indicating a tendency towards overconfidence. This tendency was observed in studies using almanac data to be more marked when the task was more difficult. Expertise in the task area and experience in estimating confidence intervals seem to influence calibration. Professional weather forecasters, for instance, produce well calibrated confidence intervals (Murphy & Winkler, 1977). Tversky & Kahneman (1982) suggest the reason why judgemental confidence intervals are too narrow is because of the effect of anchoring: a forecaster estimates the most likely value and then anchors on this point in estimating the confidence interval. O'Connor (1987) using real-life time series in a laboratory setting found that judgemental confidence intervals were influenced by the scale of presentation and that calibration varied from under- to over-confidence.

Relevance to time series extrapolation

The findings of research studies not involving time series forecasting may not be applicable to this task setting since there are indications that the setting of the task and the consequences of error might influence

judgement. Solomon, Ariyo & Tomassini (1985) found auditors, while conservative in their confidence estimates relating to audit work, displayed the usual overconfidence in general knowledge question settings. Similarly, Trotman (1985) found that while auditors underestimated the uncertainty of general tasks they were conservative (overestimating uncertainty) on accounting auditing tasks. Payne (1982) commented "The finding that decision behaviour is sensitive to seemingly minor changes in task or context is one of the major results of years of decision research" (p. 395). The task of time series forecasting is distinguished from most of the study tasks used in the calibration and cue probability learning literature by (i) the serial correlation of its cues and (ii) the presence of all of the history data when making a prediction.

2. RESEARCH HYPOTHESES AND DESIGN

The dominant research paradigm in the evaluation of a forecasting technique is the comparison of its performance with another technique (e.g. Makridakis et al. 1982). This paper has adopted this approach by comparing judgemental forecasting with least squares regression. Regression forecasting was chosen as the basis of comparison because it is simple, well understood and widely used (Dalrymple, 1987) and has proved accurate for annual data series (Makridakis et al. 1982). Moreover it is well suited to linear-trended, non-

seasonal data. Furthermore when the assumption of constancy is true, a regression forecast is optimal for such data series. The characteristics of the data series selected for this experiment were precisely those for which regression forecasting is best suited: linear-trended, annual series2.

Makridakis, Wheelwright and McGhee (1983) describe the process of producing a regression forecast and the associated confidence intervals. The forecast is based on fitting a least squares curve to the historical data and projecting this curve forward. The forecast is influenced by the trend in the history data but not by its randomness. The calculation of the confidence interval, on the other hand, is based on the standard error of regression (a measure of the past variation around the regression line) and the forecast horizon, but not by the trend. Thus for a fixed forecast horizon the confidence interval width (CIW) is dependent only on the randomness, i.e., variation of the historical data. A change to the visual presentation of the time series history does not influence a regression forecast or confidence interval.

Table 1 summarizes the influences of the factors of trend, randomness and presentation on the regression based forecasts and CIW.

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2 An annual series is by definition, non-seasonal.

Factors	Forecasts	Confidence Interval Width
Trend	effect	no effect
Randomness	no effect	effect
Presentation	no effect	no effect

Table 1: Influence of trend, randomness and presentation on regression model forecasts and confidence intervals.

Mosteller et al. (1981), Brehmer (1971) and Brehmer (1976) reveal mixed evidence for the effect of slope on the accuracy of judgemental estimates where accuracy is measured against the regression line. While there is a greater weight of opinion in the many cue probability learning studies for the influence of trend on judgement than in the one study by Mosteller et al., the setting of this latter study is closer to time series extrapolation than the cue probability studies. For this reason we cautiously select the null hypothesis that the slope will not influence the accuracy of the judgemental forecast when compared to a regression based estimate. That is, we hypothesize that the judgemental forecast behaves like the regression estimate in the presence of trend.

Since in the Mosteller et al. (1981) study randomness did not influence the accuracy of fit of the regression lines, we hypothesize that the judgemental forecast will behave like the regression forecast in the presence of trend. We note that Brehmer (1976) found to the contrary that cue validity affected the subject's judgement of slope.

Given the divergence of opinion on the topic of presentation, we choose the null hypothesis that the judgemental forecast estimate behaves like the regression estimate. We similarly hypothesize that presentation will not influence the confidence interval width.

It is tempting to suggest that the findings of the cue probability learning studies, that subjects are less accurate dealing with negative trends, lead to the hypothesis that confidence bounds will be wider for negative trends than for positive trends. But there is no evidence that the subjects were aware that they were less accurate with negative trends. Thus, this implication appears to be a little tenuous and we again cautiously select the null hypothesis that trend does not influence confidence intervals.

No studies are known that shed direct light on the influence of randomness, in a time series sense (i.e. the residual after the trend component has been removed), on judgemental assessment of confidence intervals.

Calibration studies (e.g. Lichtenstein, Fischhoff & Phillips, 1982) suggest subjects respond to randomness, but inadequately, through confidence intervals that are too narrow. But for the sake of consistency with the other hypotheses and simplifying the discussion of the results we select here again the null hypothesis that judgemental and regression based confidence intervals behave similarly with respect to randomness.

Thus, in summary, we investigate the null hypothesis that the influence effects shown in Table 1 apply equally to judgemental estimation and that deviations of the judgemental estimates from the regression based ones should not be influenced by these factors.

Research Instrument

The research instrument for testing the hypotheses was a plot of a manufactured time series showing one point for each of seven years (see Appendix 1). Annual data was used to avoid the issue of seasonality which is outside the scope of this current study. The values for the series were generated to be distributed with the selected randomness around a linear trend line. In addition to the plotted values, a table of the data was also given. Subjects were asked to prepare two forecasts, one for year 10 (a 3 year out forecast) and one for year 15 (an 8 year forecast). For each forecast, optimistic and

pessimistic bounds having a 95% chance of enclosing the actual values were also requested.

Eighteen different examples of time series were produced (3 different slopes, 3 different categories of randomness, 2 different presentations). The slopes used were up, down and flat with the up and down trends having the same absolute value of slope. The time series were positioned so that all the year 10 regression line forecasts for time series of the same presentation had about the same value. Three different categories of randomness were used: low, medium and high. The standard error of regression of the high randomness time series was almost twice that of the medium, which in turn was almost twice that of the low.

The presentation effects investigated in the literature have usually been comparisons of different forms of graphs and tables (e.g. Lawrence et al. 1985). However, in this study we wished to have all the forecasts made using a graph of the time series data. The presentation difference investigated was the influence of a vertical repositioning of the time series. The two categories of presentation were achieved by a vertical repositioning of the time series on the graph by the addition of the value 40.

The time series were labelled unit sales to remove any anticipated inflation component, and the vertical axis

was scaled by a thousand to add an additional element of realism. However, in the succeeding discussion this scaling of a thousand is omitted. The horizontal axis of the time series was labelled year 1, year 2, etc. and no time frame for the data was indicated to avoid expectations of economic conditions influencing the forecast.

Research Subjects

The experiment was given to approximately 350 MBA student volunteers at two leading European business schools. All the students had taken at least one introductory course in business statistics and from the rigorous selection procedures for entrance to the business schools could be expected to possess above average intelligence. Each student prepared forecasts and confidence intervals for one or two time series. If two time series were given, care was exercised that they be dissimilar in randomness, slope and presentation level. The allocation of one or two time series was random.

A total of 583 sets of answers were collected (a set is defined as the forecasts and the confidence intervals for two horizons for one time series), in a number of separate sessions at the two business schools. Each of these sessions was introduced by a brief verbal description of the task mentioning the importance of doing a careful job. No time limit was set for the task.

The sessions lasted around 10 - 15 minutes in duration. No monetary or course credit was given for the exercise. Motivation appeared excellent for the assignment. The collected sets of forecasts were manually edited to, ensure all the information had been supplied. This step led to 15 sets being eliminated so 568 were left for analysis: i.e. around 31 sets for each of the 18 time series although this count varied slightly.

3 ANALYSIS AND RESULTS

3.1 Year Ten Results

Table 2 presents the results of the judgemental forecasts and confidence intervals for year 10, the three year horizon, in terms of trend, randomness and presentation. The columns in the table show the estimated values, the deviations from the least squares regression based estimates, (deviation = judgement - regression) and the average of the deviations expressed as a percentage of the regression estimate. Table 3 displays the results of an ANOVA on the deviation of judgement from the regression based estimates using the same matrix adopted in Table 1. (None of the interaction terms of trend, randomness or presentation had a significant influence on deviation.). We discuss the results relating to the forecast estimates first and then the confidence intervals.

Forecast Estimate

The forecast estimates and deviations for the different categories of trend in Table 2 show that the judgemental forecasts follow the slope of the data. However, contrary to our hypothesis, they show a damping of the historical trend (both the up- and down-trend) in the judgemental estimate. That is the subjects tended to underforecast upward-trend series and overforecast down-trend series.

The ANOVA analysis of the forecast deviation showed the effect of trend to be statistically significant (Table 3). In Table 3 the terms agree and disagree are used to indicate whether the judgemental estimates behave like the regression estimates as hypothesized and presented in Table 1. Tables 2 & 3 show no influence of randomness on the forecast but a significant (though small) effect due to presentation. That is, low level data is forecasted higher (with respect to the regression forecast) than the corresponding high level data.

**********INSERT TABLES 2 AND 3 ABOUT HERE **********

Confidence Interval Estimate

The confidence interval estimates are shown both in Table 2 and graphically in Figure 1 and 2. Figure 1 presents the comparison for the 3 categories of trend while Figure

2 for randomness. Figure 1 shows, in contradiction to the null hypothesis, a substantial influence of trend on the judgemental confidence estimate. The CIWs appear much too narrow for the flat trend series but are progressively closer to the regression CIWs for the up-trend and the down-trend series. Thus using the regression CIW as a yardstick, the judgemental CIWs are particularly narrow (overconfident) for the flat trend series. The ANOVA analysis, summarised in Table 3, shows the influence of trend on the CIW deviation to be statistically significant. The judgemental CIWs shown in Figure 2, display an increase in size for increased randomness in the data. However, by reference to the regression based CIW, their calibration changes dramatically from underconfident (too wide) for low randomness to overconfident (too narrow) for high randomness.

*******INSERT FIGURES 1 AND 2 ABOUT HERE******

Table 3, based on the ANOVA analysis, reveals a significant influence of randomness on the deviation of judgemental from regression based CIW. A similar result was also obtained for an ANOVA study on the CIW itself. When a post-hoc analysis was performed on the three levels of randomness it was found that the change in CIW from low to medium was significant while from medium to high it was not. Finally there was no significant influence of presentation on CIW. In summary, the

influences of trend, randomness and presentation found in the experimental data disagree with the majority of the attributes of the hypothesis advanced.

3.2 Year Fifteen Results

Table 4 contains the results for the year 15 estimates in the same format as Table 2. This shows the same patterns of deviations from the least squares estimates as for year 10 but with the deviations from least squares in general accentuated due to projecting forward the additional 5 years. Thus the underforecasting observed at year 10 is more pronounced at year 15. The confidence interval deviations for year 15 are mostly a little larger than for year 10. The low and medium randomness series and the down-trend series have judgemental confidence intervals wider than the regression based intervals.

An ANOVA study on the year 15 estimates revealed the same results as given in Table 3.

As the year 10 and year 15 judgemental estimates represent a quasi repeated measures design a MANOVA analysis was performed on the overall results in addition to the separate ANOVA analyses which have already been presented. The MANOVA analysis showed:

- the deviation of the judgemental forecast from the regression estimate was significantly (signif. < 0.0005) influenced by trend but not by the other two factors, and

- the confidence interval width was significantly (<0.0005) influenced by trend but not by the other two factors.

4. DISCUSSION AND IMPLICATIONS

The dominant finding of the experiment is the influence of trend on the judgemental forecasts and confidence intervals and the comparative lack of influence of randomness on the confidence intervals. While this finding looks consistent with Brehmer (1971) and (1976), and Naylor & Clark (1968), a number of the details are in fact quite different. Brehmer (1976) found the estimated slope was larger (in absolute value) than the true slope for both positive and negative sloped series with the difference more marked for the positive slope. The results of this study are quite the reverse - the estimated slopes (in absolute terms) are <u>smaller</u> than the regression slope, with the difference more marked for the negative slope. The subjects did not behave as a regression model as far as trend and randomness are concerned. This is consistent with Eggleton (1982), but disagrees with Mosteller et al. (1981).

Although the seven data points lay "evenly" distributed around a straight trend line the research subjects were not convinced that the trend would continue into the future. For trended time series, they shifted their best estimate off the established trend and also widened their confidence bounds, particularly for down trends, perhaps anticipating in this case that management action would arrest the decline in sales. Their reduction of the rate of growth for the up-trend series also indicates a practical forecast since a growth for seven years might well precede some lean years. This reaction of the judgemental forecasters to slope appears to reflect a good deal of common-sense and is consistent with empirical findings supporting damped trend forecast models (see Gardner and McKenzie, 1985), and suggests a source of the quality of "robustness" found by Lawrence et al. (1985) in their analysis of judgemental forecasts of real life time series. Thus, although the subjects seem to behave differently than the statistical model, such differences may not necessarily lead to a lesser degree of forecasting accuracy.

The research subjects appeared unable to distinguish changes in randomness beyond a certain level, setting the same CIW for medium and high randomness series. O'Connor (1987) made a similar observation from a laboratory study using real-life data. This does not appear to be a case of the research subject's underestimating a change in variability but apparently one of their ignoring it.

This appears to be a problem for judgemental confidence intervals.

Given the visual nature of randomness in the experimental task, this result is surprising. Particularly for the flat time series, but also for the two sloping series, placing the upper and lower confidence bounds could be attempted by projecting out the minimum and maximum observations. It is clear that this approach was not adopted, for had it been the results would have been quite different. One possible explanation of this insensitivity to randomness is that possible future changes to the slope dominated the thinking of the research subjects while setting confidence intervals. This explanation was investigated by visual examination of the graphs on which the subjects made their forecasts. These showed overwhelmingly that the upper and lower confidence interval points were arrived at by estimating the extreme slopes that the sales curve might possibly follow, through drawing in these lines on the graphs anchored to a point looking like an estimate of the last observation with the randomness component removed. Thus the upper point appeared to be arrived at by estimating the most optimistic sales growth, while the lower point appeared to be arrived at by estimating the most pessimistic sales growth.

Past variability enters into this method of establishing confidence intervals only to the extent that it

influences the estimation of the most optimistic or pessimistic growth curve. The dominant concerns of the subjects appeared, from this visual examination of their workings, to be a potential change in the historical steady trend of growth (or decline). This view of a confidence bound appears to be a quite different concept to that postulated statistically which is based on past variation around the historical regression line (estimated with perfect hindsight using the historical data) and which is independent of the slope of historical data. Further research is needed to establish the model used by subjects to set confidence intervals, and study it.

Lichtenstein, Fischhoff & Phillips (1982) concluded that task difficulty may influence the setting of confidence bounds. Confidence bound calibration was worse for more difficult tasks, where difficulty was measured by ex-post observation of the number of correct responses. If task difficulty increases with randomness then this phenomenon may be a cause of the observed behaviour in this study. However, this explanation does not appear to fit our results since task difficulty would appear to be the same for the various tasks given to the subjects. Our experiment showed that judgemental confidence intervals are not always too narrow with respect to regression based estimates. For the low randomness series the bounds were too wide (overestimating uncertainty) while for the high randomness series they were too narrow.

The influence on the forecast of the presentation of the time series, statistically significant though minimal, demonstrates a slight potential for bias. However presentation did not influence the setting of confidence intervals. It is possible that judgemental confidence intervals can be improved by presenting to the decision makers the confidence intervals of a quantitative model. The anchoring on the objective figures estimated by the model may then improve the judgemental estimates. However, the results of Carbone et al. (1983) and Lawrence et al. (1986) do not encourage this approach as they both found judgemental adjustment from a prior estimate reduced accuracy. Nevertheless more research is required to understand better the information processing schema of judgemental forecasters so that ways of improving their forecasts and confidence intervals can be found.

We note that in place of regression as the reference, we could have chosen any one of a number of alternative forecasting models with the comparisons varying accordingly. However as the data was generated lying distributed around a linear trend line, the regression model is the optimal forecasting model when we assume that "constancy" (Makridakis, 1981) holds.

CONCLUSION

The forecasts estimated by the subjects reflect a dampening of the slope for all types of trends. This makes good practical sense although it is not consistent with the regression forecasts. Furthermore, randomness did not have an influence on the forecast which agrees with the statistical model. However, when the time series was repositioned vertically by adding 40 units (about a 50% increase), the deviation of the judgemental forecast from the regression forecast changed slightly: the presentation of a time series influenced the judgemental forecast.

The slope of the time series significantly influenced the width of the confidence intervals which disagrees with the statistical model though it probably reflects good common sense. The judgemental confidence intervals were widest for the down-sloping series and narrowest for the flat, no-growth series. Finally, the subjects were comparatively wide (underconfident) at low randomness and comparatively narrow (overconfident) at high randomness, when compared with regression based confidence intervals.

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	POINT FORECAST			CONFIDENCE INTERVAL WIDTH		
	Judgemental Estimate	Deviation	Average Dev. %	Judgemental Estimate	Deviation	Average Dev.%
TREND						
Up	98.7	-5.0	-4.51	40.9	-9.5	-5.7
Flat	101.8	1.6	1.6	28.9	-18.9	-33.2
Down	111.5	8.7	8.6	47.9	-2.4	+9.6
RANGE						
Low	104.2	1.30	1.3	33.2	3.6	-22.3
Med	104.3	2.5	2.5	41.1	-3.7	-7.7
High	103.4	1.7	1.1	43.1	-33.5	-44.2
PRESENTATION						
Low	85.1	3.3	3.8	38.5	-12.0	-11.3
High	122.4	0.4	0.3	39.8	-5.0	-8.7

Table 2: Judgemental Forecast and Confidence Interval Width, and Deviations from Least Squares based estimates for year 10 estimates.

(Deviation = Judgemental Estimate - Least Squares)

FACTORS	FORECAST	CIW
Trend	***	***
	Disagree	Disagree
Randomness	Not Significant	***
	Agree	Disagree
Presentation	**	Not Significant
	Disagree	Agree

*** significance < 0.0005

** significance < 0.01

(Agree and disagree relate to the null hypothesis that judgemental estimates behave like regression estimates)

Table 3: ANOVA Analysis on Deviation of judgement from Regression Estimate: Year 10.

	POINT FORECAST			CONFIDENCE INTERVAL WIDTH		
	Judgemental Estimate	Deviation	Average Dev.%	Judgemental Estimate	Deviation	Average Dev. %
TREND						
Up	126.2	-20.4	-13.6	72.2	-3.4	14.8
Flat	105.0	4.4	4.2	47.6	-24.1	-23.
Down	92.4	32.1	61.0	85.2	10.1	33.3
RANDOM						
Low	107.1	4.9	16.6	64.6	23.7	57.8
Med	110.0	7.6	20.0	70.4	4.3	6.4
High	106.1	4.7	18.1	69.3	-45.4	-39.9
PRESENTATION						
Low	88.9	8.8	27.2	66.0	-9.4	3.8
High	125.5	2.8	8.2	70.0	-2.8	12.1

Table 4: Judgemental Forecast and Confidence Interval Width, and Deviation from Least Squares based estimates for year 15 estimates.

(Deviation = Judgemental Estimate - Least Squares)

Figure 1

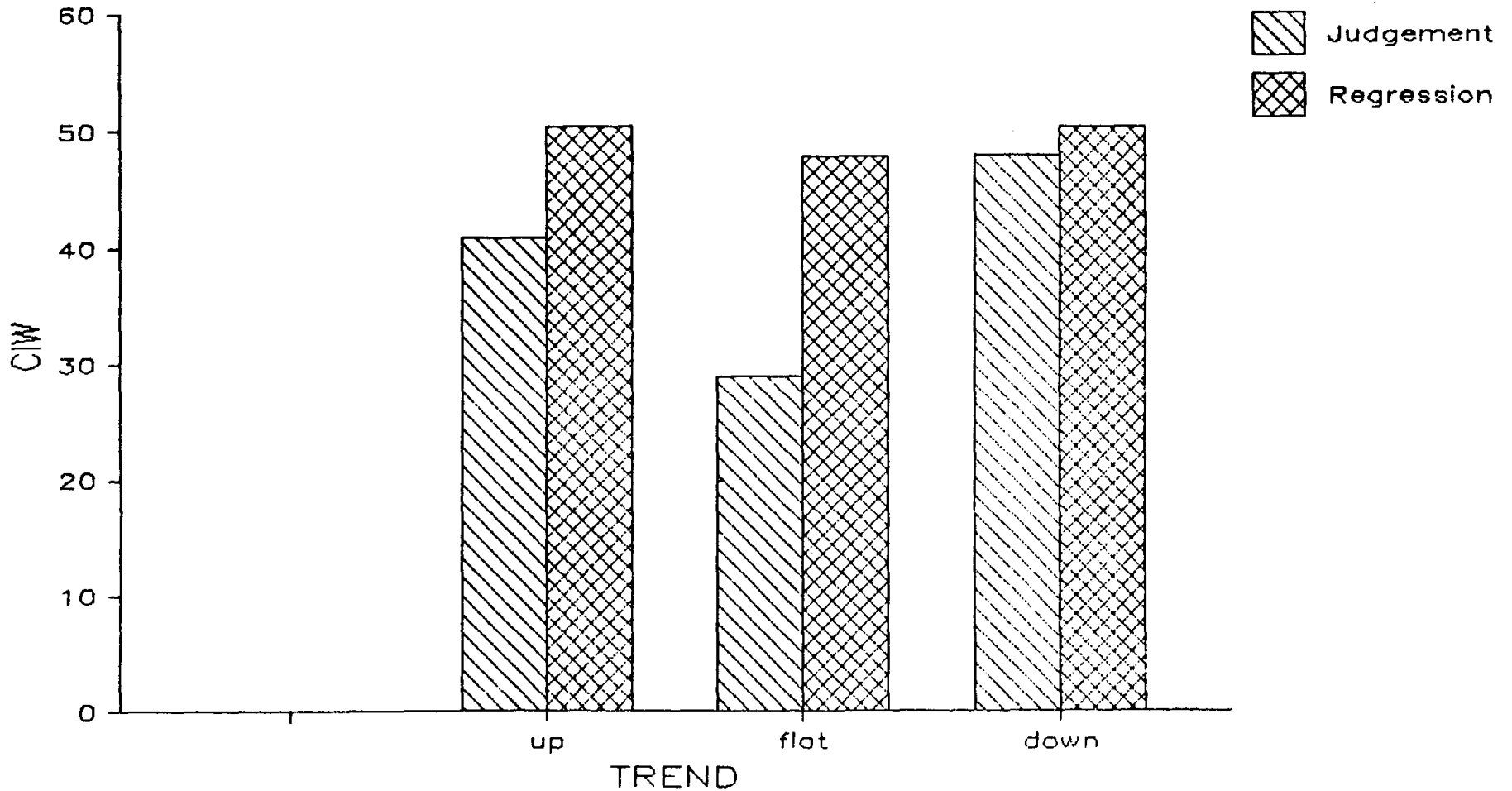
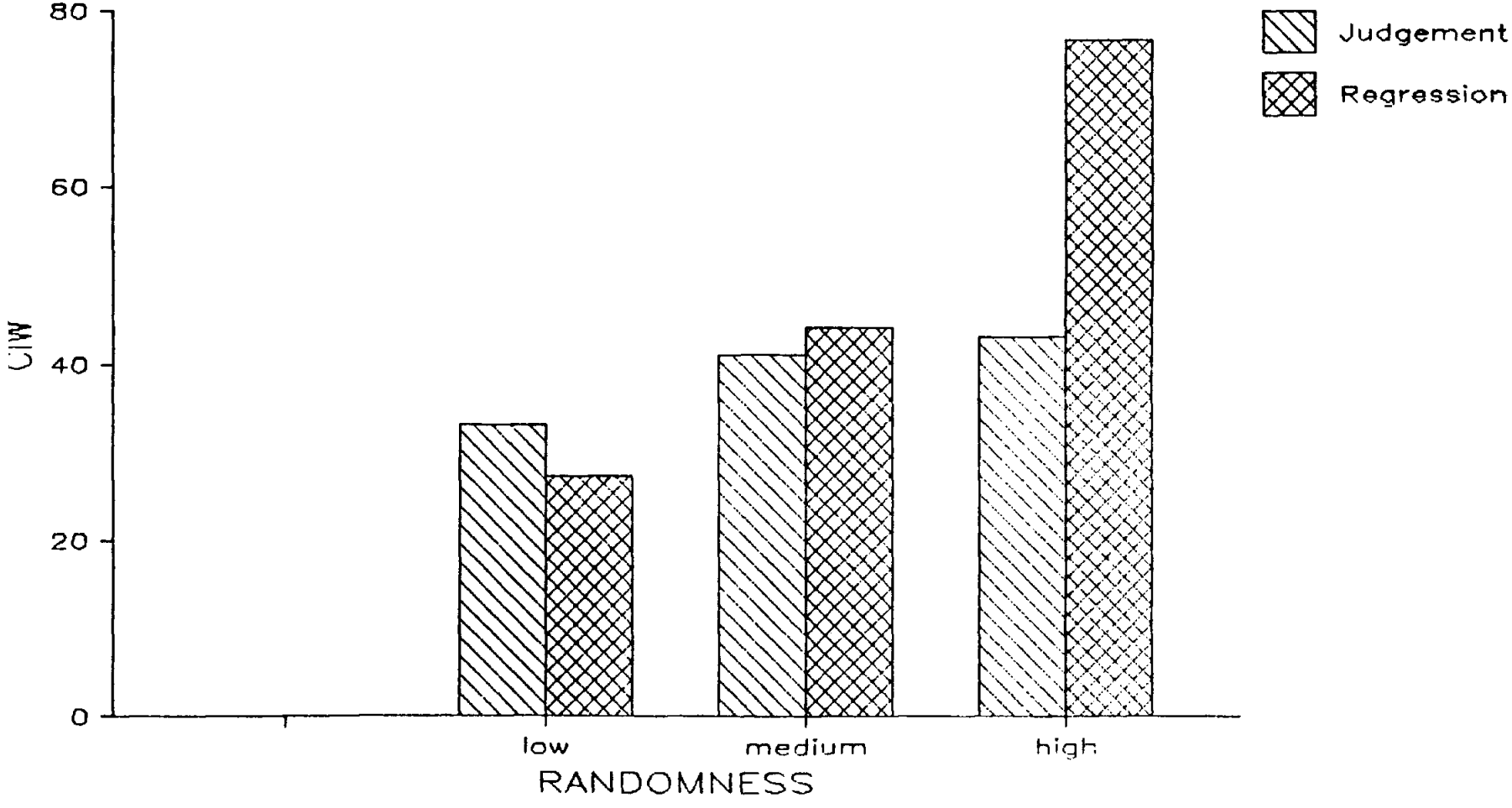
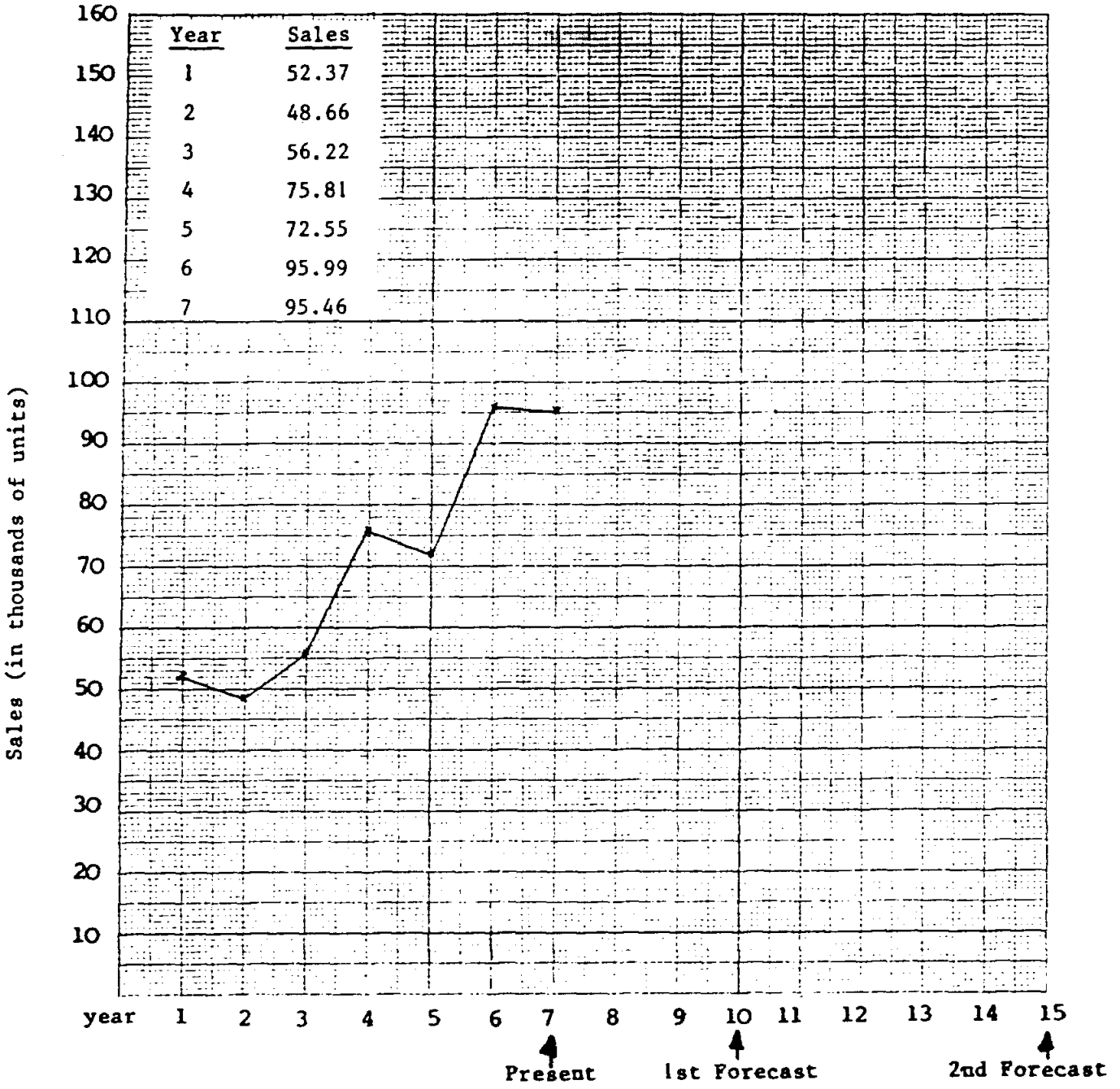

60
50
40
30
20
10
0
CIW
Judgement
Regression
up
flat
down
TREND

Figure 2


80
60
40
20
0
CIW
Judgement
Regression
low
medium
high
RANDOMNESS

APPENDIX 1

The Figure below shows yearly sales data for each one of the last seven years. Please use this information to forecast and make estimates of pessimistic, most likely and optimistic sales values for years 10 and 15.



Please write down estimates for the most likely sales volume for the years 10 and 15 as well as pessimistic and optimistic figures.

The pessimistic and optimistic values should provide a range that you feel certain will include the real, actual sales of the years 10 and 15. In probability terms these should be a chance of less than 5 in 100 that the sales value lies outside your range.

	Year 10	Year 15
Pessimistic	_____	_____
Most Likely	_____	_____
Optimistic	_____	_____

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