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Forecasting decisions in conflict situations: a comparison of game theory, role-playing, and unaided judgement

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Abstract

Can game theory aid in forecasting the decision making of parties in a conflict? A review of the literature revealed diverse opinions but no empirical evidence on this question. When put to the test, game theorists' predictions were more accurate than those from unaided judgement but not as accurate as role-play forecasts. Twenty-one game theorists made 99 forecasts of decisions for six conflict situations. The same situations were described to 290 research participants, who made 207 forecasts using unaided judgement, and to 933 participants, who made 158 forecasts in active role-playing. Averaged across the six situations, 37 percent of the game theorists' forecasts, 28 percent of the unaided-judgement forecasts, and 64 percent of the role-play forecasts were correct. © 2002 International Institute of Forecasters. Published by Elsevier Science B.V. All rights reserved.

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1. Introduction

In 1996 the New Zealand government transferred some of the assets of its monopoly electricity generator to a new private sector electricity-generating company, Contact Energy Ltd. It further split the residual into three entities in 1999. Wishing to know how participants in the new competitive market for wholesale electricity would behave following the second split, Contact organised its executives to role-play the generator company mana-

gers in a series of electricity trading simulations. The role-play behaviour was so at odds with the executives' own beliefs about how the market participants should and would behave, that they ignored the forecast. Turning to game theory for help, Contact management found it to be "no help at all... the role-playing exercise had already foretold the future, as we were to find out to our cost."¹

This anecdote suggests that role-playing may

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¹Interview with Toby Stevenson, General Manager Electricity Trading, Contact Energy Limited, 7 December 2000.

be an effective approach to predicting decisions made in conflicts among small numbers of decision makers with much at stake. The primary purpose of the research described in this paper was to investigate the relative accuracy of methods used to forecast decisions made in real conflicts. For this purpose, I defined accuracy as the proportion of forecasts that match the actual decision. Accuracy is commonly regarded as the most important criterion for judging the worth of a forecast (Armstrong, 2001b). The methods I examined were unaided judgement, game theory, and role-playing. I defined game theory as what game theorists do when faced with practical forecasting problems. It was *not* the purpose of the study to investigate other aspects of the methods, such as their value for generating strategic ideas.

While unaided judgement is commonly used to forecast decisions in conflicts, game theory and role-playing are not. Armstrong, Brodie, and McIntyre (1987) surveyed 59 practitioner members of the International Institute of Forecasters. The practitioners were asked about the use, by their respective organisations, of methods for forecasting competitive actions. The authors found that the organisations of 85 percent of practitioners used the opinions of experts with domain knowledge, the organisations of 8 percent of practitioners used formal game theory, and the organisations of 7 percent of practitioners used role-playing. The same study found expert opinion on the relative value of the methods to be at odds with the reported frequency of use by practitioners' organisations. Both marketing and forecasting experts ranked game theory and role-playing more highly than practitioners, although they disagreed about the relative value of the two methods—forecasting experts preferred role-playing over game theory.

Game theory may help practitioners provide more accurate forecasts than unaided judgement because, for example, the discipline of the approach should tend to counter judgemental

biases. Indeed, Nalebuff and Brandenburger (1996, p. 8) wrote “by presenting a more complete picture of each . . . situation, game theory makes it possible to see aspects of the situation that would otherwise have been ignored. In these neglected aspects, some of the greatest opportunities . . . are to be found”. The entry on game theory in Bullock and Trombley's (1999) dictionary states that game theorists “hope to produce a complete theory and explanation of the social world”. Given these claims and the fact that game theory is used by forecasting practitioners and is recommended by experts, it is legitimate to ask whether the method can help forecasters make useful predictions for real conflicts.

Opinions on the value of game theory for forecasting real conflicts are diverse. In contrast to the optimistic claims made by Nalebuff and Brandenburger (1996) and in Bullock and Trombley (1999), Shubik (1975, p. xi) described the assumptions behind formal game theory as “peculiarly rationalistic”. He continued: “It is assumed that the individuals are capable of accurate and virtually costless computations. Furthermore, they are assumed to be completely informed about their environment. They are presumed to have perfect perceptions. They are regarded as possessing well-defined goals. It is assumed that these goals do not change over the period of time during which the game is played”. He concluded that while game theory may be applicable to actual games (such as backgammon or chess), and even be useful for constructing a model to approximate an economic structure, such as a market, “It is much harder to consider being able to trap the subtleties of a family quarrel or an international treaty bargaining session” (p. 14).

The usefulness and realism of role-playing are often contrasted with the limitations of game theory in the game-theory literature. For example, Nalebuff and Brandenburger (1996, p. 62) emphasised the importance and difficulty of

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