

Book Reviews

Kmietowicz, Z. W., and A. D. Pearman: Decision Theory and Incomplete Knowledge. Gower Publ., Aldershot, 1981, 120 p., £ 2.50.

In November 1976 Kmietowicz gave a seminar at Hull on the work he had been doing with Cannon and Pearman. Immediately after that seminar I pointed out to him that their analyses and results could be generalised by means of a constrained game approach. In December 1976 I forwarded a copy of a paper to him for comments making this and other points. There was no response. This brief book (120 pages) produced 4 1/2 years later consists almost entirely of this prior work plus an incorrect version of part of my paper which itself criticised it, generalised it and, arguably, made it interesting.

Anyone remotely familiar with decision theory will be aware of the standard result that, for the constant sum game against nature, in general mixed strategies will dominate pure strategies for both players. After a superficial introduction (2 chapters) these authors devote 6 chapters (3 to 8) p. 13–78) to just the one class of exceptions to this general result generated by their *a priori assumption* that the player will adopt a pure strategy while imputing a weak probability ranking to the strategies of nature. Their result that the expected payoff is then simply a partial average of payoffs to a dominating strategy is then totally unsurprising while at the same time being incredibly naive.

The authors manage to take so long to generate their results by considering minimum and maximum expected payoff and (assuming a given variance covariance matrix) minimum and maximum variance cases separately both symbolically and numerically, be conducting all of their arguments on what would be the dual (nature) side of the overall programme – if they had considered the overall programme – using induction and exhaustive enumeration methods respectively all on the *assumption* that the player will adopt a pure strategy i.e. induction and exhaustive enumeration procedures to demonstrate/find a partial average result *given that* the result will be of that form!

In my paper I easily generated (in 16 pages) all of their partial average results as special cases of four simple constrained games (minimax, maximin expected payoff, minimax maximin variance via expected payoff with quadratic utility function) in which the probability rankings might be strict, weak, or correspond to a 'known' probability distribution, the optimal strategies of the player might be pure or mixed, and in which the overall system might be open or closed (i.e., establishing dominance criteria for unknown strategies). These results follow directly via duality and complementary slackness on the primal side – and can, of course, be translated to the dual side. I also considered at some length procedures for iterative reappraisal via complementary slackness of payoffs and probabilities. I mentioned there, too, (as these authors do not) that the expected variance criterion is controversial, since it implies a quadratic utility function which has a regular maximum – an objection which is usually regarded as pathological.

In their Chapter 9 (14 pages) these authors, although in what they do cover sticking extremely closely to my content, notation and order of presentation consider only part of my paper and even manage to introduce pathological errors into that. They mention and reject (my) maximin expected payoff case in favour of max max *on the grounds that* the former would generally yield mixed strategies (and despite the fact that the max max case is a special case of maximin). They simply do not mention my variance cases – even that I considered them. They focus entirely on the weak and strict ranking cases of the minimax case (omitting the exact distribution) and considering each separately, fixing the number of strategies for nature (thereby making them dependent) and then combining these two (evidently mutually exclusive) sets of results!

In Chapter 10, which precedes a brief two page conclusion, the authors make the same error of closing the system to make probabilities dependent in connection with an application of their primitive methods to a collective choice problem, citing, but not using, Intrilligator's work in connection with which this (pathological) difficulty is well known.

In short this is a worthless book.