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Comment

Gail Blattenberger

I am pleased to see attention directed to the theoretical principles underlying the statistical reasoning process in legal proceedings. Arthur Dempster has raised important questions regarding statistical analysis in employment discrimination cases. Too often statistical advice has been given in legal cases purporting to estimate a discrimination effect without explicit statement or understanding of what is being estimated. Here I offer comment on statistical evidence of discrimination in the legal context. I focus on interpretational questions rather than specific model specification issues such as reverse regression.

Continued active controversies over the meaning of probability render a universally accepted standard definition impossible. Nonetheless, the understanding of probabilistic language has implications for the interpretation of the evidential content of the analysis. Explicit statement of probabilistic modeling assumptions becomes necessary for communication not only between statistical experts and lawyers, but even among statisticians. In this I agree with Dempster.

My own position on probability adopts basically the personal measure of uncertainty meaning that Dempster advocates in this context, but my position is perhaps more extreme in this direction than his. Following de Finetti, I view probabilities as representations of uncertain opinions about the value of unknown but observable quantities. In this context it becomes important to specify whose opinions the probabilistic structure represents and under what circumstances. Probability for me is not a physical property, and estimation of unknown and inherently unmeasurable constructs lacks substance. This has relevance for the specification and interpretation of the probabilistic model.

Within this probabilistic perspective a linear model of the form specified in Dempster's equations (1) and

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(2) might represent a linear belief structure of an analyst. This model is specified:

$$(1) \qquad Y_i = G_i\alpha + X_i\beta + \theta_i.$$

I will play the role of the analyst. From my position equation (1) denotes the process by which I base my opinion about the measurable value of Y_i, employee i's salary, given the measurable values of G_i, the ith employee's gender, and given X_i, a vector of other measured characteristics of the ith employee. Although this equation has the same form as the standard model in Dempster's discussion, the interpretation is different.

Dempster expands his model to include information known by the employer but not the statistician, X^*, and a more comprehensive vector of characteristics, X^{**}, needed to determine the employee's "true worth," Y^{**}. Undoubtedly, the employer does use information available to him, but unknown to me in setting salaries; it is also true that the employer may provide nonmonetary fringe benefits which are unknown to me. I could incorporate recognition of this into my belief structure. I would question, however, the role of unmeasurable or unmeasured characteristics, X^{**}, the existence of the unmeasured and inherently unmeasurable, Y^{**}, and its expected value, Y^*. Dempster admits that the realism of these concepts is questionable, but he assumes that they exist. He proceeds to develop a model based on these concepts and examines its implications for assessing discrimination.

Economists, adhering to the human capital approach, have used the idea of an individual's marginal productivity to indicate the "true worth" of that employee. I have argued elsewhere, Blattenberger and Michelson (1984), that individual marginal productivity is not an intrinsic property possessed by an individual. It is inherently unmeasurable. Dempster does not use the term marginal productivity, but the same arguments are applicable to "true worth." I personally have had recent experience with this issue. In response to state budget cuts, I have participated in a committee