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DISCUSSION--MODEL VALIDATION: AN OVERVIEW  
WITH SOME EMPHASIS ON RISK MODELS

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McCarl and Nelson have provided an excellent survey of a large body of literature on validation, considered its implications for risk models, and made suggestions for further research on these issues as S-180 unfolds. As a neophyte in this area, I learned a great deal in a brief review of the paper and suggest that all the Technical Committee Members give the paper serious consideration. My basic judgment is that this paper will be quite influential in the accomplishments of this Research Committee.

In general, I would not take issue with the content of the paper and the perspectives of the authors. Several points raised by the authors perhaps do warrant further emphasis. First, validation is an on-going process. Second, validation requires judgment rather than cookbook manipulation of statistical criteria. Third, validation of risk models can present some special problems because of the stochastic nature of parameters and outcomes. Finally, a particular risk model will not likely be valid in all decision contexts.

The latter point is likely to be the most controversial. The theoretical training and empirical background of agricultural economists stresses comprehensive, mutually consistent decision models. A basic justification for and goal of S-180, as reflected in Objective 3, is a comprehensive analysis of risk management strategies in production, marketing and finance. The past neglect of such comprehensive analyses may be related to this methodological view: a comprehensive approach with the detail of more disaggregated models may not be fruitful. This issue will be considered later in the program, and more discussion of this point is definitely warranted.

The remainder of my discussion will emphasize psychological concepts of validation. While these concepts are not inconsistent with the McCarl and Nelson survey, psychological validation is especially relevant to measurement of risk preferences and probability distributions. McCarl and Nelson gave limited attention to the problems of validation of such measures, largely because they were concerned with overall behavioral models. Given the problems in measurement of these theoretical variables reported in the literature, some attention to validation of measures of these variables will be useful in some of the research under S-180, particularly under Objectives One and Two. These validation issues also have implications for validation by assumption discussed by McCarl and Nelson. This relationship will be developed later in the paper.

The psychological literature on validation is quite extensive. Some of this literature has been recently summarized in Musser and Musser, and this discussion will highlight that presentation. Psychologists consider

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validation as being concerned with the relationship between an empirical measure and the theoretical construct being measured. Since validation is a complex process, a simple definition is not possible. However, psychologists are concerned with three questions in validation: (1) Does the measurement technique predict theoretically related behavior? (2) Does it correlate with other measures which predict this behavior, and (3) Is it uncorrelated with other theoretically unrelated measures? These questions reflect the interest of psychologists in predicting behavior, which is the purpose of economic models outlined by McCarl and Nelson. Admittedly economists are concerned with a narrower range of behavior than psychologists. However, the experience of psychologists in measuring subjective mental processes is relevant for procedures utilized in risk research.

The potential application of this concept of validation in S-180 can be illustrated with some references to some well-known agricultural economics literature. Robison recently reviewed these studies so reiteration of the details are unnecessary here. Rather, the relationship between these studies and the questions outlined above will be emphasized. Lin, Dean, and Moore is the classic study concerned with relationships between elicited utility functions and risk responses; Officer and Halter is another example. Moving to the second question, King and Robison compared their interval estimation procedure to elicited utility functions, and Grisley and Kellogg compared their subjective probability distributions with actual outcomes. I am unaware of other examples of validation of measurement of risk preferences and probability distributions in the agricultural economics literature. Admittedly, the third question is difficult to relate to issues of risk research under S-180. However, the limitations in validation are apparent in that these examples each only consider one of the first two questions.

Research underway at the University of Georgia is concerned with both these validation questions. Part of this research was recently reported (Reece, et al.) and is only summarized here. Both the choice dilemmas scale, which is a psychological scale of willingness to assume risk (Kogan and Wallach), and standard utility function elicitation methodology was administered to students in a class on commodity markets. Behavioral data on a futures commodity trading game, which is a requirement for the course, was also collected. A correlation coefficient between absolute risk aversion coefficients estimated from the utility functions and scores from choice dilemmas scale was calculated. Correlation of these measures with the behavioral data were also analyzed with analysis of variance. The results were not surprising considering the previously reported problems with utility functions. No correlation between the two risk preference measures were found. In addition, the risk aversion coefficients did not correlate with behavior but the choice dilemmas scale did. Thus, the Kogan and Wallach scale was validated as a measure of risk preferences related to economic behavior.

Many agricultural economists will probably dismiss such results as unrelated to risky behavior under actual agricultural decisions. We share these concerns at least in part. Our interest in risk preferences measures relates to analysis of farmer behavior. Subsequent to the above research, the scale was administered to farmers. The studies of student behavior was considered as preliminary validation before use of the choice dilemma scale

with farmers. With the exception of Debertin, et al., agricultural economists have not used gaming situations in a classroom setting in validation; its efficiency compared to research with farmers merits more consideration.

The Project Outline for S-180 provides some optimism that this Committee will provide more validation of risk measures and models. Validation is mentioned in the Procedures for Objective Two; furthermore, management responses to risk are a predominant feature of Objectives Three and Four and at least a component of Objective One. Relationships of actual behavior to predicted behavior hopefully will be a prominent feature of this research. Validation of all the models utilized in research under S-180 is an unrealistic expectation. Most of the validation will by necessity be by assumption. Such an approach is perhaps more appropriate than McCarl and Nelson suggest given well accepted theories of risk management. In fact, one could argue that an important role of theory is to justify validation by assumption. However, an untested theory provides a dubious source for validation. Thus, further research on the validity of measures from expected utility theory is important as a basis for future validation of risk models.

As a final point, it is important to stress that more validation of expected utility theory exists than has been implied in this paper. The correspondence between predictions from a theory and reality also can be interpreted as testing or validating a theory. From this perspective, considerable empirical evidence exists which validates expected utility theory for use in risk management in agriculture. Other papers at this meeting review this literature. A few prominent examples may be worthwhile to mention--small grains in enterprise organizations, use of forward contracting, participation in federal commodity programs, maintenance of liquidity and credit reserves, and machinery investments are all examples of empirical research on risk which provide validation of expected utility theory. Thus, validation by assumption is probably sufficient for many of the research efforts in S-180. However, attention to more formal validation seems warranted when new models or measurement techniques are utilized and when established models are applied to different decision contexts.

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