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Modeling and Simulating Price, Yield, and Production Distributions for Risk Analysis in Agriculture: Discussion

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The purpose of this session is to discuss various procedures for modeling agricultural price and yield distributions. The model results are then used to provide improved analyses for agricultural risk management with the focus primarily upon the agricultural production sector. Each of the papers presented here contributes to that end. The discussion of these papers will be organized as follows: First, comments on each paper beginning with Richardson, Klose and Gray (RKG), then some general observations and concerns, along with a suggestion of issues for further discussion.

RKG are essentially attempting to refine risk estimates for use in firm-level simulation models. The work presented here builds on an analytical infrastructure that has been in place for some time. As such, this paper is another block in what can informally be referred to as the "FLIPSIM" pyramid. The curious aspect of this paper is the "decomposition" or delineation of what the authors refer to as "intra" and "inter"—temporal correlation. As a concept this needs further explanation. The implications of this concept also need to be explored more fully. One implication, if I am correct in my understanding of the paper, is that models which do not incorporate both "types" of correlation are mis-specified and according to the authors would understate the measure of risk used in firm-level analyses.

Featherstone and Kastens (FK) use a semiparametric approach to model regional and state farm income distributions for Kansas agriculture. FK provide a reasonably thorough explanation of the role of government program payments in their model. Of the three papers, FK provide the most in-depth explanation of their model's price component. Interestingly enough, the model does not incorporate a crop insurance component. Will future versions of the model attempt to stochastically model the regional impacts of crop insurance on Kansas agriculture? Incorporation of crop insurance would expand the policy dimension of the model and result in a more comprehensive analysis of Kansas agriculture.

Ramirez uses a flexible trigonometric transformation process to model various income probability distribution functions (pdfs) for West Texas agriculture. The strength of the paper is the thorough discussion of the econometric estimation process. Within this more formal econometric framework, Ramirez provides statistical significance tests for the key parameters in his model. He then proceeds to perform various risk-efficiency comparisons with the estimated pdfs. Application of risk-efficiency criteria at the regional level is noteworthy and should be given more consideration. Ramirez also includes a good discussion of the resulting parameter estimates (correlation, skewness, kurtosis, etc.) and the implications of these estimates for decision-makers.

In contrast to RKG, Ramirez and FK focus their efforts on the regional and state level. This is a novel approach since so much of the profession's risk-modeling efforts concentrate on the individual farm firm. The regional and state-level analyses could prove extremely useful to agricultural policy analysts and decision-makers. The ability to analyze the dis-

tributional impacts of alternative policy or economic scenarios has great appeal. Firm-level results are useful for analyzing individual incentive structures of policy or economic changes, but regional impacts with probabilistic measures could provide a richer policy debate.

All three modeling structures could be enhanced with more sophisticated procedures for dealing with acreage response and/or determination. This comment is based on our invited paper proposal and references in each paper to the changing risk environment in agriculture. RKG use a hypothetical uniform split of 100 acres per crop. I assume this is for expositional purposes only. No discussion of rotations or crop-mix allocation is included. FK fix their acreage mix on the distribution of 1999 acreage. Ramirez uses historic acreage distributions, then proceeds to establish informal acreage substitution possibilities. It would seem that the acreage determination process could be better developed for more realistic modeling applications.

In association with the acreage determination process in Ramirez and FK, both papers allocate some effort to the development or discussion of net revenue or net income distributions. FK provide some net income distributions with no apparent discussion of production cost development. Alternatively, Ramirez uses extension crop budgets to estimate net revenue distributions. The comparison of total revenue/income and net revenue/income distribution at the regional level is probably worthy of further discussion.

Perhaps the major concern with all three papers is the issue of specification error. All papers state this is a major problem, but no formal attempt is made to determine the potential Type I or II errors associated with their respective applications. Formal Monte Carlo procedures could be employed to investigate this issue. Results from such tests would be helpful in determining the contribution of alternative and improved modeling designs.

In closing, the papers of Ramirez and FK are more directly comparable because of their regional focus. The work of RKG is incremental, building on an existing modeling paradigm. The alternative correlation measures proposed by RKG should be given further consideration. With respect to further discussion and investigation, the issues of specification error and acreage determination would seem to be the more fundamental concerns. However, other readers might hold different views.