RISK ATTITUDE ESTIMATION BY ECONOMETRIC METHODS: A DISCUSSION

by

Paul N. Wilson*

Individual measures of risk preferences continue to be important empirical information for applied economic research in the agricultural sector. The generation of this type of information is costly and the path to accurate risk measures is strewn with methodological obstacles. As a result, recent efforts to directly estimate risk preferences have been few in number and generally have dealt with small, commodity-specific groups of agricultural producers. But although the supply of these risk measures is limited, the research demand for accurate and relevant estimates of Arrow-Pratt coefficients or other measures of risk attitudes has increased.

One example of this increased demand for risk coefficients is the proliferation of research using generalized stochastic dominance (GSD) as an analytical tool. GSD requires the specification of Arrow-Pratt risk intervals to rank probability distributions of a performance indicator. This tool has been used to evaluate strategies concerning cash rental arrangements, weed control methods, participation in government farm programs, optimal swine enterprise size and cotton marketing strategies to name only a select number of applications. But very little work has been done in these research efforts to verify the relevance of the risk intervals selected for these particular analyses. Professional sensitivity to this criticism of recent GSD research may be evident in the fact that one of the first papers using GSD (Kramer and Pope) used twelve risk intervals while a more recent paper (Bailey and Richardson) uses only two absolute risk intervals (e.g. risk neutrality and risk aversion). However, neither of these two research efforts estimated risk preferences for the individual growers or commodity groups that were studied.

Antle and Crissman's paper recognizes the importance of estimating risk preferences for empirical research. I would support their argument that although measuring individual risk preferences is an important activity, the distribution of risk preferences for a population of farmers is more valuable for policy analysis. Not only do the authors pose the question of how to get from individual farm data to a population estimate of revealed risk but they present a theoretical and econometric methodology which estimates these revealed risk measures using farm-level survey data that does not rely on experimental or hypothetical questioning procedures typical in risk elicitation research. My comments will revolve around the methodology developed by Antle and Antle and Crissman, the usefulness of the results discussed in their paper and a brief comment concerning future research efforts in estimating risk preferences.

One of the assumptions underlying Antle and Crissman's derivation of a distribution of risk measures is that individual producers face the same

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*Paul N. Wilson is an assistant professor in the Department of Agricultural Economics, University of Arizona, Tucson.

technology and price distributions. I can see where this assumption is necessary and may even be accurate in a low-income country dominated by monoculture. However, my perceptions are that agricultural producers in the U.S., because of variable information flows, varying management practices and a dynamic adoption process do not face the same technology and possibly not the same price distributions. Diversity in production technology may be limited in certain commodities but the decision-making technologies employed by the individual firm may be significantly different. Management, as a technology, may be the distinguishing variable which differentiates producers.

Antle and Crissman's papers present some interesting methodological insights as the principal argument of their papers is developed. Their comments on the appropriateness of exponential utility functions when there is decreasing absolute risk aversion, the proper use of Taylor series expansions and the relevance of the Arrow-Pratt coefficient as a measure of risk are added bonuses for the reader. Although I have not read all the referenced literature cited by the authors, the argument that the Arrow-Pratt measure of risk is only relevant when the agent faces riskless alternatives appears to me to be a theoretical insight with limited practical significance. Most decision makers face nearly riskless alternatives for their money in the form of guaranteed bank deposits. I am aware of growers in Arizona who actually opt for these riskless alternatives over riskier capital investments. But Antle makes this observation in relation to production input decisions (e.g. fertilizer). I would agree that in this case there may not be any riskless alternatives. This raises the question of the appropriate measures of risk behavior in relation to the type of decision being made. I am partciularly interested in comparing risk attitudes for input and investment decisions and suspect, a priori, that the decision criteria differs in selecting among alternatives in these two cases.

But the authors' discussion of the concept of increasing downside risk is timely and appropriate based on some recent research. According to the risk modeling hypotheses discussed by Patrick, et al., measures of downside risk may be more accurate reflections of the decision making environment than the Arrow-Pratt coefficient. Producers expressed "safety-first" attitudes when they were asked to reveal their decision-making processes. My personal interest in downside risk is in its compatibility with probability loss or safety-first considerations in the agricultural economics literature. Both risk averters and risk preferrers can be downside risk averse. There is some evidence that measures of downside risk aversion may accurately model economic behavior (Libby and Fishburn).

The discussion of data sources and measurement is very brief in Antle and Crissman's paper and should be expanded. Good data is critical for their analysis and this point should be emphasized. I would also like to see more space devoted to how the revenue distribution, the risk attitude distribution parameters and the risk measures are actually measured. Also, more attention and interpretation could be given to the econometric results. The statistical significance of the estimated parameters is not discussed in the paper although the standard deviations are presented.

A final comment on the results of this paper concerns the estimated distribution of risk preferences and its use for policy analysis. First, I believe such a distribution should be weighted in some way to reflect the

production capacity of each individual observation. Operation size combined with risk attitudes will determine aggregate demand and supply response by agricultural producers. Treating each producer equally will bias response estimates to public policies. Secondly, how the distribution of risk preferences will be used for policy analysis is not clear from this paper. The estimates of risk aversion, relative risk premiums, marginal risk premiums and absolute decreasing risk aversion provide point estimates of potential behavior but how these measures are to be incorporated into a policy model needs further development.

This paper is an important step in the development of risk measures for a population of agricultural producers using farm-level production data. Hopefully this effort will focus increased attention on the importance of risk measures for policy analysis and stimulate efforts to estimate risk attitudes for diverse producer groups in the U.S. This research committee has discussed the possibility of such a research program, but little coordinated effort has resulted. Antle and Crissman's work may provide a basis for implementing such an effort in a coordinated and cost effective fashion with farm recordkeeping groups in several states.

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