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## DISCUSSION: POLICY SCIENCE IN THE LAND-GRANT COMPLEX: A PERSPECTIVE ON NATURAL RESOURCE ECONOMICS

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Three of Randall's general viewpoints particularly deserve emphasis as being in agreement with my methodological views. First, the pluralistic view of the policy process and the role of economists in providing information both on objectives and policies seem to be more in accord with the nature of human beings and the policy process, compared with earlier views of economists prescribing programs to meet given objectives. Second, his endorsement of provision of information, rather than prescription, corresponds with my view of the most fruitful method of organization of research for such a policy environment. A new body of literature in psychology provides support for this position, in addition to the policy literature that he cites. This literature presents the view that individual and group decisions are greatly influenced by the limited human capacity to process information. Of particular relevance are various biases that arise from imperfect methods of making judgments because of limited human capacity (Kahneman and Tversky; Nisbett and Ross; Musser and Musser). The third viewpoint is that natural resource economics is a *science*, with standards of objectivity and pursuit of generalities—a credible, if somewhat rare, stance among modern agricultural economists.

These three views are not generally held by all members of the profession. For example, King, in his AAEA presidential address, supported at least some of these methodological views, while Tweeten, in his address, endorsed some alternative views. In the sense that my philosophical views of research in natural resource economics are so similar to Professor Randall's, I may have been the wrong choice for a discussant. To vindicate the choice of the program planners, I will raise three minor questions and then further amplify several views in the paper.

One semantic comment concerns his use of "resource economics" as synonymous with "natural resource economics." This usage seems to imply a broader content for the area than actually exists. For example, Leftwich summarizes the concept of resources as follows: "Resources

are the means available for producing goods which in turn are used to satisfy wants. Hundreds of different kinds of resources exist in the economy. Among these are labor of all kinds, raw materials of all kinds, land, machinery, buildings, semi-finished materials, fuel, power, transportation, and the like (p. 4)." While the loose use of the concept of resource probably is not confusing to most professional agricultural economists, it may be perplexing to research administrators, politicians, and others with whom agricultural economists interact. A second comment concerns an absence in the paper of discussion of issues relative to income distribution. Perhaps, this failure was an oversight, because distribution issues are explicitly considered in his text (Randall). However, income distribution is such an important component of research in a pluralistic policy setting that the issue deserves emphasis. A final comment concerns the use of optimizing models in research. While I agree that such models probably have limited or no prescriptive value, they can be useful in research such as Randall endorses. As Just argued with respect to price analysis, optimizing models provide comparative statics information concerning issues on which historical data do not exist. This comment is again largely semantic, but the conventional use of the concept "normative" to describe both prescriptive research and optimizing models suggests to some agricultural economists that rejection of prescriptive research implies rejection of optimizing models, which is not the case. Just et al. even consider applied welfare economics, which is usually considered to be prescriptive analysis, as providing information to policy makers, rather than prescribing appropriate policies (pp. 3-5).

Now that my duties as critic have been fulfilled, I will turn to further consideration of two issues that Randall discussed. These fundamental issues are: (1) the appropriate focus of natural resources research on applied versus fundamental research; and (2) the appropriate clientele for the research—agricultural or broader societal groups. The position that I will summarize in the

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remainder of this discussion is that these dichotomies identify extreme positions that have limited current relevance. Fundamental and applied research is most fruitfully mutually supportive. Furthermore, agricultural economists are not likely to be able to continue to serve agriculture without serving other groups. These two positions also have an important interrelationship.

To consider these positions, some historical comments on natural resources economics and its relationship to agriculture are helpful. As Salter documented, early natural resource economists were very applied and concerned largely with farmers. However, the political and intellectual environments of these land economists were much different than those of today. Politically, farmers had effective politician power. Furthermore, the economic theory of the time and the absence of powerful data analysis techniques precluded much fundamental analysis. The degeneration of this research into empiricism, noted by Salter, demonstrates the dangers of ignoring fundamental research.

The developments in the post World War II era provided a different environment. Wantrup and Heady both provided fundamental theoretical treatises in 1952, and data analysis techniques began to develop. However, subsequent development of theories of welfare economics and public choice were necessary for a theoretical basis for the classical issues of natural resource economics. Most important, Castle has noted that the significant problem areas in natural resource economics reflect the existence of externalities. Castle et al. note that the absence of this concept in Heady's work precluded production economics as providing a theoretical foundation for natural resource economics. This comment can be extended to Wantrup, who included only rudimentary concepts of externality theory. Castle et al. noted that problems in natural resource policy provided much stimulation for theoretical development, which supports the interaction of applied and fundamental research. At the same time that the basis for fundamental research in natural resource economics was developing, the population in and political power of agriculture was declining to a small minority.

In the modern era, the political system that created agricultural economics is gone. While the current political climate suggests that agrarian fundamentalism may again be popular, political coalitions in a pluralistic political system are very

unstable, as Randall notes. Readoption of the earlier focus on farmers could make agricultural economics subject to the next round of "hard tomatoes" rhetoric. To maintain the long-run political viability of agricultural economics, a more pluralistic clientele is probably important. The theoretical development in natural resource economics provides two appropriate strategies for this environment. First, the general equilibrium foundation of modern economic theory suggests that changes in the economic conditions of agriculture affect other groups. Therefore, objective consideration of agricultural problems requires analysis of the magnitude and distribution of benefits and costs for other groups. This analysis may provide the basis for development of clientele relationships with other groups. In addition, fundamental research allows coalitions with the broader scientific and university community. Today, colleges of agriculture cannot exist independently from the university. Fundamental research allows development and maintenance of scientific credibility within the general university community. This credibility provides support for agricultural economics under the general umbrella of academic excellence.

In conclusion, it is important to stress that the problems of agriculture cannot be ignored by agricultural economists. The rationale for our discipline is agriculture, and continued justification of the profession in an era of retrenchment in public expenditures without emphasis on agriculture is unlikely. Many issues in natural resource economics in the South do relate to agriculture and are logical concerns for our discipline. Examples from my own research program include irrigation, non-point source pollution, and integrated pest management. This paper suggests that research on such issues emphasize further development of theory and methods in the process of generating information for farmers and policy makers. At the same time, a scientific approach to such research would involve consideration of the relevance of these issues and their economic effects on groups outside agriculture. While such a research approach may seem difficult to maintain, agricultural economists in the future will not have the luxury of much deviation from such an approach. Every particular project and every particular individual professional may not be able to follow such a course, but research programs in total will likely need to include these components.

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