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216

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510

COMMENTS ON RICHARD DAY'S "FARM OUTPUT DECISIONS
AND ADAPTIVE ECONOMIC BEHAVIOR: RECENT THEORETICAL CONSIDERATIONS"

by

David Zilberman and Gordon C. Rausser*

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COMMENTS ON RICHARD DAY'S "FARM OUTPUT DECISIONS
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Day's presentation outlines an interesting set of issues that are directed at micromodeling in agriculture. How could we not concur with his recommendations that actual behavioral patterns of farmers should be studied and documented more intensely and carefully, that more efforts are needed on conceptual models of agricultural firm behavior, that the assumptions underlying these models should correspond more closely with reality, and that more emphasis should be given to understanding the behavior of the agricultural sector rather than its estimation and prediction? To be sure, these recommendations have a familiar ring. The real important question is balancing the trade-off between simplicity and accuracy in micromodel specifications for various purposes. The purpose for a particular model effort will, in large part, dictate the trade-off between complexity and inaccuracy. Armed with this perspective, we are more optimistic than Day on the profession's ability to predict and estimate the impact of policies on the evolution of the agricultural sector and the potential contribution of economics in determining the shape and form of agricultural policies.

Before launching into an evaluation of Day's arguments, let us first outline his views in their most positive light. He criticizes the static equilibrium approach taken by the majority of microeconomic studies. He emphasizes the need to incorporate dynamic feedbacks, disequilibrium, imperfect markets, and bounded human abilities in microeconomic models of the farm

sector. He outlines a framework that he has advocated for some time, namely, adaptive economics as being capable of incorporating these features in micro-economic model representations.

The realization that assumptions of conventional neoclassical models of perfect competition do not hold for U. S. agriculture is hardly novel. Actually, many of the models of the U. S. farm sector that provide much of the foundation for conventional wisdom are heuristic; these models have dominated other models in influencing and shaping U. S. agricultural policy. Moreover, they include—admittedly in a loose fashion—some of the important elements that Day argues must be incorporated in useful micromodels. Unfortunately, much of this work is overlooked in Day's survey. The particular models we have in mind are:

1. T. W. Schultz's model of U. S. agriculture. This model emphasizes the inherent disequilibrium in the farm sector induced by the dynamics of technological change, the low elasticities of demand for agricultural products, and the rigidity of agricultural supply response. In this formulation, the frequent technological innovations in modern agriculture initiate a process of natural selection, and farmers with superior abilities to deal with disequilibrium survive and prosper.

2. Cochrane's model of the "technological treadmill." This model assumes that the dynamics of agriculture is driven by exogenous technological change. The ability to adopt new technologies discriminates among or distinguishes various farmers. Farmers operate with limited foresight of future prices; thus, the rates of return from adoption of new technologies by late adopters is below the static equilibrium levels. Furthermore, some of the late adopters—and certainly the nonadopters—may face shutdown conditions.

3. G. L. Johnson's model of asset fixity. Johnson perceives agricultural input markets to be imperfect with spreads between purchase and sale prices of

inputs causing asymmetric supply responses for farm products. These asymmetric responses are more elastic for price increases than for price decreases.

The above heuristic frameworks provide the foundation for developing and applying microeconomic models in agriculture. They can, and have been, used as points of departure for rigorous modeling of the agricultural sector. In addition, they provide the threads to sew together a framework that is consistent with Day's notion of adaptive economics.

One of the key elements of Day's adaptive economic approach is its focus on behavioral frameworks. However, there are three major types of model frameworks that are used in microeconomic analysis: (a) traditional neoclassical micromodels assuming full information, profit maximization, perfect competition in both input and output markets, and neoclassical production functions; (b) behavioral models assuming bounded rationality (limited computational and informational capacities of economic agents), satisficing rather than optimizing behavior, and ad hoc decision rules; and (c) new industrial organization models assuming optimizing behavior subject to informational and computational constraints or cost and imperfect markets. Many of the latter models focus on institutions and firm behavior resulting from imperfect information and uncertainty. For example, Spence demonstrated the role education plays as a signal in labor markets; Stiglitz alerts us to the role that risk ratings and deductibles play as signals in insurance markets; and Akerlof explores various mechanisms for discriminating among workers with different abilities.¹ To be sure, we have very little experience with the more advanced new industrial organization models that have appeared in the literature. The traditional neoclassical models are the most frequently employed in

agricultural empirical applications. This is understandable--they are easier to implement and are consistent with the simple intuition of most researchers. In contrast, behavioristic models are more specific and, as a result, admit less general inferences to be drawn. Moreover, their empirical counterparts generally require specific software and, thus, their implementation is more costly than neoclassical models. For many specific applications, the gain in accuracy resulting from behavioristic frameworks does not warrant the additional computational cost that is associated with such models. For these applications, the simplicity offered by the traditional neoclassical models outweighs their greater inaccuracy.

Compared to the new industrial organization models, behavioristic models are less general and do not offer the same richness of insights. Actually, the new industrial organization models might be viewed as an outgrowth of the conflict between the neoclassical and behavioristic paradigms even though these two paradigms have different focuses (the neoclassical paradigm focuses on the market while the behavioristic paradigm focuses on the internal organization of individual firms). The focus of the new industrial organization models is to attempt to explain the decision rules and choices that behavioristic models take as given.

What the above discussion suggests to us is that the exclusive use of behavioristic models limits the potential value of the adaptive economics approach. It is our view that more efforts should be devoted to the formulation of new industrial organization models (assuming maximizing behavior and recognizing imperfect markets, uncertainty, and costly information). These formulations offer much promise in explaining behavioral patterns and emerging (declining) institutions in the U. S. agricultural sector. In many empirical

situations, the behavioristic approach can be employed in juxtaposition with a new industrial organization formulation. This process can occur by using the behavioristic approach to establish behavioral rules to be investigated and explained by the new industrial organization-type models. As a result of this combined approach, quantitative models can be constructed to predict and evaluate the effects of alternative policies particularly in the short run where the rules of behavior are presumed to be constant.

The development of useful quantitative policy models that are based in part on behavioristic rules for individual firm behavior require aggregation over farms to yield sectoral behavioral functions. Unlike Day, we are not overly concerned about microdata availability in the future. It seems to us that the proliferation of microcomputers will result in very extensive data networks and simulations using samples for actual distributions of the key parameters. The information explosion that will result over the next few decades should allow more accurate quantitative modeling of farmers' response to alternative policies. A general conceptual framework that takes us in the direction of such quantitative evaluations has been developed by Rausser, Zilberman, and Just.

In the Rausser, Zilberman, and Just framework, the distributional effects of commercial agricultural policies are emphasized. This model simplifies the individual farms' multiperiod dynamic optimization problem by imposing myopic optimization.² This simplification allows the introduction of a number of realistic elements, e.g., imperfect capital markets, land-price speculation, varying asset qualities, and asset fixity in farmer decision problems. Analytically derived aggregate relationships and industrywide outcomes are captured. This model has been generalized to include risk aversion and dynamic

adjustments, as well as tax and monetary policy effects on U. S. agricultural production (Rausser and Zilberman). When this basic model formulation is empiricized, it will represent an application of the adaptive economic approach for American agriculture which incorporates some of the key ingredients that have been advanced by Schultz, Cochrane, and G. L. Johnson. A number of interesting theoretical propositions have been derived from this formulation, and it awaits empirical confrontation and actual policy-impact analysis.

Finally, it should be noted that Day's paper, "Farm Decisions, Adaptive Economics, and Complex Behavior in Agriculture," is quite different from what he has presented here today. His paper is a survey of adaptive models with only cursory and superficial references to agriculture. In particular, Figure 9 is rather mysterious. Why should farmers behave as shown in the diagram? The diagram is presented, and then we are essentially told that it is irrelevant. In any event, no justification on normative or positive grounds is presented. On the whole, the presentation is rather long-winded and condescending. The idea of defining "efficiency" or "equilibrium" to this particular audience seems rather amazing.

The above critical remarks aside, as always, Day has provided a provocative set of issues which are indeed important in future micromodeling efforts for U. S. agriculture. He outlines some interesting directions which, if placed in proper perspective, offer much promise for future microeconomic research in agriculture. We are more optimistic regarding the potential outcomes of such research efforts than is, apparently, even Day himself.

Footnotes

*Senior authorship is not assigned.

¹The new industrial organization approach is similar to the "post-Bayesian paradigm" in statistics (Faden and Rausser). In this paradigm, simplicity--or the cost of complexity--plays a crucial role. In contrast to the conventional Bayesian approach, the cost of information sampling, data collection and summarization, etc., is treated explicitly in the formulation. Moreover, in contrast to classical statistics, the "level of significance" is part of the choice set rather than predetermined.

²Testafsjon has developed conditions for estimating the accuracy of this approximation.

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