

Reviewed by Philip Szmedra

John Antle has been arguing since 1983 against the appropriateness of the conventional framework with which economists analyze agricultural producer behavior, the neoclassical theory of production. His arguments have merit. The neoclassical paradigm is both static and certain and does not provide much insight into the production problem when dynamics and risk enter the calculus as they do in agricultural production.

Farmers’ pest management decisions in particular are characterized by two properties that make the process unique among production activities, and therefore do not allow the conventional theoretic approach much analytical worth. Pesticide input productivity depends on a random natural event, pest infestation, which makes productivity directly related to production risk. Secondly, inseason and interseasonal pest management decisions relate productivity directly to the dynamics of the production process. As social concern heightens for the harmful effects of some agricultural inputs, the regulations under which modern agriculture works will tighten.

Increased regulatory scrutiny of human and wildlife toxicity to pesticides and the environmental fate of many pesticide products demands accurate productivity measures to catalogue the benefits and risks of possible offending agents.

Here, then, is Antle’s significant contribution to the current state of measuring the benefits that farmers derive from using pesticides and pest management programs. By developing an empirical framework in which producers’ welfare under uncertainty can be analyzed with some confidence, policy guidelines for the regulation of suspected inputs can be made with ex ante knowledge of the welfare implications for different risk classes of producers. The methods developed by Antle allow quantitative investigation of the degree to which risk can bias conventional welfare analysis. This unique integration of production risk, sequential decisionmaking, and farmers’ attitudes toward risk provides insight into the microeconomic effects of regulations restricting specific input use, in directly promoting the use of alternative products or technologies. The central tenets of the book, the theoretical and methodological heart, reflect the author’s progress to date in developing empirical methods to measure the technologies and behavioral attributes of a producer population under uncertainty.

The econometric procedure defined by the author requires data defining the outputs and inputs of a producer group and prices faced by them. Given the data, the methodology allows quantification of the technological relation between inputs and outputs as a conditional probability distribution of output given inputs. After estimating the technology, one can measure the distribution of producer risk attitudes. The virtuosity of the method is embodied in its ability to allow the evaluation of producers’ economic efficiency and to analyze restrictive regulatory policies or innovative pest management techniques on the welfare and efficiency of producers.

After what is an essentially rigorous econometric exposition, Antle aims to soothe the reader’s psyche by offering a case study of the California processing-tomato industry. He provides an interesting and thorough read, laying the groundwork for each integral piece of the previously set forth methodology. The case study findings reinforce this supposition accounting for sequential decisionmaking by processing-tomato producers is central to obtaining reliable production technology information when production risk and time-related factors are important in producer decisionmaking. The implications are that laws restricting pesticide use have the greatest welfare effects on the most risk-averse individuals, who at the same time confront the greatest production risk. Restrictive laws that treat producers as a homogenous group are therefore an inefficient and inequitable method of restricting pesticide use.

Antle suggests that integrated pest management (IPM) programs, which ameliorate risk and therefore are a substitute for prophylactic pesticide applications, may offer a method to offset the welfare costs of restrictive pesticide laws to farmers most affected. This is where the author opens himself to minor criticism. Many farmers perceive IPM as a novel technology whose adoption carries with it inherent risk.

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If IPM is to become a significant welfare-equilibrating tool among producers facing restrictive pesticide regulations, institutional changes are required to make IPM a real alternative. But, this is a small argument about a small portion of this excellent book. Literature reviews at the end of every chapter provide a comprehensive catalogue of source material in IPM, modern welfare economics, stochastic production functions and their relation to econometrics, and risk-related topics. Though the author describes select chapters of his work as accessible to the general economist or informed lay person, the case study chapter cannot be read out of context. That is, one of the author's objectives is to empirically investigate the degree to which risk can bias conventional welfare analysis. One cannot impart much meaning to the empirical results without some understanding of the methods by which they were derived.

I recommend the book to applied resource and welfare economists. It is excellent as a supplementary text for a graduate level econometric or resource economics course. The book is a fitting culmination to this talented economist's early career work and an enjoyable read.