

Foreword

From the earliest days, quantitative methods have played a more crucial role in agricultural economics as a field of study than in any other area of applied economics. The scope of quantitative studies was understandably constrained when computations were made using pencil and paper, hand-powered calculators, or even electrically driven desk calculators. The advent of high-capacity electronic computers allowed researchers to conduct systematic analyses of vastly more complex empirical problems. With the very recent introduction and rapid spread of high-speed microcomputers, it is now entirely feasible for decision makers to conduct sophisticated analyses of their own rather than to rely wholly on the work of others.

The primary constraint on relevant and useful quantitative analysis has shifted from the mechanics of the solution process to the analyst's skill in design of appropriate structures for the question at hand. This book provides both traditional and innovative methods for approaching questions of interest to individual farmers and managers of agricultural marketing firms or to policy analysts who are charged with the responsibility of evaluating the impacts of alternative policy choices that may be under consideration. For each of these groups, the ability to select an appropriate frame for analysis and to mold the model in such a way that a large number of possible events can be considered is of great importance.

Linear programming has proven to be one of the most powerful tools for analysis of resource allocation choices at the firm and sector level. The introduction of nonlinear methods, multiple time period systems, and structures that make it possible to consider risk in the selection of enterprise combinations represent major contributions in programming analysis. The present volume is organized in a way that allows the reader to progress, in an understandable and logical fashion, from simple models to those of increasing complexity. It is equally suitable for advanced undergraduate and graduate students or for use by policy analysts who seek tools that will provide the fast turnaround time necessary for responding to day-to-day policy requests.

Widespread use of the analytical models developed in this book can serve to greatly enhance the quality of policy analysis available to ministries of agriculture in developing countries as well as in offices having access to the most powerful main-frame computers. The insights needed for decision making at the farm or regional level can be provided only by considering a variety of scenarios. This book offers guidelines to facilitate the construction of models that generate such insights at reasonable computer cost. Further, the presentation is sufficiently clear that noneconomists can readily discern the role and impact of technological information they may be invited to provide as team members and thus enhance their contributions to the model design process.

A unique feature of this book is the integration of farm-level decisions with regional aggregates and the art of making viable policy choices. Discussion of the basic structure of programming models and a review of computational methods are followed by an analysis of multiperiod structures that focus on potential conflicts among competing objectives. Consideration of risk in the analysis is shown to bring about important modifications of results generated under a risk-free environment.

Considerable attention is given to the problem of aggregating farms in a region. Consumption changes at the farm level in response to market price and interdependencies among products in the market and on the farm are examined. Methods for introducing market demand relationships and transportation and processing costs are developed and applied. The importance of model validation is explained, and the authors provide useful tests that they have found to be workable.

The range of policy issues that can be addressed using mathematical programming methods is illustrated through a variety of practical examples. Policy analysis is an art that must be practiced. The creative application of mathematical programming methods throughout this book is a reflection of the authors' technical competence and a demonstration of the potential contributions of quantitative agricultural policy analysis.

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