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## BOOK REVIEWS

*The Overproduction Trap in U.S. Agriculture: A Study of Resource Allocation from World War I to the late 1960's.* Edited by GLENN L. JOHNSON and C. LEROY QUANCE. (Baltimore and London: Published for Resources for the Future by Johns Hopkins University Press, 1972.) Pp. 211, US\$10.00, ISBN: 0 8018 1387 5.

Glenn Johnson's contributions to agricultural economics have been many and substantial and it is probable that his asset fixity theory is one of the best known of them. The value of the theory lies, not in the full articulated splendour of its divergence between acquisition and salvage value, its Lagrange multipliers and its boundary conditions, but in the way it concentrates our attention on the opportunity cost of resources. Application of the theory makes researchers aware of the need for care in identifying the opportunity cost of agricultural resources, particularly those resources already committed to the industry. Correct identification of opportunity cost shows that a low income farm problem does not necessarily mean that resources are being used inefficiently or that the industry is out of equilibrium. When defined in this way the farm problem becomes less of a question of how to improve resource allocation and more of a question of how to attack a poverty problem which is due to low resource use values and low opportunity costs (salvage values).

The significance of Johnson's theory could be attacked on the grounds that he has said nothing which is substantially new and that all of the apparatus of his model is implicit in received neo-classical theory. Be that as it may, this argument should not be allowed to detract from the fact that the Johnsonian model has presented us with an alternative simplification of reality which has underpinned statements as significant as that of Tweeten on the persistence of low returns in agriculture, and research such as that of Standen on the Far North Coast of New South Wales. In the limit most theoretical developments are tautological. Their significance lies in the way in which, when held in the light of our analytical powers, they cast new and valuable images of the problems which challenge us.

The present book is a monument to the work of Glenn Johnson and his graduate students at Michigan State University over the last ten years or more. It brings together the results of a project sponsored by Resources for the Future aimed at taking a comprehensive look at U.S. agriculture and is intended to outline policy directions for the future. The study was oriented toward resource allocation and much of the theoretical underpinning was provided by the asset fixity model with its message of overemployment of resources in agriculture with consequent overproduction and loss of both producer and consumer welfare.

Price expectations, the overall pattern of production, disappearance, income and resource use, together with detailed studies of the use of capital, labour and land are discussed for U.S. agriculture over the period 1917 to the mid-to late-sixties. The scope of the project is immense and the result is an authoritative statement of the performance of U.S.

agriculture over the period studied. The contributors to the core of the book, Part II, entitled Production and Resource Use, are Lehol on price expectations, Van Gigh and Quance on the aggregate pattern of production, disappearance, income and resource use, Quance on capital, Chennareddy and Jones on labour and Rossmiller and Larsen on land.

Part I of the book is written by Johnson and sets the philosophical base for the rest of the book. Much of what he says will be familiar and most attention is given to asset fixity theory and to a discussion of the distinction between normative and non-normative aspects of analysis. The treatment of asset fixity in the text is simple and geometrical. The more rigorous algebraic treatment is presented in an appendix.

There can be no doubt that Part I will provide the basic reference material of the future for discussion of asset fixity theory. However, it is noteworthy that Johnson continues to base his model on the Cobb-Douglas form of production function. While this is convenient and consistent with convention in the study of aggregate resource use, one is left with the question as to whether other forms of production function would behave as the constant elasticity Cobb-Douglas does. A recent study at the University of New England by Blinman suggests that they do not. Blinman throws doubts on Johnson's assertion that substitution of other forms of production function for the Cobb-Douglas does not destroy the conclusions of the model.

Blinman investigated six functional forms. They were the quadratic function, the power of 1.5 function, the Spillman function, the resistance function, the square root function and the Cobb-Douglas function with a constant term. Of these only the square root and, as would be expected, the expanded Cobb-Douglas function always conformed to the Johnsonian paradigm and hence its conclusions. Consistent support was not maintained in the case of the other functions. In the Spillman and power of 1.5 cases there was no way in which the configuration of the iso-MVP lines corresponded to the generalizations based on the Cobb-Douglas function. The quadratic and resistance functions appeared to comply with the Johnsonian model under certain assumptions about parameter values but not others. A disturbing result throughout was the frequency with which indeterminacy or local optima occurred.

This work suggests that Johnson's set of generalizations based on the Cobb-Douglas function is in fact a special case which depends for its robustness as an analytical device on the empirical relevance of the underlying Cobb-Douglas production function (or related forms such as the CES). If popularity in use is any guide the Cobb-Douglas is indeed relevant. However, the literature contains sufficient cautionary tales (not to mention a large number of unmentionable and unpublished disasters) to give us pause. Certainly the limited experience with estimates of an aggregate production function for Australian agriculture (Blinman adds to the list of sorry experience) suggests that the Cobb-Douglas production function has little appeal as an empirical device for this type of analysis. Considerations such as this must lower the attraction of the asset fixity model.

Part III of the book contains a summary, an evaluation and a set of recommendations. The summary view is provided by Van Gigh and the evaluation and recommendations by Johnson. Perhaps the distinctive

feature of this section is Johnson's suggestion that if the overproduction trap in U.S. agriculture is to be avoided it may be necessary to scrap the family farm and replace it with a less atomistic, more corporate structure which is more effective in taking account of the macro-consequences of its micro-decisions. Despite its U.S. orientation, the similarities between the U.S. and Australia should be enough to make this suggestion shake the Australian belief, recently enshrined in the Green Paper, in the continued comparative advantage of the family farm in the agriculture of southern Australia.

How important is this book to Australian agricultural economists? The first part provides a very useful reference on Johnsonian fixed asset theory while the conclusions are interesting and stimulating. The core of the book is a discussion of a thoroughgoing analysis of the performance of U.S. agriculture over a fifty-year period. It will provide valuable insights into U.S. agriculture and will be important in the evaluation of the comparative performance of agriculture in different countries.

However, Part II of the book is heavy going and is oriented to a U.S. audience. Because it is not aimed at a professional audience, discussion of methodological issues tends to be minimized, although the authors are frequently at pains to point out weaknesses in data, techniques and theory. Because of this, the professional agricultural economist will find that he will still have to hunt back through the literature for discussion of the details of the techniques employed. This is a great pity but at least the book does have a very useful bibliography attached to it.

W. F. MUSGRAVE

*University of New England,  
Armidale.*

*Studies in Economic Planning over Space and Time.* Edited by G. G. JUDGE and T. TAKAYAMA. (Amsterdam: North-Holland Publishing Company, 1973.) Pp. 727, Dfl 180.00, ISBN: 0 7204 3184 0.

This book is intended to be a companion to the authors' *Spatial and Temporal Price and Allocation Models* which contains a comprehensive and systematic analysis of various allocation models. There, competitive and monopolistic market allocation models involving the allocation of resources and goods over time and space have been formulated in terms of optimization problems. Advances in the theory of solution algorithms and in computer technology have made it feasible to provide numerical solutions for large optimization problems and hence for the allocation models. The empirical application of allocation models is important in that it provides us with a better understanding of the structure of the economy and hence enables us to predict the spatial and temporal adjustments to changes in policy and other parameters. In bringing together a wide selection of allocation studies which have been conducted over the last decade, Judge and Takayama have provided a convenient source of information on the types of problems that have been tackled and on the problems involved in the application and use of programming models.

In Part I various aspects of planning at the national and international level are discussed by various economists including such distinguished ones as Tinbergen and Frisch. Various input-output studies are presented including one by Tsukui who computes the Leontief trajectory and optimal growth plan for the Japanese economy.

Part II concerns itself with linear programming models of spatial and

temporal allocation applied to various industries. Most of the spatial allocation models are concerned with the agricultural sector in the United States and cover the livestock economy, the feed grains economy and the soybean industry. By contrast the section on temporal allocation models, introduced with a brief account of recursive programming by Richard Day, contains two dynamic models of the U.S. steel industry as well as a recursive model of agricultural development in India.

Part III is devoted to studies of various agricultural commodities in which non-vertical demand and/or supply functions are specified. These studies typically specify linear demand and supply functions in which case the optimization problem is a quadratic programme. Again applications to the agricultural sector dominate to the exclusion of other sectors, but, of course, this may simply be a reflection of the applicability of such models to the agricultural sector compared to other sectors of the economy. The commodities range from livestock products in Japan, oranges in Europe and bananas in Australia to dairy products in the United States and rice and wheat in India.

The final paper in Part III is by Samuelson who spells out in connection with the Hume-Ricardo-Marshall model of international trade, the conditions under which partial equilibrium analysis is valid. This is an important paper since it is only too easy to apply an operational model without consideration of whether the conditions for its valid application are met. A related point concerns the use of linear demand functions especially in multi-commodity models. In general, demand functions linear in all prices are valid only as approximations to the true demand functions in the neighbourhood of some price vector. Therefore, since an important advantage of programming models is in computing solutions for various, usually quite distinct, policy parameters it seems that future research should be concerned with using demand functions globally (or nearly so) consistent with utility maximization in the case of final demands or with cost minimization in the case of intermediate demands. Of course this will lead to nonlinear (non-quadratic) programming formulations which bring additional computational problems. At a different level the paper by Lee and Seaver expresses concern for estimating the parameters of the supply and demand functions jointly using the restrictions imposed by the spatial allocation model.

The final part of the book presents linear programming of water control systems and financial management and concludes with an econometric model designed to aid in manpower planning.

Programming models form a very useful tool for the analysis of sections of the economy where spatial and temporal allocation is an important element. The studies contained in this book clearly illustrate this point and should prove to be an indispensable source of information and ideas for those researchers planning to enter the field.

A. D. WOODLAND

*University of British Columbia,  
Monash University.*

*Farm Planning and Control.* By C. S. BARNARD and J. S. NIX. (Cambridge University Press, 1973.) Pp. 549, UK £7.40, ISBN: 0 521 08738 4.

This book is designed to serve as a text for courses in farm manage-

ment offered by universities and colleges. It is written as a text for an intermediate level of teaching in the subject, an area for which few good texts exist. It gives a comprehensive coverage of all the different facets of farm planning and control. Its treatment is largely non-mathematical and judicious use has been made of appendices to give further detail and additional examples.

The book is divided into four parts: the Organization of Resources, the Organization of Enterprises, the Combination of Enterprises and the Control of Resources and Enterprises. As the authors state in their preface, 'the general theme being that, in order to make the most economic use of the resources at his disposal the farmer has to decide what resources to use, how to organize their use within individual enterprises and how to combine the enterprises into an integrated farm system. Lastly, if these efforts are not to be wasted, he must initiate the keeping of suitable records to provide both planning data and a system of checks and control when his plans are put into practice.'

The first part, on the organization of resources, is divided into five chapters dealing with the planning environment and managerial function, the basic principles and concepts of planning as derived from the 'theory of the firm', and the organization of the various forms of farm capital, land and labour.

The second part, on the organization of enterprises, is divided into seven chapters and covers the methods and techniques used to plan farm enterprises. It points out the divergence between physical and economic efficiency and how economic efficiency alters with differing resource availabilities, markets and planning constraints. It discusses such topics as fixed and variable costs in both livestock and crop production, the selection of feedstuffs, the provision of replacement, the influence of seasons on livestock production and optimal feed conversion.

The third part of the book is divided into five chapters dealing with the combination of enterprises into an overall farming system. It begins with principles and procedures and then discusses the place and usefulness of partial and complete budgeting. Programme planning and linear programming are covered in detail. The extensions to linear programming (such as integer, parametric, quadratic and dynamic linear programming) and the other computer programming techniques of Monte Carlo methods, dynamic programming and game theory are outlined briefly and discussed in the light of their 'potential usefulness for practical advisory purposes during the 1970s, so far as can be judged (by the authors) at present' (p. 372). The final chapter of the section is devoted to a practical exposition of the various techniques available for compiling information in a matrix form to realistically portray farm planning problems.

The final part of the book is devoted to the problems of putting a plan into operation and making sure it works. It is divided into three chapters. The first deals with the details of how to collect, handle and record information, the second with the ways in which it may be analysed and the third with procedures for control.

The authors have placed considerable emphasis on relating practical farm planning problems to the principles derived from the theory of the firm. This is facilitated by the extensive cross-referencing between the theory and practical examples included in the text. The many well-

chosen illustrative examples are a feature of the book which will commend it to lecturers. However, the presentation of the examples in imperial units detracts from their usefulness to those who have adjusted to thinking in metrics.

Finally by courtesy of a typographical error, this reviewer has discovered a new crop (or is it a livestock enterprise?), 'hayed legs' (p. 211).

H. J. PLUNKETT

*Bureau of Agricultural  
Economics, Canberra.*