BOOK REVIEWS

Readings in the Economics of Agriculture. By KARL A. FOX and D. GALE JOHNSON (eds.). (London: George Allen and Unwin Ltd., 1970.) Pp. 517, $8.90.

What should be included in a volume of readings in agricultural economics spanning two decades? Fox and Johnson seem to have followed the pragmatic view that economics is what economists do. They submit their selection of articles 'as a general overview of the major analytical problems tackled and methods used by leading agricultural economists' during the period 1945 to 1966, subject to some general constraints including those relating to length, diversity and areas of specialization. The volume, for instance, does not include any articles on land economics, agricultural finance or international trade in agriculture.

The editors' introduction, though a little repetitious, is valuable in itself as a concise and broadly accurate account of the forces and personalities which have shaped American agricultural economics since its beginnings. They appear anxious to make two points in particular. The first is the seminal nature of the largely anonymous contributions of economists working in the United States Department of Agriculture. The second, presumably directed at non-agricultural economists, is the perfectly valid point that prior to 1955 agricultural economists were in the van of quantitative economic research. The latter emphasis may be explained by the fact that this volume is one of a series of readings in specialized fields of economics sponsored by the American Economic Association.

Though the editors explain their exclusion of quantitative analyses in the area of agricultural policy partly on the grounds that they were 'in some particulars too dated', what has come through in the volume as a whole is substantially a series of monuments to past problems. The result will undoubtedly be of great interest to the student of the history of American agricultural economic thought, but must be of more limited value to the present generation of graduate students, who will have to cope with the problems of the next thirty years.

Of what possible value to such students are the extensive estimates of demand elasticities for the period 1922 to 1941 contained in Fox's own classic article in *Agricultural Economics Research* or the details of the locational economics of broiler production contained in the article by Henry and Seagraves on this subject? Will the resurrection of the mathematical intricacies of Herbert Simons's 1947 article in *Econometrica* on the effects of increased productivity on the ratio of urban to rural population serve any useful purpose?

This book of readings obviously has a different rationale to most collections of republished articles in the sense that it is envisaged as a showcase for the profession rather than a student's vademecum. The contrast, say, with Fred Waugh's approach to his *Readings in Agricultural Marketing* (to which the present editors refer with approval) is most marked.

The book is organized in seven parts, each containing from two to five articles each. These seven parts deal respectively with the special characteristics of agriculture, the econometric analysis of demand and supply, methodology in the marketing and farm supply sectors, methodology in production economics, aggregate analysis of production and supply, economic development and agricultural policy. Most of the leaders of the American profession are represented in the volume, though not always by their best work or that for which they will be most remembered. Still, the articles which are included were genuine works of scholarship and made a contribution to the discipline at the time when they appeared.

Despite the general observation made earlier, some of the articles in the collection such as Nicholls's article on the role of agriculture in developing countries, Schultz's piece on poverty in agriculture and Glenn Johnson's review of the state of production economics have some timeless qualities, which merit their close study by succeeding generations of students. These truths will abide despite constant innovations in statistical methodology and changing fashions of research enquiry.

It is worthy of comment that the work of only one non-American, Raj Krishna, appears among the twenty-seven articles in the volume and that article had its origins in a Ph.D. thesis presented at a university in the United States. The title of the book is therefore misleading in that its purview is limited overwhelmingly to the contributions of American economists and its focus is primarily upon problems in the American institutional environment. It is undoubtedly true that 'agricultural economics does not have a unique body of theory and methods', but it does have an international dimension.

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The Theory of Protection. By W. M. CORDEN. (Oxford University Press, 1971.) Pp. 236, $7.80.

Although the basic concept of *effective* protection, that is, the protection of economic *activities* as opposed to commodities, has been known by businessmen, tariff making authorities and even economists for a long time, it is only within the last five or six years that economists have studied the subject systematically. For a variety of policy issues such as the economic production costs of various protective structures and the true height of inter-country barriers to international trade, the effective protection approach is of much greater relevance than more orthodox trade theory. It is not surprising therefore that the modern literature on effective protection has grown very rapidly in the last six or seven years, i.e., since the first serious economic work in this area by Johnson, Corden and Balassa.

As one would expect, this book is a clear exposition of the basic concepts of effective protection. The core of the book is devoted to a discussion of the analytical problems surrounding the concept when we introduce various complications such as substitution, the existence of non-traded goods and finite trade elasticities. Furthermore, it attempts to come to grips with the problem of assessing how restrictive are the conditions under which the ranking of industries by rates of effective protection will correctly predict the resource pulls of a protective system.

The rate of effective protection may be defined as the change in the price of an economic activity as a result of a protective system. Corden calls it the price of the value added product, that is, the value added by the economic activity. The basic, partial equilibrium concept of effective protection may be illustrated with a very simple example. Suppose we are trying to estimate the protection obtained by Australian poultry farmers. As a result of tariffs and two price schemes, the gross returns to poultry farmers are, say, 100 per cent greater than they would be under free trade. Suppose furthermore that the only input into egg production, apart from the producers' labour and the use of their capital equipment, is feed; that without protection feed costs account for half of the gross proceeds from eggs and there is no protection on feed. In this case the protection of the poultry farming activity is not 100 per cent but 200 per cent. In other words, the return to poultry farmers for their labour and capital equipment has been raised threefold by the protective structure, not twofold as a superficial consideration of the height of the nominal tariff might have suggested. Thus, the rate of effective protection for an economic activity depends on: the nominal protection given to the output from that activity, the nominal protection given to the various inputs and the relevant input/output coefficients. Corden provides a number of lucid and succinct sections on the algebra of effective protective rates under various conditions.

Let us now introduce some of the complications:

(a) *the resource pulls of a protective system in a general equilibrium model*

If we have fixed input/output coefficients and two industries—one (A) receiving an effective rate of protection of, say 50 per cent, with the other (B) receiving an effective rate of protection of zero then we can be certain that the protective system has moved resources away from the (B) activity into the (A) activity. The moment we introduce another activity, (C) with, say, again a zero level of effective protection, things are no longer so simple. Activity (A) will expand but it is possible to show that under certain very specific conditions activity (C) will also expand and only activity (B) will decline. In fact, Dr Corden, in conjunction with this reviewer, produced a small but by no means unrealistic model producing this type of result in a case involving two Australian rural industries and one non-rural industry.[1] My interest in this problem was aroused many years ago by Shannon who maintained, in his *Rural Industry in the Australian Economy*, that Australia's system of protecting manufacturing industry imposes a greater burden on labour intensive rural industries, such as wheat and dairying, than on the more extensive pastoral industries, such as wool and beef, which use a low labour/land ratio. Intuitively it seemed to me that Shannon was right; however, it was only when I presented the problem to Max Corden during his stay at Monash in 1969 that a rigorous proof was worked out. In terms of the above, (A) is manufacturing industry, (B) the more labour intensive rural industries, such as dairying and wheat, and (C) the extensive

[1] F. H. Gruen and W. M. Corden, 'A Tariff that Worsens the Terms of Trade', in McDougall, I. A. and R. H. Snape (eds.), *Studies in International Economics* (Amsterdam: North-Holland, 1970).

pastoral industries, such as wool and beef. In other words, in a three commodity world we can no longer be sure that a ranking of individual industries by rates of effective protection will correctly predict the resource pulls exerted by a protective system.

(b) *the problem of substitution*

Corden spells out the problems raised by the possibilities of substitution very clearly and carefully. Substitution among traded inputs leads to an index number problem in the estimation of effective protective rates, i.e., the use of the input/output coefficients existing in the protected situation would lead to an overestimate of the effective protective rate applying and use of free trade coefficients would lead to an underestimate.

Then there is the problem of another type of substitution, that between the traded inputs and the primary factors (or the value added product). Where this substitution exists, it raises the effective rate of protection obtained. However, if the data of the protected situation are used for estimation, the effective rate will be overstated as in the previous case. Lastly there is the possibility of biased substitution effects between one of the primary inputs and the traded inputs. (In our poultry farming example above, this would happen if feed can be substituted more easily for one primary factor, say labour, than for capital equipment.) In this case, even within a two commodity world, a ranking of industries by effective protection rates could possibly mislead us about the resource pulls of a protective structure.

(c) *non-traded inputs*

These also create difficulties for the concept of the effective protective rate. This is because the prices of non-traded inputs, like those of primary factors, are determined within the economy, whilst the prices of traded goods are determined by the world outside (given the assumption of infinite trade elasticities).

Non-traded inputs are services such as inland transport, trade, retailing, etc. Protection for, say wheat growing, also protects the railway systems serving the wheat areas—a point that Australian taxpayers have been made painfully aware of in recent years. But including non-traded inputs with the value added product also raises some problems. Firstly, the dividing line between traded and non-traded inputs is often not entirely clear cut; secondly, traded inputs contained in non-traded inputs ought, for purposes of consistency, be separated and put into the traded inputs category. This will often lead to great estimation difficulties. As a result a number of alternative methods of estimating effective protective rates have been used. The Corden method treats non-traded inputs as part of the activity which is protected (but, ideally, if the data are available, it excludes the indirect traded inputs; i.e., the traded input content in non-traded inputs). One alternative estimating technique is the Balassa method which treats non-traded inputs no differently from traded inputs (i.e., it assumes that the only activity protected is the value added product). This is less satisfactory theoretically but has sometimes been used in empirical estimation, partly on the grounds that if we take a partial equilibrium view (or a very short run view), some non-traded inputs may be in infinitely elastic supply to an industry (e.g.,

the railway inputs into wheat growing). The estimates of effective rates by the Balassa method will lead to higher rates than by the Corden method. However the absolute level of the effective protective rate for one economic activity is of little significance. If all industries are protected (a position pretty close to reality in Australia!) it is the relative level of protection which becomes relevant, i.e., which activities receive above and which receive below average levels of protection.[2]

(d) *the small country assumption*

The small country assumption, namely that elasticities of demand for exportables and of supply of importables are infinite, is an important simplifying assumption for the theory of effective protection. Fortunately, as far as Australia is concerned, this is a very plausible assumption for most of our traded goods, though some finite foreign trade elasticities should be allowed for (e.g., wool and possibly some other major export earners such as beef, wheat, iron ore?).

A Verdict on Effective Protection?

There is no doubt that these complications rob the theory of effective protection of its original pristine simplicity. Some economists have opposed it from the outset or have abandoned it when these complications became apparent. Thus Travis claimed recently that the theory of effective protection embraces an inconsistent set of assumptions representing an odd blend of Marshall and Leontief which has failed to live up to many of its claims. Harry Johnson would reply that 'the production of paradoxes and counter-examples may be counter-productive of understanding, since the practical economist needs to know, not that anything is possible, but what principles are 95 per cent reliable in practice'. This reply would be more convincing if one could be sure that the principles are '95 per cent reliable in practice'. We just don't have enough information on these issues at present. As pointed out earlier, one can construct a very simple three industry model—which may not be too unrealistic for some purposes—where the ranking breaks down. Ramaswami and Srinivasan give several examples of biased substitution effects which they regard as important. Other writers have suggested that substitution effects may not make a great deal of difference, given a plausible range of substitution elasticities. But, as Corden points out; what is plausible?

Corden is more modest in his claims. He argues that the new theory is an improvement on the orthodox two sector general equilibrium model which has dominated trade theory for so long; that the new developments show we are beginning to face the complications and difficulties of a world of many commodities and input/output inter-relationships. Furthermore he points out that if one wants to know the effect of a complicated protective structure on resource allocation and factor prices accurately, a great deal of information on demand and production functions is required in addition to the matrix of nominal tariffs in operation. These data normally do not exist, while effective rates can be and have been calculated. Effective rates tell us more than nominal rates and

[2] This is because a removal of all protection in such a situation would need to be coupled with exchange rate alteration. Corden reserves the term the 'net protective rate' for protection after the exchange rate adjustment has been taken into account.

'something is better than nothing'. It is obvious then that effective protection theory is an analytical tool with some limitations, but I feel Corden has put up a cogent case in defence of its usefulness in the armoury of the practical economist until such time as we have something better. One is almost certainly correct when stating that economic activities with relatively high rates of effective protection are directly or indirectly gaining resources from those least heavily protected, but there will be a fuzzy region in the middle of the effective protection scale where we cannot be sure about the relative resource pulls of a complicated protective system.

Lastly I think I should draw the attention of the readers of this *Journal* to Corden's chapter on Import Quotas, where the economic analysis is in many respects parallel to that which is involved in the production quota literature in agricultural economics.

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Linear Economic Theory. By D. C. VANDERMEULEN. (Englewood Cliffs, New Jersey: Prentice-Hall, 1971.) Pp. 543, $13.20.

The development of linear economic theory and of consequent empirical applications is probably the most significant post-war contribution to the evolution of economics. The initial paucity in text and expository work in this field has faded, and a fair range of quality literature is available. In reviewing a further book in this field, one should be concerned less with the ability of the author to repeat oft-published fundamentals and sophistications of linear economics, but with his contribution to, or original exposition of, an established field of knowledge. The main question then is—does this book make a substantial contribution, or does it take its place with the mixture of both quality and mediocre works on linear economics already consuming space on library shelves?

Vandermeulen has written a unique book. Its uniqueness certainly provides a claim for attention, but may also be the factor which restricts its general use as text or reference material. The conventional approach suggests that linear economic theory should be treated as some surrogate for, or approximation to, the smooth and continuous curves of neoclassical economic theory. Further, its application in empirical work draws its strength and popularity from its ability to be functionally useful in the world where continuous curves retain their beauty and quantitative elusiveness, and where lagrangian multipliers assume a quasi-doctrinal stature. Vandermeulen reverses the conventional flow of logic. He begins with the linear model, specifically linear programming, to 'develop the essential core of general equilibrium and welfare theory'. The principle on which the book is based is that linear programming provides, through the simplex and the dual, a model of resource allocation and optimization which can provide a basis for developing, understanding and interpreting micro-economic theory. This is best explained by a brief description of the contents.

Part I provides a fairly simple discussion of the linear programming model, with an elementary (the book is aimed at the intermediate level) discussion of linear equations, their solution via the simplex method, the dual, the derivation of normative supply and demand curves by para-

metric operations, vectors and vector spaces, and a geometric version of the multi-product firm. Part II applies the linear programming model to the firm, initially in fairly usual terms with respect to multi-process and multi-product firms. Chapter 9, suggested as of key importance to the development of the book, then converts the linear, piece-wise model into the conventional smooth or continuous model of the firm via the use of the Cobb-Douglas function and surface.

Part III outlines consumer choice, first (in Chapter 12) by defining preference relations, then by expressing these relations in a linear programming model, and finally by presenting a transition to the conventional model of utility maximization. The basic concepts introduced are the consumption process analogous to the production process, the piecewise indifference curve analogous to the production indifference curve, the maximization of utility for constant amounts of commodities to derive a utility function, and also subject to a budget constraint in predicting choice. Piece-wise and resultant smooth curves found in consumer theory are developed. The theory is extended to the supply of inputs and the family as a consuming unit. One gets the impression on reading this part that the essential parallel between the structure of production and consumer theory, and therefore the essential simplicity of micro-economic theory, has been overlooked in the attempt to present the sophistications of linear theory and approximations.

Part IV discusses, in fairly conventional terms, purely competitive markets, equilibrium and optimality for purely competitive industries, equilibrium and optimality for the economy, and Leontief input-output. One feels disappointed that the principles of linear economics developed in earlier chapters have not been extended into the discussion in this part of the book.

It is difficult to predict professional reaction to this book, and its ultimate place on library shelves. My guess is that it will be welcomed as an ideal text for teachers who wish to short-circuit the ponderous body of economic theory and are prepared to replace it with a simpler, somewhat pseudo-economic approach based on linear theory. Those who see prime value in conventional theory, and visualize linear economics as a useful variation or approximation, will most likely relegate the book to the 'interesting, but not necessarily accessible' part of their shelves.

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The Economics of Technological Change. By NATHAN ROSENBERG (ed.). (Harmondsworth: Penguin, 1971.) Pp. 509, $2.10.

The role of technological change as a factor involved in economic progress has evolved from a situation of almost total analytical disregard by the classical economists to the present acceptance of it as a major determinant of economic growth. This book brings together a number of previously published articles which collectively present technological change as a complex phenomenon which can be studied empirically, and whose causes and effects are amenable to treatment with the analytical tools of the economist. However, a brief examination of the contents immediately establishes that this volume does not touch, much less

exhaust, all aspects of this comprehensive subject and this is readily acknowledged in the book's introduction.

The book is presented in five parts which deal with the nature, the determinants, the diffusion, the long-term consequences, and the international aspects of technological change. A substantial proportion of the reprinted readings are contributions which were originally published in the late 1950s and early 1960s.

The contents of Part I offer some historical and analytical perspectives on the phenomenon of technological change. The influential academic career of Schumpeter in the early part of this century played an important role in bringing technological change to the attention of economists and his 1928 article on the instability of capitalism presents the veiw that capitalism's short-run instability and long-run growth are inseparably interrelated. The article by Usher considers the inventive process in detail paying careful attention to the specific factors which set the stage for the successful inventor. Ruttan, in discussing the theories of Schumpeter and Usher attempts to clarify the three related but distinct concepts of 'invention', 'innovation' and 'technological change'. Finally, Part I of the book, which has essentially set the stage historically, concludes with a paper by Blaug who argues that the neo-classical conception of technological change provides the best framework for organizing and arranging knowledge on the subject.

The readings in Part II explore from a number of angles the general question of what determines technological change, or more particularly what are the incentives or forces underlying invention. The contributed papers of Parker, Schmookler and Nelson respectively present an historical survey of technological changes over the last two centuries, an exposition of the forces underlying the allocation of resources to inventive activities and a discussion of the mechanisms by which society allocates resources to the expansion of scientific knowledge which in many instances is the precursor of technological advance. This section also presents the well-known Griliches paper on hybrid corn where an attempt is made to quantify the divergence between the social and private return from a technological innovation.

Although it is often possible to assign sole credit, in terms of a name and date, to an invention this adds very little to an appreciation of the economic consequences of this invention. Part III contains four papers which, while very diverse in actual subject matter, share the general conclusion that observed changes in the diffusion of particular innovations can be largely accounted for by economic variables. For example, a further article by Griliches illustrates how profit motives were associated with the diffusion of hybrid corn while David utilizes a threshold function pertaining to farm size to account for the rapid introduction of the reaper harvester in the American mid-west during the 1850s.

The common objective of the readings presented in Part IV is an attempt to assign some numerical value to the contribution technological change has made to economic growth. The papers by Abramovitz and Solow represent the first serious attempts to quantify this contribution and both papers explore the quantitative importance of technological change to the long-term economic growth of the American economy. Abramovitz makes use of input-output ratios for estimation while Solow works within the framework of the aggregate production function. The

two authors concur in the conclusion that only a very small portion of the long-term growth in American per capita output can be accounted for by an increasing quantity of capital and labour inputs.

The estimation of a large unexplained residual in productivity growth, which Abramovitz was careful to point out did not necessarily justify the label 'technological change', subsequently provoked numerous attempts to quantify and explain it. The two remaining articles in this section are contributions by Denison and Griliches and they attempt to examine and explain this residual growth in greater detail.

The concluding section of the book presents four articles related to the fact that sizeable differences in the level of technology exist between various nation-states and these papers attempt to explore some of the implications of such differences. In particular, contributions by Ames and Rosenberg and by Vernon respectively consider the implications of inter-country differences in the level of technology for rates of economic growth and the impact of new products on the composition of trade flows between countries. The paper by Baldwin explores the ways in which the technological constraints underlying the production function for different commodities may affect the path and rate of economic development of newly settled regions. An article by Solow, which concludes this final section of the book, looks at a range of problems which influence a country's capacity to assimilate a more advanced technology.

Overall the book has successfully brought together a balanced collection of readings which serve to demonstrate that economic theory provides a powerful apparatus for understanding both the causes and the consequences of technological change. Papers cover a very wide range of subject matter and all contribute to an understanding of technological change which is necessary if this phenomenon is to be studied empirically. However, those readers who wish to study examples of the large body of empirical research on technological change will need to look elsewhere.

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Cost Benefit Analysis. By M. G. KENDALL (ed.). (London: The English Universities Press Ltd., 1971.) Pp. 328, $14.50.

Like most published Conference proceedings, this volume contains a set of papers which vary widely in quality, and also in usefulness to any one reader. However, although the NATO Symposium enshrined in the volume was held in mid-1969, none of the better papers have been substantially superseded, which is a common failing with other publications of this type.

The only general discussion of cost-benefit analysis is a brief review by Ralph Turvey, but he makes some interesting and provocative points on four important issues: uncertainty, inflation, unemployment and the discount rate. He notes that the use of sensitivity analysis to ascertain the likely variation in results to changes in various parameters is a technique which quickly becomes unmanageable as the number of parameters increases. This is a useful correction to the common exaggeration of how far sensitivity analysis can overcome doubts on parameter assumptions. (However, a later paper by Guldbrandsen includes a neat

use of sensitivity analysis to establish the acceptability of various levels of error).

On the general lack of attention in any of the papers to the critical importance of estimates of project cost (an omission common to most other comparable texts[1]), Turvey notes that estimates of project costs will tend to be most likely (modal) rather than expected (mean) values, and have a positively skewed probability distribution. Together these mean that project costs are typically under-stated.

On the currently live issue of the treatment of inflation in cost-benefit analysis, Turvey takes the usual position of ignoring all but relative price changes. However, he shows that the incorporation of these relative price changes into estimates of future costs and benefits is a more complex exercise than most analysts appreciate or would be intuitively expected. Finally, he rejects the Mishan approach to discount rate selection, preferring the Feldstein *et al.* logic, despite its impracticality.

The following papers cover a wide range of public projects and programmes, but certain papers stand out. R. N. Grosse, on cost-benefit analysis of disease control programmes is an excellent outline of the use of analysis within the U.S. Federal Department of Health, Education and Welfare. His paper describes the use of cost-benefit analysis to guide both the structuring of overall programmes of public health, and decisions on best tactics to reduce morbidity and mortality from a single cause. The paper illustrates clearly that a major benefit from cost-benefit analysis is the commitment to systematic and quantitative analysis of problems, which emphasize the affinity between operations research and economics in the public sector. One looks in vain for any published Australian analysis comparable with this report of U.S. work.

The importance and interest of this paper contrasts strongly with the immediately following discussion of the merits of alternative pneumatic tube hospital communication systems! Of the remaining papers on the analysis of health and community services, that by Flowerdew on the evaluation of alternative land use policies, drawing on London experience, is of the most potential interest, but is too brief and inadequately referenced to satisfy.

The papers on cost-benefit analysis in defence, and research and development, are either mundane, or impossibly complex and abstruse. This disappointment is more than offset by an excellent paper by P. F. Gross on analysis of alternative forestry policies—the analysis comprehends both public and private sectors, illustrates the use of simulation techniques, and is well referenced. The discussion by Locht of the procedures for assessing rural development projects in the Netherlands may be helpful to some Australian analysis, but seems to conceal more analytical problems that it solves. Notwithstanding the quality of the authors, the transport papers are unsatisfactory—too qualitative and brief, or too mathematical and advanced.

The over-riding impression is of a Symposium in which the authors received no firm directions as to content, or level. As a result, the volume is not well matched to any particular group of readers. I would not recommend it as a set of case studies in cost-benefit analysis for students,

[1] A notable exception is Hufschmidt, M. M. and J. Gerin, 'Systematic Errors in Cost Estimates for Public Investment Projects', in Margolis, J. (ed.), *The Analysis of Public Output,* New York, NBER, 1970.

although lecturers could usefully use and refer to a few of the papers. (As a final warning—58 of the 328 pages contain papers in the original French, of quality unassessed by this reviewer).

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Europe's Future Food and Agriculture. By A. M. M. MCFARQUHAR (ed.). (Amsterdam: North-Holland, 1971.) Pp. 476, £8.20.

The title belies the real purpose of this book. It is true that in his introduction the editor refers to his primary concern '. . . with the detailed estimation and projection of the consequences of current and alternative policies . . .' (p. xiii). Elsewhere, however, he admits that 'One of the main functions . . . is to demonstrate the methods used . . .' (p. xvi), and hence '. . . to bring together the wide range of methods actually being used in practice . . .' (p. xvii). And this is roughly how it reads since the projections for each country usually take second place to the methodology that produced them.

The volume presents projections for agricultural supply and demand in 1972 and 1975 for each of the nine countries in, or adjacent to, Europe.[1] The collection of studies is preceded by a particularly thoughtful editorial introduction in which some pertinent remarks are directed towards the implications of E.E.C. rural support policies for Europe in particular and the world in general. The editor highlights the inequitable distribution to producers of government support, and the high cost of such policies to the consumer; a point not lost on opponents to British entry into the Common Market. He also emphasizes the barriers to international trade created by agricultural support policies, and correctly regards this as a violation of the spirit, if not the letter, of the General Agreement on Tariffs and Trade.

The remainder of the volume comprises the country studies. The contributions are drawn from the results of independent studies and include work sponsored by the United States Department of Agriculture, international organizations, and universities. The empirical techniques used differ widely, but the degree of mathematical sophistication employed tends to conform with the universal reputations of the institutions responsible for the work. Most of the studies commence with a review of the recent performance of the agricultural industry in the country concerned, then present the methodology employed followed by the projections obtained for each major commodity.[2]

The Belgian study employs an input-output model which acts as an accounting identity between supply and demand and is solved iteratively by price variation. The coefficients and variables for the model were obtained from regression analyses. Projections for the Republic of Ireland were also based on an input-output model, but the technical characteristics of the model are not published.

Estimates of future consumption of agricultural products in Denmark are based on the results of single-equation analyses of time series and

[1] The countries included in the volume are: Belgium, Denmark, France, Federal Republic of Germany, Republic of Ireland, Italy, The Netherlands, Sweden, United Kingdom.

[2] For some countries however, separate reports have been included to cater for the qualitative and quantitative requirements of each study.

cross-section data. Production estimates are derived by a more subjective evaluation of E.E.C. policies and their likely effect on agricultural output. Two separate studies are included for Sweden, and the first of these pursues a similar approach to the Denmark study. The German study employs the same approach, but not before it examines in depth, and then rejects, two dynamic demand models of the Koyck-Nerlove and Houthakker-Taylor type respectively. The projections for Germany appear to be more thoroughly constructed than for most of the other countries.

The chapter on France first presents independent projections for supply and demand based on an approach comparable to Denmark. In the second part of the chapter however, the author provides an unfortunately brief comparison between the projections presented earlier and results obtained by three other studies. The Italian study, on the other hand, relies entirely on the projections carried out by five independent organizations. The comprehensive comparison of the methodologies and the results achieved give an indication of the 'most likely' outcome. The difficulty with this bold approach is reconciling the differences in projections between the several studies used.

The approach described by The Netherlands is quite appealing. Using index figures for prices and productivity, they employ single-equation models for estimating production of animal products, but a multi-equation model for estimating arable crop production. The future consumption of the principal commodities was estimated from a multi-equation econometric model.

The remaining studies in the volume are more mathematically orientated and include two from the United Kingdom and a second study from Sweden. The first of the United Kingdom studies is a good summary of the multi-dimensional demand model established by the Jones 'team' at Oxford in carrying out their Supply and Demand Projection for the USDA. The second United Kingdom study is the result of more recent work in which agricultural demand relationships are estimated from a 27-equation model of the Samuelson-Stone Type, and domestic production is estimated from a generalized supply model. The results of the supply and demand studies are then incorporated in an input-output model to provide projections of future supply and demand. The second paper for Sweden is one of the best in the volume and includes a very good discussion of factors responsible for determining changes in production. Its econometric model comprises complete 4-equation systems providing for a recursive solution of supply and demand for each commodity. The presentation is highlighted by excellent diagrammatic interpretations of the recursive relationships uncovered by the analyses.

It would have been preferable to review this book in terms of its total impact and contribution, but this was precluded by the nature of the book—a series of independent studies related only by a common objective. By adopting this format there occurs repeated duplication of familiar practical and theoretical issues. A more rewarding text would have made a more direct comparison of the conditions and circumstances under which different models were applied, and the reasons for their selection as vehicles for projection. In actual fact the sub-title of the book states: 'A Comparison of Models for Projecting Food Consumption and Agricultural Production in Western European Countries to 1972 and 1975',

but the task of comparison is left entirely for the reader. It is also unfortunate that the editor has not compiled a summary chapter which reviews the projections for each commodity for the nine countries as a whole.

From the point of view of making a major contribution to agricultural economics research, a better alternative would have been to delay publication by two years to enable the first projections to be compared with early estimates of actual supply and demand for various commodities in 1972. The models employed could then be examined in terms of their performance and any variance between projections and actuality could be attributed to likely causes. An approach such as this would have provided an opportunity to reassess projections for 1975 (and develop projections for 1980) and enable future research workers to benefit from a critical appraisal of applied research. Actually, in view of the difficulties in projecting supply created by the Common Agricultural Policy of the E.E.C., there is good reason to develop a multi-national model of supply and demand comprising all present and intending members of the Common Market.

Nevertheless, the book has potential value in its present form. University staff, students, and research workers will find it a convenient composite source for a variety of econometric models. In addition, policy makers with a general interest in the trend in European agriculture should find the book a useful source, although since it is now 1972 it may be wise to compare the projections with the latest statistics available!

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Food Grain Marketing in India. By UMA J. LELE. (Ithaca: Cornell University Press, 1971.) Pp. 264, $US12.50.

Mrs Lele commenced her investigation of grain marketing in India several years ago, with an examination of the structure, intermarket and interseasonal price differences of the jowar markets in Maharashtra. That investigation has been broadened to include the two other important food grain crops, rice and wheat, and the northern, eastern and southern regions of India, together with an expanded examination of jowar marketing in Western India. The study reported in this book is one in a series being carried out at the Cornell University to examine the process of agricultural development in low income countries.

The work is an empirical analysis of a large volume of statistical data and observations regarding the structure of the market and market practices, collected in detail with the help of the resources of the Agro-Economic Research Centres located in New Delhi, Santiniketan, and Madras. The results of the analysis of the statistical data have been presented, along with a methodology for analysing the performance of the marketing system of low income countries.

The specific hypotheses examined are:

1. The traditional market structure is basically competitive and to a considerable extent fulfils the text book conditions of competitiveness.
2. All markets for individual cereals are closely interrelated; i.e. the price of a specific crop in one market is related to the prices of the

same cereal in other markets. This interrelationship between price movements in two markets is called market integration.
3. Because of the competitive nature of wholesale trade, intermarket price differences do not tend to be greater than transport costs.
4. Seasonal fluctuations in prices are consistent with storage costs.
5. Milling margins are commensurate with milling costs and milling outputs.

After setting out the structure of the markets which provide a complex set of alternative channels at each stage of marketing, each succeeding chapter of the book methodically examines these hypotheses. The study then concludes that the Indian grain market is highly competitive and that regional price disparities are small wherever mobility is relatively unrestricted and grain flows freely. It further shows that during the period under examination, restrictions on the movement of grain and transport bottle necks increased price differences between regions. It also illustrates the generally low returns to storage operations and the unpredictability of the seasonal pattern of supplies, due to the influence of a complex set of factors. The study then proceeds to set out some of the factors such as improved transport facilities and extension to market regulations which might foster intra-market and inter-market competitiveness. It is also suggested that the uncertainties about the continued existence of the commercial trade, and the lack of positive governmental policies have inhibited the modernization of the grain marketing system in India.

This work is a methodical and intensive analysis of the problems of distribution of grain which have been generally neglected in low income countries. It examines the widespread contention that the private marketing systems in India are not highly competitive and that there are regional and temporal disparities in agricultural prices which are the result of monopolistic and speculative elements in the trade.

At the same time the preoccupation with the need to establish the competitiveness or otherwise of the various elements in the trade has meant that other important components in the overall functioning of the India food grain market have received scanty, or at best only brief examination. For example in a number of countries, questions have been raised as to whether the information available to the market is adequate for its efficient functioning, and whether the data available to producers from the market promotes the efficient allocation of the resources of production.

The study reports that there is no evidence of an increasing trend in the price spread between primary and terminal markets, but the increasing margin between the consumer and producer prices being experienced by those marketing rural products in almost every country in the world received almost no attention in this book. Likewise, the financing and risk-bearing operations in the marketing process have not been examined in any detail. An analysis of these aspects of marketing would have enabled the author to conclude whether there is any way of improving the actual operation of the cereal marketing system in India.

Nevertheless, the book is a valuable contribution to an understanding of the grain trade in India and it draws attention to the need to examine the widespread assumptions about the food distribution systems of both

the developed and developing countries. The publication of such a carefully reasoned and precisely documented account of a marketing system is most timely. The accelerated growth in food grain production, helped by the technological developments with high yielding crop varieties, will place added burdens on the marketing system and require Governments to make decisions involving the long-term allocation of resources. In this context the study should be a source of some useful guidelines and assistance to Governments which may be required to formulate agricultural marketing policies that do not introduce distortions and imperfections into the existing market competitiveness which is claimed to exist in the Indian cereal distribution system.

Such a study fills an important gap in defining the extent and nature of imperfections in a particular marketing system. It also illustrates the type of empirical investigation that needs to be undertaken elsewhere, as the results of this study should not be automatically applied without examination.

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The Growth and Control of World Population. By W. D. BORRIE. (London: Weidenfeld and Nicolson, 1970.) Pp. 340, £3.00.

World population has continued to grow at an increasing rate since about 1650. Over the next 40 years it is expected to double again and to reach approximately 6,100 million. The great need for a general understanding of this trend, as a basis for improved policies to control it, is obviously the inspiration of Professor Borrie's book, *The Growth and Control of World Population.*

This is reflected in the three main components of Borrie's study:

(1) the methodological component, which expounds some techniques of demography,
(2) a factual and analytical study of population growth and associated economic and social change, and
(3) an application of the methods and the results of the positive analysis to an assessment of means now available for the control of population growth.

Borrie makes it abundantly clear that ancient and medieval history, as well as that of the industrial revolution and its antecedents, are of significance for the study of contemporary patterns and trends of change in population. This Europe-based line through world history produces the main ideas applied to the analysis of secular trends—including much that is not familiar to the non-specialist reader. For instance the 'constant-fertility-falling-mortality' theory of the growth of European population in modern times is modified to take account of well-documented cases (notably from Holland) in which increasing fertility augmented population growth under some circumstances of early industrialization and urbanization.

Carr-Saunder's theory of industrialization and population change is also modified. The general historical case for it is substantiated, but the possibility of a reversal of the sequence is advanced. Under contemporary

conditions in some of the less developed countries it may well be that population policies will bring about a fall in fertility in the early stages of 'take off' and even make a significant contribution to the establishment of conditions for economic development.

The central historical theme leads to chapters on The Great Migrations (mainly those of 1875-1914 and post-1945), and Contemporary Patterns of the Western World. From this emerges the account of one of the great developments, unique in history, which is the main basis of Borrie's faith in man's capacity for survival—and not only survival but continued progress. It is the combination of the achievement of seventy years' expectation of life with a great reduction in fertility—both due to the application of science to the control of the main determinants of population change.

'The Other Half'

Borrie's historical and contemporary studies are much enriched by comparisons and contrasts between the mainstream of development of modern Western civilization and the experience of the developing world detailed in the chapter, Population Growth in the Developing World. Under this general heading come three chapters—on The Asian Giants, Latin America, and Africa.

The contrasting historical experiences of different national groups in 'the other half' of the world teach many lessons about the Europe-based experience which are not commonly appreciated. Societies of Asia and Africa, like those of Europe, practised a wide variety of restraints on population growth including abortion and infanticide. There is also some evidence of the adjustment of restraints on fertility in circumstances in which changes in life-expectation could otherwise have led to pressure on resources through rapid population growth.

However, fertility restraints were most rigorous in Europe and in societies originating from Europe, where family planning based on inheritance laws and customs, insistence on acquisition of property before marriage, and extra-marital 'continence', kept fertility rates much lower over long periods of history than in Asian and African countries.

Unfortunately, the chapter on Latin America makes an erroneous comparison of growth in GNP with population growth. Borrie bases his evaluation of demographic change and its socio-economic significance in Latin America on the use of GNP *per capita*, where the relevant series should have been aggregate GNP. High rates of growth of aggregate output and income (considerably higher than population growth) are scaled down to a *per capita* basis and *then* compared with population growth rates. The false conclusion drawn (p. 190) is reflected elsewhere in the book (e.g., p. 14) where Latin American economic development is under-rated.

Policy and Forecasting

The greater part of the analytical and interpretative content of the work comes in the opening chapters (The World Situation and The Numbers Game), and the concluding chapters (Population Policies and the State, and Retrospect and Prospect).

The opening section sets up 'the population problem' in stark terms, and presents the author's determined optimism in the face of difficulties.

Then it elaborates the method which emphasizes historical analysis and statistical concepts and their applications as developed by demographers from the Roman Empire in the West and the Han dynasty in the East, up to Kuczynski and the Population Council. Simulation and other techniques of operations research are not considered explicitly, but the framework of positive analysis presented is one which could be complemented by systems analysis.

In the concluding parts it is shown that mercantilist-capitalist society and both Marxism and Leninism were in favour of population growth, and had no fears of Malthusian 'laws'. However, in spite of pro-natalist government policies and opposition from the Christian religion and traditional social and moral sanctions, the present 'developed' society is marked by 'virtually universal birth control' and 'unique standards of health and life expectancies'. There is no case known of a society which 'having attained this (expectations of life at birth of 60 years or more) has not matched it with a marked fall in fertility'.

The transition from poverty, high mortality, and high fertility to the present small-family regime of 'developed' societies appears to owe little to government policies affecting direct determinants of population increase. 'Transition theory' explains this in general terms—'in terms of such matters as the transformation of social institutions, economic standards and attitudes, and not in techniques of birth control'—and this is how Borrie explains it. Imperfections of such techniques or lack of technique appear to be significant, judging by Borrie's account, and some of the drastic expedients practised in primitive societies showed that motivation was not altogether lacking. These things and other evidence that women never were in favour of successive pregnancies over a long period would seem to warrant more emphasis on the availability of effective contraceptive techniques than Borrie gives them. But, it is clear that the demographic revolution of the past century took place in spite of governments and the Pope.

Motivation and Technique

On the other hand, in the less developed countries, government action assisted by international agencies appears to be the main vehicle for measures of social change designed to affect family size and overall population growth. Here, the propagation of effective techniques for birth control is an explicit and highly significant factor in family planning programmes and broader population policies. Indeed, one might think that this is the basis of government policies in cases like South Korea, Hong Kong, Taiwan and Japan, where already there appeared to be abundant motivation for women to restrict fecundity and where it appeared that all that was lacking was knowledge and availability of less costly means than abortion.

So it proved, up to a point. Condoms, *coitus interruptus,* rhythm, the loop, the pill, and vasectomy all had a part in making birth control and family planning programmes effective in these countries. Abortion probably played its part, but it had always been available and probably would have become more prevalent in the absence of government propaganda, and government servicing and supplies for cheaper and more efficient methods.

However, in the less developed countries as in the industrialized

countries, the availability of techniques has no effect unless there is the desire to make effective use of them. If women want families of six or eight, they can use birth control to space them and to limit pregnancies. This is appreciated in Japan, South Korea, etc., where the availability of technique has been supplemented by propaganda and education in favour of the small family. Without institutional change affecting the motivation of men and women, policies dependent on the availability of techniques come to the limit of their effectiveness while population increase is still proceeding at rates which were unknown up to this century. The logic of this has been borne out by experience in the countries cited.

All this adds up to the virtual certainty of a doubling of world population in the next 40 years, and related problems of food production, land use, education, employment, and public and private investment. But, says Borrie, 'the point to emphasize is not that half mankind is still illiterate and undernourished, but that in half the world man has escaped sufficiently from the control of the past to become literate and to look forward to his heritage of three score years and ten. This is a tremendous achievement, but the victory will not be won until the stirrings of the developing world, and particularly of Asia, are brought to their fulfilment of controlled population and expanding productivity' (p. 297).

Conclusions

Professor Borrie clearly would like to refute the prophets of doom and reassure the fearful. They have 'a wrong perspective' he says: they should appreciate 'the evidence of man's increasing efficiency in the control of his own biological fate'. Nevertheless 'the completion of the victory for the other half of the world which is still bound by the chains of squalor, disease and ignorance will become increasingly difficult' (pp. 18-19).

Although he does not give it so much stress, he also shows that *this* half of the world has not yet solved the population problem. Much has been achieved in devising and making available the techniques required and in applying them to family planning. But effective national and international population policies are still far off—and time is running out.

It is true of course that the poorer countries have much higher rates of population growth. Latin American, South Asian and African rates of natural increase are about twice as high as those of North America and four times the European rate (p. 288). The welfare implications of population policy are also most striking in these poorer regions. However the pressure on irreplaceable natural resources arises mainly from the richer countries. This is the aspect of the book which is most open to criticism. The author does not appear to recognize the possibility—indeed it would appear a near certainty—that the next 100 million increase in the United States population expected in the next 33 years (to which he refers on p. 296) will add much more to the problem of world population, relative to resources, than double that number of Asians.

However the author's achievement is a considerable one. He set out to provide means by which people generally could aspire to a deeper understanding of the determinants of world population growth and policy instruments by which they may be controlled. Professor Borrie has probably done more to further this aim than any other Australian. This book, in spite of some unevenness in quality, is a further important contribution

which must be read, not only for its empirical and analytical content, but also for its dialectical interest.

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The Soil Conservation Service. By D. HARPER SIMMS. (New York: Praeger, 1970.) Pp. 228, $10.30.

Agencies of government in the United States of America, particularly those of the Federal Government, provide a maze through which it is almost impossible to find one's way without some guidance. Obviously it presents just as much difficulty for the U.S. citizen, because this book is one of a series which together constitute the Praeger Library of U.S. Government Departments and Agencies. More than 80 titles are planned for the series, of which 22 preceded this volume.

To understand U.S. agencies of Government like the Soil Conservation Service, it is necessary to know more than just the functions and responsibilities assigned to it, either by statute or by administrative directive. Most of them have evolved through a period of political in-fighting and the defence of their responsibility for certain functions against attacks from established agencies, and their political supporters, which believe that a new agency is not needed, or it undermines their function, or it lessens their influence in certain fields of government action. The strength and significance of an agency depends on how well it survives this ordeal.

The Soil Conservation Service is an agency which was born of necessity at a time when the appeals for the need for a separate agency were aided by the climatological conditions and the extensive soil erosion by wind and water which resulted.

Hugh Bennett, a persistent campaigner for a separate agency, was able to take full advantage of the conditions and the emotional outbursts of the people which they engendered to persuade the Roosevelt Administration to establish an Erosion Control Service in 1935. The Service was, at first, an agency of the Department of the Interior, but later it was transferred to Agriculture.

Much of the subsequent development of the Service and the opposition to it was the result of Bennett's single-minded pursuit of his objective—a strong agency to control erosion and to develop appropriate systems of land-use and management to suit the capability of the land. These developments are described objectively and succinctly in a well-organized series of chapters.

The author, Harper Simms, recently retired from the Soil Conservation Service where he was the Director of Information, a post which he held for many years. His association with the Service began with Bennett and he writes from an intimate knowledge of background information which cannot be obtained from files and records alone. He knew and was associated closely with the personalities involved.

In his professional role Simms would know those activities of the Service which made it easy for him to maintain a good image with Congress, with other agencies, with the Soil Conservation Districts, with the land grant Colleges, with farmers and with other members of the community. He would also remember those activities of the Service

which made it difficult for him, as Director of Information, to maintain the good will of the Service with one or other of these groups.

As a former employee of the Service, Simms could be excused for some lack of objectivity, but this is not necessary. From my own knowledge of the Service and many of the people involved, including Hugh Bennett, I can assure potential readers that the history of the evolution of the Soil Conservation Service, and of the hotly contested issues which arose, have been treated in a thoroughly objective fashion.

The Service was the first government agency of its kind anywhere in the world. Not only did it act as a catalyst for other countries to take similar action, but also as a possible model to be followed. Few services in the world have followed the Soil Conservation Service precisely, but many facets of various services show the influence of this pioneer body.

The book will be of particular interest to soil conservationists, but others concerned with agriculture will enjoy reading it. Agricultural economists will be interested in the section dealing with the Service in relation to other agencies and, in particular, with the intricacies of the administration of cost sharing programmes to achieve soil conservation, which must be done through other agencies. The costs of diffuse administration to satisfy political ideals must be considerable.

As a soil conservationist, it would be easy to point out some deficiencies of the Soil Conservation Service and of the unnecessary complexity, and even inefficiency, of having other agencies involved in the task of achieving relatively simple objectives, but this is the accepted way of government administration in the U.S. It is far better to emphasize that the Soil Conservation Service is now a successful agency which was established and guided to a point of no return by a person who could appeal to people and convince them of the need for such an agency, and who also had the political ability and toughness to carry the agency through the vulnerable period when many sought to destroy it.

Perhaps the final achievement which would give Bennett great pleasure, if he were alive, is the existing arrangement whereby the Soil Conservation Service is the designated agency for leadership and coordination of the activities of all U.S. Department of Agriculture agencies and any other State agencies in the organization, planning and supervision of Resource Conservation and Development Programs carried out in co-operation with local people seeking such assistance.

Simms has packed a great deal of information into relatively few pages by his terse style and skilful use of words. Many of the topics, which are dealt with briefly, could themselves be subjects for separate books.

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Farm Management Economics. By J. P. MAKEHAM. (Armidale, N.S.W.: Gill Publications, 1971.) Pp. 279, $7.50.

Progressive farmers will be grateful to Jack Makeham for this excellent workbook and for sharing with them the benefits of his wide experience as an extension worker, professional consultant and lecturer in farm management. The book will be directly helpful in three ways: firstly, in simplifying farm management economics, secondly, in setting out examples of worksheets for farm management calculations, and

thirdly, as a handbook of useful data. A bonus feature is an introduction which summarizes the 'fundamentalist' and 'realist' schools of agricultural philosophy.

The book opens with a short chapter dealing with the economic setting confronting Australian farm managers. This serves its purpose quite well, though two policy proposals mentioned briefly (p. 13) are open to question. The first refers to an income insurance plan with both producer and Government contribution. The Government contribution ('which should be generous') being justified as an offset to the effects of tariffs on the cost structure of export primary industries. One would expect this to be administratively cumbersome, especially with changes in tariffs. The second proposal is for a subsidy, early pension, or lump-sum grant to a 'certain small group of farmers whose age or other characteristics prevent them from leaving their farm, even though their disposable income (cash plus non-cash) is far below the acceptable poverty line deemed acceptable by the Australian community'. What would be the long-run implications of such a policy and how does it compare with welfare assistance to other groups?

Two chapters are devoted to clarification of key concepts such as gross margins, partial budgets, diminishing returns and opportunity costs. Then there are good chapters on development budgeting and machinery economics and a less-detailed one on marketing.

Probably the most useful part of the book for commercial farmers will be that dealing with the management of the four basic types of farms found in Australia, viz. animal farms, crop farms, tree farms and mixed farms. These chapters have a clear, practical approach to farm management economics and draw attention to some key factors in crop and animal husbandry.

The final section provides a useful summary of the sources of finance but does not go as far as other sections of the book in providing positive guidance. In fact it could be said that Makeham's suggestion (p. 97) that 'the choice between alternative sources of funds depends on external interest rates' is too loose. It would have been useful to follow it up with some discussion of the methods of appraising such matters as the conditions attached to various types of loans and whether to take advantage of discounts for cash or extended credit.

There is a need to demonstrate to farm managers that it is possible to introduce some refinements in their financial management. For a start, care should be taken to highlight the importance of financing long-term development and fixed assets with long-term loans and reserving short-term finance for short-term needs. The opportunity could then be taken to emphasize the risks of financing long-term needs with short-term debts.

Makeham has rightly mentioned the availability of excellent computer facilities to assist in the financial management and control of farms. Instead of moving from crisis to crisis farmers should be able to exercise increasing control over their financial resources. This includes being prepared to sell out and buy in again if circumstances warrant such radical adjustment.

By planning and controlling cash flows farmers will ensure that funds are continually used efficiently, that risks are minimized, and opportunities are taken to reduce the interest bill. Those who are prepared to

study the principles and follow the procedures set out in this book could hardly fail to find ways of increasing profits.

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Behavioural Change in Agriculture: Concepts and Strategies for Influencing Transition. By J. PAUL LEAGANS and CHARLES P. LOOMIS (eds.). (Ithaca: Cornell University Press, 1971.) Pp. 506, $15.40.

Behavioural Change in Agriculture is the edited proceedings of a conference at Cornell University. The conference was concerned with the process of agricultural development in 'low producing areas of the world'. The prime objective was to summarize relevant conceptual models from a range of disciplines, including agricultural science, administrative theory, political science, sociology and social psychology. In addition, the conference provided for an exchange of experience and ideas between people who have been involved in influencing developmental change policies.

In editing the conference proceedings, Leagans and Loomis have given attention to the need to relate the chapters and round out the discussion. The book is held together by a series of Editors' Introductions that place the chapters within the context of a simplified version of Loomis's 'Processually Articulated Systems (P.A.S.) Model of developmental change'. This P.A.S. model is complex and is not adequately reflected in many of the chapters. Accordingly, the editors' attempts at integration are only partially successful and it is difficult to treat the book as a whole. This review gives a brief overview and an indication of some of the highlights of the book.

The general themes of the book, and some of the flavour of the discussions, are reflected, perhaps facetiously, in the sub-headings of John B. Holt's final chapter, Résumé. The first heading, 'Strategy of Optimum Complementarity' refers to the need for complementarity between change processes at the macro (institutional) level, and at the micro (farmer) level. The title 'Multidisciplinary Science and Transcultural Technology' heads a discussion on the lack of attention in agricultural science courses, to interdisciplinary training for problem solving. There has been a related failure to adequately recognize the need for adaptive research. 'Social System Strategy' is used to re-emphasize the need for a systems approach that integrates macro and micro level change processes.

If complementary institutional changes are necessary to generate large-scale behavioural change, then educational programmes must be 'multifocal'—directed at the institutions as well as the farmer. Moreover, educational problems are magnified when there is a cross-cultural linkage in the change programme. These are the messages of Holt's fourth subheading 'Multifocal and Cross-cultural Education'.

Under the heading 'What Kind of Farmer?—The Multilevel Decision-Making Model', Holt reviews the assumptions that are made about the farmers' freedom of choice. There are contrasting approaches to this issue, emphasizing (a) a high level of freedom from administrative direction; or (b) an authoritarian system; or (c) a mixed approach, which recognizes some freedom of choice at the farm level and the need for some control through public powers and the manipulation of private incentives.

Holt's remaining two headings 'Administration for Development' and 'Mobilization of Political Power for Development' are self-explanatory.

Behavioural Change in Agriculture is divided into four parts. The first part discusses the relationship between developmental processes at the micro and macro levels. Mosher's Chapter 2 is a summary of his widely known systems concepts for agricultural development. Deutsch's Chapter 3 is a more unusual contribution. He presents a paradigm that relates the characteristics of a society's political system to the tendencies for 'associative versus dissociative' social and political behaviour and to responsiveness to change programmes.

Part II deals with technology and its utilization. Chapter 4, by Cummings, emphasizes the process of generating new technology. Leagans, in Chapter 5, presents a remarkably concise summary of current wisdom on the how and why of extension work.

Part III discusses 'The Economy and the Polity'. In Chapter 6, Parsons puts forward the agricultural economists' obvious claims to a piece of the action. Fry's Chapter 7 on Developmental Aspects of Administration starts in a similar vein to Parsons. He then moves on to an interesting conceptualization of power relationships in the social structure.

The theme of Part IV is 'Social Science and Development'. Chapter 8, on Sociology (I. T. Sanders), and Chapter 9, on Social Psychology (H. C. Triandis), should be of value in opening up interest in a more rigorous application of applied behavioural science to developmental change problems.

Part V is a review of four chapters under the heading 'Synthesis: Concepts and Strategies'. The exciting chapter is Loomis's detailed presentation of the P.A.S. model as a concise, integrated approach to analysis of behavioural factors in development. Chapters 11 and 12 are summaries relating to agricultural science and administrative policy. Finally Holt's Résumé is Chapter 13.

In addition to the main chapters and the Editors' Introductions the book is littered with 'responses' and 'synthesis responses'—presenting new ideas, balancing comments on issues from the main chapters, and occasionally, additional concepts.

One significant limitation of *Behavioural Change . . .* is that the editors claim to have used systems analysis and the 'change agent-change target, linkage model' to integrate the individual chapters. Unfortunately, these ideas appear in horse and buggy versions which do not have enough power, vis-a-vis the diverging frames of reference of the contributors, to provide the hoped-for integration. In other words, there is a tendency to use systems analysis and the linkage model as slogans which paper over the difficulties of communication between disciplines. The reader has to treat this book as a challenge to his own powers of integration.

However, this will be an important book. It is a mine of concise summaries of conceptual models that are useful views of the change process. It should be used as a companion volume to Bennis, Benne and Chin's *The Planning of Change*[1] which throws a different perspective on many of the relevant issues.

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[1] Bennis, W. G., Benne, K. D., and Chin, R., *The Planning of Change,* 2nd edn. (Holt, Rinehart and Winston, 1969).

Commodity Futures as a Business Management Tool. By HENRY B. ARTHUR. (Boston: Harvard Business School, 1971.) Pp. 392, $US10.00.

As the title suggests, this book is aimed at providing a guide for businessmen in the use of futures markets as part of their commercial operations, as opposed to speculative operations. As such, it caters for a more specialized group of readers, namely those with business interests in commodities for which a futures market exists. But in doing so the author provides an insight into the theoretical aspects as well as the practical aspects of the operation of futures markets.

The study consists of four parts. Part 1 introduces price risks and futures trading on an industry-wide basis. Chapter 1 looks at the implications of price changes with respect to inventory holdings and contractual agreements, including futures contracts; and the concept of the 'total industry position' with regard to price changes. The next chapter is a more detailed study of futures markets and the use of futures trading. The records of a clearing house (the medium through which contracts are traded), a broker, and an individual trader are examined to clarify the market institutions. The use of futures as a business management tool in terms of liquidity and time flexibility for the firm is discussed. The hedging concept is developed in terms of the 'theory of analogous part', where the analogous part is defined as the part of the firm's cash commitment that is completely offset in the futures market. The 'residual' is still exposed to price risk.

Part 2 studies risk management in the individual firm. The net 'at risk' position with regard to price fluctuations of the firm is outlined, and the implications of this for the business functions of procurement, processing, marketing and the custody of assets is discussed. The author goes on to outline the action and decision processes whereby the net price-risk exposure can be appraised and the different possible actions compared. Ways of 'mastering' this price risk are listed, including hedging in commodity futures contracts, with the advantages and limitations of hedging on futures markets being assessed.

Part 3, titled 'Major Commodity Complexes—Policies and Programmes in the Use of Futures', analyses the wheat and flour, soybean, beef, cocoa and the frozen concentrated orange juice industries in the U.S.A. Futures markets operate in these industries. The characteristic features of each industry and the implications of these for hedging are outlined, and the actual policy and use of futures markets of selected firms are discussed.

Part 4 rounds off the study with a generalized discussion of the response of firms to price risks, and the guidelines employed by management to overcome some of the effects of price risks.

Whilst this book does provide a guide to the use of commodity futures, it does so in a descriptive manner. A more formalized statistical approach taking account of such factors as attitudes towards risk, the degree of risk facing a firm in terms of potential losses and gains and objectives or circumstances that may limit the firm's action would enhance the study.

With the Sydney Greasy Wool Futures Market being the only futures market in Australia at present, the use of any book as a guide to businessmen's use of futures trading is clearly limited. It is in the context of an

expository text on the actual practice of futures trading, and the light this sheds on the economic function of futures markets, that this book makes a worthwhile contribution to the literature on commodity futures.

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Linear Programming and Related Techniques. By C. VAN DE PANNE. (Amsterdam: North-Holland, 1971.) Pp. 364, Dfl. 48.00 soft covers Dfl. 34.00.

This book it written primarily for use in undergraduate courses in economics and business administration but may also be useful in management training programmes generally. The text is divided into four parts: Basic Methods of Linear Programming; Applications of Linear Programming; Transportation and Network Methods; and Decision Tree Methods.

In the first section the author sets out to explain linear programming in such a manner that the essentials are covered without use of linear algebra. While the attempt is reasonably successful, it is debatable whether the objective is worthwhile. These days, most undergraduates in linear programming courses might be presumed to have some basic knowledge of linear algebra and for these students the author's 'long-hand' notation suffers in comparison with the 'shorthand' presentations that are possible with vector and matrix notation. Moreover, the author has necessarily had to confine himself to a rather brief and barely adequate treatment of some aspects of the topic. There are, however, useful chapters in this section on sensitivity analysis and near optimal analysis and on parametric programming.

In Part II the applications that are dealt with include dynamic production and inventory problems, a simple capital budgeting problem, and an application to the dairy industry. A feature that may commend the book to some readers is that Chapter 7 in Part II deals with linear programming computations using the IBM *Mathematical Programming System* (MPS), including examples of data input, control programme and computer output. Also in this part of the book is a chapter on the relationship between linear programming and economic analysis in which quadratic programming is introduced to obtain an equilibrium solution to a production problem with elastic demand.

In Part III the treatment of transportation and network methods is integrated with the corresponding linear programming methods, while perhaps the most notable feature in Part IV is the chapter on branch-and-bound methods for integer programming which are now becoming more widely available in commercial mathematical programming computer systems.

In reviewing a book which is yet another addition to the plethora of texts on linear programming one is bound to ask how the newcomer compares with its competitors for what must surely be a finite market. Judged in this way one can say that this text, for most purposes, is neither outstandingly better nor worse than at least half-a-dozen alternatives. It has the important advantage over some of the opposition, including some of the 'standard' texts, of being up-to-date. However, not all modern computational options get a mention—a notable omission is

separable programming. Nevertheless, there are sufficient features in the book that are of merit to be able to suggest that teachers of linear programming and related operations research methods should be sure to obtain a copy to determine how well this particular text conforms with their own prejudices, preferences and needs.

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