BOOK REVIEWS

MOIRA: Model of International Relations in Agriculture. By HANS LINNEMANN, JERRIE DE HOOGH, MICHIEL A. KEYZER and HENK D. J. VAN HEEMST. (North-Holland: Amsterdam, 1979.) Pp. 379, ISBN 0 444 85169 0.

This book reports on a study which originated from the debate following the Club of Rome publications on the Predicament of Mankind. The study aimed to investigate the world food situation and to evaluate international policy options in terms of their effectiveness in reducing world hunger. These aims are pursued within the context of a quantitative framework, MOIRA (model of international relations in agriculture).

The book falls naturally into three parts; part I which deals with world food production potential, part II which outlines the structure of the MOIRA model, and part III which discusses some model simulations.

The first part, which is self-contained, establishes (yet again) the technical limits to world food production and as such is likely to appeal more to the agricultural scientist or plant physiologist than to the economist. Detailed inventories of agricultural output potential assuming 'ideal' production technologies are assembled for 200 world regions after taking into account endowments such as soil quantity and quality, water availability and climatic features such as rainfall, sunlight, relative humidity and winds. Not surprisingly, in view of the 'ideal' technology assumption and the omission of yield-reducing factors such as plant disease and accelerated erosion, the authors arrive at an optimistic maximum yield figure, some 300 times the 1965 volume of production.

The second and major part explains MOIRA's economic structure. MOIRA is a world agricultural sector model which links the food sectors of 106 geographical units (country groups) by an equilibrium model of international food trade. Thus MOIRA can be placed in the literature of world economic models which includes, for example, the Leontief et al. United Nations Model to Study the Future of the World Economy, the USDA World GOL Model, the IMF Multicountry Exchange Rate Model (MERM) and the LINK model developed by Klein and others at the Wharton School in co-operation with economists in other OECD countries. Of course, each of these models has its own strengths and weaknesses, which implies that each should be used for some but not other purposes. MOIRA's narrow focus (world food security) and sectoral categorisation (only agricultural sector output is endogenous) distinguish it from the above-mentioned models, all of which are more flexible in design and hence applicable to a wider range of policy problems than is the case with MOIRA.

The usual documentation of an economic model consists of a complete list of the equations of its structural form. In the case of MOIRA, however, only the algorithm for the solution of the model is given. This is developed sequentially in FORTRAN-like notation. The omission both of a mathematical summary of the model's structural form, and of a consolidated listing of parameter and variable nomenclature, is unfortunate. Despite a detailed discussion of the components of the algorithm and

their economic implications, the model's linkages and notation remain difficult to assimilate.

MOIRA has an annual time horizon extending to the year 2010. Major exogenous variables are country-specific population growth and non-agricultural GDP, fertiliser prices and country-specific nutritional standards. Given scenarios for these variables, MOIRA generates country-specific projections for numerous endogenous variables, the most important being agricultural sector outputs and employment levels, food consumption per capita, food self sufficiency ratios, and the sectoral and geographic distribution of world hunger. This latter variable is formulated as the difference between the exogenously specified nutritional norm and the endogenously projected food consumption level.

Individual country groups contain only two sectors (food and non-food) and two economic agents (producers and consumers). Production technology is described by a single production function estimated cross sectionally from country-specific data on land area, yields and the primary factor input mix. Agricultural output is explained by the decision of the representative farmer to combine variables factors (fertiliser and capital) with his (short-run) fixed factors, land and labour, to maximise expected income at input and output prices which are given from his viewpoint. Food supply functions for each country therefore reflect natural resource endowments, labour inputs and the prices of outputs and of variable inputs. Agricultural labour, although given in any year, changes over time as a result of population growth and the outflow to the non-agricultural sector. This latter change is modelled as responding to income inequality between the sectors.

Given that hunger reflects distributional rather than global food limitations, and that the emphasis of the study is on establishing the distribution of hunger under alternative food strategies, the model provides a more disaggregated treatment of consumption than it does production. Food consumption behaviour is described by a function (estimated cross sectionally) which relates per capita consumption of consumable protein to per capita income and food price levels. Consumers in each country are classified into 12 income groups with 6 in each sector. MOIRA assumes that governments manipulate, via taxes and subsidies on food trade flows, the domestic food price level to achieve a desired distribution of income between producers and consumers. This aspect of government behaviour is modelled by the inclusion of a so-called income disparity equation. Cross sectional analysis is again employed to identify variables important in explaining variations in sectoral income distributions across countries. The domestic price level is viewed as representing the outcome of the government's food price policy and of the world market price. Iterative methods are used to set the latter price at a value which equates, through its effect on the domestic food price, aggregate food consumption with aggregate food supply.

The final and most interesting part considers some simulations with MOIRA. The accompanying interpretation of the results is particularly valuable in assisting the reader to understand the linkages underlying what is a complex model. The results, and interpretation of the mechanisms involved, seem plausible. Despite a growth in food output in excess of population growth, the standard run (which is based on likely

scenarios for population growth and non-agricultural sector growth), projects more widespread hunger in the densely populated countries of South and South East Asia. Also implied is an increase in the inequality of food distribution between rich and poor countries. Halving the estimate of population growth alleviates, but does not solve, the world food problem. Reducing income inequality outside agriculture within national economies is particularly effective in reducing the number of people who go hungry globally.

Policies intended to achieve a redistribution of food supplies, such as reduced consumption in wealthy countries and food aid programs, are evaluated, as are policies aimed at stimulating food production in the developing countries (e.g. international price stabilisation and trade liberalisation). Of these alternatives, MOIRA indicates that a large-scale food aid plan financed by the rich countries would be the most promising. The model suggests that the virtual elimination of hunger over the simulation period would require a sustained redistribution of food aid from the rich to the poor countries of about 0.5 per cent of the national incomes of the rich countries.

It is easy to find shortcomings with the theoretical design of an ambitious applied study such as this, which of necessity involves considerable abstraction from reality. For example, the exogenous treatment of the major part of world output, i.e. nonfood output, and the lack of any formal input-output linkages between the food and the nonfood sectors are severe limitations given the model's long-run setting. This and other limitations are conceded in a frank evaluation of the project by the authors. On balance, however, this book deserves the readership of both agricultural scientists and policy makers concerned with world food security, and applied economists engaged in large-scale model building.

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An Aggregative Programming Approach to Agricultural Sector Analysis. Edited by NEAL WALKER and K. A. PARTON. (University of New England: Armidale, N.S.W., 1979.) Pp. 255, ISBN 0 85834 265 0.

One of the major difficulties of large-scale modelling is ensuring that adequate time and resources are allocated to documenting the models and their application. The Aggregative Programming Model of Australian Agriculture (APMAA) project stands out as a glowing example of how to achieve a commendable level of publications, even from the early stages of development of such a model. The current monograph adds further to the publications record of the APMAA team.

An Aggregative Programming Approach to Agricultural Sector Analysis is essentially a collection of twelve papers, written by ten authors or co-authors involved with the APMAA project. The monograph has been written as an attempt 'to provide an insight into model building as a process' and to fill the void in publications between theory and application of large-scale models. With the large number of contributors, a consistent theme throughout would be well-nigh impossi-

ble to achieve, and has not been achieved. In fact, the title is somewhat misleading because the book contains numerous approaches to agricultural sector analysis. This in itself highlights some of the difficulties of managing large-scale modelling projects.

Chapters in which the threads are drawn together are by Neal Walker (Planning an agricultural sector model: an overview) and Neal Walker and John Dillon (Epilogue: model rationale and implementation). The authors offer some very informative insights into managing large-scale aggregative programming projects. This reviewer would agree that 'there is doubtless some generality to the management difficulties and successes . . . faced' (p. 12.8). However, nowhere in these two chapters is there a clear statement of the purpose of APMAA. It is therefore difficult for the reader to understand how one of the most critical aspects of model building (defining objectives and monitoring their achievement) has been or should be handled.

The chapters by Neal Walker (Structural aspects of representative farm linear programming matrices), Richard Monypenny (Input data characteristics relative to programming models and the modelling process) and Philip Sluczanowski (Data handling aspects of large-scale models) relate to aspects of model structure and development. It is pleasing to see an often-neglected aspect of 'empirical' research, namely data, receiving attention, although Sluczanowski's chapter says little more than his 1976 article in the *Review of Marketing and Agricultural Economics.*

Aggregation bias is addressed by John Kennedy in Chapter 5 (The aggregation problem). By adopting the standard definition of aggregation bias for large LP models (p. 5.2), some of the sources of aggregation error (aggregation over time, aggregation of enterprises) are not considered. I suspect that greater attention to these sources of error in the development of APMAA might have led to a different model structure to that outlined by Walker — one with fewer than 521 representative farms and greater disaggregation of the individual farm matrices.

Evaluating model performance is tackled by Richard Monypenny (Preliminary measures of model performance). The chapter is oriented towards 'model builders' measures of model performance' and not towards the ultimate test, 'predictive ability'. A number of the difficulties of evaluating model performance are discussed and it is argued that tests of predictive ability cannot be made with long-term normative models, such as APMAA. While one can sympathise with this argument, there remains a number of measures of model performance which could have been quoted. One measure is a comparison of APMAA solution values with actual values in the base year. Incidentally, the argument that tests of predictive ability cannot be made with models such as APMAA appears to conflict with Wicks' later evaluation of alternative risk formulations using Theil's *U*-statistic (p. 8.29).

In the following four chapters, various extensions to aggregative programming models are put forward: 'Incorporation of dynamic aspects into aggregative programming', 'Introducing risk into an aggregative programming model' both by John Wicks; 'Stochastic yields and resources' by Pauline Beesley and Emilio Francisco; and 'Price endogenous features and spatial aspects of aggregative programming models' by Kevin Parton and John Guise. A number of alternative ap-

proaches are documented and this section of the book is fruitful with ideas for further research, but less fruitful on bridging the gap between theory and applications of APMAA.

Chapter 11 is by Kevin Parton and Pauline Beesley (Model results and their interpretation). The importance of the interface between end users of model results and the modeller is discussed. As well, the questions of appropriate policy experimentation and interpretation are addressed.

Overall, the collection of papers is very readable and loaded with references. It offers anyone working on large models, particularly programming models, a very useful set of ideas and approaches. While the monograph assists in filling the void in publications between theory and application of large-scale models, it is disappointing that much of the discussion is devoted to model development and very little to model application. The large-scale modelling approach is also idolised excessively in the monograph. A very useful addition to the APMAA series of reports would be an in-depth evaluation of the pros and cons of large-scale aggregative programming models. Perhaps there is scope for such an evaluation in an *ex post* sense, given the fate of APMAA.

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Building Implementable Marketing Models. By PHILIPPE A. NAERT and PETER S. H. LEEFLANG. (Martinus Nijhoff Social Sciences Division: Leiden/Boston, 1978.) Pp. 406, ISBN 90 207 674 8.

The book is divided into three parts. The first part (Chapters 1–4) serves as an introduction and statement of objectives. It provides a general classification of models according to degree of explicitness and assessment of benefits which flow from the use of marketing models and a typology of marketing models according to the intended use of the models and the market orientation and degree of detail. The second part of the book (Chapters 5–12) is a selective presentation of the process of model building, the criteria on which models are likely to be implemented and ways of choosing and specifying a subset of marketing models from the wide selection available. The third and final part (Chapters 13 and 14) of the book is concerned with the determinants of model implementation arising from the characteristics of the organisation, the model builder, the model user, and the model.

In the second part of the book, which is possibly of most interest to the novitiate practitioner, I found the presentation of models, ranging across the standard econometric brand to Markovian, Bernoullian, and learning models, to be lucid and effective.

The authors are legitimately concerned with the apparent infrequency of implementation of marketing models in private industry and in the public sector. However, their ideas of the frequency of use are totally assertive and no evidence is adduced as to whether many firms or government instrumentalities use or abuse marketing models frequently, infrequently or at all. On the same base of casual observation of the use of marketing models in Australia, it seems to this reviewer that marketing models have attracted the attention they deserve.

Despite the assertion of the authors that they did not intend to put yet another state-of-the-art book on the market, that is precisely what they have done, but with some additional insight into model building and implementation which puts the book into the more readable and useful class as a marketing text. Their broad-brush treatment (with appropriate referencing) of estimating methods enables them to range widely over model types.

This is an enjoyable and thoughtful text which should be on the shelves of anyone seriously interested in marketing and on the list of usable books for the dilettante who wishes to display virtuosity in model building for marketing problems.

The book is well annotated throughout with references to more rigorous presentations in the literature when the authors feel it necessary to sacrifice analytical detail in the cause of clarity. The bibliography is excellent, the index adequate. Overall, in this reviewer's opinion, the authors achieve their goal of presenting convincing argument that good, well-specified models can be built and estimated and that effective dialogue can be developed between builders and users of marketing models.

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Farm Planning and Control (2nd edition). By C. S. BARNARD and J. S. NIX (Cambridge University Press, 1979.) Pp. 600, ISBN 0 521 2960 8.

This is a good and comprehensive British farm management textbook for intermediate level courses in farm planning and control at universities. The first edition of the book was reviewed previously in this *Journal* 19(1), 66–8.

The second edition retains the same useful layout as the first. The major change has been to give greater importance to the topic of uncertainty. It is now discussed throughout the book and is the subject of a new chapter — Chapter 16, 'Uncertainty and farm organisation and planning.' Additional sections have been included to outline focus-loss and MOTAD in relation to risk programming, to explain briefly inflation accounting and growth theory, and the range of examples of formulating problems in matrix form for linear programming and similar types of analysis has been extended. The bibliography has been replaced by a more useful selection of further readings for each chapter and the authors have metricated and updated the examples used throughout the text.

While the changes have improved the script, they have also added to its length and resulted in a textbook of 600 pages. A pruning of the remainder of the script, although perhaps more difficult, would have been a better way of accommodating the changes.

The strength of the book is its comprehensive treatment of the topic of farm planning and the development of the basic economic principles of farm planning and control with the use of many realistic farm examples.

It is these features of the book that should make it attractive to lecturers of farm management courses in universities and colleges of advanced education and to farm advisers in Australia and New Zealand.

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Landscape Economics. By COLIN PRICE. (Macmillan: London, 1979.) Pp. 168, ISBN 0 333 23673 4.

In this pioneering book, Dr Price attempts to show how economics can be applied to the range of landscape problems. His theme is that economics should be applied more often to landscape problems. Such application will be difficult and will require much persistence and imagination from the analyst. To make contributions to important landscape decisions the economist may need to abandon his purism and abandon some cherished preconditions. Price suggests that, because of this, purists may consider the book trivial. The book is an attempt to break new ground and so cannot be considered trivial. But it is often frustrating and occasionally dangerous.

Chapter 1 effectively addresses and dismisses arguments that landscapes possess subjective qualities that place them outside economic argument and economic valuation. Chapter 2 compares financial costs, opportunity costs and social costs, and rightly argues that even a simple statement of costs may improve current landscape analyses. The notion of demand for landscapes is addressed in Chapter 3 together with the associated task of defining units of consumption. Chapters 4 and 5 purport to cover approaches of the landscape architect and politician-administrator, while Chapter 6 covers what is loosely called the statistical basis of valuation. Dr Price's own approach is synthesised in Chapter 7 under the title of 'Controlled subjectivity'. The treatment of values over time is discussed in Chapter 8 while Chapter 9 is possibly the most useful chapter of all with its applications of economics to different kinds of landscape problems. The final Chapter 10 is a confused pot pourri of location theory, benefit-cost analysis and conclusions.

The constructive synthesis of ideas of Chapter 7 starts from the landscape architect's approach, which the author delightfully terms 'quantified paternalism'. Dr Price's basic idea is to qualify these initial, expert views for consumer values and for landscape peculiarity and diversity. This procedure of successive qualifications to an original scale is like the rest of the book — intuitively appealing but unnecessarily hard to follow. Readers would very much like to know how to implement the idea and what economic axioms it meets and violates. Chapter 7 also covers Greig's interesting approach to valuation through simulation of behaviour and deriving the implied values.

Chapter 9, 'The application of landscape economics', is an interesting discussion of how Price's ideas may help decisions. The first section considers strategies that householders may adopt when views from a house decline. The second considers what increase in house price might accompany a good view. Actual situations (one or a few houses at a time) seem

to be confused with global situations (all houses in a given development). Consideration of actual marginal changes as they occur is simpler and usually sufficient to answer the questions posed. The section on the visited landscape usefully analyses visitor reaction to detrimental landscape changes. The concluding discussion finally reaches important economic problems of landscape as a foreign exchange earner, as a redistributor of real wealth, and of policy measures to achieve landscape goals. The content of this chapter could perhaps have been enlarged at the expense of some earlier chapters.

Dr Price seems to be schizophrenic about quantitative techniques and empirical applications. He rightly urges plenty of both but never shows how to use either. For example, he espouses game theory and the use of probabilities for risk but never shows how to use either. He promotes computer modelling and linear programming but castigates multiple regression which rests much more strongly on observation of actual behaviour — a principle he endorses. He argues for more economics in landscape management and frequently presents innovative arguments. But his rambling style and careful effort to present all sides of a question cloud this useful material. He should have included less detail, more examples and more policy implications. Perhaps too he should have paid more attention to the needs of the reader and less to his own ideas and needs.

In his Preface, the author advises that much of the material is provisional and has not previously been offered for comment. This normally-acceptable role for a book is, unfortunately, coupled with an inadequate literature review and apparently little experience in testing methods and ideas empirically. The author's attitude to multiple regression is a case in point. He dismisses this and similar statistical methods because the number of explanatory variables is large and the functional forms of the equations are complex (p. 71). And on page 81 pure multiple regression analysis is accused of failing at the level of detail to relate consumer choice to elements of the landscape. Objections to potentially large numbers of variables or complex forms are valid but have been coped with sufficiently often that many guidelines are available and obvious. One sort of guideline derives from the very economic theory the author tries to apply and another derives from common sense. At least two of the references have related consumer choice to elements of the landscape, if not perfectly then at least with great promise. Further, related environmental areas like air pollution confront the same problem and offer many good examples. The objections to multiple regression seem to imply a lack of experience with the method and an inadequate literature review.

The diffuse and rambling prose frustrates comprehension of some otherwise interesting arguments. The author advocates game theory for some kinds of analysis but never adequately shows how to do this — although at least one of his references has done this. The discussion of demand for landscape visits is also hard to follow. In fact, many readers would readily understand a rapid assertion that marginal utility depends on quantity of consumption, characteristics of the landscape, the subject's preferences and his previous experience.

Dr Price advocates a zero discount rate for landscape valuation. This dangerous argument seems to rest on such spurious arguments as (a)

some areas may have landscape qualities too high to be discounted, and (b) because we cannot forecast future visit rates or future landscape quality, we should not discount. The notions of social time preference and opportunity cost are clouded but underemphasised. A strong argument for a zero discount rate would be welcome but it must be based on and rebut conventional arguments.

Despite the difficult presentation, *Landscape Economics* deserves to be widely read. All of the ideas, even the questionable ones, deserve a wide audience and they will stimulate thought and further work. Hopefully Dr Price will continue to work on his ideas and, through carefully-reported empirical applications, actually manage to demonstrate how to apply them. But at an Australian price of about $29.95 for 168 pages – versus £12 in England – the publisher can expect few local sales outside institutional libraries.

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The Economics of Natural Resources. By RICHARD LECOMBER. (Macmillan: London and Basingstoke, 1979.) Pp. 247, ISBN 0333 19142 4 pbk.

This is a useful book though it does not have either a unifying theme or the structure to be a good textbook or a definitive treatise. In the introduction the author suggests that a 'persevering non-economist' could handle all but the appendices. He is stretching the notion of perseverance! The book requires a good knowledge of microeconomics to be intelligible. However, this aside, much of the book is well written and researched and displays a theoretical eclecticism which is probably essential at this stage in this rather new and very complex area.

After a short introduction which includes some nontechnical terminological points and a plan of the book, Chapter 2 launches rapidly into the prime question. Does the world have a natural resource shortage? This is usefully analysed in terms of Pessimists (e.g. Boulding, Commoner, Daly, Meadows, etc.) and Optimists (e.g. Beckerman, Maddox, Nordhaus, etc.), though this rather simplistic division is rightly not allowed to obscure the fact that many writers and theories cannot be so easily categorised. The analysis of this chapter is definitely for the trained economist and includes references to C.E.S. production functions and 'resource augmenting technical progress' without any attempt at prior explanation. (So much for the 'persevering non-economist'!) Nevertheless, it is in general a good account of the diversity of attitudes and attempted answers to the question and almost anybody would get some idea of the flavour of this complex debate.

Chapter 3 looks at the well-developed theories of the exploitation of the fishery and the mine, respectively, typifying a renewable and a nonrenewable resource. The objective is the optimal pattern of use of the resource and the formal models are explored. The exposition is not always clear and one wonders whether it is possible to do justice to two such large and complex bodies of literature in a mere twenty pages. The

brief Chapter 4 on the *socially* optimal use of resources, which has a lengthy mathematical appendix, is well summed up in its 'Conclusion' that there are few general conclusions in a world dominated by uncertainty and by fundamental philosophical questions. An example of the latter is the question as to whether total welfare is properly a function of both individual utility and the number of individuals involved, and if so what weights to attach to each of these components. Lecomber does not dodge these sorts of question but, not surprisingly, fails to answer them. Chapter 5 is a highly critical analysis of the market mechanism as a resource allocator. It briefly establishes the traditional economists' benchmark, the formal conditions necessary for a perfect market, and then proceeds to show how varied are the forms of market failure. There is an excellent section on the problems of discounting, though it rather fails in this case to confront the fundamental question that discounting over long periods raises issues of distribution rather than social efficiency.

Chapters 6 and 9 are more discursive and in general less technical. They look at various resource policies and include a great deal of useful detail, though one has the feeling at times that quality of exposition has been sacrificed for quantity of material. This is particularly true of Chapters 8 and 9, which look, respectively, at the future supply and demand for energy. At times, the wealth of information and theories and counter-theories is overwhelming, and one craves for a little bit more guidance than the author seems willing to give. However, it would be churlish not to record that this is an exhaustive and scholarly study of perhaps the single most important area of resource use.

The last chapter on government policy is so short (two pages) that it does not require comment. Suffice to say that it fails even to touch on the extensive public choice literature and perhaps, in the circumstances, would have best been left out.

There are adequate subject and name indexes and a good reference list which reflects the considerable breadth of sources, by no means confined to the conventional economics discipline. In this connection, and mindful of the fact that one can always find gaps in sources, it is nevertheless surprising that Ciriacy-Wantrup, perhaps the literary father of resource conservation theory in economics, is not mentioned anywhere in the book. Similarly, Baumol, who has made major theoretical contributions in several areas, for example the social discount rate, receives no mention.

Overall it is a useful survey of the state of play, but rather inconsistent in the level of analysis and lacking in coherence. One can understand the great difficulty in synthesising a large and diffuse literature, some of which is heavily value permeated. In this sense, the book probably reflects well the ambiguities and gaps in our theories. In summary, it is a more than useful reference book that raises most of the questions, but answers few of them. Perhaps this honestly reflects the state of economic science in the area of natural resources.

Finally, it is reasonable to say that the review copy had more than its fair share of printing errors and, in addition, four pages were bound out of sequence.

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Proceedings of the Conference on Value of Meteorological Services. (Melbourne, 21–23 February 1979.) Pp. 197, ISBN 0 9596170 2 7.

One of the tantalising features of this collection is the uncertainty about who has published it (presumably the Royal Meteorological Society, Australian Branch, from whom it is available for $5, GPO Box 5089AA, Melbourne, 3001) and who has edited the *Proceedings* (presumably, the members of the Organising Committee which also included members from the other sponsoring societies, the Economic Society of Australia and New Zealand and the Victorian Branch of the Australian Agricultural Economics Society). This Society was represented by Julian Alston and Geoff Edwards.

It is argued (p. 5) that whatever has emerged from the Conference that is new and useful must be considered a direct result of the unique amalgam of the sponsoring Societies and, of course, of the meeting of minds of the professions represented. Accordingly, it is appropriate to search the document for what is new or useful. On this score, I must say that the *Proceedings* are rather disappointing.

Economists will find most novelty in the wideranging contribution by Sue Richardson, 'The value of meteorological services to the general public', which is reproduced in full. She reviews many economic aspects of evaluating weather forecasts. Amongst her conclusions (p. 166) is that 'the selection of clothing to attain maximum comfort appears to be one of the major, if not the *major*, ways in which a forecast as short as 24 hours can contribute significantly to individual welfare . . .'. From this she adduces the tentative hypothesis that 'the greatest gainers from weather services are young adults with relatively high incomes . . . a group the community may not particularly wish to subsidise'.

Richardson's thought-provoking review is followed by Cliff Walsh's discussion of some of the public-good features of meteorological services. Indeed, the general question of limitations of present methods of financing the Bureau of Meteorology, and constraints on its appropriation of fees for its services, seem to have been among the key issues of the Conference and discussions of these problems appear at many places through the *Proceedings* (e.g. p. 72). Walsh evidently contributed to a coherent appreciation of desirable forms of dealing with a good that is not entirely 'public'.

The main part of the Conference was organised around four themes, namely:

(a) the value of meteorological services to primary industry;
(b) the value of meteorological services to secondary and tertiary industry;
(c) the value of meteorological services to the general public; and
(d) the methods for assessing the value of meteorological services.

The *Proceedings* are generally presented according to this classification. However, the material is presented in a way that does not make it very easy to follow because of the repetitive treatment of some topics. For instance, it is rather challenging to follow the contributions of John Freebairn to the *Proceedings*. His two papers (on the value of meteorological services to primary industry and on methods of estimating benefits) are reproduced in full, are reported as separate Abstracts and are also reviewed at several points in Summaries and in

Syntheses. Only 7 of the 38 Conference Papers are reproduced in full but all are abstracted, summarised and discussed.

I found this feature of re-creating the atmosphere of the Conference to be distracting, but it may be unfair to single out this set of *Proceedings* for particular criticism. I have long held ambivalent attitudes towards the publication of raw proceedings. Whilst some verbatim reports of proceedings can be highly entertaining (for example, the discussion sessions of the Royal Statistical Society reported in its *Journal*), I have no regrets that the *Australian Journal of Agricultural Economics* – except in the introductory issue – has not resorted to the practice of publishing conference proceedings.

The topic of this Conference is indeed a sadly neglected one and the organisers are to be congratulated for bringing the relevant disciplines together. One difficult issue broached that has received very little attention is the study of gains from recording and providing climatological data. It is a pity that many papers presented are not addressed to the valuation questions suggested in the titles. In particular, readers who want to discover estimates of the value of meteorological forecasts are bound to be disappointed. There is useful discussion of method but little of results. Some papers seemingly have little to do with the stated theme of the Conference. This includes two of the papers that I found most interesting, namely that of Professor G. Blainey on 'How climate has affected Australia's history' and Professor C. H. B. Priestly's fascinating comparison of meteorology and economics.

One can draw a parallel between this book of *Proceedings* and a categorical forecast of the weather tomorrow; if you acquire it you *may* be wiser and better off but – this happy state is uncertain.

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