BOOK REVIEWS

Struggle for the North. By J. H. KELLY. (Sydney: Australasian Book Society, 1966.) Pp. 218, $4.25.

This is a personal book: it is a political book. To judge it solely on its agricultural economics would be a disservice because its slant on history and the forceful opinions it contains will have a wide appeal. Far wider, one suspects, than Davidson's *The Northern Myth*, with which it has little in common beyond a general concern for Australia's North. Davidson has left us with an academic and detailed analytical treatment of the costs and returns associated with existing and proposed investments in the agricultural and pastoral industries of tropical Australia. Such was the strength of his book. Yet in the arenas of public opinion and administrative action such also was its weakness. Davidson's commendable attempts at coldly analytic vigour, although predictably interspersed with trenchant criticism, must have limited his audience. And, perhaps unfortunately, facts are temporal. Yields, prices, and costs all change and Davidson's view is from a moment in time.

Kelly's book ranges far wider, touching on legislation, lobbies, cattle, land ownership and tenure, transport, minerals, water, aborigines, and prospects for planning. Here is stuff for the imagination and ammunition for arguments. This is a book about the North that will be read around the world.

His analysis is largely historical. This gives it a certain timelessness. Except in his appended budgets of cattle station developments, Kelly seldom treads in Davidson's footsteps. Emphasis is laid on acts, ordinances, administrative decisions, news, fragment of fact, rather unconnected minutae of the past, and his own published and unpublished reports from his days with the B.A.E.

The "startling new material" referred to in the introduction is rather difficult to find. The whole is presented in a highly subjective manner. There is no doubt that Kelly is well informed and even less doubt that he embarked on this work with the aim of amassing evidence against absentee landholders, maladministrators of the public estate, ignorant and prejudiced employers of aborigines, geopoliticians and non-Labor governments. The result is a fascinating chronicle of misdeeds and influence in high places, compellingly written without terribly much regard for the niceties of academic objectivity. After each attack, Kelly produces a detailed policy to right all wrongs. In this reviewer's eyes, his suggestions often have the attraction of coincidence with his own beliefs, but Kelly is at a loss to demonstrate their worth except by an appeal to the reader's common sense. The one suggestion that is indubitably correct is that research is needed on many points so that issues such as those aired in this most readable book may be resolved.

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Probability and Profit: A Study of Economic Behaviour along Bayesian Lines. By W. FELLNER. (Homewood: Irwin, 1965.) Pp. 239, $7.50 U.S.

One of the more recent and important developments in economics is the Bayesian approach to economic analysis and decision making. Although many of the components of the Bayesian approach are not new, it questions much of the conventional wisdom employed in economic analysis. The approach has many statistical and economic ramifications. Professor Fellner's book presents some of the basic elements of the Bayesian approach, in particular emphasizing the use of subjective probabilities and utility maximization as contrasted to the classical approach of objective (frequential) probabilities and profit maximization.

The subject is introduced with a brief resumé of the author's views on the Bayesian approach to decision making. This is followed by a detailed examination of the origins and controversy surrounding the alternative use of subjective and objective probabilities. The basic postulates underlying modern utility theory and subjective probabilities are then presented preparatory to a discussion outlining their use in economic theory and decision making. In this context two chapters are devoted to a discussion of profit theory. A further chapter discusses utility analysis in the theory of the firm, the specific problems involved in Cournot's theory of oligopolistic equilibrium, and Tobin's theory of liquidity preference in portfolio selection. Fellner supports the subjective approach of the Bayesians, and in advancing arguments for its use in business decisions he is critical of the "rule-of-thumb subjectivism" of classical statistical inference. The book concludes with useful bibliographical commentaries on approximately fifty major publications in the area.

In contrast to most previous expositions, Fellner's treatment of the Bayesian approach is simple and non-mathematical. Had the author concentrated on the approach generally accepted by Bayesians, the book would have made a very useful introductory text for those interested in a broad outline of Bayesian methods. Unfortunately, Fellner spends much time in developing and explaining a theory of his own which is not generally accepted by Bayesians. Fellner finds Savage's generally accepted axiom system of probabilities and utilities too restrictive. He bases his objection to the Savage axioms on his observations that "rational" decision makers often bias their subjective probabilities according to the confidence with which they hold these probabilities. (An appendix describes an experiment which supports this view.) Fellner considers such biases are admissible as rational behaviour, and he incorporates them in a semi-probabilistic theory of rational behaviour. The theory has been presented elsewhere[1] and strongly criticized by several leading Bayesian theorists.

Fellner argues that where a decision maker has "shaky" degrees of belief he will "slant" his subjective probabilities, where "slanting expresses an allowance for the instability and the controversial character of some types of probability judgement" (p. 5). These probabilities, or

[1] Fellner, W. "Distortion of Subjective Probabilities as a Reaction to Uncertainty". *Qrtly. J. Econ.* 77: 327-36, 1961.

decision weights, need not sum to one. Fellner presents two versions of decision theory to allow for the "shaky" beliefs of the decision maker. Version 1 allows the slanting of probabilities, but the decision maker's utility function remains consistent with monetary consequences. In version 2 the probabilities must conform to the Savage axioms, but the lack of confidence the decision maker has in these probabilities is incorporated into his utility function. Fellner's semi-probabilistic theory is based on version 1, but no rigorous argument is really offered of why it is preferred to the less controversial version 2.

Fellner's hypothesis may be useful in explaining why people have trouble in formulating probabilities which are consistent with the axioms of probability theory, but it has, in the reviewer's opinion, no normative content. Before the theory could be used normatively the rationality of incorporating a state of mind into the analysis of an economic problem has to be justified. If it can be justified, the difference between normative and positive becomes extremely fine. Because many, or even most, decision makers may act in this manner is no justification of its rationality. In fact it has been suggested by Raiffa that if the "irrationality" of using slanted probabilities was pointed out to the decision maker, he would conform to the Savage axioms. A further problem ignored by Fellner in his theory is the problem of probability preferences. Psychologists (notably Edwards) have shown that many decision makers have preferences for some probabilities. This preference is related to the decision maker's familiarity with probabilities; it is unrelated to the decision problem. Such preferences are likely to be mistakenly incorporated in the slanted probabilities and attributed to the decision maker's confidence in these probabilities, when in fact they are totally unrelated.

The book has much to recommend it as an introduction to the Bayesian approach. However, not being convinced of the correctness of Fellner's semi-probabilistic theory, one must note that this overlay of originality detracts from the worth of the book as a basic text.

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New Guinea on the Threshold: Aspects of Social, Political and Economic Development. Edited by E. K. FISK. (Canberra: Australian National Univ. Press, 1966.) Pp. 290, $3.95.

This book is a collection of papers on the Territory of Papua and New Guinea. It is a result of a considerable amount of research interest shown by the Australian National University in the area in recent years. The contributors are all specialists in their respective fields and are also familiar with the overall social, political and economic conditions in the Territory. The result is a well-informed book.

The book covers a wide range of subjects. In the first section F. J. West gives us the historical background in which he examines past policies followed at the time when the development of self-government and independence of the Territory were not considered urgent. This is followed by a section on the economy with contributions by E. K. Fisk, H. C. Brookfield, R. T. Shand, and Norma McArthur. Fisk outlines the main structural features of the economy and discusses their implications for economic policy over the next few years. He points out that a very large proportion of the gross capital formation in the monetary sector is by public authorities—roughly 62 per cent compared with 36 per cent by private investors and two per cent by church missions. The funds for public investment are provided mainly by the Australian government, either directly through Commonwealth departments or through grants to the Territory Administration. In the private sector there has been a considerable net outflow of capital in recent years, and funds for investment in this sector have come largely from retained profits of business enterprises which have been highly prosperous. In regard to the subsistence sector, Fisk argues that there exists a large reservoir of investible resources in the form of surplus labour and, to a lesser extent, surplus land which are "potentially the greatest domestic source of development capital immediately available" in Papua and New Guinea. These resources can be used for both private and public capital formation.

Brookfield examines the natural resources of the Territory. Before contact, most of the people were able to maintain the desired standards of living with the resources available in their localities, but modernization of the economy will involve a major redeployment of population. He stresses the need for properly integrated planning in order to achieve rapid development and suggests that Australians should seek practical advice from people with experience in the process of growth and change in other tropical areas. Shand discusses the relative importance of various industries in the rural sector and examines their prospects for further development in the light of the availability of overseas markets. He anticipates a rapid increase in rural production over the next few years and most of this will contribute towards higher export income. McArthur reviews the demographic situation, emphasizing the practical difficulties involved in compiling population statistics. According to her the estimates are subject to a very considerable margin of error which makes nonsense of precise planning for schools and schoolteachers.

The third section of the book is concerned with social problems and includes contributions by O. H. K. Spate, S. A. Wurm, Paula Brown, and Marie Reay. Spate writes on the complex problems of education. He points out that education in the Territory was pioneered by missionaries of various Christian denominations whose contact with the indigenous people goes back some years before the establishment of colonial administrations. Before the Second World War, the Administration's policy was to subsidize mission schools which maintained certain minimal standards but it showed very little direct interest in the provision of educational facilities. Since the War, however, the Administration has taken a much more direct interest in providing educational facilities, but, numerically, the mission schools are still dominant. While stressing the need for education at the tertiary level, Spate points out that higher education must not be completely divorced from the local environment. Spate regards education to be closely bound together with economic viability and political stability and as such it is one of the gravest issues facing the Territory.

Wurm discusses the complex problem of language and literacy confronting Papua and New Guinea. There are some 700 recognizable languages which present a basic difficulty in developing a sense of nationhood. The need for making the indigenous people literate and proficient in English is seen as urgent and a scheme for achieving this goal is outlined. In this scheme the importance of using local vernacular whenever possible for elementary basic education before the introduction of formal education is emphasized. Brown writes on the process of social change and provides an interesting account of the emergence and significance of social movements, notably the cargo cults. Reay deals with the role and status of women and remarks on the part played by women's organizations inspired from Australia.

The final section of the book is devoted to political problems and contains two papers by R. S. Parker and one by D. G. Bettison. Parker provides an interesting account of the growth of the Territory Administration and the advance towards responsible government since 1945. He remarks that the Administration has been greatly strengthened since the War under the dynamic and imaginative leadership provided by the first Minister of Territories, Mr. P. M. C. Hasluck, although certain weaknesses have developed in the administrative machinery. Parker points out that there is lack of concerted planning and co-ordinated action at the District and Territory headquarters level, and that excessive concentration of decision making in Canberra has often caused delays and dampened initiative in the field. In regard to movement towards responsible self-government, some changes have been introduced in recent years, but there are a number of dilemmas and uncertainties confronting the Australian government. Parker, however, is reluctant to commit himself regarding target dates for political and administrative independence for the Territory. Bettison writes sympathetically on the problems facing the expatriate community and discusses their relationship among themselves and with the indigenous people.

The editor has done a very good job. The papers are logically assembled and the style is both simple and interesting. The book is addressed to a wide cross-section of the public. It is a useful contribution to the understanding of the problems in Papua and New Guinea, especially at the time when the Territory is approaching the threshold of self-government and independence.

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Accounting and Planning for Farm Management. Report of a Joint Committee on Standardization of Farm Accounting. (Brisbane: Queensland Department of Primary Industries, 1966.) Pp. 158, $2.50.

Comprising public accountants, University lecturers and officers of the Queensland Department of Primary Industries, a Queensland Joint Committee under the chairmanship of E. O. Burns was formed in 1963 to "examine the basis of farm management accounting and to devise uniform methods of preparing and using farm records".

This report, the result of two years' deliberations by the Joint Committee, is written in three parts. In Part I the proposed system of accounting, based on gross margins analysis, is described. A classification of accounts is outlined (Chapter 9), and the authors stress the need for uniform accounts' classification and presentation if comparative analysis, which the authors consider the basis of farm management accounting, is to succeed.

The recommended system envisages three main statements: a Profit Statement; a Statement of Assets and Liabilities; and a Statement of Sources and Uses of Cash with subsidiary statements showing livestock trading, and disposal and acquisition of assets. Suggested physical record schedules are set out in an appendix.

As a whole, the system is logical and practical. Where put into practice it will result in greatly improved farm accounts. None the less, some points are open to criticism. In the profit statement, "Wool" and "Sheep" are shown as two separate enterprises—in fact, these two products are joint products from the one enterprise. Deferred receipts from prior years' production are included in current gross income because of the difficulty of estimating total price for produce sold through some marketing organizations. This practice would lead to distortion of some gross margins. It would seem preferable for management purposes to calculate gross income as the total estimated sale value of the current year's production inclusive of payments receivable.

In the Statement of Assets and Liabilities, livestock on hand are valued at a "standard value". The Committee was unable to agree whether the value should be based on cost of production or net realizable value. It recommends as an interim measure that the current practice of averaging purchases at cost, and natural increase at a discretionary standard value, be continued. In areas where there is a risk of large scale loss of livestock, such a recommendation is soundly based. Over much of Australia, however, this attitude is not justifiable and, on grounds of consistency alone, it seems logical to value the livestock inventory at farm-gate price. Land and improvements are listed in this statement at cost less depreciation and the owner's estimate of the current market value of the property is entered as a footnote. Capital growth being an important aspect of investment in agriculture, it deserves more prominence in management accounts. Perhaps in cases where some degree of estimation is required, accountants might prefer to draw up separate informal statements.

In Part II of the report, the interpretation of accounts is discussed and a wide range of efficiency factors is listed. In practice, appropriate ratios will need to be carefully selected and used in conjunction with trained farm management personnel. An example of comparative analysis is set out in Chapter 11. Planning methods, ranging from partial budgeting to linear programming, are discussed in Part III and examples are given.

Appendices to the report include an outline of the marketing and payment procedures for primary products grown in Queensland, and an explanation of the algebra of linear programming. A comprehensive well-designed index facilitates use of the report.

Overall this is a remarkably open-minded and pace-setting book. It will be invaluable to accountants who are considering expanding their practice into this field. It is certain to become a text for both agricultural and farm accounting courses. Because it is concise and readable, it can be recommended to anyone interested in farm accounting. Suffice to note that at the Society's Workshop on Farm Accounting held in

August 1966 at the University of New England, the report (with a few slight amendments) was unanimously approved as a suitable basis for farm managament accounting. In short, the Joint Committee is to be congratulated.

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Farm Accounting in New Zealand (with *Supplement*). Prepared by the Farm Research Committee of the New Zealand Society of Accountants' Board of Research and Publications. (Wellington: N.Z. Society of Accountants, 1966.) Pp. 156, £2 N.Z.

As a result of a recommendation from the 1964 N.Z. Agricultural Development Conference, a Committee was set up of representatives from organizations and professions with an interest in farm accounting. The aim of the Committee was to produce recommendations which would raise the standard of financial reporting for N.Z. farming industries.

To meet this aim, the Committee has done two things. Firstly, a standard classification and core of accounts has been developed and is presented as a *Supplement* to the report. The code, applicable to any type of farming enterprise, follows both a natural and functional classification. It can be expanded and should fit satisfactorily into any office classification. A commodity index is included so that the code number for any item can be identified, either in a general or finer classification.

Secondly, an accounting system has been designed to meet such diverse needs as those of taxation, statistical collection and management. Pro-forma accounts set out in the report contain detailed classifications for physical data such as classes of livestock, in addition to suggested presentations for financial data.

The main accounting statements are: a Farm Working Account; an Income Adjustment and Appropriation Account; a Balance Sheet; and a Cash Flow Statement.

The purpose of the Farm Working Account is to estimate Net Farm Profit available for appropriation (within the limits imposed by valuing livestock at taxation "standard" values) and to provide information for income tax purposes. Net Farm Profit is transferred to the Income Adjustment and Appropriation Account. In this account non-farm and personal income is brought to account, provision is made for tax, personal drawings are charged and the surplus or deficit is transferred to Capital Account. In the Balance Sheet, which is confined to the farm business (all current banking account balances are included), fixed assets are listed at cost less depreciation. Although these accounts are primarily designed for proprietary and taxation purposes, information is presented in such form that useful management data can be extracted with little work.

The Cash Flow Statement, a valuable budgeting aid, is well designed. Supporting statements include livestock and other income accounts, a schedule of assets and depreciation and a report on taxation (which shows any liability for tax). The Committee suggests that accountants occasionally prepare a chart of life insurance policies and an estimate of potential death duties. Examples are given of all these statements.

In Chapter 10, preparation of a comparative statement—Statement of Economic Farm Surplus—is explained. Instructions for annual budgeting are given in Chapter 11 and example working notes are set out in an appendix.

This publication sets a standard for farm accounting in New Zealand. If successfully put into practice, uniform presentation and classification of accounts, and consistent analysis between firms, will be achieved. There will be further considerable economies through computer operation and the coding of original documents. More precise planning should be possible, both at the national policy level and for the individual farmer. Other countries, including Australia, could well follow New Zealand's example.

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Principles and Practice of Farm Management Accounting. By C. A. MALLYON. (Sydney: Law Book Co., 2nd Edn. 1966.) Pp. 463, $7.50.

In 1961 the first edition of *Farm Management Accounting* was hailed as a most worthwhile contribution to the all-too-sparse literature on farm accounting in Australia. The book contained seven parts: introduction, operation, presentation, and analysis of farm accounts, budgeting, project accounting and conclusion. The major change in the second edition is that six chapters have been added to the part on budgeting to cover such topics as "Gross Margins Analysis" and "Break-Even Analysis". Further, the section previously called "Project Accounting" is now termed "Cost Accounting", with "enterprise accounting" replacing the original term "project accounting". This part also contains an additional chapter titled "Variable Costing for Planning and Control". All monetary values have been converted to decimal currency.

The author states in the preface that "Apart from the additional subject matter and the monetary conversion, changes in the original text have been minor. In view of some of the positive criticism of earlier reviewers, certain aspects were amended. However, on the whole, it has been found in practice that the structure of the book well served its purpose." In December 1961, the reviewer for the *Review of Marketing and Agricultural Economics* criticized the book on the grounds that the heavy emphasis on double entry accounting was likely to deter many farmers and graziers from taking up management accounting; that the difference between fixed costs and variable costs had not been made clear; that the explanation of linear programming was too complex; and that the discussion on how to calculate a regression equation was unwarranted in a book intended for a farmer audience. The present reviewer considers these were relevant criticisms—to what extent have they been accepted?

The emphasis on double entry book keeping is unchanged—examples of ledger accounts and lay out of material occupy over 50 of the 158 pages which constitute the book's first three parts. It is doubtful if the proportion diminishes appreciably in the later sections.

In his excellent chapter on gross margins, Mallyon refers time and again to the need to distinglish clearly between fixed and variable costs. On page 288 he shows how misleading is the effect of mistakenly calling a variable cost a fixed cost. Yet on page 385 we find no change in the paragraph on distribution of overhead expenses, where it is suggested that these be allocated as the enterprises can bear them! Why, if he believes it is clearly wrong to call a variable expense an unallocated fixed expense on page 288, does he try to allocate an unallocatable overhead expense on page 385? So, although Mallyon seems to find acceptable the agricultural economist's argument that we can best plan by clearly distinguishing between fixed or overhead and variable costs, adding several chapters to illustrate the recently developed techniques such as programme planning which depend upon the distinction, he was not prepared to accept the earlier reviewer's criticism.

There is further evidence of the conflict in Mallyon's thinking on the subject in the new chapter "Variable Costing for Planning and Control". Here Mallyon suggests that direct costing be considered as a tool for farm management as it clearly shows the difference between budgeted and actual results and presents the data in a form suited to gross margin types of analysis. However on pages 420-421 we find that such expenses as freight, carting and crop insurance on a wheat crop become considered as a special type of overhead cost which can be allocated, although on pages 289 and 290, when discussing gross margins, they are labelled "direct costs" without comment.

Mallyon splits his former chapter on linear programming into two parts. The first of these is completely re-written and is now a most acceptable introduction to the topic. The second contains the short-cut method of Waugh. This is of so little general application it seems a waste of space to discuss it. Likewise the retention of the discussion of regression analysis appears unwarranted in terms of the audience for whom the book is aimed.

Turning to other points, the reviewer believes there is nothing inherently complex in linear programming and that it will have a considerable future in farm management. Equally, programme planning may be most valuable for problems too difficult to budget and yet not worth sending away for computer analysis. Therefore it hurts to see errors such as the following in a book which in general has such a high standing. The first sentence of Chapter 29, page 319, states that "Naturally, in complex cases the mathematics of linear programming can become exceedingly difficult" and the third paragraph of Chapter 30 contains the sentence: "However, unlike linear programming it [programme planning] depends only on arithmetical means to reach its goal. That is, access to a computer is not required." In fact the mathematics of linear programming never become more complicated than the application of multiplication, division and subtraction according to simple rules a 14-year-old schoolboy could follow. What is true is that application of the rules becomes tedious and time consuming in complex cases, and so it is often desirable to use a computer.

In the following paragraph (Chapter 30, page 327) Mallyon says of programme planning: ". . . the arithmetic involved could well become oppressive. Very little has been done where more than two restraining resources affect production. Even with two restraining resources, where there is a range of enterprises the time involved in calculation has been found to be considerable". Again the statements are not strictly true. For example, Wethers at North Carolina has developed an efficient technique for programme planning. Using a desk calculator, he frequently solves problems with, say, seven restraints and about 12 activities in an afternoon. It is true that with larger problems programme planning will also become too tedious to solve by hand.

In fairness one must say that, overall, the book is admirable. The points listed above are to indicate that the reader should be wary in accepting all the author's conclusions. Nevertheless, how many practicing agricultural economists could make the contribution to accounting which Mallyon has made to farm management thinking whilst working full time in a senior position in their own field? No doubt the book will be of most use to accountants, and will fill a most useful place on the bookshelf of those interested in farm management accounting. It is to be hoped that in later editions it will be possible to use a standard terminology such as that recommended at the Society's August 1966 "National Workshop on Standardization of Terminology and Procedures in Farm Management Accounting".

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Transforming Traditional Agriculture. By T. W. SCHULTZ. (New Haven: Yale Univ. Press, 1964.) Pp. 212, $4.50 U.S.

An attempt is made in this book to identify the main barriers to accelerating the rate of growth of agricultural production in poor countries. Particular attention is given to the role of investment.

It is argued that in traditional agriculture, factors of production, not excluding technology, are being efficiently allocated. Given low marginal productivities of both labour and capital, the economist should not be surprised people do not work harder or save more. The common view that farmers in poor countries are slow to adopt profitable new practices is declared invalid. It is implied that the true explanation of the relatively static state of the arts is the high real cost of additional technology.

A digressive and less convincing chapter follows on the theory of disguised unemployment, the belief that much farm labour in low income countries has zero marginal productivity being challenged on both *a priori* and empirical grounds. Returning to the main theme, Schultz, following an analysis due to Friedman, argues that the price of the sources of income streams from agriculture is relatively high in traditional societies because suppliers are unable to produce sources cheaply. High interest rates, historic movements of private overseas capital into poor countries, and apparently labour intensive methods of production are held to be not incompatible with a low marginal return to old forms of capital. Investment in new or traditional forms of capital, however, will yield a high return and transform agriculture into a "relatively cheap source of economic growth".

It is convincingly shown that it is analytically unhelpful to lump these new capital factors under the catch-all head of technological change. The supply and distribution of these non-traditional inputs is then examined with unusual rigour, particular emphasis being placed on the problem of incentive and economies of size. Schultz then considers costs of search, systems of land tenure and (most important) level of training as factors determining the demand for new inputs. This leads on to a concluding chapter on the importance of investment in human capital and in particular on elementary education.

The most obvious defect on the book is that the empirical foundations appear too slender for the weighty theoretical edifice they must support. Evidence is largely drawn from a pre-war anthropological study of a Guatemalan peasant community and a more recent account of the economy of one Indian village. Thus the work can hardly be accepted as a general theory of agricultural development.

The author, nevertheless, has presented a stimulating compendium of ideas in an area in which stimulation is sorely needed. Some of these ideas are highly original, others have not been previously presented with such clarity and sureness, while yet others have hitherto not been awarded a seal of approval by so eminent an economist. The reviewer found the rejection of the common (sometimes crypto-racialist) view that people in poor countries, especially farmers, conspicuously lack economic acumen particularly refreshing. The criticism of the vague and obfuscatory phrase "technological change" also appears well founded.

More criticially, however, the author has paid rather scant tribute to much recent work in this field. This has lead to some tilting at windmills. For instance, few contemporary specialists in agricultural development theory would claim that farm production in poor countries can be greatly increased by applying further traditional inputs without at the same time injecting complementary non-conventional inputs; or that increasing farm size is a prerequisite to increasing labour productivity. Moreover one feels the argument at times is perhaps unnecessarily introspective.

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The Random Character of Stock Market Prices. Edited by P. H. COOTNER. (Cambridge, Mass.: M.I.T. Press, 1964.) Pp. 510, $15.

At a meeting of the Royal Statistical Society of 1953, M. G. Kendall reported the results of an investigation of the properties of some economic time series—in particular, of share price indices and wheat and cotton prices. His principal conclusion (as quoted here referring to Chicago wheat prices, 1883 to 1934, but broadly applicable to the other price series studied as well) was as follows:

> It seems that the change in price from one week to the next is practically independent of the change from that week to the week after. This alone is enough to show that it is impossible to predict the price from week to week from the series itself. And if the series really is wandering, any systematic movements such as trends or cycles which may be "observed" in such series are illusory. The series looks like a "wandering" one, almost as if once a week the Demon of Chance drew a random number from a symmetrical population of

fixed dispersion and added it to the current price to determine the next week's price. And this, we may recall, is not the behaviour in some small backwater market. The data derive from the Chicago wheat market over a period of fifty years during which at least two attempts were made to corner wheat, and one might have expected the wildest irregularities in the figures. To the statistician there is some pleasure in the thought that the symmetrical distribution reared its graceful head undisturbed amid the uproar of the Chicago wheat-pit. The economist, I suspect, or at any rate the trade cyclist, will look for statistical snags before he is convinced of the absence of systematic movements. And he will be very right to do so.

Kendall, a non-economist, was clearly disappointed by his discovery that price series showed little evidence of systematic elements in their movements. However, at least one member of his audience was heartened by Kendall's findings. In discusing Kendall's paper, F. W. Paish said:

"I am extremely grateful to Professor Kendall for his conclusion . . . Many people . . . have spent many years trying to forecast what the stock markets are going to do on the basis of what they have already done. I always thought it futile, and am glad Professor Kendall has confirmed my opinion. It seems inevitable that where prices are based on expectations, markets are as likely to go up as down. If the market thought they were more likely to go up, they would have gone up already."

Paish's remarks express succinctly the theoretical reasoning underlying the random-walk hypothesis concerning the behaviour of speculative (stock and commodity) prices. It should perhaps be stressed that this hypothesis does not imply that a skilled speculator cannot forecast price changes, but merely that one cannot forecast future prices from knowledge of past prices alone. Or, as the editor of the volume under review puts it, "the existence of randomness in stock price changes does not imply that stock prices have no relationship to the real world of events, but only that investors make no systematic errors in forecasting those events".

The random-walk (or Brownian motion) hypothesis has an interesting history. In 1900 Louis Bachelier developed an elaborate mathematical theory of speculative prices based on the assumption that stock prices should have independent increments, and tested his theory against the French government bond market of the time. Of Bachelier's work, Cootner remarks that "so outstanding is it that we can say that the study of speculative prices had its moment of glory at its moment of conception". However, the work was ahead of its time and its value went unrecognized for decades.

The idea of a random-walk—this time in commodity rather than stock prices—was revived in 1934 by Holbrook Working, and it is from Working's writings that agricultural economists are likely to have come in contact with the random-walk hypothesis. Alfred Cowles, founder of the Cowles Commission, also carried out some relevant empirical investigations in the 1930's. Kendall's work was apparently done in ignorance of these earlier studies. The study of speculative prices has expanded rapidly in the last ten years, doubtless partly because of the availability of computers.

Whereas earlier investigations mainly served to demonstrate, and to provide an economic rationale for the close approximation of price movements to the random-walk model, recent studies have concentrated on detecting departures from randomness in price changes. This has required the development of new and refined statistical techniques. It now seems clear that most price series do not describe a pure random-walk, but that the departures from randomness are not large. It has proved possible to devise rules for buying and selling in speculative markets which, when tested on historical data, would have earned profits; however, the profits usually disappear after allowance is made for transaction costs.

The book under review is a collection of reprints of most of the significant articles dealing with the random-walk hypothesis published before 1964. These are arranged in four sections: origins and justification of the random-walk theory; refinement and empirical testing; the random-walk hypothesis re-examined; the statistical analysis of option prices. Cootner has written an introduction to each section, and these pieces, together with the inclusion of some previously unpublished papers by others, add considerably to the book's value. But even if the book were no more than a collection of reprinted articles it would have served a useful purpose, since a number of the items included were previously available only in obscure journals. Since photographic reproduction has been used, type-face and format varies from chapter to chapter, and this is a minor annoyance. While the book will appeal principally to statisticians and econometricians, it contains a great deal of material which will hold the interest of statistically unsophisticated readers as well.

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Agricultural Education in Australia. By R. N. FARQUHAR. (Melbourne: Aust. Council for Educational Research, 1966.) Pp. 320, $6.

Any study of agricultural education in a particular country should not only describe the types of training which are available but also attempt to ascertain whether the institutions concerned perform the functions for which they were established and if they are producing the type of graduate the country needs.

Dr. Farquhar has devoted three-quarters of his book to describing the agricultural education facilities available at all levels of education in Australia. His precise tables give details of the types of courses offered, the origin, numbers and qualifications of the students and staff at each institution and of the graduation and failure rates of students. The careful arrangement of data makes comparisons between different institutions at any particular educational level an easy matter. Because of this detailed description the book can be recommended to any institution wishing to advise people on the training in agriculture available in Australia. It would be invaluable in secondary schools in advising pupils on the types of tertiary education available in agriculture.

Probably because of lack of conclusive evidence, Farquhar devotes far less space to discussing the more important and more interesting question of the adequacy of the agricultural educational facilities in Australia.

Using the results of a survey the author establishes that far more agricultural diplomates and graduates will be required in future years than the existing educational establishments are capable of supplying. This conclusion is used to suggest that more or larger agricultural colleges and agricultural faculties in Universities are required. Farquhar is in a sound position when he suggests this solution for agricultural colleges as most of these institutions have large waiting lists of students. In the case of Universities he is on less certain ground as he points out that only one University is rejecting students because of inadequate facilities. If more agricultural graduates are to be available it is first necessary to attract students to this field. Farquhar is not unaware of this problem although he fails to suggest the obvious solution of increasing the salaries paid to agricultural scientists. The rapid increase in the number of Farm Management Advisers and Consultants is chiefly due to the high monetary rewards obtained by skilled workers in this field.

In commenting on the type of agricultural graduate required, Farquhar stresses the need for people with a broad training to give general advice and points to the weakness of some Australian Universities in producing specialists. This concluion appears to arise from the author's belief that extension has been neglected as a part of undergraduate training and as a field of employment for graduates. In a chapter devoted to extension, he stresses the need for establishing training in extension as part of all agricultural courses. While this may be a useful addition to the agricultural curriculum, it assumes that the theory and the methods of extension are already known. There appears to be little evidence to support this contention. Research into the best methods of conveying information to farmers should precede the establishment of detailed courses in the subject. What is not known, cannot be taught.

The book concludes with a series of recommendations for agricultural education in Australia. While any reader is bound to disagree with a number of these, they do form a useful basis for initiating a much needed discussion on how agricultural training in Australia should develop.

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