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BOOK REVIEWS

Natural Resource Economics: Conservation and Exploitation. By PHILIP A. NEHER (Cambridge University Press, New York, 1990.) Pp. ix + 360, ISBN 0-521-32358-4 hardcovers, 0-521-31174-8 paperback.

Philip Neher at the University of British Columbia has produced a *tour de force* in natural resource economics with this self-contained book. A persevering reader can start with next-to-no knowledge of economics or the principles of optimisation, and end up with a working knowledge of how to analyse a wide range of complex dynamic natural resource problems. Hamiltonians, phase diagrams and the comparative statics of equilibrium solutions are eventually employed routinely. Along the way elementary economics concepts such as the industry made up of competitive firms, price elasticity of demand, homothetic production functions and marginal cost curves are introduced. The basic rules for differentiation are expounded in appendices.

Natural resource problems are dealt with at two levels. Part One introduces the nature of the problems faced in managing the fishery, the forest, the environment and the mine in successive chapters. Basic solutions are rigorously obtained using logic and diagrams, but without resort to first-order conditions for maximisation. Although these chapters may be classed as introductory they are nevertheless demanding and provide an in-depth understanding of how economic analysis may be used to tackle the dynamics of natural resource problems.

More complex problems arising in the management of these resources (except the forest) are treated in Parts Three (renewable resources) and Four (exhaustible resources). The chapters in these last two parts make extensive use of the maximum principle. Control theory and the maximum principle are intuitively derived in an innovative last chapter of Part Two, which introduces the basic ideas of dynamic analysis.

Because of its pivotal role in natural resource economics the way in which the principle is deduced deserves some comment. In the Preface Neher stresses the importance of control theory: "Modern resource economics is considered to be a branch of applied intertemporal economic analysis". He also states: "Only rudimentary calculus is required to learn how to apply it to fundamental problems". In my view the simplest way to derive the maximum principle with basic calculus is to operate analytically on the discrete-time fundamental recursive equation of dynamic programming, though an appeal to the envelope theorem is required. The more usual simple approach is constrained optimisation using Lagrange multipliers, also in discrete time. Neher deduces the maximum principle without use of Lagrange multipliers, though from the notation used (eg 'L' for the intertemporal objective function) his approach is meant to match the Lagrangian approach. The net benefit from control of resource

exploitation from one period to the next consists of the period's direct contribution to the objective function plus the change in value of the resource stock. The novel part of Neher's derivation is the way in which the change in value of the resource stock is dealt with. Although the derivation makes intuitive sense, and the resulting optimality conditions for periods between the start and end of the decision process are correct, the departure from the Lagrangian approach necessitates adjustments to the terminal conditions which cannot be easily explained intuitively.

Throughout the book the resources that receive the most thorough treatment are the fishery and the mine. Part Three contains chapters on a schooling fishery and search fisheries, and Part Four chapters on variable extraction costs and taxation. For both resources the analysis is conducted first without and then with stock effects in the costs of resource exploitation. Frequent use is made of innovative four-quadrant diagrams.

As Neher points out in the Preface, it has not been possible to deal with uncertainty. Nor is the book a survey of the resource literature. An important topic which could be usefully included in a later edition of the book whist still preserving the emphasis on dynamic optimisation is game theory for open access resources and pollution.

In conclusion, the singular strength of the book is in its emphasis on economics rather than mathematics to solve dynamic natural resource problems. Part One is highly recommended for teaching purposes. One's attitude towards the explanation of control theory is a matter of taste. Parts Three and Four are advanced: not all topics covered will be of general interest, but a fund of examples and exercises is provided.

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Geography and Trade, By PAUL KRUGMAN (Leuven, Belgium and MIT Press, Cambridge Massachusetts, 1991.) Pp 142, ISBN O-262-11159-4.

This rather modestly-presented and quite small book is in fact quite a phenomenon in its own right. It tells the tale of the discovery by Krugman, as a respected figure in international economics, of the spatial (regional) dimension in economics. It is the tale of his discovery of the long-established and long-recognised commonality of intellectual interest between the fields of international economics and intranational economics and how both are essentially spatial economics. In order to understand the phenomenal nature of this book, this review will summarise the contents of the book and provide some contextual comment.

Geography and Trade consists essentially of three lectures presented by Krugman at the Catholic University of Leuven in Belgium, together with some supporting appendices. The first lecture, entitled 'Centre and Periphery', begins with the statement that Krugman 'realized that I have spent my whole professional life as an international economist thinking and writing about economic geography, without being aware of it', where

he defined economic geography as 'the location of production in space'. He attempts to show that 'one of the best ways to understand how the international economy works is to start by looking at what happens *inside* nations', with particular reference to disparities in growth rates and local specisalization. He argues that international economists ignore the geographical (spatial) aspects, and that no one, apart from urban and regional economists (who are 'almost uniformly peripheral to the economics profession'), is exploiting the insights which come from looking at localisation and trade within countries. Krugman discovers that 'the most striking feature of the geography of economic activity . . . is *concentration* . . . and the pervasive influence of increasing returns', and develops a simple model of geographic concentration based on the interaction of increasing returns, transportation costs and demand.

In the second lecture, entitled 'Localization', Krugman discovers the principles of localisation economies, including the principles and advantages of labour pooling and the accompanying technological spillovers and economies. Krugman uses some rather crude analysis (Gini coefficients, three-digit classification of manufacturing industries at the state level) and discovers that many industries are highly localised. This leads to a further discovery that high technology and tradeable service industries are also exhibiting localization.

In the third lecture, entitled 'Regions and Nations', Krugman discovers that national borders are the main reason for the differences between international and intranational economics and proceeds to demonstrate this with some simplistic comparisons of levels of specialization between the U.S. regions and the countries of the EC. Some attention is then given to the implications of economic integration in a core-periphery context.

Remembering that a book which reports three lectures is necessarily more superficial and less-detailed than a more thorough text, any critique must recognise the intent of the book. Nevertheless two important points should be made.

The first point refers to the general field of spatial economics and the impressive heritage in spatial economics which exists today. This heritage, both theoretical and empirical, has addressed major topics such as regional (spatial) growth and disparities, regional income determination and interaction, spatial dispersion and form, the economics of location, spatial competition and numerous other topics which include the modelling of regional and national economies and interrelationships.

One small, but very significant part of this literature and learning has traditionally been that area termed agglomeration economies, which refers to those economies accruing at the level of the single establishment, industry and regional level, due to the concentration of economic activity. These include a wide range of internal and external agglomeration economies, economies in interindustry linkages, localisation economies and urbanization economies, which have been well-documented, empirically observed and read by students of spatial economics for many years. Krugman has recently discovered some (but not all) of these agglomera-

tion forces and has drawn them together in *Geography and Trade* in the most simplistic form, rediscovering the crashing truisms of simple location theory. That such a limited collection of basic ideas should be considered worthy of publication is a tribute to the stature in which Krugman is held in the economics profession.

The second point is really quite disturbing. If the simplistic concepts presented in *Geography and Trade* are actually *new* to the community of international economists, as Krugman believes, then appreciation of the spatial dimension in economics remains at a very low level, despite the heritage of spatial economics established over many years, and associated with a number of great names, including such as Hoover and Isard. Even if *Geography and Trade* contains little which is new to regional and urban economists, the stature of Krugman will serve to raise the general level of appreciation in the economics profession generally.

Geography and Trade has a distinct phenomenological value to all economists. It provides a classical example of a specialist in one area of economics discovering some of the elementary truisms of another area of economics and showing the excitement of discovery. Given the increasing specialisation in economics we will probably see more of these discoveries.

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Disarray in World Food Markets: A Quantitative Assessment. By ROD TYERS and KYM ANDERSON (Cambridge University Press, 1992) Pp. xxiv + 444, ISBN 0 521 35105 7.

The significance of world food markets is attested by the fact that over two billion people are directly or indirectly engaged in food and agricultural production, processing, marketing and trade. Anything upsetting or destabilising food market forces and, in particular, the dominating role of prices is of fundamental concern to these people and their industries.

In the past two decades, a number of seminal works debating disarray in world agricultural markets have appeared in the literature (see, for example, Johnson 1973, 1991; World Bank 1986). Tyers and Anderson have been significant contributors to this debate. *Disarray in World Food Markets: A Quantitative Assessment* brings together all their writings on food policy from the past decade. The book seeks to reveal their full story about world food markets; the familiar tale of government intervention enhancing chaos in markets.

The objectives of the book are to quantify the increasing extent and changing pattern of this chaos, to explain the reasons behind the adoption of distortionary policies and to measure the impact of these policies and their alternatives on world food markets. In view of the abundance of previous studies, the justification for another piece covering the same ground must be compelling. Tyers and Anderson attempt to present a case for their study by highlighting several contributions they believe the book makes.

First, the study measures the extent to which government intervention contributes to the low and unstable prices in world food markets, including the corresponding trade and welfare effects. Second, it traces the growing trends of government intervention in industrial and newly industrialised countries since the 1950s. Third, the book investigates the likely effects of policy reform in the centrally planned economies (CPEs). Fourth, it examines the political economy rationale for protectionism. Fifth, the work considers the reluctance of developing countries to support the inclusion of agriculture in the Uruguay Round and attempts to demonstrate that they may indeed benefit from liberalisation.

In my view, however, the main contribution of the book is that it provides a systematic and articulate synthesis of Tyers and Anderson's earlier works using a formal dynamic model of world food markets. On this ground alone, *Disarray in World Food Markets: A Quantitative Assessment* provides a welcome addition to the substantial body of scholarly work on modelling and quantifying distortions in world agricultural markets. The book is a well-structured piece of work with clear direction and plenty of useful graphs, figures, tables, footnotes, technical appendices and a bibliography of pertinent sources. It contains three broad sections, each consisting of three chapters.

Section One is devoted to a background discussion of food markets and their behaviour. Evidence reviewed in Chapter 1 indicates that the long-run downward trend in real international food prices and the year-to-year fluctuations in those prices have increased considerably over the past two decades, industrial countries have effectively become net exporters of food staples and developing countries net importers. That government intervention has given rise to additional distortions in food markets is supported by the growth of nominal and effective rates of protection in industrial and newly industrialised countries traced in Chapter 2. This chapter also serves to display interesting data on the increasing use of trade volume fluctuations to help stabilise domestic markets and export subsidies to dispose of surpluses. The reasons for the global growth in protection are spelled out in Chapter 3, where the costs and benefits of seeking intervention to various interest groups are canvassed. This chapter employs a positive political economy model which does not appear to have been integrated into the normative world food market model presented later in Chapter 5.

The authors devote Section Two to the economic principles of food market distortions, the model and the empirical results of some of their simulations. Chapter 4 portrays the theory underlying the model using the partial equilibrium analysis graphically and argues, quite correctly, that the direction and magnitude of the impact of various policy shocks on food markets can only be determined via a formal economic model. This task is undertaken in Chapter 5 which, together with Appendix 1, constitutes the heart of the study. The chapter lays the multi-faceted world food market model out clearly. The model is global, covering thirty countries and country groups and incorporating the cross-effects in production and consumption among seven commodity groups comprising wheat, coarse

grains, rice, ruminant and non-ruminant meats, dairy products and sugar, which according to Tyers and Anderson, make up to half the value of world food trade. The model has a dynamic mode and a stochastic production component for each country. In addition, both stockholding behaviour and policy are endogenous allowing price transmission equations to be used to incorporate the two central features of each country's food price policies; the protection component and the stabilisation component. The model has the capacity to estimate the price and quantity impact of various policy changes in world food markets and their corresponding welfare effects. Most of the estimates of rising costs and distributional consequences of current food policies are reported and discussed in Chapter 6.

The final section of the book, Section Three, looks at policy reform in OECD and CPE food markets prior to summarising policy implications. Chapter 7 presents the results of simulations from the dynamic model considering partial liberalisation of OECD food markets. They indicate major benefits for both the liberalising countries and the traditional food exporting countries. The thorny issue of the impact of economic reform in the CPEs is addressed in Chapter 8 based largely on the example of China. Additional simulations in this chapter show that China's demand for food would rise if this country moved toward a more open economy yielding higher international food prices. Chapter 9 summarises the key findings of the study and analyses their policy implications for the three groups of countries. In this final chapter, Tyers and Anderson reiterate their call for liberalisation. While supporting this cause in principle, I wish to reflect upon a number of their points and arguments which I believe are rather loosely stated and appear to be inconsistent with the theory and practice of international trade. My comments are not meant to question the significance of the study, but to stimulate further thinking on some of the more controversial issues.

The study seems to somewhat overstate the importance of liberalisation as the exclusive policy to achieve trade expansion. As evidenced by the recent experience in Japan and East Asian newly industrialised countries, agricultural trade can substantially expand via income growth even in the presence of high nominal and effective rates of protection noted by the authors (Chapter 3). I suspect that the same argument may also apply to China in light of the high rates of GDP growth recently experienced in that country. This observation underlines a central weakness of the partial equilibrium approach used in the study as it cannot capture significant gains in trade which often are associated not with agricultural growth, but with growth in other sectors.

Using the results of their simulations, Tyers and Anderson suggest that developing countries 'would benefit economically from such reforms: international food prices would fluctuate less, and many developing countries would have opportunities to expand net foreign exchange earnings. Such opportunities would be even greater if those countries spend more on agricultural research, since investments in such research currently have a very high payoff (a payoff which would be enhanced by

higher international food prices)' (p.309). This is a rather optimistic assessment of the socio-economic environment in which developing countries are operating. Of the numerous problems they are facing, I will dwell on only two.

One is the central issue of supply rigidities working against the expansion of food export earnings, the most important being the structural rigidities of many production systems in developing countries. These include inelastic supply, small subsistence farmers, property rights, credit markets, rural-urban migration, limited resources, poor climate, soil erosion, antiquated rural institutions, social and economic structures and non-productive patterns of land tenure. Whatever the levels of international food prices, little export expansion can be expected when these influences mitigate positive supply responses from risk-averse farmers. More fundamentally, adoption of the world price standard can have serious consequences for trade policy and the overall development process. Investment choices based on free trade principles are likely to result in sectoral fragmentation and lopsided development. However, regardless of the outcome, what is urgently needed in these countries is not investments in 'agricultural research' but massive investments aimed at eliminating structural supply rigidities.

The other is the vexed and urgent issue of poverty in developing countries. There are currently over one billion hungry and undernourished people living in the world. I find it quite perplexing to appreciate how higher (albeit less fluctuating) international food prices can help these people and their governments in their quest for food. The provision of basic food in some of these countries is already at such low and parlous levels that any attempts to cut them further invite social disaster. More generally, the prescription of the kind of liberalisation advocated by Tyers and Anderson runs counter to development strategies that place a high premium on the fulfilment of basic human needs. The raising of food prices, while desirable on efficiency grounds, tends to be cost inflationary, and heightens the degree of hardship that has to be borne by consumers augmenting the ranks of the hungry. Does liberalisation have to be this costly?

The authors suggest that both developing countries and the CPEs be given trade concessions for supporting reforms which raise the cost of their food imports (p. 309). They further suggest that food exporting countries should agree not to use food export embargoes as an economic or political weapon against these countries (p. 310). I believe that both these suggestions are simply wishful thinking and fly in the face of economic theory and historical evidence. Is it really conceivable for either of these two groups of countries to allow themselves to be at the mercy of governments of industrial countries? Aren't these countries better off playing by the rules of the marketplace and taking advantage of the current low food prices along with a host of competing subsidy packages? Would it make any economic or political sense for these countries to opt for a 'liberalised' market in which their food import prices are higher and their export prices are determined politically and may well be lower?

What Tyers and Anderson advocate is also inconsistent with the general principles of liberalisation programmes. Most liberalisation programmes lead to the curtailment of the government's role with a greater emphasis to be placed on decentralised planning through the marketplace. They are based on the assumption that, given an optimal set of prices, most economic agents will behave rationally, thereby assuring the requisite changes in terms of allocative efficiency and growth. However, the ultimate outcome of Tyers and Anderson's suggested liberalisation programme may be heavily influenced by perceptions that are formed about the government in power, such as its arbitrary or capricious behaviour, and/or its capacity for political repression. Is this what is meant by liberalisation?

Tyers and Anderson identify a couple of factors that they believe will contribute to ensuring that there is a declining tolerance of protectionism. The first is 'the increasing globalisation of firms in the manufacturing and services sectors' (p.313). It may just as well be argued that there is also the increasing integration of a very strong and growing international agribusiness lobby which will ensure that protectionism is maintained or even enhanced. These include the input, marketing services and processing industries which are greatly benefiting from the current support programs. The agricultural landowners and the banking sector will also push for the cause of protectionism to maintain the capitalised land value. The second factor that the authors claim will help the cause of liberalisation is the '301' provisions in the US trade policy which allow retaliation against countries that restrict US export goods (p.313). As an example, Tyers and Anderson highlight the opening of the Japanese market for beef and citrus which was seemingly made possible through such a threat by the United States (p.313). While it is unclear as to whether the underlying objective of the '301' provisions is to liberalise trade or to maintain US hegemony in international markets, I believe that the authors have been rather selective and overlooked the unsuccessful cases. The most notable example is the EC market for various US export products. Of similar note is the failure of the actual US retaliation against the European Community in the international wheat market. A related issue is that of the increase in anti-dumping and countervail cases settlements in the United States which has resulted in the further politicisation of agricultural trade decisions. Do these developments exhibit a declining or growing tolerance of protectionist policies?

Finally, and most importantly, the key premise underlying the model developed by Tyers and Anderson is that prices do, and ought to, play a fundamental role in the process of allocation, distribution and development. Consistent with the conventional wisdom, their aim is to 'get prices right'. As a general proposition, while the international price standard may be useful in determining practical approximations to a set of efficiency or accounting prices, and can therefore serve as a guide to policy, it cannot be used indiscriminately. International prices are supposed to reflect the opportunity cost of traded inputs and outputs. However, most of these prices are not determined in open and free markets in which the

principles of nondomination, nonseparation and open pricing can be presumed to hold. They are more reflective of the oligopolistic control of world markets by dominant firms and/or transnational corporations. Accordingly, even under little or no government intervention, 'the law of one price' is implausible and cannot yield robust liberalisation strategies.

On the whole, however, none of these issues should detract from the substantial value of *Disarray in World Food Markets: A Quantitative Assessment* to researchers, practitioners, policy makers and others interested in food trade policy. The book provides a comprehensive and insightful account of the wide-ranging features of liberalisation and could serve as a useful source of reading for any agricultural policy course.

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References

Johnson, D. G. (1973), *World Agriculture in Disarray*, Macmillan Press, London.
Johnson, D. G. (1991), *World Agriculture in Disarray*, Second Edition, Macmillan Press, London.
World Bank (1986), *World Development Report 1986*, Oxford University Press, New York.

Legumes: The Australian Experience. By B. R. DAVIDSON and H. F. DAVIDSON (Research Studies Press, John Wiley & Sons, Brisbane) Pp. 470 Hardback, ISBN 0-860380-146-3.

LEGUMES — the Australian experience is a fascinating (to me), wide-ranging and scholarly blend of geology, biology, history, agriculture and economics. It is a product of the symbiosis between a husband and wife team, Bruce and Hilary Davidson.

It is hard to define exactly what the protean Bruce (who died in March 1994) was. I'll label him an economist, agriculturalist, historian, original thinker, enthusiast and helper. Hilary is a microbiologist who, with J. M. Vincent, did much pioneering work on rhizobia root nodule bacteria of pasture legumes from the 40s to the 70s.

To justify my claim that the text was 'a fascinating, wide ranging and scholarly blend . . .', I cite the topics dealt with; history and fossil evidence; taxonomy, climate, vegetation and early man; sources and cycling of nitrogen in Australian soils; legumes and nitrogen; early European settlement (1788-1820); the pastoral occupation (1820-1860); development of farming systems (1860-1920); Howard and subterranean clovers; the sub and super revolution; the economic environment during various phases of settlement (1899-1950); the post World War II economic environment and the part played by legumes; the 'down' side of legume use; tropical legumes; legume crops in perspective; economic limits to, and prospects for, legume cropping.

Each topic has been researched rigorously. The authors drew on a staggering 1500 or more articles and books to arrive at their explanations

and conclusions. Works from a host of disciplines are cited, from geology and geo-chemistry to paleo-botany, systematics, history and economics. This certainly frees the text from a narrow disciplinary straight-jacket! The index is massive: 24 pages. A perusal will show the breadth and depth of scholarship used to produce the text. (As a compiler of three 'she'll be right' type four page indices, I appreciate what a chore this must have been for the authors.)

Perhaps to highlight the 'one world' view of economist Bruce, the authors deal with both native and so-called immigrant legumes such as sub-clover. They claim that 'Recent legume immigrants . . . have been accompanied by other technological changes. However, there is little doubt that they have played a major part in trebling wheat production and doubling the production of wool and beef'. Australia's native legume species are mostly trees and woody shrubs. There are fewer than 2000, of which more than 800 are acacias (e.g. wattle, mulga, blackwood). Few native grazing species of economic importance exist.

The sub-title of the text is *The botany, ecology and agriculture of indigenous and immigrant legumes*. I would have added after the word 'agriculture' the words 'and economic impact'. Even though that would make the title a mouthful, the book does embrace that aspect too. The economic impact of immigrant legumes (clovers, medics) has been little less than incredible, and all in about 100 years.

'Tommy' Bent, a populist premier of Victoria, once said: 'Every time I see a dairy cow, I dips me lid to her'. In the same vein, we should 'dip our lids' to the sub-clover plant. Also to the authors for giving us such a clearly written, readable read, laced with a woods not trees vision of how things came to be as they are.

Who would gain from reading the book?

- It should be strongly recommended and readily available to fourth year students of agriculture; agricultural and resource economics; natural resources; and botany.
- Older professionals in a number of related disciplines would enjoy it. They would have had training in, and a feel for, the biology which underpins the development of Australian agriculture. Many such people have, of necessity, had to stick within the confines of their discipline. This book would give them one chance to 'think big'.
- Agricultural economists who haven't been exposed much to the 'agricultural' bit of their professed title.

Finally, to break with some reviewing tradition, I did actually read and understand the book. I could find nothing to nit-pick.

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