BOOK REVIEWS

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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More People, Less Erosion: Environmental Recovery in Kenya. By MARY TIFFIN, MICHAEL MORTIMORE and FRANCIS GICHUHI. (Wiley, Chichester, 1993.) Pp. xii + 311, ISBN 0-471-94143-3.

I fear that this is a book that will be purchased, but not read. It will be one of those pieces of the literature that development economists think they understand because it is well known. In fact, this is a controversial book that cannot be read at a superficial level. A couple of thorough readings are needed for the full implications of the authors' arguments to be comprehended.

The book has the two main objectives of reporting on a detailed longitudinal case study in a particular location and, based on this, developing a theoretical framework for analysing the impact of population pressure on land degradation in semi-arid areas of the less developed world. Hence, the title can be interpreted either descriptively or prescriptively. As a description it is saying that the history of Machakos is one in which there has been population growth combined with less erosion. Much more contentious is the prescriptive interpretation that suggests that there should be less concern than there has been in the past, in environmentally fragile regions, about the impact of population growth. Indeed there is a great risk that the title could convey the message that further population growth is a benefit.

Contained in the introductory chapter and forming the impetus for the study is some photographic evidence that examines the landscape at particular sites in Machakos over a period from the 1930s to the present day. Over a period in which population has more than quadrupled, the land appears from the photographic record to have become less susceptible to erosion (even allowing for the fact that the softer tones of modern photography bias the evidence in favour of this outcome).

The main purpose of the work is set out in chapter 2. It is to challenge the orthodox view that population growth in rural Africa leads to a vicious circle that results in pressure on poor agricultural land, fewer trees and general environmental degradation. The mechanism by which the circle is supposedly broken is through population growth combining with market opportunities to stimulate innovation and investment in agricultural production. While this mechanism is undoubtedly important, perhaps crucially important, there are other factors at work and the selective manner in which the evidence on occasions is presented tends to discredit their position and leave the authors open to a charge of biased reporting.

The statistical evidence (chapter 4) clearly shows the rapid increase in population in Machakos over the 60-year period under investigation. The statistical evidence, partly because of its nature, is less clear on changes in the extent of erosion (chapter 7). Apparently in response to this uncertainty in the soil-loss and soil fertility statistics, other circumstantial evidence is also presented including: changes over time in crop and livestock production in chapter 6, to give an impression of the sustainability of the agricultural production system as it progressively has become more settled; a limited analysis of changes in vegetation in chapter 8; and a description of the expansion of soil conservation in chapter 11, water conservation in chapter 12 and tree management in chapter 13. Each of these is a useful examination of the area being considered. Collectively, these chapters leave the reader with the strong impression that there have been significant attempts at environmental improvement, and, indeed, that some improvement has taken place. However, the extent of the remaining erosion problem is not clear, the reason for any improvement is not as certain as the authors claim, the food production system is probably not as robust as is claimed by the authors and the replicability of the results to other regions is questionable. Each of these issues is considered sequentially below.

With respect to the remaining erosion problem, it would be possible to give many examples of sites in Machakos where gullies even on crop land are still being formed without any attempt to control the problem. In the penultimate chapter, it is claimed that (p. 263) 'Chapter 7 has shown that soil erosion has been eliminated on much cultivated land, and greatly reduced on others, and that there are beginning to be signs of improvement on grazing lands'. However a careful reading of chapter 7 reveals (a) that there is no firm evidence of a reduction in soil loss, but that there is a belief that soil loss on arable land has been reduced because of the conservation measures taken, and (b) that soil loss on grazing land is continuing, but with some hope for optimism because of land registration and a reduction in communal grazing. Hence the evidence presented neither confirms nor denies the strong conclusions reached by the authors and overstating their case in this manner leads to a reduction in credibility. The results would have been accepted more readily if the conclusions had been stated in a more tentative manner.

Turning to the reasons for environmental improvement, the emphasis throughout the book is first on population growth and second on market opportunities stimulating innovation and investment. While there is undoubtedly truth in this argument, the lack of emphasis given to the market opportunities, especially for labour off-farm and for management of small business, raises some doubts. Indeed the special off-farm circumstances in Machakos mean that a more reasonable description of the situation is one in which the resource base has been stabilised more by remittances of off-farm earnings and retirement income of civil servants than innovation induced by population growth. Indeed, as shown by Ockwell *et al.* (1991) adoption of new practices in semi-arid eastern Kenya has not been widespread, except where farm families have a reasonable level of outside income.

By stating that (p. 96) 'On a per head basis, the value of staple food production has kept pace with population growth' and that (p.263) 'food output [is] tracking population growth' provides an unwarranted mood of optimism with respect to the robustness of the food production system in Machakos. Indeed in their detailed analysis (p.84 and Figures 6.4 and 6.5) the authors present a more balanced view in which in normal years food production at about 200kg/head is just keeping pace with population growth and not moving ahead of it, while in drought years food imports can become significant. The importance of variability in both food and non-food crop production could have been given more prominence in the text.

Realising that the study would be criticised on grounds of difficulty of generalising to other regions, the authors present a spirited defence in the final chapter of their choice of Machakos for their case study, arguing for a number of reasons that the results have wider applicability to other semi-arid regions of Africa. This is an issue on which current research in Uganda by the Overseas Development Institute will shed more light.

In conclusion, this book is only partly successful in its first aim of presenting a detailed case study and it fails in developing a new theoretical framework linking population pressure to land degradation. While there are some omissions, such as an analysis of the impacts of structural change on equity and the provision of more complete soil-loss information, the case-study aspects are workmanlike. Even if one disagrees with some of the emphasis given, it is still a book that should be read by those concerned about the impacts of rural development on semi-arid environments. The book does not present a new theory but is rather a special case of the conceptual framework developed by Bilsborrow (1987) in which economic responses to population growth are highlighted relative to demographic responses.

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Sustainable Agriculture, By the STANDING COMMITTEE ON AGRICULTURE, Report of the Working Group on Sustainable Agriculture, SCA Technical Report Series-No. 36 (CSIRO, Melbourne) Pp 118 Softback ISBN 0-643-05226-7

Sustainability is crucial to the maintenance of Australia's farm assets and to the long term viability of the farm sector — according to the authors of this report. The essential feature of sustainable development is its recognition that economic management can improve the environment and that an improved environment can enhance the performance of the economy — again according to the authors.

The objectives of this report were to address a set of policy questions posed by the Federal Minister for Primary Industries and Energy. The questions included the following general issues:

(1) What are the barriers to the adoption of known, economically viable, environmentally sound practices?

(2) What market mechanisms can be introduced or strengthened to encourage sustainability?

The Group was also asked to address specific issues including targets for land degradation, optimal stocking rates, interaction between drought policies and sustainability, the role of regulations for water management and the optimal use of chemicals.

The first chapter of the report covers the full brief for the group: the approach, the relationship between ecologically sustainable development and agriculture and the relevance of the report. Chapter 2 defines sustainable agriculture, advocates principles to achieve it and reviews the state of knowledge in Australia. In an attempt to assess specific problems, resource management issues such as land degradation, use of chemicals, pests and biodiversity are reviewed in Chapter 3. Existing policies, the failure of existing markets and potential policies to promote sustainability are discussed in Chapter 4. The final Chapter 5 discusses how to improve the agricultural resource base and identifies policies for sustainable agriculture.

The report offers 47 recommendations for maintaining the resource base, including pricing mechanisms, property rights, regulations and incentives, institutional arrangements, extension, education, training, research, and information. The executive summary, and indeed the whole book, is concise, well presented and highly readable.

The concept of sustainability is inherently confusing. For example, what is to be sustained? Should the economic welfare of the community as a whole, or the productivity of individual paddocks, be sustained? The Working Group attempts to remove this confusion with its own definition. Sustainable agriculture is the use of farming practices which maintain or enhance the economic viability of agricultural production, the natural resource base and other ecosystems which are influenced by agricultural activities. This definition usefully recognises the separate roles, and the joint contribution, of ecology and economics.

The discussion of policies in Chapter 4 starts well, but then resorts to (or inadvertently makes) some sweeping assumptions. An important issue in the policy framework and in the response of governments, the report argues, is whether or not markets are working effectively. To be effective, the prices of goods, services and inputs must reflect the full costs and benefits of production and consumption. An important condition for achieving sustainability, the report continues, is that all indirect costs, all environmental costs and all cash costs are accounted for in these prices. The inclusion of all these costs is a prerequisite for economic efficiency but efficiency cannot be assumed to lead to a sustained land use.

The combination of market logic, and argument to promote sustainability, permeates the report irrespective of whether the two are complementary. For example, the Working Group identified further microeconomic reform (particularly with respect to transport and the waterfront) as consistent with the objective of promoting sustainable agriculture. When considering farm costs, they say, resources should be allocated to the most profitable and sustainable production opportunities. Contrary to their assumption, the most profitable opportunities are not necessarily the most sustainable.

The book seems to ignore the over-riding economic issues — do the benefits of sustained production exceed the costs of time, money and effort needed to achieve them? Equally importantly, do today's landholders have to make investments which benefit tomorrow's community? Conversion to sustained use, in the long-term sense of this report, will sometimes be uneconomic to land-holder and to the community. Conversion will sometimes re-distribute income away from today's land-holders and away from low-income land holders.

Despite these economic concerns, the report provides a useful coverage of current technical knowledge. For example, a three-page table summarises practices which contribute to, and practices which ameliorate, problems like the decline in soil nutrients and the decline in soil structure. The Group developed a set of agro-ecological regions for Australia as aggregates of Local Government Areas in terms of common agricultural practices, homogenous climate and homogenous topography. These regions will prove helpful to the discussion and analysis of agricultural problems.

The Minister received comprehensive answers to his questions. This short, well-written book covers sustainable agriculture more concisely, and with less rhetoric, than most other treatises in the area. That, and the 47 recommendations, make this report a useful contribution to the debate on sustainability .

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Food and Agriculture in a Market Economy. By MICHAEL TRACY (1993). (Agricultural Policy Studies, Belgium.) Pp. 286, ISBN 2-9600047-0-1.

With the transition from centrally planned economies to more market orientated systems, the countries of Central and Eastern Europe face choices in the way their agriculture systems continue to develop. It is the agricultural reform options facing these economies that Tracy addresses in *Food and Agriculture in a Market Economy.* While there is agreement among these countries that economic reform is needed, there is still considerable debate about the pace of reform implementation, the role that market forces will be allowed to play in resource allocation and the level of government intervention in the economy. The pressures for land reform and the cost-price squeeze faced by farmers in these former planned economies makes agriculture a key sector in the debate. An important issue in the reform debate is that of agricultural protection. Should these countries protect their agriculture sectors, or would the adoption of free trade principles be a better way to increase the living standards of the population and increase economic efficiency?

The adoption of free market principles in the former centrally planned economies is certainly a difficult process and is resulting in major economic upheaval. Exposure to international competition is placing great adjustment pressures on industries, especially agriculture and, as a result, pressure is mounting to maintain/introduce protection of this sector. One of the major influences which will continue to underpin the reform process in agriculture is the potential for membership of the European Union, formerly the European Community. Already Hungary, Poland and the Czech Republic have indicated that they will be applying for membership. Other countries in this group view membership of the European Community as one of their medium term goals. But integration is not an automatic process. Further substantial reform is necessary before these countries are ready for integration.

It is the alternatives that are available for the agricultural development of the former planned economies of Eastern Europe, and reform of agriculture in general, that Tracy describes in his latest book *Food and Agriculture in a Market Economy*. Most of the book aims to supply the information and tools necessary to understand the economics of reform and gives an objective view on the choice between free market or protection in agriculture. This is done using a mix of introductory economic analysis and economic policy experience from Western market economies, particularly the European Community.

Since Tracy takes into account the economic theory backgrounds of readers in the Central and Eastern European countries no prior knowledge of neoclassical economic theory is assumed. Part A contains fundamentals on the theory of supply, consumption and demand, price determination and international trade. Theory is well supplemented by examples from the European Community including a detailed description of agribusiness in the European Community in terms of market structure and possible market failure. Part A ends with a description of the problems in agriculture, particularly in the European Community, which have led governments and policy makers to provide income support to agricultural producers. These include falling agricultural prices, small farm size, low income elasticity of demand for agricultural products, underemployment in agriculture and price instability.

Part B explains how and why, when it comes to agricultural policy, many Western market economies have departed from the economic principles described in Part A and how these countries have encountered serious financial and economic problems as a result. Detailed description of the Common Agricultural Policy (CAP) of the European Community shows how once established, support and protection are difficult to remove. Agricultural policy experience is also drawn from the United States, Canada, Australia, New Zealand and Japan. Included in part B is a discussion on the political influence of lobby groups on the decisions of policy makers who protect agriculture and details the evolution of the complex agricultural policies of the European Community and the United States.

Tracy gives a good account of the evolution of the CAP, how it effects individual commodities and the decision making process of the European Community. The agricultural policies of the European Community receive most attention in Part B although US farm policies are also outlined in some detail. Tracy shows clearly how the aim of stabilisation of farm incomes has become confused with farm income support in the major market economies.

The theory and experience described in the previous two sections are drawn together in Part C. Tracy suggests countries from Cental and Eastern Europe can learn from US and EC experience with issues such as farm tenure, market prices, trade and agribusiness. The expected path to economic reform is also outlined although the author suggests that the problems of the Central and Eastern European countries is unparalleled, there is little experience in the market economies that can be drawn upon simply.

Tracy stresses the importance of the operation of market signals throughout the book and even more importantly, he gives solid evidence of the distortion in production and prices that result when the market is not allowed to operate freely. Western market economists will be familiar with the notion that 'so long as market forces are permitted to operate in a competitive economy, the profit motive will bring about the result that the theory anticipates'.

Readers will find one of the most useful aspects of the book to be the references at the end of each chapter. References are used to expand the text and indicate some of the most recent references on agricultural trade issues as well as more advanced texts on economic theory and various foreign language texts of relevance.

While the whole book should be extremely useful and well worth reading for audiences from Central and Eastern Europe where major restructuring of large collective farms is occurring, it will be the second half of the book, which deals with policies of Western market economies, that will be most useful for those readers familiar with basic economic theory.

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Krugman, Paul (1991), *Geography and Trade,* Leuven University Press. (Leuven, Belgium and MIT Press, Cambridge Massachusetts.) Pp 142, ISBN 0-262-11159-4.

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 specialization. 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 agglomeration 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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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 (e.g. '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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Agricultural and Environmental Resource Economics. By GERALD A. CARLSON, DAVID ZILBERMAN and JOHN A. MIRANOWSKI (eds) (Oxford University Press, New York, 1993.) Pp. ix + 528, ISBN 0-19-507651-6.

This book is the work of the Consortium for Crop Production Systems, a group of fourteen economists based in the USA. While each has made an authored contribution to the publication the editors claim, I think legitimately, that this book fits into the category of an agricultural economics textbook rather than a collection of readings on the subject. *Agricultural and Environmental Economics* provides an impressive integrated analysis of environmental and resource issues in the context of agricultural production systems. It differs from most other resource economics texts in that it focuses solely on agriculture. This means there is almost no discussion of industrial pollution, fisheries management, forestry production or mining.

The chapters are ordered in a conventional way with the basic theoretical models and analytical tools being outlined in the first four chapters.

The following five chapters deal with specific issues relevant to the interaction between agricultural production and environmental concerns. The broad areas covered are productivity growth and environmental quality, externalities from production, pesticide and pest management issues, water quality and land economics. The remaining two chapters address the issue of agricultural policy and its impact on the environment.

The chapters dealing with specific issues have been authored by researchers who have had considerable experience in the areas covered. The approach within these chapters is generally to analyse the issue using clearly specified models highlighting relevant empirical studies. In most cases the chapters also include a detailed discussion of possible directions for future research in the area.

The chapter on productivity growth (authored by John Antle and Tom McGukin) is well worth focusing on as it is a good example of an extension of empirical analysis of agricultural issues to explicitly include the environment. The conceptual underpinnings of the study of productivity growth and technological change are outlined together with a concise review of alternative empirical approaches to measurement. Antle and McGukin then proceed to use a simple conceptual production model to show how explicit consideration of the environmental impact of agricultural growth can provide a markedly different policy picture. Importantly, in this case there is no empirical example of the suggested approach. This is not surprising given the data requirements of this type of analysis.

While it is clearly a matter of balance, I suspect that this, and some other chapters of the book, would be improved if more attention had been given to the data problems involved in applying some of the innovative ideas that are discussed. This lack of attention to the inherent data problems is not restricted to the one chapter and is all the more surprising given the heavy emphasis in the text on empirical analysis. The environmental implications of agricultural production are generally associated with non-point problems. This means that measurement at any level, including the individual farm unit, is very difficult. The lack of data on factors such as the sources and extent of externalities results in particular policy problems which are given little space in this book.

The chapter by John Miranowski and Mark Cochran on the economics of land makes interesting reading for an Australian because it is an area of agricultural economics that has received relatively little attention from Australian researchers. Miranowski and Cochran emphasise the need to understand how and why individual producers invest in land and how efficient the market for land is.

Any book that deals with the quantitative analysis of resource issues places some mathematical demands on readers. In this case, the demands are not onerous. Although readers who have limited skills in quantitative economics or mathematics will find some sections in some chapters hard going, there has obviously been a conscious editorial decision to analyse issues using analytical tools most senior undergraduate students would be familiar with.

Overall, *Agricultural and Environmental Economics* is an interesting, and in parts, innovative book. Its emphasis on agriculture makes it a valuable reference source for agricultural economists but will probably limit its use in teaching in agricultural economics programs.

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