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Book reviews

The Economic and Environmental Impacts of Agbiotech: A Global Perspective, edited by Nicholas Kalaitzandonakes. Published by Kluwer Academic/Plenum Publishers, New York, USA, 2003, pp. xii + 336, ISBN 0 30647 501 4 (hdbk), $US144.95.

Since the introduction of bioengineered crops in the mid-1990s there has been widespread adoption by farmers of these, at times highly contentious, technologies. This has led to important questions such as: what are the key factors driving the adoption of the technologies; what are the economic and environmental impacts; and how are the benefits distributed? This book, edited by Nicholas Kalaitzandonakes, is an attempt by a global panel of authors to address these issues.

The book is organised into 16 chapters and focuses on insect resistant (IR) and herbicide tolerant (HT) crops, the first generation agrobiotechnologies that are now in the commercial stage of their life cycle. Economists do not appear to be the primary audience of this book, but rather anyone interested in this topic, particularly policy makers and regulators.

In Chapter 1, Kalaitzandonakes introduces the economic and environmental impacts of agrobiotechnology. Interestingly, agrobiotechnology is not defined as it is assumed that readers have a sufficient background in the topic to have an understanding of what is meant by the term. Rather, agrobiotechnology is described as an evolving process starting with the discovery of gene transfer and cell fusion in the early 1970s. The main impacts of agrobiotechnology are categorised into production, environmental and economic. These are themes that are constantly revisited in the various chapters.

The impact of agrobiotechnologies on the conventional agrochemical market is discussed by McDougall and Phillips in Chapter 2. The agrochemical sector includes all herbicides, insecticides, fungicides and plant growth regulators. It is argued that the main impact of agrobiotechnology has come from the introduction of transgenic crop varieties possessing herbicide tolerances and/or insect resistance. The main commercial impact has been in the herbicide sector, with a change in the market dynamics occurring as selective herbicides lose market share to non-selective herbicides.

Carpenter and Gianessi (Chapter 3) consider the trends in pesticide use since the introduction of genetically engineered crops. This discussion is largely focused on pest control options for corn, cotton and soybeans in the USA. They conclude that pesticide use patterns have been affected dramatically by the introduction of genetically engineered crops. Cotton insecticide use has reduced substantially, with more modest reductions in corn and soybeans. Carpenter and Gianessi also note the need to consider the relative toxicity of the herbicides being substituted and not just the volumes. They use the case study of the more environmentally benign herbicide glyphosate replacing the use of other herbicides in soybeans and cotton.

The following 13 chapters present case studies of agrobiotechnologies in various countries. These include the economic and environmental impacts of herbicide tolerant and insect resistant crops in the USA (Chapter 4); the environmental effects of glyphosate resistant soybeans in the USA (Chapter 5); the adoption of cotton biotechnology in the USA (Chapter 6); the economic impact of herbicide tolerant canola in Canada (Chapter 7); the deployment and impact of transgenic Bt cotton in Australia (Chapter 8); transgenic crops in Spain (Chapter 9); trangenic cotton in Mexico (Chapter 10); the adoption of herbicide tolerant soybeans in Argentina (Chapter 11); the impact of Bt cotton in China (Chapter 12); and the impact of agricultural biotechnology in South Africa (Chapter 13).

Of these contributions, the chapter by Fitt, which traces the development of Bt cotton, has the most relevance to Australian readers. Another feature of all these chapters is the relatively simplistic manner in which economic impacts of agrobiotechnology are assessed. Only Penna and Lema (Chapter 11) and Pray and Huang (Chapter 12) attempt formal economic analyses. Penna and Lema use simple gross margin analysis combined with stochastic dominance to compare differences in conventional and herbicide tolerant soybean strategies, while Pray and Huang present an economic surplus model for measuring the impact of Bt cotton. Kirsten and Gouse (Chapter 13) present the gross margin difference between Bt and non-Bt cotton.

I believe the most valuable contributions come from the final 3 chapters of the book. The farm-level impact studies used in the case-study chapters are biased estimates of the economic gains from agrobiotechnologies as they do not account for welfare effects or potential variations from agricultural product prices. There can be input and output substitution effects across industries as well as welfare implications from those in an industry who lose and gain from adoption of a technology. In Chapter 14, Frisvold and Tronstad present a mathematical programming model for measuring the welfare effects of Bt cotton adoption. Their discussion has relevance to not only the issue of agrobiotechnology, but provides a useful framework for evaluating the adoption of any new technology. Lemarie and Marette (Chapter 15) present an economic surplus model that specifically considers the relevance of the competition and substitutability between conventional pesticides and genetically modified seeds on size and the distribution of innovation impacts.

In the final chapter, Kalaitzandonakes attempts the difficult challenge of bringing together the diversity of views and issues introduced by the various authors. He does this by considering some key themes that emerged. The key impacts of agrobiotechnology were identified as production, environmental and economic. Direct production impacts were identified as involving substitution of the new products for synthetic pesticides, as well as reductions of production risks and associated output losses. Indirect production impacts were identified as involving shifts in agronomic practices and cropping systems. These impacts have measurable economic implications. Environmental impacts revolve around the suggestion that, because IR and HT technologies lead to reductions in pesticide use, by implication, they should result in lower pesticide runoff into local watersheds. Also, as HT is often associated with minimum tillage, by implication, there should be less soil erosion and water runoff, and reduced surface and groundwater contamination. Kalaitzandonakes concludes that, 'many of the key

economic and environmental impacts of IR and HT technologies remain unmeasured, begging for methodological advances that will permit more complete appraisals'.

One disappointment I had with the book was that no contributor took the opportunity to develop any arguments to counter the moral and environmental concerns raised by various groups who are opposed to agrobiotechnology.

This is a difficult book to read from cover to cover, and is best used as a source of reference material as not all chapters are relevant to all readers. The book is a wealth of statistics, data and knowledge by respected professionals on agrobiotechnology. One problem may be that the value of the information will diminish with time as the statistics become dated. *The Economic and Environmental Impacts of Agbiotech: A Global Perspective* is a valuable reference book to all researchers, regulators and policy makers with an interest in agrobiotechnology.

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Comparative Environmental Economic Assessment, edited by Raymond J.G.M. Florax, Peter Nijkamp and Kenneth G. Willis. Published by Edward Elgar, Cheltenham, UK, 2002, pp. xxi + 362, ISBN 1 84064 260 2 (hdbk).

This book presents a collection of papers about environmental valuation presented at a workshop held in Amsterdam in 1998 and is, therefore, a representation of ideas around a common theme rather than a comprehensive coverage of the theme. Some of the presentations will be of more interest than others, depending on the background and interest of the reader, but there is something for everyone interested in either meta-analysis and/or the broader issue of value transfer.

Value transfer has been applied for many years, but had not been open to scholarly review until a special issue of the journal *Water Resources Research* was devoted to the topic in 1992. It occurs when the estimates of environmental valuation from one case study are applied to another, similar situation. This book provides a more recent update on the subject, with a particular focus on the use of meta-analysis.

The editors describe meta-analysis as:

> a systematic framework that synthesizes and compares past studies, and extends and re-examines the results of available data to produce more general results than earlier attempts have been able to do, by focusing on a joint kernel of previously undertaken research. (p. 7)

Meta-analysis has obvious potential as a cost effective tool in value transfer. However, a variety of studies have been conducted to evaluate the validity of benefit transfer, and wide disparities have been found between estimated values and transferred values. The main difficulty appears to be in obtaining this 'joint kernel', particularly as initial valuation studies were not designed with benefit transfer in mind.

The use of value transfer will become more robust as applications and issues are presented and discussed in the published literature. This book makes an important contribution by presenting a range of contributions and opinions.

The book is ordered in three parts. In Part I (Chapters 2–6), relevant issues in the role and applicability of meta-analysis and value transfer are examined. Chapters 2 and 3 are academic presentations: the former (Heijungs) involves a more unusual contribution from a physicist and in the latter (Bal and Nijkamp) the underlying assumption of *ceteris paribus* is discussed. In Chapter 4, Kremers, Nijkamp and Rietveld use meta-analysis to examine transport policy analysis and suggest the use of a general equilibrium framework to overcome the lack of homogeneity in economic research. The next two chapters are targeted at a broader audience and present a more comprehensive overview of the strengths, weaknesses and preconditions for effective application of meta-analysis (Chapter 5 (Button)) and value transfer (Chapter 6 (Brouwer)). The chapter by Brouwer is very similar to his earlier article on the same topic (Brouwer 2000).

In Part II (Chapters 7–11) methodological aspects are explored. Bergand, Magnussen and Navrud (Chapter 7) and Engel (Chapter 8) examine value transfer applications and their generally unsuccessful performance. The discussion provides a useful appraisal of methodological problems and the differences that exist from study sites (from where information is collected) to policy sites (to which information is transferred), and differences between valuations, even those applying the same technique. A key focus is the different implications of using direct benefits, complete benefit function, or meta-analysis as the principal method of transferring values from one site or population to another. Two quite different methodological approaches to value transfer are suggested by Bateman, Lovett and Brainard in Chapter 9 (using GIS) and Brundson and Willis in Chapter 11 (using a Bayesian approach). The need for detailed background information about valuation assessments becomes increasingly important as the applications of value transfers continue to rise. In Chapter 10, Florax highlights how the current etiquette and restrictions associated with publishing valuation studies impede the full reporting of sufficient information.

In Part III (Chapters 12–15) four case studies are presented. In Chapter 12, Schipper, Nijkamp and Rietveld use meta-analysis to explain variations in the results of 30 hedonic pricing valuations of aircraft noise over a 30-year period. Bos and van den Bergh (Chapter 13) detail a practical cost–benefit application for a sustainable nature policy in a wetland area of the Netherlands. The assessment includes a value transfer of recreational benefits. In Chapter 14, Nijkamp, Geremia, van den Bergh and Verhoef present an overview of a large project trying to synergise international research on environmental quality in Europe and create a basis for comparative studies: an ambitious task. The study lays the foundation for comparative analysis, but the process of trying to standardise information, required for meta-analysis, provides its own challenges. In the last case study, Nijkamp and Ursem (Chapter 15) apply meta-analysis to identify the critical success factors of combined urban energy and environmental policy initiatives.

The book highlights the real need for valuation studies to be developed with the potential for benefit transfer in mind. For example, in the reporting of model outputs it will be more useful to present a range of demographic variables whether or not they are significant. The fact that a particular variable is not significant also provides useful information (Engel: Chapter 8).

Making as much information available as possible about a valuation will increase the likelihood of a robust value transfer. One practical way to provide public access to a more comprehensive range of valuation information is to allow Internet access to the original data files. Several of the authors in this edition, who provide a key focus for this book, are part of a research group at the Free University in Amsterdam, which has made data files available on the Master-point (Meta-Analysis of Spatial, Transport and Environmental Research) website (http://www.feweb.vu.nl/re/master-point/).

From the perspective of an Australian audience, while the book makes an important contribution to the published literature on value transfer, there is a lack of information on choice modelling (CM), a stated preference valuation technique that has been more commonly applied in Australia than the contingent valuation method. One of the main advantages of CM is the ability to assess preferences for multiple attributes of a particular good, which makes it highly suitable for use in value transfer. One of the problems highlighted in several of the presentations is that differences occur between the attributes of a good being valued at the study site and those of the good at the policy or transfer site. Because CM valuations are able to deconstruct valuations into values for different attributes, more specific value transfers can be made. Brouwer (Chapter 6) is the only author to mention CM and indicates that there is increased interest in the use of Choice experiments.

Finally, another point that is made by several authors is that while development will continue in the use of meta-analysis and value transfer, there will be ongoing demand for original baseline studies. There is still considerable debate about methodological and theoretical aspects of stated preference and other non-market valuations, and there will continue to be a need to improve the quality of the baseline studies as well as developing robust value transfer applications.

Overall, the strength of the book lies in the scope and breadth of issues raised by the different authors. While a key focus is on meta-analysis, the book has broad appeal to readers interested in the challenges involved in efficiently and effectively applying value transfer in impact assessment studies.

Reference

Brouwer, R. (2000). Environmental value transfer: state of the art and future prospects, *Ecological Economics* 32, 137–152.

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Rural Poverty, Risk and Development, by Marcel Fafchamps. Published by Edward Elgar, Cheltenham, UK, 2003, pp. x + 262, ISBN 184376 436 9 (hdbk), £59.95.

This book is a valuable contribution to knowledge. The content is well linked to the broad context of rural sectors in developing countries and is soundly based on robust theoretical concepts.

Risk is a prominent feature in the lives of people in rural households in developing countries, but is more pervasive and serious for them than for typical rural families in developed countries. Variations of climate tend to be more extreme, and often more severe in their impact on crop yields in the tropics than in temperate zones. Further, markets are relatively unstable, and in many cases market information is poor. Insecurity of poor families as a result of low social and economic status is important in some countries, while insecurity as a result of the vagaries of state action is important in others. Looming over these risks is the poverty of many families, meaning that the outcome of risky events can often make the difference between survival and starvation. Thus the pervasiveness of various kinds of risk being faced by rural poor households in developing countries has important implications for economic analysis.

Building upon the author's personal research in this field, the material in this book summarises recent theoretical and empirical contributions to the field. The book has seven chapters. Chapter 1 is brief, providing an outline of the relationship between rural poverty, risk and development.

Chapter 2 provides a characterisation of different risk factors in rural economies. It emphasises that despite the prevalence of high risk factors in rural poor areas, those affected lack adequate tools for risk management. In particular, a low level of assets makes it difficult for many families to absorb the adverse outcomes from risky events.

Chapter 3 deals with risk-coping strategies of the rural poor. A variety of risk coping strategies is discussed and modelled, including altering production choices (e.g. diversification), saving, liquidating assets, and risk sharing. Focusing on individuals, the author gives examples of different ways that the poor save and keep their wealth in liquid form. A range of mechanisms for risk sharing is also discussed. Finally, strategic allocation of scarce resources within the household is considered as a risk-coping strategy, although the author observes that it may involve choices with unpleasant consequences, such as malnutrition, higher mortality among children and school dropouts.

Chapter 4 considers limits to the risk-coping strategies of the rural poor. Their strategies are subject to technological, environmental and economic constraints. Commitment failure is identified as a serious limitation to the capacity of rural societies to share risk, with consequences for mutual insurance and social insurance. Formal and informal credit is considered as one way to share risk. I was particularly interested in sections of the book on the prevalence of risk-sharing networks in rural poor communities and the vulnerability of solidarity systems to risky events.

Chapter 5 covers risk and inequality. It investigates how wealth accumulation and risk sharing affect inequality over time. The investigation first begins with an assumption that marketable assets are absent, and that accumulation of wealth is not feasible. This assumption is then relaxed and, wealth accumulation and risk sharing are considered together to identify their combined effects on inequality. Trade-offs between insurance and social mobility, and between asset markets and social polarisation, are identified.

Chapter 6, which I would regard as the most interesting, is devoted to risk and development issues. It deals with matters such as nutrition and human capital, technological innovation, commercial versus subsistence orientated farming, precautionary saving and investment constraints, which are some of the mechanisms through which risk and

poverty hurt development. The author also discusses the risk-sharing and risk-taking attitudes of the poor.

Chapter 7 concludes with a list of policy suggestions for governments and the international community. For governments, recommendations are made on settlement patterns, disease prevention, savings instruments, divisible technology, and support to existing informal institutions. The latter are particularly important for developing countries. For the international community, suggestions are made for its assistance in the eradication of diseases and pests, the development of vaccines, agricultural research, and access to European and USA markets for agricultural and craft products of the rural poor.

In recent decades, the economic study of rural families in developing countries has undergone a formidable increase in scope and complexity. An array of theories now exists on household decision making, the working of rural factor markets, paths of technical change, the internal relationships of household, and prospects for the rural poor in a capitalist world economy. The economic literature also deals with aspects of risk and uncertainty pertinent to the poor rural in developing countries (for a review see e.g., Wik 1999).

However, economists concerned with the welfare and future prospect of rural communities in developing countries need to be aware of the social and political forces that surround and constrain the application of their economic analyses. Only from such awareness can the limitations of purely economic analysis be understood, naive mistakes of economic policy avoided, and fully informed debate about the goals and implementation of development policies take place.

The book is suitable for researchers, policy makers, academics and graduate students who are interested in poverty, development issues and risk analysis. Because of the substantial number of illustrative economic models it contains, the book should be useful to those both with and without strong mathematical backgrounds.

Reference

Wik, M. (1999). Coping with risk in agriculture: income and consumption smoothing strategies in LDCs, *Forum for Development Studies* 2, 329–344.

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