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## Editorial

# Increasing efficiency in production, research, markets and environmental management

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This selection of 22 of the best contributed papers, plus one plenary paper, from the XXIV IAAE Conference in Berlin is in the end a personal one, although the papers have gone through at least three and in some cases four separate reviewing processes. Altogether 131 contributed papers were presented, and many fine ones have had to be omitted from this collection. Some of these will be included in the Conference Proceedings volume, edited by George Peters, to be published by Ashgate.

One theme, which links many of the papers, is that of youth. A significant number of papers are either solo or with their supervisors by recent Ph.D. graduates. For the first time, a competition for the best contributed paper was conducted during the Berlin conference. From a three-stage blind selection process, three papers by new recruits to the agricultural economics profession emerged for final judging in a plenary presentation. The winning paper by *Rinku Murgai* is an innovative re-consideration of productivity growth in Indian agriculture before, during, and after the Green Revolution period. It is a paper which links to a theme joining many of the papers, namely, what to include and exclude when measuring research returns, productivity and efficiency change — of which more are given below.

The other two winners were (a) *Manitra Rakotoarisoa* with *Shahla Shapouri* in a paper on “Market Power and Pricing of Commodities from Developing Countries: The Case of U.S. Vanilla Bean Imports”, and (b) *Tancredè Voituriez* with a paper on “What Explains Price Volatility Changes in Commodity Markets? Answers from the World Palm Oil Market”.

These are linked to a number of other papers that deal with the analysis of market efficiency and price behaviour. Other topic areas covered in this collection are the economics of reducing insecticide use, biotechnology, and agricultural development.

The dominant theme of the papers presented here is that of the need for more careful measurement. It is all very well having elaborate theories and ways of imposing these on estimation, but if the underlying measurement procedures are incomplete or faulty, the results obtained can be misleading. This agenda is well set out in the first paper by *Julian Alston* and *Philip Pardey* concerning “Attribution and other problems in assessing the returns to agricultural R&D”. Alston and Pardey have a long history of research in this field, and have provided a wide ranging review of the measurement problems that might account for overestimation of the economic returns to research. They start out by noting that care must be taken in interpreting the internal rates of return generated by this branch of analysis, since the high rates estimated in many such studies would imply totally implausible total economic benefits from investing in R&D over the long and even medium runs. They then examine potential sources of bias due to misattribution of research costs, and identify sources of streams of improved productivity which should be costed into this form of analysis. They also review problems of attribution over time, and use a meta-analysis to assess the effects of assuming alternative functional forms and lag structures on the estimated relationship between R&D investment and the stream of benefits.

The ‘attribution’ issue is taken up in other papers. *Robert Townsend* and *Colin Thirtle* argue that failure to account for the fact that much livestock health research is needed to, in effect, simply stand still and counter the damaging effects of disease mutation, means that the benefits of livestock R&D are systematically understated. They convincingly argue this with reference to livestock research in South Africa.

Whereas most evaluations of R&D are conducted ex post, *Cesar Falconi*, *Steven Omamo*, *Guy d’Ieteren*, and *Fuad Iraqi* present an ex ante assessment of a biotechnological research programme to improve livestock resistance to Trypanosomosis in Africa. Their appraisal of the potential rate of return to investment in a specific biotechnological research approach to this problem is of high rates of return. In relation to the attribution issue raised by *Alston* and *Pardey*, this prompts the reflection that marginal returns to new applications of R&D techniques are likely to be higher than average returns which carry the costs of basic research and long lead times.

*Matin Qaim* also presents the results of an ex ante appraisal of two different biotechnological research programmes directed at sweet potatoes in East Africa. Again the estimated social returns are high. However, in this case the research is proceeding on the basis of donations of technological expertise by a private sector company, which will not itself benefit directly, financially from this research. The returns which could be captured by a private research venture are not such as to induce a private investment. The paper’s message is that for this type of research in future, which could deliver significant benefits to consumers and producers of what is a minor crop on the global scale, the public sector cannot rely on corporate altruism, but will have to invest more. In a related vein, the question of “Private R&D Investment in Agriculture: The Role of Incentives and Institutions” is taken up by *Oscar Alfranca* and *Wallace Huffman*. They present econometric analysis for seven EU countries to indicate that incentives, such as contract enforcement and stronger patent rights, lead to larger private R&D.

*Rinku Murgai* re-examines the conclusions of previous analyses, that productivity growth in the Punjab was relatively low during the Green Revolution period (1966–1974). She argues convincingly that conventional estimates of total factor productivity are biased downwards, because some of the contribution

of labour and land saving technologies is attributed to factor accumulation. That is to say, there has been measurement and attribution bias. Consequently, the conclusion reached is that productivity growth was in fact high during 1966–1974, but that, in contradiction to previous estimates, productivity has subsequently fallen.

The issue of appropriate indexation procedures in productivity measurement is also considered by *Atakelty Hailu* and *Terrence Veeman* in relation to the Canadian pulp and paper industry, where changes in environmental impact need to be considered. They compare four alternative methods of productivity measurement, and argue that the distance function approach is best suited in this case to take account of reductions in polluting emissions, and thus to eliminate underestimation of productivity growth. Another Canadian paper concerning reductions in pollutants is that of *Cher Brethour* and *Alfons Weersink*. Apparently there have been significant reductions in the amounts of high risk chemical constituents in agricultural insecticides since 1983 in Ontario. Using detailed breakdown on active constituents and estimates of willingness to pay for risk reduction, they generate social values of the reduced risks.

Valuing reductions in pesticide use is also the subject of a paper by *Leah Cuyno*, *George Norton* and *Agnes Rola*. They use a pesticide scoring system to value reductions in pesticide applications resulting from an integrated pest management scheme in the Philippines. As with the Brethour and Weersink paper, they obtain contingent valuations of a range of risks (to human health, aquatic species, insects, mammals and birds) by specific insecticides. The authors believe that their estimated annual social benefit of over \$ 30 per person may be an underestimate of the true value.

Underlying the *Alston/Pardey* review of estimates of rates of return to investment in research is a meta-analysis of the results of 292 studies. *Abdourahmane Thiam*, *Boris Bravo-Ureta* and *Teodoro Rivas* apply a similar meta-analysis to 51 estimates of technical efficiency to test whether the methodology chosen has a statistically significant impact on the estimate. Using Tobit analysis they conclude that factors such as primal versus dual approaches and the numbers of fixed and variable inputs increase average technical efficiency estimates. On the other hand, using the Cobb–Douglas functional form and

cross-sectional data is associated with lower estimates of technical efficiency. Thus, both this and the Alston/Pardey paper provide useful guidance for future research on these heavily studied subjects.

One of the themes of the Berlin Conference was ‘Innovation’, and one paper which presents a truly innovative technology is that of *Thomas Berger*. His paper summarises the application of a spatial multi-agent programming model, using what he calls a “multi-agent/cellular automata approach” to model the interaction between irrigation and structural change in a farming area of Chile. Limitations of space only permit the reader to gain a partial insight into the methodology, which combines detailed ecological GIS data with heterogeneous assumptions about the behaviour of individual farm agents. What is striking is the way in which the model endogenises land transfers and water trades, and produces a dynamic projection of structural change. It would appear to be a demanding methodology, but appears to be more flexible than other approaches to bio-economic modelling, and is one which deserves further evaluation.

Another totally different type of paper dealing with innovation is that of *Abdul Bayes*, which tells a remarkable story concerning the impact of introducing cellular mobile phones into villages in Bangladesh. The phones are provided on credit to women savers with the Grameen Bank, and this is the tale of yet one more impressive element of that institution’s work. The women owners hire out the phones to users, and derive sufficient incomes from this on average to make useful supplements to family incomes, while at the same time enhancing the position of women generally in the villages. The technological leap from no telephones in villages to cellular phones is shown to have multiple positive impacts.

*Takeshi Sakurai* and *K. Palanisami*’s paper on choice between a common form of irrigation management (by tank) and a private one (by tubewells) in Tamil Nadu is innovative for a different reason, namely, that it was the only paper presented at the conference which uses game theory. His conclusion is that producers will in effect play the “chicken game”, so that although tube wells are the most costly form of irrigation, most will invest in them, while continuing to use cheaper communally provided tank water, if others manage it.

A collection of four excellent papers deal with market and price behaviour. These include the two runners up in the best contributed paper competition. *Manitra Rakotoarisoa* and *Shahla Shapouri* consider “Market Power and Pricing of Commodities from Developing Countries: The Case of US Vanilla Bean Imports”. The vanilla bean market is dominated by the US and the EU, which import 85% of all vanilla beans world wide. The countries producing the beans are mainly small ones struggling to develop, and for some of them vanilla beans are a major export. Many of them have been advised to devalue their currencies at various times. The paper sets out to test whether this has worked fully to their advantage, in the sense of increasing the local currency price of vanilla beans exports by the percentage devaluation. The conclusion is that it has not, and that US importers have been able to take advantage of exchange rate depreciations or devaluations by using market power to force down the dollar price paid.

*Tancrede Voituriez* presents an analysis of “What Explains Price Volatility Changes in Commodity Markets? Answers from the World Palm Oil Market”, using an unusually long time series running from 1818 to 1999. He develops a simulation model of changing trading behaviour (to reflect growing shorter distance trade within Asia) and tests the ability of this to explain the actual changes in palm oil price volatility. His conclusion, contrary to what are probably normal expectations, is that the expansion of the market through the expansion of shorter distance trading has, if anything, increased price volatility.

*Eleni Gabre-Madhin*, also uses simulation methodology to assess “The Role of Intermediaries (brokers) in Enhancing Market Efficiency in the Ethiopian Grain Market”. She develops a model of how traders search to match positions both with and without brokers. Using survey data for the trading details and transaction costs of 169 wholesale grain traders and brokers, numerical analysis with GAMS is used to solve for traders’ optimal search solutions under different scenarios. The main conclusion is that the presence of brokers reduces divergence from the socially optimal strategies of the economic actors involved.

Taiwan derives all of its substantial imports of maize from the US which exposes importers to both price and exchange rate change risk. While the former can be hedged on the Chicago futures market, there is no

futures contract in the Taiwanese–US dollar exchange rate, and thus, no direct way of hedging the latter. The paper of *Kang Liu, Jerome Geaun and Li-Fen Lei* examines this problem by developing a model to simulate whether risk can be reduced by hedging in one of a number of currency futures markets or through forward contract. The conclusion is positive on this score, with the Deutsch mark–Dollar futures contract being optimal to reduce exchange rate risk.

Two papers are included which deal with food security issues in Asia. *Dina Umali-Deininger and Klaus Deininger* examine India's policies for providing emergency and subsidised staples to the poor. They argue that even with the 1997 reforms, which introduced the Targeted Public Distribution system, the problems of efficiently targeting assistance remain largely unresolved, and that the systems in place are inefficient and costly. They set out proposals for further reform, central to which is expanding the role of the private sector, and curtailing that of the public sector. For anyone lecturing on food policy issues, the paper is particularly interesting for confirming the extent to which all the traditional forms of state intervention in grain markets and distribution still operate in India.

*Carlo del Ninno and Paul Dorosh* also consider the relative roles of the private and public sectors in their paper "Averting a Food Crisis: Private Imports and Public Targeted Distribution in Bangladesh after the 1998 Flood". Through a household survey, their analysis demonstrates the relative effectiveness of a number of emergency and longer term food relief schemes to target the poor in the wake of the "flood of the century". They argue that the resultant food emergency was less severe than might have been expected because trade liberalisation between Bangladesh and India enabled the private sector to respond rapidly. This minimised the need for state agencies to manage food aid, although they did perform an important supplementary role in targeting the most vulnerable.

Issues of food safety and animal disease are currently at the top of the European agenda, and particularly so in the UK. *Tim Lloyd, Steve McCorrison, Wyn Morgan, and Anthony Rayner* consider "The Impact of Food Scares on Price Adjustment in the UK Beef Market". They apply co-integration methods to exam-

ine the impact of a "food publicity index" on monthly beef price data for the period 1990 to late 1998, at the retail, wholesale and producer levels. A major objective is to consider how the market power of the large retail suppliers interacts with negative publicity shocks. Their conclusion is that this market power results in a disproportionate amount of any price shock falling on producer prices.

In a similar vein, *Wim Verbeke and Ronald Ward* use an almost ideal demand (AIDS) model to study the impact of TV news coverage (of largely health scare problems, and hormone residues) and of advertising on the demand for fresh meat in Belgium. They conclude that price responsiveness is inelastic compared to the large impacts of television publicity, which are shown to have been particularly negative on beef and veal expenditures, with positive consequences on pork expenditure. In comparison, and given relatively little investment in it, fresh meat advertising is found to have only minor impacts.

Few papers were presented in Berlin on the EU's Common Agricultural Policy or WTO issues and only one paper on this topic area is presented in this selection. That paper is by *George Philippidis and Lionel Hubbard* on "The Economic Cost of the CAP Revisited". Their analysis is conducted by Computable General Equilibrium Analysis using the GTAP model. What is different about this analysis is a modification of standard analysis to allow for a nationally-based differentiation of food products to reflect national preferences in consumption. This is incorporated in the model by allowing imperfect competition in the non-primary sectors to permit hierarchical expression of preferences. Their results are that free trade (CAP abolition in 2005) would lead to losses in hierarchical utility through reductions in product diversity, something not allowed for in previous analyses, and would lead to only small economic welfare gains. These are estimated to be worth 0.19% of GDP for the EU-15 and 0.56% for the UK.

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